HEMPEL

Product Data Manual

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EXPLANATORY NOTES TO PRODUCT DATA SHEETS

The product data sheets comprise descriptions of the products, product data, and guidelines/recommendations for their use. The purpose is to contribute to the best possible results when using the products.

PRODUCT NAMES, QUALITY NUMBERS, AND SHADE NUMBERS.

PRODUCT NAMES:

Generally the proprietary name of a Hempel paint is a collective name denoting the group and the generic type to which it belongs, thus:

Physically drying:

HEMPATEX®	:	Chlorinated rubber, acrylic (solvent-borne)
HEMPANYL®	:	Vinyl, vinyl copolymer
HEMUCRYL®	:	Acrylic (water-borne)

Chemically curing:

HEMPALIN®	:	Alkyd, modified alkyd (oxidatively drying)
HEMPADUR®	:	Epoxy, modified epoxy (solvent-borne, solvent-free)
HEMUDUR®	:	Epoxy (water-borne)
HEMPATHANE®	:	Polyurethane (isocyanate)
GALVOSIL®	:	Zinc silicate

Note: Where a proprietary name is not used the product name is preceded by HEMPEL'S.

QUALITY NUMBERS:

Each Hempel product is identified by a 5-digit quality number. The first two digits relate to the principal function and the generic type. The third and fourth digits are serial numbers. The fifth digit identifies specific formulas with the same product, e.g. high temperature curing/low, medium temperature curing, conformity to local legislation. Therefore, the first four digits define the end-user performance, ie the dried, cured paint material. The fifth digit usually relates to the conditions of application, however, may also be used purely for logistic reasons.

First digit	**Function**
0 - - - -	Clear varnish, thinner
1 - - - -	Primer for steel and other metals
2 - - - -	Primer for non-metallic substrates
3 - - - -	Paste product, high-solids material
4 - - - -	Intermediate coating, high-build coating used with/without primer and finishing coat
5 - - - -	Finishing coat
6 - - - -	Miscellaneous
7 - - - -	Antifouling paint
8 - - - -	Miscellaneous
9 - - - -	Miscellaneous

Second digit	**Generic type**
- 0 - - -	Asphalt, pitch, bitumen, tar
- 1 - - -	Oil, oil varnish, long-oil alkyd
- 2 - - -	Medium to long-oil alkyd

- 3 - - -	Short-oil alkyd, styrenated alkyd, epoxyester, silicone alkyd, urethane alkyd	
- 4 - - -	Miscellaneous	
- 5 - - -	Reactive binder (non-oxidative), one or two-component	
- 6 - - -	Physically drying binder (solvent-borne) (other than - 0 - - -)	
- 7 - - -	Miscellaneous	
- 8 - - -	Aqueous dispersion, thinner	
- 9 - - -	Miscellaneous	
Example:	**HEMPADUR 15570:**	**1 - - - - Primer for steel** **- 5 - - - Reactive binder** **- - 57 - Serial number** **- - - - 0 (or 1) Standard formula**

SHADE NUMBERS:

Hempel paints are supplied in colours identified by a 5-digit, standard shade number as follows:

White	:	10000
Whitish, grey	:	10010-19980
Black	:	19990
Yellow, cream, buff	:	20010-29990
Blue, violet	:	30010-39990
Green	:	40010-49990
Red, orange, pink	:	50010-59990
Brown	:	60010-69990

Example:
HEMPALIN PRIMER 12050-50410: 50410 = red shade

Hempel's standard shade numbers do not directly correlate to official colour standard numbers. However, colours corresponding to specific official standard colours may be established.

Frequently used colours/shades are displayed in HEMPEL's colour cards.

The fifth digit may be used to identify specific formulas with the same shade, but a different type of pigments used, eg conformity to (local) legislation. 0 indicates a standard formulation, 6 lead-containing pigments.

Note: The shades of primers, many intermediates and antifoulings may fluctuate as a distinct shade is not important for such products.

Description:

A short description of the product with emphasis on generic type, pigmentation, principal properties, and certain limitations.

Recommended use:

The purpose(s) for which the product is designed or particularly well suited. The product may be specified for other uses in tailor-made paint systems for specific purposes.

Service temperature:

Indicates the maximum temperature that will have no immediate detrimental effect on the paint.

A service temperature constantly near the maximum will result in a shorter lifetime of the specified paint system compared to the lifetime anticipated when operating at normal temperatures. If service temperatures are often fluctuating between normal temperatures and near maximum temperatures this will result in an additional decrease in the anticipated lifetime of the paint system ("accelerated ageing").

Most paints will change appearance when exposed to high temperatures, either by a change in colour and/or by loss of gloss.

In addition most paints will become soft at high temperatures and show higher sensitivity to mechanical or chemical actions.

Exposure to warm liquids, water included, will normally only be recommended for dedicated paint systems. At high temperatures, wet service will have a more pronounced influence on lifetime compared to dry service.

When a paint system is exposed to fluctuations of temperatures wet service conditions will induce more stress to the coating system than dry service at same temperatures.

Furthermore it is of importance whether the liquid has a higher temperature than the coated steel.
A "cold wall" effect will increase the risk of blistering and thus put further limitations to the temperature resistance. Most paint systems do only tolerate a very low negative gradient of temperature under wet/immersed service conditions.

Approvals, certificates:

A list of official and semi-official certificates and approvals.

Other certificates and approvals than listed may be available from the nearest Hempel office.

Availability:

Delivery of certain products requires notice in advance for logistic reasons. This is indicated by the expression "Local availability subject to confirmation".

PHYSICAL CONSTANTS

Finish:

The appearance of the paint film after drying under optimum conditions in laboratory, given as high gloss (>90), glossy (60-90), semi-gloss (30-60), semi-flat (15-30), or flat (<15). All figures are in gloss units and according to ISO 2813:1994(E) (specular gloss, 60 degree geometry). The actual appearance will depend on the conditions during application and drying/curing.

The finish indicated in the product data sheet is according to optimal conditions (ie application and measurements under standardised laboratory conditions).

Colours/shade nos:

See SHADE NUMBERS. Certain physical constants may vary from one colour to another.

Volume solids:

The Volume Solids (VS) figure expresses in percentage the ratio:

$$\frac{\text{Dry film thickness}}{\text{Wet film thickness}}$$

The stated figure has been determined as the ratio between dry and wet film thickness of the coating applied in the indicated thickness under laboratory conditions, where no paint loss has been encountered.

For selected paints not drying too fast an alternative airless spray procedure is:

A paint is applied by airless spray in the indicated thickness to a smooth, degreased steel panel. Application and drying/curing conditions of the paint are (approx) 23°C/73°F and 50% RH. A number of wet film thickness measurements are taken immediately after application followed by a similar number of dry film thickness measurements 7 days (approx 23°C/73°F, 50% RH) after application.

Volume solids are usually slightly higher than the theoretical value, which is found by a calculation based on the paint composition taking specific gravity and solid content of each individual raw material into consideration.

Volume solids take into account that small amounts of solvents are usually retained, and that air may be entrapped in the dry paint film either in the form of vacuoles or as interstices in zinc silicates.

Volume solids are in better agreement with practical measurements of dry film thickness than the theoretical value.

For 100% solids volume products the theoretical value is indicated.
This value is not reflected in the ratio:

$$\frac{\text{Dry film thickness}}{\text{Wet film thickness}}$$

of all 100% products, due to a form of shrinkage during curing.

Theoretical spreading rate:

The theoretical spreading rate of the paint in a given dry film thickness on a completely smooth surface is calculated as follows:

$$\frac{\textit{Volume solids x 10}}{\textit{Dry film thickness (micron)}} \quad m^2/\text{litre}$$

or

$$\frac{\textit{Volume solids\% x 16.04}}{\textit{Dry film thickness (mils)}} \quad \text{sq.ft./US gallon}$$

1 mil is rounded off to 25 micron - the exact value is 25.4 micron.

In the product data sheet the Theoretical spreading rate is stated for an indicated dry film thickness (dft) that is usually specified for the product. Some products may be specified in different dry film thicknesses for different purposes affecting the spreading rate accordingly. Theoretical spreading rate cannot be given for paint materials used for saturation of an absorbing substrate, wood, concrete, etc.

The correction factors of ISO 19840 have not been taken into account in the product data sheets - if used, the actual specification must be adjusted accordingly to avoid excessive film thickness and over consumption of primers.

The Practical spreading rate is not given in the product data sheet as the variation is too great to be represented by one single figure.

Consumption factor:

The practical consumption is estimated by multiplying the theoretical consumption with a relevant Consumption Factor (CF).

The Consumption Factor depends on a number of external conditions and cannot be stated in the product data sheet as the variation is too great to be represented by one single figure.

$$\text{Practical consumption} = \frac{\textit{Area x CF}}{\textit{Theoretical spreading rate}}$$

The variation in the Consumption Factor is largely attributed to the following:

1) Waviness of paint film:

   In order to ensure the specified minimum film thickness, a manually applied paint film will unavoidably a) show some waviness of the surface and b) a thickness distribution with an average value somewhat higher than the specified dry film thickness in order to fulfil eg an 80:20 rule. This leads to a higher consumption than theoretically calculated.

2) Complexity and size/shape of the surface to be calculated:

   Complex, odd-shaped and small-sized surfaces are virtually impossible to paint without overspray and will therefore lead to higher consumption than theoretically calculated from the area square in question.

3) Surface roughness of the substrate:

   Surface roughness of the substrate gives a "dead volume" to be filled up or in the case of shopprimers a "surface area ratio" greater than one and will therefore cause a higher consumption than theoretically calculated for a smooth substrate.

4) Physical losses:
   Factors such as residues in cans, pumps and hoses, discarded paint due to exceeded pot life, wind loss, etc. will all contribute to a higher consumption.

The Practical spreading rate thus varies with method of application, skill of the painter, shape of the object to be painted, texture of the substrate, film thickness applied, and working conditions.

In any case it is not beneficial to stretch the paint as much as possible, but rather to try to obtain the specified thickness of the applied paint on the entire area.

Flash point:

The lowest temperature at which a liquid liberates sufficient vapour to form a mixture with the air near its surface which, if ignited, will make a small flash, but not catch fire.

The flash points of Hempel's paints are measured according to the Setaflash method (closed cup). For two-component products flash points are normally given for the mixed products. The figures are given as guidance with a view to local regulations for precautions against fire during use.

Adding THINNER to a paint may change the flash point of the diluted material.

Specific gravity:

The weight in kilogramme per litre at 25°C/77°F. An equivalent figure is given in lbs per US gallon.

For two-component products the specific gravity is given for the mixed product.

The specific gravity may in practice vary in an interval of a few percent compared to the theoretical value indicated in the product data sheet.

Dry to touch:

Drying time in the product data sheet is "dry to touch" unless otherwise indicated.

For shopprimers a more relevant figure for "dry to handle" is given.

Drying times refer to a temperature of 20°C/68°F, 60-70% relative humidity, with adequate ventilation.

"Dry to touch": A slight pressure with a finger does not leave a mark and the surface does not feel sticky

"Dry to handle": The paint surface is sufficiently hardened to be handled with care without coming off/being damaged.

The drying process until "dry to touch" is - for solvent (or water) containing paints - first and foremost dependent on ventilation. Furthermore it depends on the temperature and on the film thickness of each coat applied.

All surfaces should be ventilated. It should be noted that water-borne paints have higher requirements to ventilation than do solvent-borne paints.

In the case of physically drying paints, drying time is also influenced by the number of coats, the total film thickness of the system and the film thickness per coat. As a rough rule of thumb, twice the film thickness of a given single coat will require approx 4 times the drying time with the same amount of ventilation. This goes for both solvent and water-borne paints.

It should be stressed that when apply applying more coats, entrapped solvents may result in a softer film than if only one coat is applied. This is especially relevant in the case of physically drying paints.

Also temperature has much influence on the drying/curing time. A temperature drop of 10°C/18°F will roughly require twice the drying time for physically drying paints.

Fully cured:

The curing time is given for two-component products at a (steel) temperature of 20°C/68°F and provided adequate ventilation. The curing is accelerated at higher temperatures and retarded at lower temperatures. For some products the curing times at different temperatures are given as a table in the product data sheet/in the Application Instructions. For products where the curing time is given at 20°C/68°F only, the following rough rule of thumb can be utilised:

The curing time is roughly halved at an increase in temperature of 10°C/18°F, and doubled at a decrease in temperature of 10°C/18°F.

Curing will stop almost completely below the temperature stated under application conditions as the lowest temperature at which the paint should be applied.

V.O.C.:

The calculated weight of volatile organic content in gramme per litre. An equivalent figure is given in lbs per US gallon.

Alternatively, VOC can be indicated by a measured value.

Products that may be used for buildings in the European Union are covered by the EU directive 2004/42/EC. For such products additional VOC information is listed on page 2 of the product data sheet – the additional VOC information indicates the maximum level of VOC that the product can have in any colour, it indicates the maximum VOC that the product may have after adding the maximum recommended amount of thinner – and it indicates the EU limits for the product category as of 2007 and 2010.

Shelf life:

The time the product will keep in good condition when stored under cover in original, sealed containers under normal storage conditions. Shelf life is indicated only if it is one year or less at 25°C/77°F. It will decrease at higher temperatures, eg will be almost halved at 35°C/95°F.

If no specific limitation is given, a paint should not be stored for more than five years at 25°C/77°F or three years at 35°C/95°F for one-component products and three years at 25°C/77°F or two years at 35°C/95°F for two-component products from the date of production.

Long-term storage and storage at high temperatures may require careful remixing of the paint prior to application due to (slight) sediment in the can.

If storage conditions are unknown and in any other case in doubt about suitability of a paint material this can be rather easily verified by checking the following:

a. no corrosion of the inside unopened, undamaged cans

b. apparent viscosity in can: after remix, paint must not appear gelatinous or require excessive thinning prior to proper application.

c. application in specified film thickness: a uniform, closed paint film is to be demonstrated

d. drying time to be within the limit specified in the product data sheet

The date of production is indicated in the batch number:
For 7 digit batch numbers: The date of production is indicated in the first 3 digits of the batch number: The 1st digit indicates the year of production, the 2nd and 3rd digits indicate the month of production.
For 9 digit batch numbers: The date of production is indicated in 3 digits of the batch number: The 3rd digit indicates the year of production, the 4th and 5th digits indicate the month of production. The 1st and 2nd digits identify the production factory.

Storage temperature:

In order to maintain application properties as designed, paints should not be stored at temperatures above 50°C/122°F prior to application.

APPLICATION DETAILS

Mixing ratio:

Two-component, chemically curing products are supplied as BASE and CURING AGENT in the correct mixing ratio. **The mixing ratio must be strictly adhered to, also when subdividing**. As a general rule, add the CURING AGENT to the BASE 30 minutes (induction time) before use (at 20°C/68°F), unless the pot life is (very) short, and stir well. This is especially of importance when applying paints to low-temperture surfaces. In certain cases, more specific advice is given as to induction time.

It is very important for two component products that the prescribed amount of CURING AGENT is added to the BASE. In order to ensure this the indicated thinner may in most cases beneficially be used to flush the CURING AGENT can. Once the material has been mixed the curing will proceed. Therefore, only the quantity needed within the pot life of the mixture should be mixed at a time.

Application method:

Gives the possible or recommended method(s) of application. As a general rule, the first coat of a rust-preventing primer should be applied by brush or airless spray to obtain best possible wetting and penetration into the substrate.

Application by brush or roller usually demands more coats applied to achieve the specified film thickness than application by airless spray equipment.

Thinner (max.vol):

Hempel's paints are delivered in such a way, that they are ready for application at 20°C/68°F by brush or airless spray after stirring (for two-component products after mixing of BASE and CURING AGENT). This goes for a given normal application range of dry film thickness. If the paint is too thick, eg in cold weather or for special purposes eg application in lower film thickness, the THINNER(S) indicated under this heading may be added to give the required viscosity. The amount of thinner to be added, depends on prevailing temperature, spray method, etc. The usual maximum percentage is indicated for the respective application method. If more thinning is deemed necessary under special circumstances, consult nearest Hempel office.

Adding a small percentage of thinner will give no measurable difference in the film thickness. There are cases, however, when a higher degree of thinning is necessary and justified. It should then be kept in mind that adding thinner increases the quantity of liquid paint without contributing to the solids content. Consequently, a proportionally higher wet film thickness must be applied when adding any significant amount of thinner in order to obtain the specified dry film thickness.

$$\text{VS\% after thinning} = \frac{VS\% \times 100}{\%\ THINER\ added + 100}$$

Example: If 0.5 litre of THINNER is added to 20 litres of paint, then % THINNER added equals

$$\frac{0.5 \times 100}{20} = 2.5\%$$

VS% after thinning equals

$$\frac{VS\% \times 100}{102.5}$$

Note: Avoid unnecessary eg habitual thinning

Pot life:

Roughly speaking, the pot life **for solvent-borne** paints depends on the paint temperature as follows:

The pot life is halved at an increase in temperature of 10°C/18°F, and doubled at a decrease in temperature of 10°C/18°F.

For HEMPADUR products the pot life is usually shorter for application by airless spray than for brush application. This is due to the fact that the anti-sagging properties are gradually lost after expiration of the pot life indicated for airless application. Thus the high dry film thickness usually specified by airless spray application is only obtainable **within** the pot life indicated for airless application.

Note: Pot life cannot be extended by thinning.

In the case of **water-borne**, two-component epoxy products this rule of thumb will not fit. The temperature's influence on the pot life is noted in the relevant data sheets.

Nozzle orifice:

A typical nozzle orifice (or a range of nozzle orifices) is indicated.

Nozzle pressure:

A nozzle pressure generally suitable is given.

Note: Airless spray data are offered as a guidance and are subject to adjustment to suit the work at hand.

Cleaning of tools:

Normally the indicated HEMPEL THINNER can be used for cleaning of tools after use. Where special cleaning agents are recommended it is indicated on the product data sheet.

Tools used in connection with water-borne paints may be difficult to clean. Therefore, it is especially important to follow the instructions stated in the product data sheets.

Indicated film thickness, dry:

Dry film thickness (dft) is indicated in a thickness frequently used in specifications. **Note:** Several products are **specified** in different film thicknesses for different purposes Checking of dry film thicknesses is, generally, done with gauges calibrated on smooth reference steel panels. Shopprimers are controlled according to a special procedure, which is available at your Hempel sales office.

Indicated film thickness, wet:

Wet film thickness (wft) is indicated in multiple of 25 micron (1 mil) in order to facilitate the practical measurements with the wet film thickness gauge (comb gauge). These values are rounded off to the multiple of 25 which is regarded most relevant in each case.

Recoat interval:

The time required or allowed to pass at 20°C/ 68°F or the relevant temperature range for the product in question before the subsequent coat is applied. The intervals are related to the temperature, film thickness, number of coats, type of future (in service) exposure and will be affected correspondingly. For maximum intervals the temperature in this context is the highest surface temperature during the period. For some products the interval is more critical in regard to intercoat adhesion than others. If the maximum interval is exceeded it may be necessary to roughen the surface to ensure adhesion of the next coat. On the other hand, for some paint types the interval may not be critical in respect of adhesion, but a primer coat should not be left unprotected for too long in an aggressive environment.

If nothing else is mentioned the indicated intervals refer to recoating with the same paint. Other paints of different types may require other (recoating) intervals.

Minimum and any maximum intervals should always be adhered to if the paint system is to provide maximum protection.

Furthermore, beware of undesired influence of moisture and carbon dioxide on epoxy and polyurethane paints, which especially occurs at low temperatures and high humidity. This will result in a greasy surface preventing any adhesion of the subsequent coat.

After exposure of any painted surface in polluted environment thorough cleaning by high pressure fresh water hosing or another appropriate measure is always recommended before recoating. Different minimum and maximum recoating intervals are given for certain products depending on the later exposure, ie

- In atmospheric conditions mild
  medium
  severe
- In water

Details about recoat intervals are stated in the relevant painting specification.

SURFACE PREPARATION:

The recommended degree of cleaning of the surface before painting. The degrees of cleaning refer to ISO 8501-1:2007. Pictorial Surface Preparation Standards for Painting of Steel Surfaces, unless otherwise indicated.

For some products a minimum surface profile is mandatory. The profile so specified is given with reference to one or more of the roughness comparators: Rugotest No. 3, Keane-Tator Comparator, or the ISO Comparator.

For previously painted surfaces the method and degree of preparatory cleaning is generally indicated.

APPLICATION CONDITIONS:

If climatic or other limits, beyond what is dictated by normal good painting practice, apply to the use of a particular quality of paint, this is indicated under this heading. As a general rule, paint should never be applied under adverse weather conditions. Even if the weather seems fit for painting there will be condensation if the temperature of the substrate is at or below the dew point (the temperature at which the atmospheric humidity condenses, e.g. as dew). To compensate for fluctuations the temperature of the surface should be at least a few degrees above the dew point during painting and drying. 3°C/5°F is often quoted as safe.

Beware of ice on the surface at temperatures below the freezing point.

In confined spaces it may be necessary to remove solvent vapours or water vapours by providing an adequate amount of fresh air constantly during application and drying, both for reasons of safety and health, and to assist evaporation.

Keep the paint temperate (room temperature) when applying during winter. If not, the paint will require excessive thinning leading to an increased risk of sagging. Viscosity in any paint will increase if the temperature decreases.

PRECEDING COAT: Recommendations of some preceding paint(s) known to be compatible with the product. No limitation is implied. Other compatible products may be specified depending on the purpose. In this context, shopprimers are regarded an integral part of the surface preparation.

SUBSEQUENT COAT: Recommendations of some subsequent paint(s) known to be compatible with the product. No limitation is implied. Other compatible products may be specified depending on the purpose.

REMARKS: Under this heading other relevant data or information are included.

SAFETY: Under this heading **general** safety precautions when handling or working with the product are given. Packings are provided with applicable safety labels which should be observed. In addition, Material Safety Data Sheets, national or local safety regulations should always be followed.

ISSUED BY: HEMPEL A/S.- Month and year at bottom page, current formula.

Note: The product data sheets are subject to change without notice and automatically void five years from issue.

Additional notes and definitions of some expressions used in the product data sheets:

Surface cleaning*

Low pressure water cleaning (LP WC):	up to 340 bar/5000 psi
High pressure water cleaning (HP WC):	340-680 bar/5000-10.000 psi
High pressure water jetting (HP WJ):	680-1700 bar/10.000-25.000 psi
Ultrahigh pressure water jetting (UHP WJ):	above 1700 bar/25.000 psi

*As defined in "Joint Surface Preparation Standard NACE No. 5/SSPC-SP 12, 1995".

Note: Wet abrasive blasting may be performed with low or high pressure fresh water to which a relative small amount of abrasives is introduced, and in some cases inhibitors are added to prevent flash rusting (however, as a general rule it is recommended **not** to use inhibitors when cleaning areas to be immersed during service. Surplus of inhibitors may lead to osmotic blistering).

A blast primer is a paint used for short term protection of a newly blast cleaned steel surface of an assembled structure in order to ease the working procedures. In this context blast primers are often regarded an integral part of the surface preparation.

A holding primer is a paint used to prolong (hold) the protective lifetime of a shopprimer till the specified paint system proper can be applied.

To apply a **mist coat** or **flash coat** is a two step application procedure used to minimise popping when painting on a porous substrate. At first, one or two spray passes are applied very thin to expel the air from the pores. As soon as this thin coat has flashed off, the film is built up to the specified film thickness.

A **tiecoat** is a layer of paint which improves the adhesion between coatings of different generic types, eg to "bridge" between conventional and advanced coatings, or between epoxy and physically drying paints.

A **sealer coat** is a layer of paint which is used to seal off (fill the pores of) porous surfaces such as zinc silicates and empty, insoluble matrix of certain antifoulings. In this connection it prevents disturbance of the balance between binder and active pigments of the new antifouling. Furthermore, certain paints may be used as sealer coats to minimise popping of the following coat(s) when painting a porous substrate.

When a paint is mentioned to be resistant to **spillages and splashes** of certain chemicals it is understood to be limited in both area and time. The spilt chemical must be removed as soon as possible and not remain on the surface more than 1-2 days.

When stating **both metric and US figures** the US figures may be rounded off when an exact figure is of less importance.

SURFACE PREPARATION STANDARDS

Among the several existing official and unofficial standards for cleaning of steel preparatory to painting, one - viz.

The old SWEDISH STANDARDS INSTITUTION:
Surface Preparations Standards for Painting Steel Surface (SIS 055900 - 1967) has gained prominence and acceptance across the frontiers. So much so that it has served as a model for and has even been adopted direct as national standard in other countries. Its cleaning degrees Sa 2, Sa 2½, etc. being practically universally recognized, they are referred to throughout this book in recommendations for cleaning of steel.

The Swedish Standard, as it was usually called, was first to employ pictorial representations of the specified cleaning degrees. It is now superseded by INTERNATIONAL STANDARD ISO 8501-1:2007. Yet with the same photos as used by the SIS standard plus additionally four photos (flamecleaning) from the former German standard DIN 55928, Part 4, Supplement 4.

Other prominent standards, notably

STEEL STRUCTURES PAINTING COUNCIL (U.S.A.):
Surface Preparation Specifications (SSPC-SP 2, 3, 5, 6, 7, and 10)

BRITISH STANDARDS INSTITUTION; Surface Finish of Blast-cleaned steel for Painting:
(BS 4232 but now superseded by BS 7079)
and
INTERNATIONAL STANDARDIZATION ORGANIZATION ISO 12944, Parts 1 through 8:
Corrosion Protection of Steel Structures by Protective Paint Systems,

do also concern with the equipment, materials and procedures used to achieve the specified finish.

The British Standard BS 4232 used drawings to indicate the (Second and Third quality) finishes, whereas the American uses the same photos as ISO 8501-1:2007. ISO 12944 refers to ISO 8501-1:2007, but includes also descriptions for secondary surface preparation with reference to ISO 8501-2:1994.

Except for BS 4232 they all take into account the state of the raw steel surface before cleaning, and grades the result accordingly:

A: Steel surface largely covered with adherent mill scale but little, if any, rust.

B: Steel surface which has begun to rust and from which the mill scale has begun to flake.

C: Steel surface on which the mill scale has rusted away or from which it can be scraped, but with slight pitting visible under normal vision.

D: Steel surface on which the mill scale has rusted away and on which general pitting is visible under normal vision.

A surface preparation method using high pressure water for cleaning is getting more common. The best definition of terms and surface preparation standards are presented by ISO 8501-4:2006.

For comparison of the standards see the following pages. The text of the individual Standards are quoted literally.

ISO 8501-1:2007

Designation	Description
Sa 3	**Blast-cleaning to visually clean steel.** When viewed without magnification, the surface shall be free from visible oil, grease and dirt, and shall be free from mill scale, rust, paint coatings and foreign matter. It shall have a uniform metallic colour. See photographs A Sa 3, B Sa 3, C Sa 3 and D Sa 3.
Sa 2½	**Very thorough blast-cleaning.** When viewed without magnification, the surface shall be free from visible oil, grease and dirt, and from mill scale, rust, paint coatings and foreign matter. Any remaining traces of contamination shall show only as slight stains in the form of spots or stripes. See photographs A Sa 2½, B Sa 2½, C Sa 2½ and D Sa 2½.
Sa 2	**Thorough blast-cleaning.** When viewed without magnification, the surface shall be free from visible oil, grease and dirt, and from most of the mill scale, rust, paint coatings and foreign matter. Any residual contamination shall be firmly adhering (see note 2 below). See photographs B Sa 2, C Sa 2 and D Sa 2.
Sa 1	**Light blast-cleaning.** When viewed without magnification, the surface shall be free from visible oil, grease and dirt, and from poorly adhering mill scale, rust, paint coatings and foreign matter (see note 2). See photographs B Sa 1, C Sa 1 and D Sa 1. **Notes:** 1. The term "foreign matter" may include water-soluble salts and welding residues. These contaminants cannot always be completely removed from the surface by dry blast-cleaning, hand and power tool cleaning or flame cleaning; wet blast-cleaning or hydrojetting may be necessary. 2. Mill scale, rust or a paint coating is considered to be poorly adhering if it can be removed by lifting with a blunt putty knife.
St 3	**Very thorough hand and power tool cleaning.** As for St 2, but the surface shall be treated much more thoroughly to give a metallic sheen arising from the metallic substrate. See photographs B St 3, C St 3 and D St 3.
St 2	**Thorough hand and power tool cleaning.** When viewed without magnification, the surfaces shall be free from visible oil, grease and dirt, and from poorly adhering mill scale, rust, paint coatings and foreign matter (see note 2). See photographs B St 2, C St 2 and D St 2. **Notes:** 1. For descriptions of surface preparation methods by hand and power tool cleaning, including treatment prior to, and after, the hand and power tool cleaning procedure, see ISO 8504-3. 2. Preparation grade St 1 is not included as it would correspond to a surface unsuitable for painting.
BS 7079-1990	Replaces BS 4232-1967. BS 7079-1990 is identical to ISO 8501-1:2007.

SSPC

Designation		Description
SSPC-SP-5	**1.1**	A white Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter.
	1.2	ACCEPTABLE VARIATIONS IN APPEARANCE THAT DO NOT AFFECT SURFACE CLEANLINESS as defined in Section 1.1 include variations caused by type of steel, original surface condition, thickness of the steel, weld metal, mill or fabrication marks, heat treating, heat affected zones, blasting abrasive, and differences in the blast pattern.
	1.3	When painting is specified, the surface shall be roughened to a degree suitable for the specified paint system.
	1.4	Immediately prior to paint application the surface shall comply with the degree of cleaning as specified herein.
	1.5	SSPC-Vis 1-89 or other visual standards of surface preparation may be specified to supplement the written definition.
SSPC-SP-10	**2.1**	A Near-White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining as noted in Section 2.2.
	2.2	Staining shall be limited to no more than 5 per cent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied paint.
	2.3	ACCEPTABLE VARIATIONS IN APPEARANCE THAT DO NOT AFFECT SURFACE CLEANLINESS as defined in sections 2.1 and 2.2 include variations caused by type of steel, weld metal, mill or fabrication marks, heat treating, heat affected zones, blasting abrasives, and differences in the blast pattern.
	2.4	When painting is specified, the surface shall be roughened to a degree suitable for the specified paint system.
	2.5	Immediately prior to paint application, the surface shall comply with the degree of cleaning as specified herein.
	2.6	SSPC-Vis 1-89 or other visual standards of surface preparation may be specified to supplement the written definition.
SSPC-SP-6	**3.1**	A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for **staining**, as noted in Section 3.2.
	3.2	Staining shall be limited to no more than 33 per cent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discolourations caused by stains of rust, stains of mill scale, or stains of previously applied paint. Slight residues of rust and paint may also be left in the bottoms of pits if the original surface is pitted.
	3.3	**ACCEPTABLE VARIATIONS IN APPEARANCE THAT DO NOT AFFECT SURFACE CLEANLINESS** as defined in Sections 3.1 and 3.2 include variations caused by type of steel, original surface condition, thickness of the steel, weld metal, mill or fabrication marks, heat treating, heat affected zones, blasting abrasive, and differences in the blast pattern.

SSPC

Designation		Description
SSPC-SP-6, cont.	**3.4**	When painting is specified, the surface shall be roughened to a degree suitable for the specified paint system.
	3.5	Immediately prior to paint application, the surface shall comply with the degree of cleaning as specified herein.
	3.6	SSPC-Vis 1-89 or other visual standards of surface preparation may be specified to supplement the written definition.
SSPC-SP-7	**4.1**	A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Mill scale, rust, and paint are considered tightly adherent if they cannot be removed by lifting with a dull putty knife.
	4.2	The entire surface shall be subjected to the abrasive blast. The remaining mill scale, rust, or paint shall be tight.
	4.3	When painting is specified, the surface shall be roughened to a degree suitable for the specified paint system.
	4.4	Immediately prior to paint application, the surface shall comply with the degree of cleaning as specified herein.
	4.5	SSPC-Vis 1-89 or other visual standards of surface preparation may be specified to supplement the written definition.
SSPC-SP-2	**5.1**	Hand tool cleaning is a method of preparing steel surfaces by the use of non-power hand tools.
	5.2	Hand tool cleaning removes all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Mill scale, rust, and paint are considered adherent if they cannot be removed by lifting with a dull putty knife.
	5.3	SSPC-Vis 1-89 or other visual standards of surface preparation agreed upon by the contracting parties may be used to further define the surface.

ISO 12944-4 is not quoted (translated) but is fully in line with ISO 8501-1:2007 (except for the extra standards as mentioned on page 10).

Comparing the standards, no doubt that Sa 3 and SSPC-SP-5 are identical in their demands to surface cleanliness. Also Sa 2½ and SSPC-SP-10 seem identical.

Concerning Sa 2 and SSPC-SP-6 these differ slightly, SSPC-SP-6 expressing more demands to quality. SSPC-SP-6 requires remnants being stains only. Sa 2 states "residual contamination shall be firmly adhering".

Note: For SSPC the **written** specification takes preference - for ISO 8501-1:2007, the photos.

ISO 8504-1:2006

Surface preparation and cleaning of steel and other hard materials by high and ultrahigh pressure water jetting prior to paint application.

Water jetting is a relatively new method of surface preparation. The standard deals with the removal of visible and invisible contamination. After cleaning the surface will still be wet and flash rusting may occur on cleaned steel during the drying period Maintenance being the main area of use**,** any old coating remaining after water jetting must be well adhering, intact and roughened by the treatment as well as compatible with the new coating system to be applied.

As a general rule, coatings which are later to be exposed to severe mechanical and/or chemical exposures, like eg specially wear and impact resistant coatings and chemically resistant tank coatings, should not be applied to water jetted surfaces. Neither should coatings for which protection relies upon metallic contact to the steel substrate, such as zinc rich primers be applied to water jetted surfaces.

Description of the surface appearances after cleaning:

Wa 1	**Light high-pressure water jetting** When viewed without magnification, the surface shall be free from visible oil and grease, loose or defective paint, loose rust and other foreign matter. Any residual contamination shall be randomly dispersed and firmly adherent.
Wa 2	**Thorough high-pressure water jetting** When viewed without magnification, the surface shall be free from visible oil, grease and dirt and most of the rust, previous paint coatings and other foreign matter. Any residual contamination shall be randomly dispersed and can consist of firmly adherent coatings, firmly adherent foreign matter and stains of previously existent rust.
Wa 2½	**Very thorough high-pressure water jetting** When viewed without magnification, the surface shall be free from all visible rust, oil, grease, dirt, previous paint coatings and, except for slight traces, all other foreign matter. Discoloration of the surface can be present where the original coating was not intact. The grey or brown/black discoloration observed on pitted and corroded steel cannot be removed by further water jetting.

Description of the surface appearance for three flash rust grades:

L	**Light flash rust** A surface which, when viewed without magnification, exhibits small quantities of a yellow/brown rust layer through which the steel substrate can be seen. The rust (seen as a discoloration) can be evenly distributed or present in patches, but it will be tightly adherent and not easily removed by gentle wiping with a cloth.
M	**Medium flash rust** A surface which, when viewed without magnification, exhibits a layer of yellow/brown rust that obscures the original steel surface. The rust can be evenly distributed or present in patches, but it will be reasonably well adherent and it will lightly mark a cloth that is gently wiped over the surface.
H	**Heavy flash rust** A surface which, when viewed without magnification, exhibits a layer of red-yellow/brown rust that obscures the original steel surface and is loosely adherent. The rust layer can be evenly distributed or present in patches and it will readily mark a cloth that is gently wiped over the surface.

For further details, please refer to ISO 8501-4:2006.

ABRASIVE BLASTING SURFACE PROFILE

Not only inorganic zinc coatings and solventfree coatings, but most paint systems require a roughened substrate surface to obtain proper adhesion. The **surface profile** of the roughened substrates is characterized by a **surface roughness** and a **roughness profile**, which must be itemized separately in specifications for surface preparation.

During field work the anchor pattern is conveniently assessed by visual or tactile comparison, using standardized comparators. Such comparators are e.g. Rugotest No. 3, Keane-Tator Surface Profile Comparator, and ISO 8503 surface profile reference comparators.

Surface roughness:

In connection with surface preparation, roughness is defined as the irregularities in surface texture, which are caused by blastcleaning.

The roughness can be characterized by several roughness values. Most often the roughness is designated by the **maximum height of the profile** (peak-to-valley height), R_Z . Sometimes the **arithmetical mean deviation of the profile** $\mathbf{R_A}$, previously known as CLA- and AA-values (**C**entre **L**ine **A**verage and **A**rithmetical **A**verage, respectively), is used. Designations in boldface are according to ISO Standard.

Because these values may have very different numerical values assigned to them for a given surface, it is very important to distinguish between them.

It is also important to note that roughness comparison specimens may use different roughness values. Rugotest No. 3 uses roughness numbers according to ISO 1302 and 2632/II, which are assigned to R_A values. Keane-Tator Surface Profile Comparator uses the maximum average peak-to-valley height, which ressembles R_Z, while ISO surface profile reference comparators uses the designations “Fine”, “Medium”, and “Coarse”.

Although it is not possible to calculate R_A values from R_Z and vice versa, a working group of the international Standards Sub-Committee TC 35/SC 12 has established that a good approximation for R_Z is R_A x 6.

Roughness profile:

Roughness profiles can be characterized as round or sharp edged. Steel shot produces a round profile, while not worn down steel grit as well as most mineral abrasives give a sharp edge.

When a roughness profile is given in Hempel’s Product Data Sheets it is normally a sharp profile.

Because optical effects play a role when judging a surface by means of comparators, both Rugotest No. 3, Keane-Tator Surface Profile Comparator, and ISO surface profile reference comparators have different scales for different profiles.

Rugotest No. 3 has specimens for round and sharp profiles collected in one comparator. For greater roughness values there is even a division in fine and coarse grained finish.

Keane-Tator Surface Profile Comparator has three different discs, designed by S (sand), G/S (steel or metallic grit), and SH (shot), respectively. ISO Comparators are obtainable either as a “G” version or a “S” version for use on gritblasted and shotblasted surfaces, respectively.

The disc corresponding to the abrasive used must be selected for comparison.

CONVERSION TABLES

To convert	From	To	Multiply by	
Distance:	mil	micron	25	(25.4 is the correct value, but rounded in this book)
	micron	mill	0.04	(0.0394 is the correct value, but rounded in this book)
	inches	centimetre (cm)	2.54	
	centimetre (cm)	inches	0.3937	
	feet	metre	0.3048	
	metre	feet	3.2808	
	yards	metre	0.9144	
	metre	yards	1.0936	
	nautical mile	km	1.853	
	km	nautical mile	0.5396	
Area:	sq.ft.	sq. metre (m^2)	0.0929	
	sq.metre (m^2)	sq.ft.	10.764	
Volume:	US gallon	litre	3.785	
	litre	US gallon	0.264	
	Imp. gallon	litre	4.55	
	litre	Imp. gallon	0.22	
	litre	cu.ft.	0.0353	
	cu.ft.	litre	28.32	
Area/Volume:	m^2/litre	sq.ft./US gallon	40.74	
	sq.ft./US gallon	m^2/litre	0.0245	
	m^2/litre	sq.ft./Imp. gallon	48.93	
	sq.ft./Imp. gallon	m^2/liter	0.0204	
Weight:	lbs	kg	0.4536	
	kg	lbs	2.2046	
Density:	kg/litre	lbs/US gallon	8.344	
	lbs/US gallon	kg/litre	0.1198	
V.O.C.:	g/litre	lbs/US gallon	0.0083	
Pressure:	atm.	bar	1.013	
	atm.	kp/cm^2	1.033	
	atm.	p.s.i.	14.70	
	bar	atm.	0.987	
	bar	kp/cm^2	1.02	
	bar	p.s.i.	14.50	
	kp/cm^2	atm.	0.968	
	kp/cm^2	bar	0.981	
	kp/cm^2	p.s.i.	14.22	
	kp/cm^2	MPa	0.098	
	p.s.i.	atm.	0.068	
	p.s.i.	bar	0.069	
	p.s.i.	kp/cm^2	0.07	

Notes:

- atm. is the so called physical atmosphere (the pressure of 760 mm mercury). The technical atmosphere, at, is identical to kp/cm2.
- 1 bar = 10^5 Pa (Pascal) = 10^5 Newton/m^2.
- MPa = MegaPascal = 10^6 Pascal = MegaNewton/m^2.
- The so-called **k**ilogram **f**orces/cm^2 is considered equal to Kp/cm^2.

To convert	From	To	Calculate
Temperature:	Celcius	Fahrenheit	(9/5 x °C) + 32
	Fahrenheit	Celcius	5/9 x (°F - 32)
Film thickness: (micron)	Wet	Dry	$\frac{wft \times VS\%}{100}$
	Dry	Wet	$\frac{dft \times 100}{VS\%}$

wft = wet film thickness, dft = dry film thickness, VS% = Volume Solids

CALCULATION OF

Theoretical Spreading Rate (on completely smooth surface)

In m^2 per litre = $\frac{VS\% \times 10}{desired\ dft\ (micron)}$ In sq.ft. per US gallon = $\frac{VS\% \times 16.04}{desired\ dft\ (mil)}$

Theoretical Paint Consumption (on completely smooth surface)

In litre = $\frac{area\ (m^2) \times desired\ dft\ (micron)}{VS\% \times 10}$

In US gallon = $\frac{area\ (sq.ft.) \times desired\ dft\ (mil)}{VS\% \times 16.04}$

Practical consumption:

The practical consumption is influenced by i) simple losses, by ii) additional consumption to fill up the "dead volume" of the surface roughness, but especially iii) by the "waviness" of the paint surface. However, the term "loss factor" is still used in parallel with the term "consumption factor" to describe a relationship between the theoretical, calculated consumption and a practical either observed de-factor consumption or an "aimed at" consumption.

Practical consumption = $\frac{area \times consumption\ factor}{theoretical\ spreading\ rate}$

However, as

Consumption factor = $\frac{100}{100 - z\%}$ (z = "loss" = simple loss + dead volume loss + waviness loss)

and

theoretical spreading rate = $\frac{VS\% \times 10}{DFT}$

the practical consumption could be written as

$$\frac{10 \times DFT \times area}{VS\% \times (100\text{-}z\%)}$$

where it is very important to use the **"loss"** for z and **not** the consumption factor.

FORMULAS FOR ESTIMATING SURFACE AREAS OF SHIPS

Bottom (incl. boottop):

$$A = ((2 \times d) + B) \times Lpp \times P$$

where

d = draught maximum (as per Lloyd's)
B = breadth extreme (as per Lloyd's)
Lpp = length betw. perpendiculars (as per Lloyd's)

P = 0.90 for big tankers, 0.85 for bulk carriers, 0.70-0.75 for dry cargo liners

or

$$A = Lpp \times (Bm + 2 \times D) \times \frac{V}{Bm \times Lpp \times D}$$

where

D = mean draft at paint line (m)
Bm = breath moulded (m)
Lpp = length between perpendiculars
V = displacement (cubic metre) corresponding to the draft

Boottop:

$$A = 2 \times h \times (Lpp + 0.5 \times B)$$

where

h = width of boottop (to be informed by owner)
Lpp = length betw. perpendiculars (as per Lloyd's)
B = breadth extreme (as per Lloyd's)

Topsides:

$$A = 2 \times H \times (Loa + 0.5 \times B)$$

where

H = height of topsides (depth - draught) (as per Lloyd's)
Loa = length over all (as per Lloyd's)
B = breadth extreme (as per Lloyd's)

Weather Decks incl. upper decks on superstructure, foundation, hatches and top of deck houses:

$$A = Loa \times B \times N$$

where

Loa = length over all (as per Lloyd's)
B = breadth extreme (as per Lloyd's)
N = 0.91 for big tankers and bulk carriers,
0.88 for cargo liners, 0.84 for coasters, etc.

(accuracy depends on your choice of N which indicates the actual area in relation to its circumscribed rectangular)

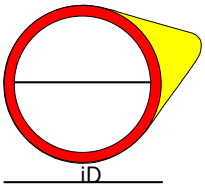
ESTIMATING SIZE OF SURFACES:

Plates:

Plate thickness mm	sq.m/ ton	Plate thickness mm	sq.m/ ton
1	254.5	16	15.9
2	127.2	17	15.0
3	84.8	18	14.1
4	63.6	19	13.4
5	50.9	20	12.7
6	42.4	21	12.1
7	36.4	22	11.6
8	31.8	23	11.1
9	28.3	24	10.6
10	25.4	25	10.2
11	23.1	26	9.8
12	21.2	27	9.4
13	19.6	28	9.1
14	18.2	29	8.8
15	17.0	30	8.5

The indicated values are for **both** sides. If one side only, reduce by half.

Pipes:



eD

Exterior area (sq.m/m):

pi x eD

pi = 3.14

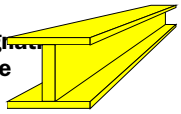
eD = exterior diameter in metres

Interior area (sq.m/m):

pi x iD

pi = 3.14
iD = interior diameter in metres

ESTIMATING SIZE OF SURFACES - BEAMS AND PROFILES, examples:



Designation shape	Size	Weight kg/m	Surface area sq.m/m	sq.m/ton
HEB	100	20.4	0.57	27.8
	160	42.6	0.92	21.5
	220	71.5	1.27	17.8
	280	103.0	1.62	15.7
	360	142.0	1.85	13.0
	600	212.0	2.32	10.9
INP	80	5.94	0.30	51.2
	140	14.3	0.50	35.1
	200	26.2	0.71	27.1
	260	41.9	0.91	21.6
	340	68.0	1.15	16.9
	400	92.4	1.33	14.4
RHS	20x20	1.1	0.08	70.8
	30x30	1.8	0.12	68.6
	40x40	2.4	0.16	67.2
	60x60	3.6	0.24	66.0
	80x80	7.3	0.32	44.1
UNP	30	4.3	0.17	40.7
	50	5.6	0.23	41.5
	80	8.6	0.31	36.1
	180	22.0	0.61	27.8
	280	41.8	0.89	21.3
	400	71.8	1.18	16.4
	20x3	0.88	0.08	87.5
	25x4	1.5	0.10	66.9
	30x4	1.8	0.12	65.2
	40x4	2.4	0.16	64.1
	50x6	4.5	0.19	43.4
	50x9	6.5	0.19	30.0
	75x7	7.9	0.29	36.7
	75x10	11.1	0.29	26.2
	100x10	15.1	0.39	25.8
	100x16	23.2	0.39	16.8
	150x15	33.8	0.59	17.3

In the case of the HEB beam, the first illustration, height and breadth are equal up to the size of 280. The "size" is the height and equal to the profile number.

In the case of the INP beam, the "size" is the height and equal to the profile number.

In the case of the UNP beam, the "size" is the height and equal to the profile number.

In the case of the v-profile, the two flanges are reckoned equal, the second digit being the thickness of the steel.

Product Data

HEMPEL'S MARINE VARNISH 02220

Description: HEMPEL'S MARINE VARNISH 02220 is a quick-drying clear urethane alkyd varnish.

Recommended use: On new wood as well as over previously varnished wood, interior and exterior, above the waterline.

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Transparent /00000
Finish:	Glossy
Volume solids, %:	46 ± 1
Theoretical spreading rate:	18.4 m²/litre - 25 micron 738 sq.ft./US gallon - 1 mil
Flash point:	38°C/100°F
Specific gravity:	0.9 kg/litre - 7.5 lbs/US gallon
Dry to touch:	2-3 hours at 20°C/68°F
V.O.C.:	430 g/litre - 3.6 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Best results will be obtained with a flat varnish brush. Spray application is possible with most types of spray equipment after thinning, but this application method is mainly subject to specific local conditions, so no general guidelines can be given.
Cleaning of tools:	THINNER 08230
Indicated film thickness, dry:	25 micron/1.0 mil
Indicated film thickness, wet:	50 micron/2 mils
Recoat interval, min:	6 hours (20°C/68°F)
Recoat interval, max:	See REMARKS overleaf

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S MARINE VARISH 02220

SURFACE PREPARATION:

New wood: Saturate the dry surface with a commercial antimould fluid, preferably made from fungicide dissolved in white spirit. Apply one coat HEMPEL'S MARINE VARNISH 02220 thinned with 20% THINNER 08230. Apply a second coat HEMPEL'S MARINE VARNISH 02220 thinned 5-10%. Finally apply 3-5 coats HEMPEL'S MARINE VARNISH 02220 undiluted.
For the best result rub with dry or wet fine sandpaper and dust off between coats for a smooth finish.
Previously varnished wood: Wash surface with suitable cleaning agent. Do not use detergents unless they are removed completely, as otherwise residues can spoil the drying properties and give adhesion problems. Proceed as for new wood. In some cases the antimould treatment and the first thinned coats can be omitted.
Note: Ammonia water may discolour oak, mahogany and teak.

APPLICATION CONDITIONS:

The surface must be completely clean and dry. Do not apply under humid conditions or at temperatures below 5°C/41°F. The moisture content in the wood should not exceed 16%.

SUBSEQUENT COAT:

None.

REMARKS:
Recoating:

Maximum recoating intervals related to later conditions of exposure (20°C/68°F):

Surface temperature	20°C/68°F	
Recoated with (Quality nos only)	Atmospheric	
	Mild	Medium
02220	None	2 days

If the maximum recoating interval is exceeded, rub down the surface to ensure adhesion.

Note:

HEMPEL'S MARINE VARNISH 02220 is for professional use only.

ISSUED BY:

HEMPEL A/S - 0222000000CO010

Product Data

HEMPADUR SEALER 05990

BASE 05999 with CURING AGENT 95040

Description:

HEMPADUR SEALER 05990 is a low viscosity, two pack epoxy varnish with good penetration properties.

Recommended use:

For saturation of well cleaned concrete surfaces before application of pigmented paints. Must be applied in such an amount that the surface is just saturated. The surface should not appear "glossy" in any way.
Also suitable for sealing of thermally sprayed metallic coatings.

Service temperatures:

Related to substrate and subsequent coat.

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory h (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Transparent/00000
Finish:	Flat
Volume solids, %:	29 ± 1
Theoretical spreading rate:	Not relevant *(See REMARKS overleaf)*
Flash point:	25°C/77°F
Specific gravity:	0.9 kg/litre - 7.5 lbs/US gallon
Dry to touch:	3-4 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	615 g/litre - 5.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 05990:	Base 05999 : Curing agent 95040 4 : 1 by volume	
Application method:	Airless spray	Brush
Thinner (max.vol.):	08450 (up to 5%)	08450 (up to 5%)
Pot life:	8 hours (20°C/68°F)	
Nozzle orifice:	.017"-.021"	
Nozzle pressure:	100 bar/1450 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	Not relevant	
Indicated film thickness, wet:	Not relevant *(See REMARKS overleaf)*	
Recoat interval, min:	4 hours (20°C/68°F)	
Recoat interval, max:	None *(See REMARKS overleaf)*	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas

HEMPADUR SEALER 05990

SURFACE PREPARATION:

Concrete: All possible slip agent, oil, grease and other contaminants must be removed by e.g. volatilizing by flame cleaning or treatment with suitable detergent. Last mentioned in the following way: Saturation of the surface with fresh water. Washing with detergent followed by fresh water hosing. Depending on construction and purpose, abrasive blast, high pressure water jet or treat the concrete with power tools to obtain a rough and firm surface free of scum layer and other contamination. Remove dust and loose material. If mechanical treatment is impossible, the surface may be treated with acid etching. For this purpose an approx. 5% w/w nitric or phosphoric acid solution is recommended. Note: Strong acids take necessary precautions, make sure that safety regulations are obeyed! Prior to etching the concrete should be saturated with fresh water to prevent acid corrosion of the reinforcement bars. Leave the acid to act for 3-4 minutes and hose down the surface with fresh water - preferably first a 5% w/w sodium hydroxide solution - and scrub carefully. After that the surface must dry homogeneously and appear as an even, rough surface free of a loose outer layer. The surface must have a pH reaction of between 6.5 - 8.0. If any of these conditions are not fulfilled, the process must be repeated. The surface must be dried with good ventilation for at least 2 days (65% relative humidity and 20°C/68°F). The pre-treatment is controlled by scraping with a strong knife. The surface shall feel solid and hard, and the knife must only leave a clear scratch mark.
Thermally sprayed metallic coatings: HEMPADUR SEALER 05990 should be applied shortly after the metal coat has been applied and approved to prevent possible contamination of the porous coating.

APPLICATION CONDITIONS:

The concrete must be fully cured, e.g. 28 days for normal Portland cement, and completely dry with humidity content in the surface below 4%. The concrete must also be controlled for absence of capillary water action or for subsoil water.
Use only where application and curing can proceed at temperatures above 10°C/50°F. Apply only on a dry surface, free of dust, grease, oil and other contamination - as described above.
Strongly absorbing surfaces may need repeated treatment. In any case a glossy surface must not appear and such a surplus of HEMPADUR SEALER 05990 must be removed by sanding, abrasive sweep-blasting or similar methods before painting takes place.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT:

According to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	615	625	750	750

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Film thicknesses/ consumption:

HEMPADUR SEALER 05990 is used for saturation of the absorbent concrete surface. Application should be initiated by assessing the degree of dilution in order to obtain a correct result. The actual amount of thinner required will depend on temperatures, the surface and type of the concrete and the actual application technique.
Furthermore, a practical theoretical spreading rate cannot be calculated. For practical purposes, approx. 10 m²/litre (410 sq.ft./US gallon) is indicated depending on the surface roughness, porosity of the concrete, and the application method.

Appearance:

In any case a glossy surface must not appear and such a surplus of HEMPADUR SEALER 05990 must be removed by sanding, abrasive sweep-blasting or similar methods before painting takes place.

Note:

HEMPADUR SEALER 05990 is for professional use only.

ISSUED BY:

HEMPEL A/S - 0599000000CO005

HEMPEL'S HI-VEE LACQUER 06520

Description:

HEMPEL'S HI-VEE LACQUER 06520 is a non-yellowing, clear varnish based on acrylic resin dissolved in white spirit. Physically drying. The inclusion of a UV absorber serves to protect the preceding paint film against ultraviolet radiation.
Further benefits are water and dirt repellent properties.

Recommended use:

For protection of HEMPEL'S HI-VEE 56540, especially in outdoor exposure, to maintain the high visibility (HI-VEE) of the fluorescent effect.
Not recommended for surfaces subject to excessive wear.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	Transparent/00000
Finish:	Glossy
Volume solids, %:	27 ± 1
Theoretical spreading rate:	10.8 m^2/litre - 25 micron 433 sq.ft./US gallon - 1 mil
Flash point:	32°C/90°F
Specific gravity:	0.9 kg/litre - 7.7 lbs/US gallon
Dry to touch:	1-2 hours at 20°C/68°F
V.O.C.:	585 g/litre - 4.9 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Best results are obtained with a flat varnish brush. Spray application is possible with most types of spray equipment after thinning with THINNER 08230, but this application method is mainly subject to specific local conditions, so no general guidelines can be given.
Cleaning of tools:	THINNER 08230
Indicated film thickness, dry:	25 micron/1 mil
Indicated film thickness, wet:	100 micron/4 mils
Recoat interval, min:	3 hours (20°C/68°F)
Recoat interval, max:	none *(See REMARKS overleaf*

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S HI-VEE LACQUER 0652

APPLICATION CONDITIONS:	As dictated by normal good painting practice. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPEL'S HI-VEE 56540.
SUBSEQUENT COAT:	None.
REMARKS:	No maximum recoating interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by (high pressure) fresh water cleaning and allow to dry.
Note:	**HEMPEL'S HI-VEE LACQUER 06520 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 0652000000CO007

HEMPEL'S THINNERS 08...

HEMPEL PAINT is produced and supplied in such a way that thinning is normally not necessary provided the paint is properly mixed/stirred.
However, if the paint is to be applied in a low film thickness (for instance as a "sealer coat") or if the paint has become too thick, e.g. in cold weather, the HEMPEL THINNER(s) indicated on the product data sheet may be added to obtain a consistency most suitable for application. As a general rule, thinning should be kept at a minimum as the quality of the paint work will suffer from too liberal thinning. However, if application is to take place at high temperatures (air and/or steel), thinning may even beyond the limits mentioned on the data sheets exceptionally be necessary in order to avoid dry-spray and poor film formation.
HEMPEL'S THINNERS are blended to give the best results with regard to brush ability, spray properties, etc.
In some cases ordinary solvents may substitute. As such products are beyond our control, we disclaim any responsibility for the results.
In each case the respective product data sheet and - when available - the APPLICATION INSTRUCTIONS should be consulted. As regards the use of THINNERS for cleaning of tools, see REMARKS overleaf.

HEMPEL'S THINNER NO.	FLASH POINT ·	EXAMPLES OF GENERAL USE
08080	25°C/77°F	HEMPEL'S ANTIFOULINGS GLOBIC NCT and SAP, OCEANIC and OLYMPIC HEMPALIN DECKPAINT 53240. HEMPAQUICK qualities All-purpose thinner for HEMPATEX qualities. HEMPATHANE topcoats and enamels.
08230	32°C/90°F	Thinner for HEMPALIN qualities (except HEMPALIN DECKPAINT 53240 and HEMPAQUICK qualities) and other alkyd-based products.
08450	23°C/73°F	General purpose thinner for HEMPADUR qualities.
08510	3°C/37°F HIGHLY FLAMMABLE	Special purpose thinner for HEMPATHANE ENAMEL 55100 HEMPATHANE TOPCOAT 55210
08570	4°C/39°F	HEMPEL'S SHOPPRIMER E 15280 HEMPEL'S SHOPPRIMER ZS 15890
08700	24°C/75°F	HEMPEL'S GALVOSILs For HEMPADURs used as "non-popping" sealers on GALVOSILs.

HEMPEL'S THINNERS 08

REMARKS: THINNER 08230 has a stronger thinning effect than white spirit or turpentine.

Tools can usually be cleaned with the THINNER prescribed for the product.

For cleaning of tools which have been used for HEMPADUR products, HEMPEL'S TOOL CLEANER 99610 is recommended. Do not use it for thinning, **nor for cleaning after use of polyurethane products, HEMPATHANEs**.

Note: **HEMPEL'S THINNERS are for professional use only.**

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S

08080000000C0004
08230000000C0005
08450000000C0009
08510000000C0002
08570000000C0007
08700000000C0006

HEMPINOL 10220

Description: HEMPINOL 10220 is a physically drying, high-build, bituminous coating.

Recommended use: For inexpensive short to medium-term anticorrosive protection of interior and exterior steelwork not exposed to direct sunlight. Not resistant to continuous mechanical stress.

Availability: Part of Group Assortment. Local availability subject to confirmation.

Certificates/Approvals: Has a Spanish, Danish, French, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Black /19990
Finish:	Flat
Volume solids, %:	53 ± 1
Theoretical spreading rate:	3.0 m²/liter - 175 micron 121 sq.ft./US gallon - 7 mils
Flash point:	38°C/100°F
Specific gravity:	1.1 kg/litre - 9.2 lbs/US gallon
Surface dry:	10 (approx.) hours at 20°C/68°F *(ISO 1517)*
Dry to touch:	16 (approx.) hours at 20°C/68°F
V.O.C.:	375 g/litre - 3.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08080 (2%)	08080 (15%)	08080 (5%)
Nozzle orifice:	.021"-.025"		
Nozzle pressure:	200 bar/2900 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	175 micron/7 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	325 micron/13 mils		
Recoat interval, min:	When dry		
Recoat interval, max:	None		

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPINOL 10220

SURFACE PREPARATION:	**New steel:** Abrasive blasting to minimum Sa 2 or mechanical cleaning to St 3. For temporary protection, if required, use a suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPINOL 10220. **Maintenance:** Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by abrasive blasting, power tool cleaning or water jetting. Dust off residues and allow the surface to dry. Touch up to full film thickness.
APPLICATION CONDITIONS:	As dictated by normal good painting practice. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	None or according to specification.
SUBSEQUENT COAT:	None.
REMARKS:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence the amount of thinning necessary, drying time and recoating interval. Normal range is 125-200 micron/5-8 mils.
Note:	**HEMPINOL 10220 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1022019990C0009

Product Data

HEMPEL'S BALLAST COAT SH 10880

Description:

HEMPEL'S BALLAST COAT SH 10880 is a semi-hard, one-component, surface-tolerant, high-build coating. It is flexible, water resistant and corrosion-preventing.

Recommended use:

For short to medium-term repair and maintenance of ballast tanks, cofferdams and void spaces under conditions where abrasive blast cleaning is not feasible. Resistant to cathodic protection by sacrificial anodes. Resistant to foot traffic during survey of tanks, but not to continuous mechanical stress.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

Certificates/Approvals:

Classification C1 by Marintek, Norway.
Accepted by Lloyd's Register of Shipping as a Maintenance Coating, Class 2.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Alu-bronze/19820 - black/19990
Finish:	Flat
Volume solids, %:	52 ± 1
Theoretical spreading rate:	3.0 m^2/liter - 175 micron 119 sq.ft./US gallon - 7 mils
Flash point:	38°C/100°F
Specific gravity:	1.1 kg/litre - 9.2 lbs/US gallon
Surface dry:	10 (approx.) hours at 20°C/68°F *(ISO 1517)*
Dry to touch:	16 (approx.) hours at 20°C/68°F
V.O.C.:	375 g/litre - 3.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08080 (2%)	08080 (15%)	08080 (5%)
Nozzle orifice:	.021"-.025"		
Nozzle pressure:	200 bar/2900 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	175 micron/7 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	325 micron/13 mils		
Recoat interval, min:	When dry		
Recoat interval, max:	None		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S BALLAST COAT SH 10880

SURFACE PREPARATION:	**Maintenance:** Remove all oil and grease, mud and similar contaminants with suitable detergent followed by (high pressure) fresh water cleaning. Remove rust scale and loose coating material by abrasive blasting, power tool cleaning or water jetting to minimum Sa 1, St 2 (ISO 8501:2007) or Wa 1 (ISO 8501-4:2006). Existing epoxy or coal tar epoxy system to be uniformly matted by grinding, abrasive sweep blasting or water jetting. Dust off residues. Allow the surface to dry. The durability of the system depends on the achieved degree of surface preparation. Insufficient removal of scale will result in later flaking.
APPLICATION CONDITIONS:	As dictated by normal good painting practice. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	None or according to specification.
SUBSEQUENT COAT:	None.
REMARKS:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence the amount of thinning necessary, drying time and recoating interval. Normal range is 125-200 micron/5-8 mils per coat in a two-coat system. Application of HEMPEL'S BALLAST COAT SH 10880 as a one-coat system is possible, recommended dry film thickness is 300 micron. The durability of a one-coat system is very much influenced by the application method.
Curing before filling of tanks:	Ballast tanks may be filled when all painted surfaces are completely dry. It is recommended to ascertain the drying condition by a thorough inspection before filling.
Maintenance:	Regular maintenance of the coating is carried out touching up with HEMPEL'S BALLAST COAT SH 10880 to full film thickness after having prepared the surface as described above.
Note:	**HEMPEL'S BALLAST COAT SH 10880 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1088019820CO0002

Product Data

HEMPALIN PRIMER 12050

Description:
HEMPALIN PRIMER 12050 is a relatively quick-drying, zinc phosphate primer, based on long oil alkyd and urethane alkyd.

Recommended use:
General purpose primer for HEMPALIN systems for protection of steel in mild to medium atmospheric corrosive environments.

Service temperatures:
Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:
Approved as a low flame spread material by Danish, French, Spanish and Singaporean authorities according to IMO resolution MSC 61 (67).
Has a Danish, French, Spanish, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.
Complies with EU Directive 2004/42/EC, subcategory i.
Please see REMARKS overleaf.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	Green/40760 - Red/50410
Finish:	Flat
Volume solids, %:	49 ± 1
Theoretical spreading rate:	12.3 m^2/litre - 40 micron 491 sq.ft./US gallon - 1.6 mils
Flash point:	38°C/100°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	2-4 hours at 20°C/68°F
V.O.C.:	415 g/litre - 3.5 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush/Roller
Thinner (max.vol.):	08230 (5%)	08230 (5%)	08230 (5%)
Nozzle orifice:	.018"		
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08230		
Indicated film thickness, dry:	40 micron/1.6 mil		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	See REMARKS overleaf		
Recoat interval, max:	See REMARKS overleaf		

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPALIN PRIMER 12050

SURFACE PREPARATION:

New steel: Abrasive blasting to minimum Sa 2. For temporary protection, if required, use a suitable shopprimer. Damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPALIN PRIMER 12050.
Maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up to full film thickness.

APPLICATION CONDITIONS:

As dictated by normal good painting practice.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT:

HEMPALIN system according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	415	430	600	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Some of the **certificates** are issued under the former quality number 1205.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 30-50 micron/1.2-2 mils.

Recoating:

Recoating intervals related to later conditions of exposure:
(40 micron/1.6 mils dry film thickness of HEMPALIN PRIMER 12050)

	Minimum		Maximum	
Steel temperature	20°C/68°F		20°C/68°F	
Recoated with (Quality Numbers only)	Atmospheric		Atmospheric	
	Mild	Medium	Mild	Medium
HEMPALIN, except 53240	5 hrs	8 hrs	none	3 days
53240	2 days	2 days	none	7 days

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. Before recoating after exposure in contaminated environment, clean surface thoroughly with (high pressure) fresh water hosing and allow to dry.

Note:

HEMPALIN PRIMER 12050 is for professional use only.

ISSUED BY:

HEMPEL A/S - 1205040760CO018

Product Data

HEMPEL'S UNI-PRIMER 13140

Description:
HEMPEL'S UNI-PRIMER 13140 is a quick-drying, one-component, modified epoxy ester primer with zinc phosphate rust-inhibiting pigments.

Recommended use:
As a versatile primer on steel and metal surfaces for HEMPALIN or HEMPATEX in mild to medium corrosive atmospheric environment. It provides the possibility of reducing the number of primers for maintenance.

Service temperature:
Maximum, dry exposure only: 140°C/284°F (or as dictated by subsequent HEMPATEX topcoats).

Certificates/Approvals:
Approved as a low flame spread material by the French and Spanish authorities according to IMO resolution MSC 61 (67).
Has a French and Spanish EC-type Examination Certificate.
Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Light grey/12170 - Red/51320
Finish:	Flat
Volume solids, %:	42 ± 1
Theoretical spreading rate:	8.4 m²/litre - 50 micron 337 sq.ft./US gallon - 2 mils
Flash point:	30°C/86°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Surface dry:	¾ (approx.) hr at 20°C/68°F (ISO 1517)
Dry to touch:	2 (approx.) hours at 20°C/68°F
V.O.C.:	520 g/litre - 4.3 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush/Roller
Thinner (max.vol.):	08080 (5%)	08080 (10%)	08080 (10%)
Nozzle orifice:	.019"-.023"		
Nozzle pressure:	150 bar/2200 psi (Airless spray data are indicative and subject to adjustment)		
Cleaning of tools:	HEMPEL'S THINNER 08080		
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	125 micron/5 mils		
Recoat interval, min:	See REMARKS overleaf		
Recoat interval, max:	See REMARKS overleaf		

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S UNI-PRIMER 13140

SURFACE PREPARATION:

New steel: Abrasive blasting to minimum Sa 2½ is recommended. A suitable zinc-free or low-zinc shopprimer may be used for temporary protection if required. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPEL'S UNI-PRIMER 13140.
Smooth metal surfaces: Very careful degreasing and removal of other contaminants.
Maintenance: Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water hosing. Remove all rust and other loose material by abrasive blasting or power tool cleaning. Feather edges to sound and intact areas. Dust off residues. Touch up to full film thickness.

APPLICATION CONDITIONS:

Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT:

HEMPALIN or similar alkyds or HEMPATEX systems according to specification.
Recoating with other qualities, see REMARKS below.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	10 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	520	555	600	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Substrate:

Smooth metal surfaces and zinc-coated steel are only relevant as substrate in case of later mild exposure conditions.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence amount of thinning necessary, drying time, and recoating interval. Normal range is 25-80 micron/1-3.2 mils.

Recoating:

Recoating intervals related to later conditions of exposure:
(50 micron/2 mils dry film thickness of HEMPEL'S UNI-PRIMER 13140)

	Minimum		Maximum	
Steel temperature	20°C/68°F		20°C/68°F	
	Atmospheric		Atmospheric	
Recoated with	Mild	Medium	Mild	Medium
HEMPALIN[1)]	1 hour	2 hours	None	3 days
HEMPATEX, HEMPALIN[2)]	4 hours	6 hours	None	None

[1)]Dissolved in white spirit only
[2)]Dissolved in aromatic solvents

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Recoating with epoxy and P.U.:

Recoating with HEMPADUR and HEMPATHANE is possible, but should be done with as thin layers as possible to minimize the risk of lifting. Furthermore, in this case - used as a "bridge coating" - it is recommended to apply HEMPEL'S UNI-PRIMER 13140 in 25 micron/1 mil dry film thickness only. Make a test patch to secure full compatibility between the old paint system and the new paint *system*.
Minimum recoating interval (20°C/68°F) is 48 hours, maximum none.

Notes:

Before recoating after exposure in contaminated environment, clean surface thoroughly with high pressure fresh water hosing and allow drying.
HEMPEL'S UNI-PRIMER 13140 is for professional use only.

ISSUED BY:

HEMPEL A/S - 1314012170CO0006

Product Data

HEMPALIN PRIMER HI-BUILD 13200

Description: HEMPALIN PRIMER HI-BUILD 13200 is a quick-drying, urethane-modified alkyd primer.

Recommended use: General purpose primer for HEMPALIN systems for protection of steel in mild to medium atmospheric corrosive environments.

Service temperatures: Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals: Approved as a low flame spread material by Danish, French, Spanish and Singaporean authorities according to IMO resolution MSC 61 (67).
Has a Danish, French, Spanish, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.
Complies with EU Directive 2004/42/EC, subcategory i.
Please see REMARKS overleaf.

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	White/10000 - Yellow/22430
Finish:	Flat
Volume solids, %:	47 ± 1
Theoretical spreading rate:	6.3 m^2/litre - 75 micron 251 sq.ft./US gallon - 3.0 mils
Flash point:	38°C/100°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Surface dry:	1 (approx.) hr at 20°C/68°F *(ISO 1517)*
Dry to touch:	4 (approx.) hours at 20°C/68°F
V.O.C.:	410 g/litre - 3.4 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Brush (touch up)
Thinner (max.vol.):	08080 (5%)	08080 (5%)
Nozzle orifice:	.021"-.023"	
Nozzle pressure:	200 bar/2900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	THINNER 08080	
Indicated film thickness, dry:	75 micron/3 mils	
Indicated film thickness, wet:	175 micron/7 mils	
Recoat interval, min:	See REMARKS overleaf	
Recoat interval, max.:	See REMARKS overleaf	

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPALIN PRIMER HI-BUILD 13200

SURFACE PREPARATION:

New steel: Abrasive blasting to Sa 2½ is recommended. For temporary protection, if required, use a suitable zinc-free shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPALIN PRIMER HI-BUILD 13200.
Maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up to full film thickness.

APPLICATION CONDITIONS:

As dictated by normal good painting practice.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT:

HEMPALIN system according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	410	435	600	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Some of the **certificates** have been issued under the former quality number 1320.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 50-75 micron/2-3 mils.

Recoating:

Recoating intervals related to later conditions of exposure:
(75 micron/3 mils dry film thickness of HEMPALIN PRIMER HI-BUILD 13200)

	Minimum		Maximum	
Surface temperature	20°C/68°F		20°C/68°F	
	Atmospheric		Atmospheric	
Recoated with	Mild	Medium	Mild	Medium
HEMPALIN, except 53240 and 13200	5 hours	8 hours	None	3 days
13200	5 hours	8 hours	None	None
53240	5 days	5 days	None	10 days

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
Before recoating after exposure in contaminated environment, clean the surface thoroughly with (high pressure) fresh water and allow drying.

Note:

HEMPALIN PRIMER HI-BUILD 13200 is for professional use only.

ISSUED BY:

HEMPEL A/S - 1320022430C0015

Product Data

HEMPAQUICK PRIMER 13624

Description:

HEMPAQUICK PRIMER 13624 is a very quick-drying zinc phosphate pigmented alkyd primer.

Recommended use:

As a rust preventing primer on steel, machinery parts, etc. where quick drying is needed, both as a workshop primer for temporary protection and as a general purpose primer in fast drying alkyd-based systems for protection of steel in mild to medium atmospheric corrosive environments.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:

Tested for non-contamination of grain cargo by Newcastle Occupational Health, Great Britain.
Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade Nos:	Light grey/12170 - Red/50710
Finish:	Flat
Volume solids, %:	47 ± 1
Theoretical spreading rate:	5.9 m^2/liter - 80 micron 236 sq.ft./US gallon - 3.2 mils
Flash point:	31°C/88°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Surface dry:	½ (approx.) hr at 20°C/68°F (ISO 1517)
Dry to touch:	1 (approx.) hour at 20°C/68°F
V.O.C.:	480 g/litre - 4.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08080 (10%)	08080 (15%)	08080 (5%)
Nozzle orifice:	.017"-.021"		
Nozzle pressure:	150 bar/2175 psi *(Airless spray is indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	80 micron/3.2 mils		
Indicated film thickness, wet:	175 micron/7 mils		
Recoat interval, min:	See REMARKS overleaf		
Recoat interval, max:	See REMARKS overleaf		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPAQUICK PRIMER 13624

SURFACE PREPARATION:

New Steel: Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to minimum Sa 2, alternatively power tool cleaning to St 3 depending on the corrosion impact.
On machinery: May be applied directly on steel and iron after degreasing and mechanical cleaning.
Repair of damaged areas: Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by abrasive blasting or power tool cleaning followed by fresh water cleaning. Touch up to full film thickness.

APPLICATION CONDITIONS:

Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT:

Xylene-based HEMPALINs and similar alkyds or according to specification.

REMARKS:

Certificate is issued under the former quality number 1362.

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	480	535	600	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter the spreading rate and may influence the amount of thinning necessary, drying time and recoating interval. Normal range is 40-80 micron/1.6-3.2 mils.

Recoating:

Recoating intervals related to later conditions of exposure:
(80 micron/3.2 mils dry film thickness of HEMPAQUICK PRIMER 13624)

	Minimum		Maximum	
Surface temperature	20°C/68°F		20°C/68°F	
	Atmospheric		Atmospheric	
Recoated with	Mild	Medium	Mild	Medium
HEMPALIN*	15 minutes	30 minutes	None	None

*Dissolved in xylene only.

Notes:

Before recoating after exposure to contaminated environment, the surface should be thoroughly cleaned by high pressure fresh water hosing and allow to dry.
HEMPAQUICK PRIMER 13624 is for professional use only.

ISSUED BY:

HEMPEL A/S - 13624121700C0003

Product Data

HEMPEL'S SHOPPRIMER E 15280

BASE 15289 with CURING AGENT 95270

Description:

HEMPEL'S SHOPPRIMER E 15280 is a two-component epoxy polyamide primer, pigmented with zincphosphate rust-inhibiting pigments. It is designed for automatic spray application as well as manual application.

Recommended use:

As a shopprimer for protection of blast cleaned steel plate and other structural steel during the storage and building period.

Service temperatures:

Maximum, dry exposure only: 140°C/284°F.

Certificates/Approvals:

Approved as a welding primer by Lloyd's Register of Shipping and Det Norske Veritas. Tested for non-toxicity of welding fumes by the Danish Welding Institute and Schweisstechnische Lehr- und Versuchsanstalt, Germany.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/50890
Finish:	Flat
Volume solids, %	22 ± 1
Theoretical spreading rate:	See REMARKS overleaf
Flash point:	-4°C/25°F
Specific gravity:	1.1 kg/litre 9.2 lbs/US gallon
Dry to handle:	5-10 min. at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	640 g/litre - 5.3 lbs/US gallon *(According to EPA Fed Ref Method 24)*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15280:	Base 15289 : Curing agent 95270 2 : 1 by volume		
Application method:	Airless spray	Air spray	Brush (touch up)
Thinner (max.vol.):	08570 (20%)	08570 (20%)	08450 (20%) *(See REMARKS overleaf)*
Pot life:	8 hours (20°C/68°F)		
Nozzle orifice:	.021"		
Nozzle pressure:	75 bar/1100 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610		
Indicated film thickness, dry:	15 micron/0.6 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	Not relevant		
Recoat interval, min:	6 hours (20°C/68°F)		
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S SHOPPRIMER E 15280

SURFACE PREPARATION:	**New steel:** Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to cleaning degree specified for final coating system, usually Sa 2½. Apply immediately after cleaning. All damaged shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to recoating. For repair and touch-up use primer specified for final coating system.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above 10°C/50°F. The temperature of the surface and that of the paint itself must also be above this limit. Maximum steel temperature approximately 45°C/113°F. For shopprimer application at temperatures above app. 45°C/113°F special measures must be taken (See "Thinning" under REMARKS below). Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	None or HEMPEL'S GALVOSIL qualities according to specification.
SUBSEQUENT COAT:	As per specification.
REMARKS:	Certificates are issued under the former quality number 1528.
	Recommended dry film thickness: 20-25 micron/0.8-1 mil measured on a smooth test panel.
Theoretical spreading rate:	On steel abrasive blasted to a profile, Ra = 12½ micron/0.5 mils, equivalent to Rugotest No. 3, N10a-b, or Keane-Tator Comparator, 3.0 mils segments, or ISO Comparator Medium (G), the indicated 15 micron/0.6 mils film thickness corresponds to approximately 25 micron/1 mil measured on a smooth test panel (see special instructions for this procedure). Corresponding "theoretical" spreading rate will be 8.4 m^2/litre (337 sq.ft./US gallon). On steel abrasive blasted to a profile, Ra = 6.3 micron/¼ mil, equivalent to Rugotest No. 3, N9a, or Keane-Tator Comparator, 2.0 mils segments, or ISO Comparator Fine (G) the indicated 15 micron/0.6 mils film thickness corresponds to approximately 20 micron/0.8 mils measured on a smooth test panel (see special instructions for this procedure). Corresponding "theoretical" spreading rate will be 10.5 m^2/litre (428 sq.ft./US gallon). As sealer: 8.8 m^2/litre (359 sq.ft./US gallon). The shopprimer should be applied in a uniform film thickness. Avoid dry spray and exaggerated film thicknesses.
Air Spray:	Air spray is usually performed by having a low pressure (e.q. 10:1) piston pump pumping the shopprimer under constant re-circulation.
Recoating interval:	No maximum recoat interval for adhesion, but dictated by gradual breakdown and damage during exposure and fabrication.
Thinning:	When applied at higher temperatures extra thinning or use of thinner with slower flash-off time may be needed to secure proper paint film formation. It is a must that a homogenous and smooth paint film is obtained.
Notes:	Before recoating after exposure in contaminated environment, clean the surface thoroughly by high pressure water cleaning and allow drying.
	HEMPEL'S SHOPPRIMER E 15280 is for professional use only.
ISSUED BY:	HEMPEL A/S - 1528050890CO003

HEMPADUR PRIMER 15300

BASE 15309 with CURING AGENT 95040

Description:

HEMPADUR PRIMER 15300 is a two-component polyamide-cured epoxy primer containing zinc phosphate as corrosion inhibiting pigment. It cures to a strong and rust-preventing coating.

Recommended use:

As a primer or intermediate coat in container systems. May be used as a general purpose epoxy primer according to painting specification.

Service temperatures:

	Dry exposure only:	In water (no temperature gradient):
Maximum:	140°C/284°F	35°C/95°F

Certificates/Approvals:

Approved as a welding primer by Lloyd's Register of Shipping.
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Generally for container newbuildings only.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/50890 - Grey/12170
Finish:	Flat
Volume solids, %:	51 ± 1
Theoretical spreading rate:	12.8 m^2/litre - 40 micron 511 sq.ft./US gallon - 1.6 mils
Flash point:	26°C/79°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Surface dry:	1 *(app.)* hour at 20°C/68°F *(ISO 1517)*
Dry to touch:	2-3 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	445 g/litre - 3.7 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15300:	Base 15309 : Curing agent 95040 4 : 1 by volume		
Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08450 (25%)	08450 (50%)	08450 (5%)
	For on-line container production thinning according to specification		
Pot life:	8 hours (20°C/68°F) *(airless spray)* 8 hours (20°C/68°F) *(brush)*		
Nozzle orifice:	.021"		
Nozzle pressure:	175 bar/2500 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610		
Indicated film thickness, dry:	40 micron/1.6 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval:	See REMARKS overleaf		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR PRIMER 15300

SURFACE PREPARATION:

New steel: Abrasive blasting to Sa 2½. For temporary protection, if required, use a suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPADUR PRIMER.
Other metals and light alloys: Thorough degreasing and removal of any salty contamination. Abrasive sweeping to create a suitable dense anchor profile.
Repair and maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt andother contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR PRIMER 15300. Feather edges to sound intact areas. Dust off residues. Touch up to full film thickness.
On pit-corroded surfaces, excessive amounts of salt residues may call for high pressure water jetting, wet abrasive blasting, alternatively dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

APPLICATION CONDITIONS:

Use only where application and curing can proceed at temperatures above 10°C/50°F.
The temperature of the paint itself should be 15°C/59°F or above to secure proper application properties. In confined spaces provide adequate ventilation during application and drying.
Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.

SUBSEQUENT COAT:

HEMPATEX HI-BUILD 46370 or according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	35 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	445	550	550	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Certificate has been issued under the former quality number 1530.

Weathering/ service temperatures:

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and will influence the amount of thinning necessary, drying time and recoating interval. Normal range dry is 25-75 micron/1-3 mils.

Recoating:

Recoating intervals:
Minimum (primarily only relevant for container coatings): 20 minutes' flash-off time for 40 micron/1.6 mils HEMPADUR PRIMER 15300 when topcoated with designed container coatings, epoxy, polyurethane, acrylic or CR types.
The minimum recoating interval only applies in the case of forced ventilation, proper application and if the completed paint system is thoroughly dry before exposed to aggressive environments.
Maximum: Recoating interval for non-immersion services is 24 hours for acrylic or CRs, 3 days for PUs and none for epoxies.
In the case of long recoating intervals, a completely clean surface is mandatory to ensure intercoat adhesion. Any dirt, oil and grease to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing. Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.
To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

Note:

HEMPADUR PRIMER 15300 is for professional use only.

ISSUED BY:

HEMPEL A/S - 1530050890CO0005

HEMPADUR ZINC 15360

BASE 15369 with CURING AGENT 95740

Description:

HEMPADUR ZINC 15360 is a two-component polyamide cured zinc-rich epoxy primer. It cures to a hard wearing and highly weather-resistant coating. Offers cathodic protection of local mechanical damage.

Recommended use:

For on-line application on containers. Can be used as a zinc-rich epoxy primer for other purposes according to separate painting specification.

Service temperatures:

Maximum, dry exposure only: 160°C/320°F, however depending on the subsequent coat.

Certificates/Approvals:

Approved as a welding primer by Lloyd's Register of Shipping.
Complies with SSPC-Paint 20, Level 2, in respect to zinc content.
Complies with ISO 12944-5, as zinc-rich primer.
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red-grey/19830
Finish:	Semi-flat
Volume solids, %:	50 ± 1
Theoretical spreading rate:	12.5 m^2/litre - 40 micron 501 sq.ft./US gallon - 1.6 mils
Flash point:	30°C/86°F
Specific gravity:	2.3 kg/litre - 19.2 lbs/US gallon
Surface dry:	30 minutes at 20°C/68°F *(ISO 1517)*
Dry to touch:	2 *(app.)* hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	460 g/litre - 3.8 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15360:	Base 15369 : Curing agent 95740 4 : 1 by volume		
Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08450 (30%)	08450 (50%)	08450 (5%)
	For on-line container production thinning according to specification		
Pot life:	8 hours (20°C/68°F)		
Nozzle orifice:	.017"-.021"		
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610		
Indicated film thickness, dry:	40 micron/1.6 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	As per separate APPLICATION INSTRUCTIONS		
Recoat interval, max:	As per separate APPLICATION INSTRUCTIONS		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR ZINC 15360

SURFACE PREPARATION: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning.
Abrasive blasting to Sa 2½ with a sharp-edged surface profile corresponding to Rugotest No. 3, BN9a, Keane-Tator Comparator, 2.0 G/S or ISO Comparator, Medium (G).

APPLICATION CONDITIONS: Use only where application and curing can proceed at temperatures above 10°C/50°F The temperature of the surface must also be above these limits, respectively.
The temperature of the paint itself should be 15°C/59°F or above. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT: According to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	30 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	460	550	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Certificate has been issued under the quality number 1536.
Note: If used as anticorrosive protection under insulation of high temperature equipment it is very important that NO moisture can penetrate during slow-down periods. This to avoid risk of "wet corrosion" when the temperature rises.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence amount of thinning necessary, drying time, and recoating interval. Normal range is 15-50 micron/0.6-2.0 mils.
(The dry film thickness range does not take into account the correction factors for rough surfaces as listed in ISO 19840).

Stirring: Before mixing with the curing agent stir the base thoroughly in order to redisperse any possible settling after storage. After mixing it is equally important to maintain stirring to keep the wet paint as a homogeneous mixture.
This is specifically important in case of a high level of thinning and/or long break in application, where the risk of settlement of zinc particles is the highest.

Recoating: Recoating intervals related to later conditions of exposure: Consult separate APPLICATION INSTRUCTIONS.
If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
Before recoating after exposure in contaminated environment, clean the surface thoroughly by (high pressure) fresh water hosing and allow drying. In addition, scrubbing with a stiff brush may be necessary to remove zinc corrosion products (white rust).

Note: **HEMPADUR ZINC 15360 is for professional use only.**

ISSUED BY: HEMPEL A/S - 15360198300006

For product description refer to product data sheet

HEMPADUR ZINC 15360

BASE 15369 with CURING AGENT 95740

Film thickness:

Depending on the area of use the typical dry film thickness may vary between 15 micron/0.6 mil and up to 50 micron/2 mils. This will alter amount of thinning needed, spreading rate, drying time and recoating interval as described below.
Indicated film thicknesses are as follows:

Shopprimer, Containers:

When used as a shopprimer in container systems a typical dry film thickness is 15 micron/0.6 mil. Dilute 100-150% for airless spray, corresponding wet film thickness 60-75 micron/2.4-3 mils. (**Note:** In the case of a high degree of thinning, the mixture is to be stirred constantly and recirculate until all paint has been used).

Primer, container systems:

When used as a primer in container systems the dry film thickness is approx. 30-40 micron/1.2-1.6 mils corresponding to 60-80 micron/2.4-3.2 mils wet film thickness. Dilute 5-10% for airless spray.

Spreading rates:

The film thickness and the spreading rate are inversely proportional. By controlling the spreading rate, a check of the film thickness can be made.

Theoretical spreading rate calculated for undiluted paint:

15 micron/0.6 mil is 33.3 m^2/litre or 1337 sq.ft./US gallon
30 micron/1.2 mils is 16.7 m^2/litre or 668 sq.ft./US gallon
50 micron/2 mils is 10.0 m^2/litre or 401 sq.ft./US gallon

Thinner:

Airless spray: HEMPEL'S THINNER 08450 or 08570. Lowest nozzle pressure should be used when highest amount of thinner is added. THINNER 08570 is used for fast setting at application in shops. (Be aware of increased risk of dry spray).

Air spray and application by brush: Usually only HEMPEL'S THINNER 08450.

Stirring:

Before mixing with the curing agent stir the base thoroughly in order to redisperse any possible settling after storage. After mixing it is equally important to maintain stirring to keep the wet paint as a homogeneous mixture.
This is specifically important in case of a high level of thinning and/or long break in application, where the risk of settlement of zinc particles is the highest.

HEMPADUR ZINC 15360

Physical data versus temperature:

Drying time and recoating interval vary with film thickness, drying/curing temperature and later exposure conditions.

HEMPADUR ZINC 15360 in a dry film thicknesses of 30-40 micron/1.2-1.6 mils:

Surface temperature	10°C/50°F	20°C/68°F	30°C/86°F
Drying time, approx minutes	1 hour	30	20
Curing time, approx days	18	7	4
MINIMUM recoating interval related to later conditions of exposure:			
Interval for recoating with 46330, 46370, 46410 58030			
Atmospheric, medium	40 minutes	15 minutes	7 minutes
Atmospheric, severe	2½ hours	1 hour	30 minutes
Immersion	Not relevant	Not relevant	Not relevant
Interval for recoating with HEMPADUR and HEMPATHANE qualities			
Atmospheric, medium	5 hours	2 hours	1 hour
Atmospheric, severe	8 hours	3 hours	1½ hours
Immersion*	15 hours	6 hours	3 hours
MAXIMUM recoating interval related to later conditions of exposure:			
Interval for recoating with 46330, 46370, 46410			
Atmospheric, medium	40 hours	16 hours	8 hours
Atmospheric, severe	30 hours	12 hours	6 hours
Immersion	Not relevant	Not relevant	Not relevant
Interval for recoating with 58030			
Atmospheric, medium	10 days	4 days	2 days
Atmospheric, severe	5 days	2 days	1 day
Immersion	Not relevant	Not relevant	Not relevant
Interval for recoating with HEMPADUR qualities			
Atmospheric, medium	None	None	None
Atmospheric, severe**	75 days	30 days	15 days
Immersion**	75 days	30 days	15 days
Interval for recoating with HEMPATHANE qualities			
Atmospheric, medium	25 days	10 days	5 days
Atmospheric, severe	7½ days	3 days	1½ day
Immersion	Not relevant	Not relevant	Not relevant

* NOT relevant for HEMPATHANE Qualities
**Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

The minimum recoating intervals assume sufficient ventilation and correct application. In case of forced ventilation and/or drying at higher temperatures sufficient "flash-off" time should be allowed for. For approx.15 micron/1 mil dry film thickness count for minimum 10 minutes flash-off (at 20°C/68°F), for approximately 30 micron/1.6 mils minimum 15 minutes, for approximately 50 micron/3 mils minimum approximately 30 minutes.

The short minimum recoating intervals when recoated with 46330, 46370 and 46410 are only provided in case the finished paint system is through dry before exposure to the environment.

If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion.

Before recoating after exposure in contaminated environment, irrespective of recoating interval, clean the surface thoroughly e.g. by (high pressure) fresh water hosing and allow to dry. **It is very important that any possible zinc salts, "white rust", are removed**. Scrubbing with a stiff brush and plenty of water may be required.

HEMPADUR ZINC 15360

Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
ISSUED BY:	HEMPEL A/S - 1536019830C0006

HEMPADUR 15400

BASE 15409 with CURING AGENT 95100

Description:
HEMPADUR 15400 is a two-component, amine adduct cured epoxy paint, which cures to a coating with excellent resistance to a wide range of chemicals as tabulated in separate CARGO PROTECTION GUIDE.

Recommended use:
As a tank lining.

Service temperatures:

	Dry exposure only:	In water (no temperature gradient):
Maximum:	140°C/284°F	50°C/122°F

Wet service temperatures, other liquids:
Consult the corresponding CARGO PROTECTION GUIDE.

Certificates/Approvals:
Complies with Section 175.300 of U.S. Federal Regulations in respect of carriage of dry and wet foodstuffs.
Approved by Lloyd's Register of Shipping as a recognized corrosion control coating.
Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
Tested for non-toxicity of welding fumes by the Danish Welding Institute.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000 - Light red/50900
Finish:	Semi-flat
Volume solids, %:	48 ± 1
Theoretical spreading rate:	6.0 m^2/litre - 80 micron 241 sq.ft./US gallon - 3.2 mils
Flash point:	26°C/79°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Surface dry:	3 (approx.) hrs at 20°C/68°F (ISO 1517)
Dry to touch:	8-10 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	480 g/litre - 4.0 lbs/US gallon

Shelf life:
1 year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15400:	Base 15409 : Curing agent 95100 4 : 1 by volume	
Application method:	Airless spray	Brush (touch-up)
Thinner (max.vol.):	08450 (5%) *(See APPLICATION INSTRUCTIONS)*	08450 (5%)
Pot life:	2 hours (20°C/68°F)	4 hours (20°C/68°F)
Nozzle orifice:	.021"	
Nozzle pressure:	200 bar/2900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	80 micron/3.2 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	175 micron/7 mils	
Recoat interval, min:	10 hours (20°C/68°F)	
Recoat interval, max:	21 days (20°C/68°F)	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 15400

SURFACE PREPARATION:	Abrasive blasting to near white metal Sa 2½ with a surface profile corresponding to Rugotest No. 3, BN10, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator, Rough Medium (G). (Please do also see Notes under REMARKS).
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above 10°C/50°F. A special curing agent 95990 may be available for curing between 5°C/41°F and 10°C/50°F if required, see Application Instructions. The temperature of the surface and that of the paint itself must also be above this limit. Optimal spraying properties are obtained at paint temperatures of 15-25°C/59-76°F. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Relative humidity max. 80%, preferably 40-60%. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	None, or as per specification.
SUBSEQUENT COAT:	None, or as per specification.
REMARKS:	**Certificates** are issued under the former quality number 1540.
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 80-125 micron/3.2-5 mils.
Recoating:	If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
Curing:	Do not put tanks into service until the paint system is completely cured - consult the corresponding CARGO PROTECTION GUIDE and APPLICATION INSTRUCTIONS.
Notes:	This datasheet outlines the main guidelines and recommendations. For details the corresponding PAINTING SPECIFICATION must be consulted and strictly adhered to during execution of the work. The CARGO PROTECTION GUIDE and the corresponding PAINTING SPECIFICATION may be tailored to meet other conditions than stipulated above. Such adjustments may include the degree of surface preparation, conditions of application, dry film thickness, and recoating interval. **HEMPADUR 15400 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1540010000CO014

For product description refer to product data sheet

HEMPADUR 15400

15400: BASE 15409 with CURING AGENT 95100
15402: BASE 15409 with CURING AGENT 95990

Scope:

These application instructions cover surface preparation, application equipment, and application of HEMPADUR 15400 as a tank coating.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major newbuildings/new constructions or extensive repair jobs.

Steel work:

All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in weldings seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be build-up on all surfaces. The radius of the rounding should be approximately 1-2 mm.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:2007. Any laminations must be removed.

All steel work (including welding, flame cutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed by (high pressure) fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes. Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

Old steel: Even after a very thorough tank cleanings, pits may typically contain contamination in the form of remnants of old cargoes as well as water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary:

After the first blasting, a very thorough vacuum cleaning is carried out in order to see if any "cargo bleeding" occurs as well as controls for water soluble salts are made. Reference is made to separate instructions. Special care should be taken in evaluating pitted areas.

To obtain full chemical resistance according to the CARGO PROTECTION GUIDE, the steel surface must be abrasive blast cleaned according to ISO 8501-1: 2007, Sa 2½.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10, Keane-Tator Surface Comparator, G/S min. 3.0 or ISO 8503/1 rough MEDIUM (G).

Use steel grit, aluminium silicate or similar sharp-edged abrasives of a good quality free of foreign matters, soft particles, and the like. Control for possible contamination according to separate guidelines.

Steel grit with particle sizes of 0.2 - 1.2 mm or aluminium silicate of 0.4 - 1.8 mm will usually create the desired surface profile when the air pressure measured at the nozzle is 6 - 7 bar/85 -100 psi.

The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

When the abrasive blasting is completed, remove residual grit and dust by vacuum cleaning. Abrasive particles not removed by vacuum cleaning are to be removed by brushing with clean brushes followed by vacuum cleaning.

The importance of systematic working must be stressed when blasting. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

Shopprimed and previously painted surfaces: Existing coating materials to be completely removed. Depending on the type of shopprimer and the requested chemical resistance, the shopprimer should be removed completely or partly. Reference is made to HEMPEL's CARGO PROTECTION GUIDE/tank coating specification.

Note: Degree of steelwork finish and surface preparation are more detailed described in HEMPEL's Technical Standard for Tank Coating Work.

Application equipment:

HEMPADUR 15400 is to be applied by airless spray equipment. Stripe coating and minor repairs can be carried out by brushing.

Airless spray equipment: A large pump is preferred, with a pump capacity of 8-12 litres/minute.

Pump ratio:	Min. 45:1
Nozzle orifice:	.018"-.021"
Nozzle pressure:	200 bar (2900 psi)
Hoses:	To avoid excessive loss of pressure in long hoses, hoses with an internal diameter of up to 0.5" can be used

(Spray data are indicative and subject to adjustment).

Thinning:

If required: max. 10% of THINNER 08450, possibly higher if tendency to dust-spray will require more thinning eg at higher temperatures. Thinning should only be at the required level to avoid possible risk of solvent entrapment.

Only add thinner to the mixed paint.

Cleaning of equipment:

The whole equipment to be cleaned thoroughly with HEMPEL'S TOOL CLEANER 99610 after use.

Mixing, pot life:

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 87 parts by weight of base and 13 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. **Allow the mixed paint to pre-react before application, see table below**.

d. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

CURING AGENT 95100:

Temperature of mixed paint	(10°C/50°F[1])	15°C/59°F[1]	20°C/68°F	25°C/77°F	30°C/86°F[2]
Induction time, minutes	(30)	25	15	10	5
Pot life, hours, airless spray	(4)	3	2	1½	1
Pot life, hours, brush	6	5	4	3	2

1) At paint temperatures below 15°C/59°F the viscosity can be too high for airless spray application.

2) Temperatures at 30°C/86°F and above should be avoided due to an enhanced risk of dry-spray and poor film formation.

CURING AGENT 95990:

Temperature of mixed paint	(5°C/41°F[1])	(10°C/50°F[1])	15°C/59°F[1])
Induction time, minutes	(35)	(30)	25
Pot life, hours, airless	(3)	(2)	1½
spray	4	4	4
Pot life, hours, brush			

1) At paint temperatures below 15°C/59°F the viscosity can be too high for airless spray application.

Application procedure:

The first full coat is usually applied immediately after vacuum cleaning. The first stripe coat afterwards. The final dry film thickness of the three coat system must be between 240-500 micron.

The wet film thickness must be 175-200 micron and must be measured regularly.

Film-build/continuity: With this tank coating, it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique must be adopted to ensure good film formation on **all** surfaces and **no** dust spray. It is very important to use nozzles of the correct size, ie not too big. Select small nozzles for spray application of complicated structures, while bigger nozzles may be used for regular surfaces. A proper, uniform distance of the spray gun to the surface, 30-50 cm, should be aimed at. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. The consumption of paint must be controlled and heavy layers must be avoided because of the risk of sags and cracks and solvent retention.

Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, must be remedied.

Note: In the case of old, pit-corroded steel, application of a diluted, extra first coat is recommended to obtain better "penetration" in the fine pits. For this purpose, it is relevant to dilute approximately 10%. Application by brush is recommended and film thickness so low that the surface is "saturated" only.

Stripe coating:

All places difficult to cover properly by spray application should be stripe coated twice by brushing. The first stripe coat is applied either before or after the first full coat. The second stripe coat is most typically applied after the second full coat. Which procedure to follow depends on the actual working conditions. A sprayed coat using small spray nozzles with a narrow angle may substitute the second brush-applied stripe coat, however, lightening holes and similar, plus possible undercuts and similar will still demand brush- applied stripe coating.

Micro climate:

The actual climate conditions at the substrate during application:

The minimum surface temperature is 10°C/50°F when using CURING AGENT 95100, 5°C/41°F when using CURING AGENT 95990.

The maximum surface temperature should preferably be below approximately 30°C/86°F. In a warm climate it is recommended to carry out application during night-time. Application at high temperatures, up to approximately 40°C/104°F, is possible, but extra care must be taken to avoid poor film formation and excessive spray dust. Extra thinning may also be necessary.

The steel temperature must be above the dew point. As a rule of thumb, a steel temperature which is 3°C/5°F above the dew point can be considered safe.

In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent.

Drying and curing, ventilation:

In a dry film thickness of 80 micron, with a steel temperature of 20°C/68°F, a relative air humidity of maximum 80% and adequate ventilation, HEMPADUR 15400 will be dry to touch after 8-10 hours. For similar drying conditions, the paint film will accept light traffic after approximately 24 hours.

Correct film formation depends on an adequate ventilation during drying.

A good guideline for tank coating work is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPADUR 15400 gives off in total 123 litres solvent **vapour** until it is completely dry.

The lower explosive limit, LEL, is 0.5%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 250 m^3 per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the tank.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.

Actual safety precautions may require stronger ventilation.

Curing time:

Provided that adequate ventilation, recommended relative humidity, specified film thickness, and recommended minimum recoating interval are kept, the following curing times are valid:

CURING AGENT 95100:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)*
Curing time	18 days	11 days	7 days	5 days	4 days	(3 days)

*Avoid application at elevated temperatures to avoid dry-spray and poor film formation.

CURING AGENT 95990:

Steel temperature	5°C/41°F	10°C/50°F	15°C/59°F
Curing time	25 days	18 days	11 days

Recoating intervals:

Provided observance of the above stated ventilation and relative humidity the following recoating intervals in relation to the (steel) temperature are valid:

CURING AGENT 95100:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	35°C/95°F
Minimum	30 hours	14 hours	10 hours	7 hours	5 hours	4 hours
Maximum	28 days	25 days	21 days	18 days	14 days	10 days

CURING AGENT 95990:

Steel temperature	5°C/41°F	10°C/50°F	15°C/59°F
Minimum	45 hours	30 hours	14 hours
Maximum	35 days	28 days	25 days

The maximum relative humidity before and between the coats should not exceed 80% and the steel temperature should always be above the dew point, in practice minimum 3°C/5°F above the dew point.

The maximum intervals assume that the film formation is of good quality and without dry spray and that no kind of surface contamination exists except contamination which can be removed completely by vacuum cleaning. Furthermore, the coating must not have been exposed to direct sunlight for more than maximum 2 days.

Conditions for paint application work:

Dry spray is not acceptable as this will reduce the protective characteristics of the paint and make later tank cleaning difficult. Dry spray can be avoided by using adequate staging, spraying equipment and methods.

Hold the spray gun at a right angle to and about 30-50 cm/1-1½ foot from the surface making even parallel passes at a rate to produce the specified wet film thickness as per specification.

Avoid dry spray (overspray creating excessive paint mist), e.g. by using a smaller fan angle, and the lowest possible pressure. A small fan angle should also be used, if spray application is used, for "stripe coating" of for instance reverse sides of stiffeners.
Each layer must be applied homogeneously and as near above the specification of 80 micron dry film thickness as possible. The consumption of paint must be controlled, and heavy layers must be avoided because of the risk of sagging, cracks and solvent retention.

Surface irregularities such as dry spray, sagging, exaggerated thickness or embedded dust or abrasives will have to be remedied.

If sandpapering between layers, for instance on the bottom, is needed, great care must be taken to avoid damage of otherwise intact surfaces. When using mechanical means only lightweight equipment should be used, orbital sander is recommended. Yet, avoid sandpapering on top of welds or irregularities or near to vertical surfaces.

The finished coating must appear as a homogeneous surface without pores, runners or contamination of any kind.

For the standard specification following applies to the dry film thickness:

The minimum dry film thickness is 240 micron; the maximum thickness to be aimed at is approximately 500 micron. The minimum dry film thickness is evaluated according to the "80-20" rule, i.e. no more than 20% of the total number of individual measurements must be lower than the minimum dry film thickness, and the lowest individual measurement must be at least 80% of the minimum dry film thickness, ie 192 micron. Dry film thickness control is not to be carried out within the first 24 hours after application of final coat (20°C, sufficient ventilation). The measurement must be carried out using an electromagnetic dry film thickness gauge calibrated with shims placed on a smooth steel substrate. The maximum dry film thickness can be evaluated according to the "80-20" rule.

Repairs:

It is of great importance that all damage to the coating is repaired.

Repair shall be started up as soon as possible. Repair of mountings for staging, etc. must take place in connection with the dismantling of the staging, the tempo of which shall be adjusted to the touch-up procedure.

It is important that the repaired areas, as well as the rest of the coated areas, are fully cured before the tank is taken into use or washed by the tank cleaning system.

The extent of damage to the coating can be evaluated by a sea water test. Wash the tanks with clean sea water by means of the tank cleaning machines until profiles and/or heating coils on tanktop is covered. Allow the water to stay for minimum 3 days, after which period the tank is emptied and cleaned with clean fresh water to remove salts.

HEMPADUR 15400

The repair process:

General: Before mechanical treatment is started, surfaces to be repaired have to be cleaned for any salts and other contamination.

Areas less than 5 x 5 cm.
The surface preparation can be executed by grinding to a clean rough metal surface, feathering edges of intact coating and slightly sanding the adjacent surface.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up by brush to full film thickness with minimum 4 coats of HEMPADUR 15400.

Areas up to 1 square metre
The surface preparation must be executed by vacuum blasting or open nozzle blasting so that the steel has a proper roughness and a cleanliness to Sa 2½-3 according to ISO 8501-1:2007. The overlapping zone must be sanded or sweep blasted to ensure a good adhesion of the new paint.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up by brush to full film thickness with minimum 4 coats or by spray 3 coats HEMPADUR 15400.

Areas more than 1 square metre or areas where several damaged spots are concentrated.
Treatment: Repeat the original specification.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY**:**

HEMPEL A/S - 15400100000CO014

HEMPADUR 15500

BASE 15509 with CURING AGENT 97580

Description:
HEMPADUR 15500 is a two-component, amine adduct cured phenolic epoxy (novolac) paint, which cures to a coating with excellent resistance to a wide range of chemicals as tabulated in separate CARGO PROTECTION GUIDE.

Recommended use:
As a tank lining.

Service temperatures:

	Dry exposure only:	In seawater (no temperature gradient):
Maximum:	160°C/320°F	50°C/122°F

Wet service temperatures, other liquids:
Consult the corresponding CARGO PROTECTION GUIDE.

Certificates/Approvals:
Approved by Lloyd's Register of Shipping and Maritime Register of Shipping, Russia, as a recognized corrosion control coating.
Complies with Section 175.300 of the Code of Federal Regulations in respect of carriage of foodstuffs (FDA) for tanks larger than 2006 m^3/530,000 US gallon.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Off-white/11630 - Light red/50900
Finish:	Flat
Volume solids, %:	68 ± 1
Theoretical spreading rate:	6.8 m^2/litre - 100 micron 273 sq.ft./US gallon - 4 mils
Flash point:	26°C/79°F
Specific gravity:	1.7 kg/litre - 14.2 lbs/US gallon
Surface dry:	2-3 hours at 20°C/68°F *(ISO 1517)*
Dry to touch:	4-6 hours at 20°C/68°F
Fully cured:	10 days at 20°C/68°F *(See REMARKS overleaf)*
V.O.C.:	325 g/litre - 2.7 lbs/US gallon
Shelf life:	1 year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15500:	Base 15509 : Curing agent 97580 8.9 : 1.1 by volume 93.8 : 6.2 by weight	
Application method:	Airless spray	Brush (touch-up)
Thinner (max.vol.):	08450	08450 *(See APPLICATION INSTRUCTIONS)*
Pot life:	3 hours (20°C/68°F)	
Induction time:	15 minutes (20°C/68°F) *(see REMARKS overleaf)*	
Nozzle orifice:	.018"-.021"	
Nozzle pressure:	200 bar/2900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	100 micron/4 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	150 micron/6 mils	
Recoat interval, min:	36/24 hours (20°C/68°F)	
Recoat interval, max:	21 days (20°C/68°F) *(See REMARKS overleaf)*	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 15500

SURFACE PREPARATION:	For optimum performance to the full range of chemicals in accordance with the main CARGO PROTECTION GUIDE, abrasive blasting to very near white metal Sa 2½-3 with a surface profile corresponding to Rugotest No. 3, BN10, Keane-Tator Comparator 3.0 G/S, or ISO Comparator Rough Medium (G). Consult separate APPLICATION INSTRUCTIONS.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above 10°C/50°F. **The steel temperature must never drop below this limit until full curing has taken place**. The temperature of the paint itself must be above 15°C/59°F, best results are obtained at 17-23°C/62-73°F. Relative humidity max. 80%, preferably 40-60%. Apply on a dry and clean surface with a temperature above the dew point to avoid condensation. Provide adequate ventilation during application and drying in confined spaces. Consult separate APPLICATION INSTRUCTIONS.
PRECEDING COAT:	None.
SUBSEQUENT COAT:	None.
REMARKS:	Some of the **certificates** have been issued under the former quality number 1550.
Film thicknesses:	Minimum total dry film thickness for the system is 300 micron/12 mils. May be specified in higher film thickness than indicated depending on purpose and area of use. This will alter spreading rate and influence drying time. For further information about film thicknesses, see separate APPLICATION INSTRUCTIONS.
Colour:	Minor differences in shade 11630 may occur.
Recoating:	Roughening of the surface is necessary if the maximum recoating interval is exceeded.
Mixing:	The thoroughly mixed BASE and CURING AGENT must be prereacted before application (15 minutes at 20°C/68°F), at other temperatures, please see APPLICATION INSTRUCTIONS.
Thinning:	Keep thinning at an absolute minimum. Do not dilute the components separately - only the mixture.
Curing:	Resistance to the widest range of cargoes is provided by additional heat curing, see APPLICATION INSTRUCTIONS and CARGO PROTECTION GUIDE.
Note:	**HEMPADUR 15500 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1550011630CR006

For product description refer to product data sheet

HEMPADUR 15500

CURING AGENT 97580

Scope:

These application instructions cover surface preparation, application equipment, and application of HEMPADUR 15500 as a tank coating.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major newbuildings/new constructions or extensive repair jobs.

Steel work:

All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in welding seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be build-up on all surfaces. The radius of the rounding should be minimum 2 mm.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:2007. Any laminations must be removed.

All steel work (including welding, flamecutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed by high pressure fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes.

Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

Old steel: Even after a very thorough tank cleanings, pits may typically contain contamination in the form of remnants of old cargoes as well as water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary. After the first blasting, a very thorough vacuum cleaning is carried out in order to see if any "cargo bleeding" occurs as well as controls for water soluble salts (reference is made to separate instructions) are made. Special care should be taken in evaluating pitted areas - ask for special guidelines.

Grit blast to min Sa 2½, ISO 8501-1:2007.

To obtain full chemical resistance according to the CARGO PROTECTION GUIDE, the steel surface must be abrasive blast cleaned according to ISO 8501-1:2007, very near to white metal Sa 2½-Sa 3. In practice, this requirement is to be understood as white metal Sa 3 at the moment of abrasive blasting, but allows a slight reduction at the moment of paint application.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10, Keane-Tator Surface Comparator, G/S min. 3.0 or ISO 8503/1 rough MEDIUM (G).
Use steel grit, aluminium silicate, or similar sharp edged abrasives of a good quality free of foreign matters, soft particles, and the like. Control for possible contamination according to separate guidelines.

In case steel grit is used this must furthermore be controlled so that a proper grain size distribution is maintained.

Steel grit with particle sizes of 0.2 - 1.2 mm or aluminium silicate of 0.4 - 1.8 mm will usually create the desired surface profile when the air pressure measured at the nozzle is 6 - 7 bar/85 -100 psi.

The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

When the abrasive blasting is completed, remove residual grit and dust by vacuum cleaning. Abrasive particles not removed by vacuum cleaning are to be removed by brushing with clean brushes followed by vacuum cleaning.

The importance of systematic working must be stressed when blasting. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

Shopprimed and previously painted surfaces: All shopprimer or existing coating materials to be completely removed. Avoid the use of zinc shopprimer whenever possible.

However, if the steel is shopprimed with zinc, it is very important that **all** zinc is removed by abrasive blast cleaning. Separate check procedures will be necessary to demonstrate the effectiveness of removal. More blast cleaning may be deemed necessary! Use of a red zinc shopprimer will facilitate the visual check of the blast cleaning and is considered necessary in order to obtain an acceptable surface preparation.

Note: Degree of steelwork finish and surface preparation are more detailed described in HEMPEL's Technical Standard for Tank Coating Work.

Application equipment:

HEMPADUR 15500 is to be applied by airless spray equipment. Stripe coating and minor repairs can be carried out by brushing.

Airless spray equipment: A large pump is preferred, with a pump capacity of 8-12 litres/minute.

Pump ratio:	Min. 45:1
Nozzle orifice:	.018"-.021"
Nozzle pressure:	200 bar (2900 psi)
Hoses:	To avoid excessive loss of pressure in long hoses, hoses with an internal diameter of up to 0.5" can be used

(Spray data are indicative and subject to adjustment).

Thinning:

If required: max. 10% of THINNER 08450, Additional thinning may be required at higher temperatures to counteract dry-spray. However, never use more thinner than required to avoid possible risk of solvent entrapment. Thinner only to be added to the mixed paint.

Only add thinner to the mixed paint.

Cleaning of equipment:

The whole equipment to be cleaned thoroughly with HEMPEL'S TOOL CLEANER 99610 after use.

Mixing, pot life:

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 93.8 parts by weight of base and 6.2 parts by weight of curing agent or by volume: 8.9 parts by volume base and 1.1 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Allow the mixed paint to pre-react before application, see table below.
d. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	(15°C/59°F[1])	20°C/68°F	25°C/77°F	(30°C/86°F[2])
Induction time	(25 minutes)	15 minutes	10 minutes	(5 minutes)
Pot life	(4 hours)	3 hours	2 hours	(1 hour)

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures at 30°C/86°F and above should be avoided due to a risk of dry-spray.

Application procedure:

The first full coat is usually applied immediately after vacuum cleaning.
The first stripe coat afterwards.

Film-build/continuity: With this tank coating intended for aggressive cargoes, it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation and no dry-spray on **all** surfaces must be adopted.

It is very important to use nozzles of the correct size, ie not too big. Select small nozzles for spray application of complicated structures, while bigger nozzles may be used for regular surfaces.

A proper, uniform distance of the spray gun to the surface, 30-50 cm, should be aimed at. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dry-spray.

The paint layer must be applied homogenously and as close to the specification as possible. The consumption of paint must be controlled and heavy layers must be avoided because of the risk of sags and cracks and solvent retention.

Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, must be remedied.

Note: In the case of old, pit corroded steel, application of a diluted, extra first coat is recommended to obtain better "penetration" in the fine pits. For this purpose, it is relevant to dilute 5-10%. Application by brush is recommended and film thickness so low that the surface is "saturated" only.

Stripe coating:

All places difficult to cover properly by spray application should be stripe coated twice by brushing immediately before the spray application. Typically, first stripe coat is applied after the first full coat and the second stripe coat after the second full coat.

The second stripe coat with brush can be replaced with spray application with a small narrow nozzle, but still air slots and similar and possible undercuts (welds) and the like will require brush application.

Film thicknesses:

The final dry film thickness of the three coat system must be between 300-600 micron (max. 450 micron below 15°C)/12-24 mils (max. 18 mils below 59°F).

Corresponding to 100 micron/4 mils dry film thickness, the wet film thickness must be 150-175 micron/6-7 mils and must be measured regularly.

Normally up to 200 micron/8 mils per coat may be accepted for 100 micron/4 mils specifications, but at temperatures below 15°C/59°F, it is important not to exceed a dry film thickness of 150 micron/6 mils in any area.

Micro climate:

The actual climate conditions at the substrate during application:

The minimum surface temperature until full cure is 10°C/50°F.

To ensure an all-over steel temperature of minimum 10°C/50°F, special attention should be paid to possible "cold bridges" eg stiffeners on deck.

In case of steel temperatures lower than 10°C/50°F there is a severe risk of incomplete curing, resulting in a too open film with reduced chemical resistance.

When the outside temperature is lower than 10°C/50°F, it is therefore recommended to use insulation mats on deck and in addition to aim at a general steel temperature of 15°C/59°F to minimise the risk of (locally) too low steel temperatures.

Furthermore, the steel temperature should be kept reasonably constant - within the range of ± 3°C/5°F is recommended. Any changes of the outside temperature should therefore be carefully monitored and heating equipment calibrated accordingly.

The maximum surface temperature should preferably be below approximately 30°C/86°F. In a warm climate it is recommended to carry out application during night time. Application at high temperatures, up to approximately 40°C/105°F, is possible, but extra care must be taken to avoid poor film formation and excessive spray dust.

The steel temperature must be above the dew point. As a rule of thumb, a steel temperature which is 3°C/5°F above the dew point can be considered safe. The relative humidity shall preferably be 40-60%, maximum 80%.

In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent.

Drying and curing, ventilation:

In a dry film thickness of 100 micron/4 mils, with a steel temperature of 20°C/68°F, a relative air humidity of maximum 80% and adequate ventilation, HEMPADUR 15500 will be dry to touch after 4-6 hours. Under these drying conditions, the paint film will accept light traffic after approximately 16 hours.

Correct film formation depends on an adequate ventilation during drying.

A good guideline for tank coating work is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPADUR 15500 gives off in total 82 litres solvent **vapour** until it is completely dry.

The lower explosive limit, LEL, is 1.0%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 82 m^3 per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the tank.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.
Actual safety precautions may require stronger ventilation.

Curing time:

Provided that adequate ventilation, recommended relative humidity, specified film thickness, and recommended minimum recoating interval are kept, the following curing times are valid:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)*
Curing time	18 days	14 days	10 days	8 days	7 days	(6 days)

*Avoid application at elevated temperatures to avoid dry-spray and poor film formation.

Post curing:

The chemical resistance of the coating can be extended by **post curing**, which preferably should take place within the first year in service.

Post curing is accomplished by carrying a hot cargo of mineral lube oil, vegetable oil or animal oil at minimum 50°C/122°F. The curing time is 8 days at 50°C/122°F and 4 days at 60°C/140°F.

Post curing of double-hull tankers may also be accomplished by using tank cleaning machines to spray hot, clean fresh water to achieve a minimum steel temperature of 60°C/140°F and maximum 80°C/176°F. The curing time is 16 hours at 60°C/140°F and 3 hours at 80°C/176°F. **All adjacent ballast tanks must be empty and all adjacent cargo tanks must be either empty or carrying a liquid cargo of minimum 40°C/104°F**.

Contact HEMPEL for detailed advice about post curing.

Recoating intervals:

Provided observance of the above stated ventilation and relative humidity the following recoating intervals in relation to the (steel) temperature are valid:

Steel temperature		10°C/50°F*	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F
Minimum	after the first coat	90 hours	60 hours	36 hours	24 hours	18 hours
	after the second coat	60 hours	40 hours	24 hours	16 hours	12 hours
Maximum:		47 days	34 days	21 days	16 days	14 days

* Absolute minimum temperature recommended.

The maximum relative humidity before and between the coats should not exceed 80% and the steel temperature should always be above the dew point, in practice minimum 3°C/5°F above the dew point.

Conditions for paint application work:

Dry spray is not acceptable as this will reduce the protective characteristics of the paint and make later tank cleaning difficult. Dry spray can be avoided by using adequate staging, spraying equipment and methods.

Hold spray gun at a right angle to and about 30-50 cm from surface making even parallel passes at a rate to produce the specified wet film thickness as per specification.

Avoid dry spray (overspray creating excessive paint mist), e.g. by using a smaller fan angle, and the lowest possible pressure. A small fan angle should also be used, if spray application is used, for "stripe coating" of for instance reverse sides of stiffeners.

Each layer must be applied homogeneously and as near above the specification of 100 micron/4 mils dry film thickness, as possible. The consumption of paint must be controlled, and heavy layers must be avoided because of the risk of sagging, cracks and solvent retention.

Surface irregularities such as dry spray, sagging, exaggerated thickness or embedded dust or abrasives will have to be remedied.

If a sandpapering between layers, for instance on the bottom, is needed, great care must be taken to avoid damage of otherwise intact surfaces. When using mechanical means only lightweight equipment should be used, orbital sander is recommended. Yet, avoid sandpapering on top of welds or irregularities or near to vertical surfaces.

The finished coating must appear as a homogeneous surface without pores, runners or contamination of any kind.

Control of dry film thicknesses:

For the standard specification the following applies to the dry film thickness:

The minimum dry film thickness is 300 micron/12 mils, the maximum thickness is approximately 600 micron/24 mils (below 15°C/59°F: 450 micron/18 mils). The minimum dry film thickness is evaluated according to the "80-20" rule, ie no more than 20% of the total number of individual measurements must be lower than the minimum dry film thickness, and the lowest individual measurement must be at least 80% of the minimum dry film thickness, ie 240 micron/9.6 mils. Dry film thickness control is not to be carried out within the first 24 hours after application of final coat (20°C/68°F, sufficient ventilation). The measurement must be carried out using an electromagnetic dry film thickness gauge calibrated with shims placed on a smooth steel substrate. The maximum dry film thickness can also be evaluated according to the "80-20" rule.

Taking into use:

Do not use the tank before the coating is properly cured. Reference is made to curing time on page 5.

Repairs:

It is of great importance that all damage to the coating is repaired.

Repair must be started up as soon as possible. Repair of mountings for staging, etc. must take place in connection with the dismantling of the staging, the tempo of which shall be adjusted to the touch-up procedure.

It is important that the repaired areas, as well as the rest of the coated areas, are fully cured before the tank is taken into use or washed by the tank cleaning system.

The extent of damage to the coating can be evaluated by a seawater test. Wash the tanks with clean seawater by means of the tank cleaning machines until profiles and/or heating coils on tank top is covered. Allow the water to stay for minimum 3 days, after which period the tank is emptied and cleaned with clean fresh water to remove salts.

The repair process:

General: Before mechanical treatment is started, surfaces to be repaired have to be cleaned for any salts and other contamination.

Areas less than 5 x 5 cm.

The surface preparation can be executed by grinding to a clean rough metal surface, feathering edges of intact coating and slightly sanding the adjacent surface.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up by brush to full film thickness with minimum 4 coats of HEMPADUR 15500.

Areas up to 1 sq.m.

The surface preparation must be executed by vacuum blasting or open nozzle blasting so that the steel has a proper roughness and a cleanness to Sa 3 according to ISO 8501-1:2007. The overlapping zone must be sanded or sweep blasted to ensure a good adhesion of the new paint.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up by brush to full film thickness with minimum 4 coats or by spray 3 coats HEMPADUR 15500.

Areas more than 1 sq.m. or areas where several damaged spots are concentrated.

Treatment: Repeat the original specification.

Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
ISSUED BY**:**	HEMPEL A/S - 1550011630CR006

HEMPADUR 15553

BASE 15557 with CURING AGENT 98021

Description:
HEMPADUR 15553 is a two-component polyamide adduct-cured epoxy paint. It cures to a flexible, well adhering coating with good abrasion and impact resistance. Contains zinc phosphate. Cures down to -10°C/14°F.

Recommended use:
As a primer for HEMPATEX, HEMPADUR and HEMPATHANE systems on hot dipped galvanized surfaces, aluminium and stainless steel in moderately corrosive environments. HEMPADUR 15553 is also suited when roughening of the surface is not possible. Please see surface preparation overleaf.

Service temperatures:
Maximum, dry exposure only: 140°C/284°F.

Certificates/Approvals:
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Off-white/11630
Finish:	Flat
Volume solids, %:	55 ± 1
Theoretical spreading rate:	11.0 m²/litre - 50 micron 441 sq.ft./US gallon - 2.0 mils
Flash point:	30°C/86°F
Specific gravity:	1.6 kg/litre - 13.4 lbs/US gallon
Dry to touch:	3 *(app)* hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	400 g/litre - 3.3 lbs/US gallon. *See REMARKS overleaf.*
Shelf life:	½ year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage. If the shelf life is exceeded please contact HEMPEL for further advice.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15553:	Base 15557 : Curing agent 98021 3 : 1 by volume	
Application method:	Airless spray	Brush
Thinner (max.vol.):	08450 (5%)	08450 (5%)
Pot life:	2 hours (20°C/68°F)	
Nozzle orifice:	.017"-.019"	
Nozzle pressure:	175 bar/2450 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	50 micron/2 mils	
Indicated film thickness, wet:	100 micron/4 mils	
Recoat interval, min:	See REMARKS overleaf	
Recoat interval, max:	See REMARKS overleaf	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 15553

SURFACE PREPARATION:

Stainless steel and aluminium surfaces: Remove dirt, oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. It is very important that all contamination and dust are removed.
Roughening of the surface is recommended for optimum adhesion.
Galvanizing: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Zinc salts (white rust) must be removed by high pressure hosing combined with rubbing with a stiff nylon brush if necessary.
It is recommended to recoat spray-metallised surfaces as soon as possible to avoid possible contamination.

APPLICATION CONDITIONS:

Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. At the freezing point and below be aware of the risk of ice on the surface, which will hinder adhesion.
Use only where application and curing can proceed at temperatures above -10°C/14°F. The temperature of the surface must also be above this limit.
The temperature of the paint itself should be 15-25°C/59-77°F.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT: HEMPADUR, HEMPATHANE or HEMPATEX qualities according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	400	425	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Passivation/ surface preparation:

Ammonium chloride or any other passivation agent should not be present on the surface when coating the galvanized surface.
Water should not be used for cooling down the steel.
Cleaning of steel should not be initiated unless the steel temperature is below 30°C/86°F.

Application:

As the galvanized zinc layer may be porous it is recommended to apply a mist coat of undiluted HEMPADUR 15553, allow air to escape, and then apply a full coat of HEMPADUR 15553 a few minutes later.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 50-80 micron/2.0-3.2 mils.

Recoating:

Recoating intervals related to later conditions of exposure (50 micron/2 mils dry):

	Minimum			Maximum		
Surface temperature	20°C/68°F			20°C/68°F		
	Atmospheric			Atmospheric		
Recoated with	Mild	Medium	Severe	Mild	Medium	Severe
HEMPATEX	30 minutes	30 minutes	3 hours	None	24 hours	12 hours
HEMPADUR	3 hours	3 hours	6 hours	None	None*	None*
HEMPATHANE	3 hours	3 hours	6 hours	None	10 days*	3 days

*Except for mild climatic conditions avoid long-term exposure of galvanized steel coated with a thin layer of paint only as this may create white rust **under** the paint.

If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR 15553 within the above directions for recoating.
A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing.
Any degraded surface layer, as a result of a long exposure period, must be removed as well.
Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.
To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

Note: **HEMPADUR 15553 is for professional use only.**

ISSUED BY: HEMPEL A/S - 1555311630CO002

This Product Data Sheet supersedes those previously issued.
For explanations, definitions and scope, see "Explanatory Notes" in the HEMPEL Book.
Data, specifications, directions and recommendations given in this data sheet represent only test results or experience obtained under controlled or specially defined circumstances. Their accuracy, completeness or appropriateness under the actual conditions of any intended use of the Products herein must be determined exclusively by the Buyer and/or User.
The Products are supplied and all technical assistance is given subject to HEMPEL's GENERAL CONDITIONS OF SALES, DELIVERY AND SERVICE, unless otherwise expressly agreed in writing. The Manufacturer and Seller disclaim, and Buyer and/or User waive all claims involving, any liability, including but not limited to negligence, except as expressed in said GENERAL CONDITIONS for all results, injury or direct or consequential losses or damages arising from the use of the Products as recommended above, on the overleaf or otherwise.
Product data are subject to change without notice and become void five years from the date of issue.

HEMPADUR FAST DRY 15560

BASE 15569 with CURING AGENT 97560

Description:
HEMPADUR FAST DRY 15560 is a two-component, polyamine adduct cured epoxy paint with a very short drying time. Contains zinc phosphate.

Recommended use:
As a quick drying primer or intermediate coat in HEMPADUR systems for especially fast recoatable in-shop applications.
Can be used for on-site work too if eg VOC compliance is requested.

Service temperatures:
Maximum, dry exposure only: 140°C/284°F. See REMARKS overleaf.

Certificates/Approvals:
Complies with EU Directive 2004/42/EC, subcategory j. See REMARKS overleaf.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey 12170 - Reddish grey/12430* *(MIO version) (See REMARKS overleaf)*
Finish:	Flat
Volume solids, %:	62 ± 1
Theoretical spreading rate:	6.2 m^2/litre - 100 micron 249 sq.ft./US gallon - 4 mils
Flash point:	27°C/81°F
Specific gravity:	1.5 kg/litre - 12.5 lbs/US gallon
Surface dry:	½ (approx.) hr at 20°C/68°F (ISO 1517)
Dry to touch:	1-1½ hour at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	330 g/litre - 2.7 lbs/US gallon *(According to EPA Fed Ref Method 24)* 355 g/litre - 3.0 lbs/US gallon

**Another shade: red 50630 may be available according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15560:	Base 15569 : Curing agent 97560 4 : 1 by volume		
Application method:	Airless spray	Air Spray	Brush
Thinner (max. vol.):	08450 (5%)	08450 (15%)	08450 (5%)
Pot life:	2 hours (20°C/68°F)		
Nozzle orifice:	.019"-.021"		
Nozzle pressure:	175 bar/2500 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610		
Indicated film thickness, dry:	100 micron/4 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	175 micron/7 mils		
Recoat interval, min:	See REMARKS overleaf		
Recoat interval, max:	See REMARKS overleaf		

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR FAST DRY 15560

SURFACE PREPARATION:

New steel (dry conditions): Abrasive blasting to Sa 2½. For temporary protection, if required, use suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPADUR 15560.
Maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by wet or dry abrasive blasting or power tool cleaning. Feather edges to sound and intact areas. After wet abrasive blasting hose down the surface with fresh water and allow drying. Touch up bare spots to full film thickness.

APPLICATION CONDITIONS:

Use only where application and curing can proceed at temperatures above 0°C/32°F.
The temperature of the paint itself should be 15°C/60°F or above to secure proper application properties.

In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: None, or according to specification.

SUBSEQUENT COAT: HEMPADUR, HEMPATHANE, HEMPATEX or HEMUCRYL as per specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	355	420	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Shade: CURING AGENT 97560 will become darker during storage. This will result in a darker and more yellowish shade than grey 12170. The colour change will have no influence on the performance.

Weathering/ service temperatures: The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 75-150 micron/3-6 mils.

Irregular surfaces: Special care should be taken in relation to irregular surfaces (welding seams, undercuts etc.) as application with an excessive film thickness - typically being more than 400 micron/16 mils per coat - may result in cracking especially on such areas.

Recoating: Recoating intervals related to later conditions of exposure:
(Dry film thickness of HEMPADUR FAST DRY 15560 as indicated below)

	Minimum In-field application* 100 micron/4 mils		Minimum Workshop application 75 micron/3 mils		Maximum**	
Surface temperature	20°C/68°F		20°C/68°F		20°C/68°F	
Exposure during service	Atmospheric		Atmospheric		Atmospheric	
Recoated with	Medium	Severe	Medium	Severe	Medium	Severe
HEMPATEX	1 hour	2 hours	15 minutes	1 hour	8 hours	8 hours
HEMPADUR	2 hours	3 hours	1 hour	1½ hours	None	None
HEMPATHANE	2 hours	3 hours	1 hour	1½ hours	10 days	3 days
58030	1 hour	2 hours	1 hour	1½ hours	24 hours	8 hours

*In case of general maintenance involving epoxy systems of high total dry film thickness, the minimum recoating interval may advantageously be doubled up.
** For mild atmospheric exposure recoating with HEMPADUR and HEMPATHANE qualities has no maximum. For other qualities please contact HEMPEL.

If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR FAST DRY 15560 within the above directions for recoating.
A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing.
Any degraded surface layer, as a result of a long exposure period, must be removed as well.

Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.
To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

Note: **HEMPADUR FAST DRY 15560 is for professional use only.**

ISSUED BY: HEMPEL A/S - 15560121700C0009

HEMPADUR 15570

BASE 15579 with CURING AGENT 95570

Description:

HEMPADUR 15570 is a two component, polyamide-adduct cured epoxy paint, which cures to a strong and highly corrosion resistant coating, at temperatures down to -10°C/14°F. The Micaceous Iron Oxide pigmented light grey 12430 quality is also well suited for application under humid conditions, on damp steel surfaces, and may be applied on moist surfaces.

Recommended use:

1. As a maintenance and repair primer, intermediate, and/or finishing coat in HEMPADUR systems in severely corrosive environment. As a finishing coat where a cosmetic appearance is of less importance.
2. As a low temperature curing epoxy primer, intermediate, and/or finishing coat in paint systems according to specification. Well suited as a (blast) primer in coal tar epoxy systems.

Service temperatures:

Dry exposure only:	Maximum 140°C/284°F *(See REMARKS overleaf)*
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	40°C/104°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

Tested for non-contamination of grain cargoes at the Newcastle Occupational Health, Great Britain.
Approved as a low flame spread material by Danish, French and Spanish authorities according to IMO resolution MSC 61 (67).
Has a Danish, French, Spanish, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.
Complies with EU Directive 2004/42/EC, subcategory j.
Please see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Reddish grey/12430* *(MIO)*	Red/50630*
Finish:	Flat	Flat
Volume solids, %:	54 ± 1	55 ± 1
Theoretical spreading rate:	5.4 m^2/litre - 100 micron	5.5 m^2/litre - 100 micron
	217 sq.ft./US gallon - 4 mils	221 sq.ft./US gallon - 4 mils
Flash point:	25°C/77°F	25°C/77°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	3-4 *(approx)* hours at 20°C/68°F	3-4 *(approx)* hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F	7 days at 20°C/68°F
V.O.C.:	420 g/litre - 3.5 lbs/US gallon	415 g/litre - 3.4 lbs/US gallon

**Another shade: grey 12170 may be available according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15570:	Base 15579 : Curing agent 95570		
	3 : 1 by volume		
Application method:	Airless spray	Air Spray	Brush
Thinner (max. vol.):	08450 (5%)	08450 (15%)	08450 (5%)
Pot life:	2 hours (20°C/68°F)		
Nozzle orifice:	.019"-.021"		
Nozzle pressure:	175 bar/2500 psi		
	(Airless spray data are indicative and subject to adjustment)		
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610		
Indicated film thickness, dry:	100 micron/4 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	200 micron/8 mils		
Recoat interval, min:	As per separate APPLICATION INSTRUCTIONS		
Recoat interval, max:	As per separate APPLICATION INSTRUCTIONS		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 15570

SURFACE PREPARATION:

New steel (dry conditions): Abrasive blasting to Sa 2½. For temporary protection, if required, use suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPADUR 15570.

Light alloys: Thorough degreasing and (light) abrasive sweeping to remove contamination and to secure adhesion - surface profile depending on later exposure.

Stainless steel: (Eg ballast tanks of chemical carriers) to be abrasive blast cleaned to a uniform, sharp, dense profile (Rugotest No. 3, BN9a, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S) corresponding to Rz minimum 50 micron. Any salts, grease, oil, etc. to be removed before abrasive blasting is commenced.

Maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to minimum Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR 15570.

As an alternative to dry cleaning, water jetting to sound, well adhering coat and/or to steel. Intact coat must appear with roughened surface after the water jetting. By water jetting to steel, cleanliness shall be Wa 2 - Wa 2½ (atmospheric exposure) / minimum Wa 2½ (immersion) (ISO 8501-4:2006). A flash-rust degree of maximum M (atmospheric exposure) / M, preferably L (immersion) (ISO 8501-4:2006) is acceptable before application. Feather edges to sound and intact areas. Dust off residues. Touch up bare spots to full film thickness when the surface has reached the condition of being damp, may be moist.

In case of wet abrasive blasting a suitable inhibitor may be used. Surplus inhibitor and residual abrasives and sludge must be removed by (high pressure) fresh water cleaning before recoating. Cleaning with hot water is recommended.

Note 1: Inhibitors are generally not recommended for surfaces which will be immersed during service.

Note 2: Damp surfaces: Water is not readily detectable, but the temperature of the surface is below the dew point. **Moist surfaces:** pools of water and droplets have been removed, but there is a noticeable film of water. **Wet surfaces:** Droplets or pools of water are present).

APPLICATION CONDITIONS:

Use only where curing can proceed at temperatures above -10°C/14°F.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

The temperature of the paint itself should be 15°C/60°F or above to secure proper application properties.

In confined spaces provide adequate ventilation during application and drying.

Occurrence of standing water or droplets on the painted surface immediately after application may result in discolouration.

PRECEDING COAT: None, or according to specification.

SUBSEQUENT COAT: None, HEMPADUR, HEMPATHANE or HEMPATEX as per specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	425	485	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Certificates are issued under the former quality number 1557.

Weathering/ service temperatures: The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 50-125 micron/2-5 mils.

Curing agent: Curing agent 95570 is hazy. This is intended and has no negative influence on the performance.

Note: **HEMPADUR 15570 is for professional use only.**

ISSUED BY: HEMPEL A/S - 1557012430CO0011

This Product Data Sheet supersedes those previously issued.
For explanations, definitions and scope, see "Explanatory Notes" in the HEMPEL Book.
Data, specifications, directions and recommendations given in this data sheet represent only test results or experience obtained under controlled or specially defined circumstances. Their accuracy, completeness or appropriateness under the actual conditions of any intended use of the Products herein must be determined exclusively by the Buyer and/or User.
The Products are supplied and all technical assistance is given subject to HEMPEL's GENERAL CONDITIONS OF SALES, DELIVERY AND SERVICE, unless otherwise expressly agreed in writing. The Manufacturer and Seller disclaim, and Buyer and/or User waive all claims involving, any liability, including but not limited to negligence, except as expressed in said GENERAL CONDITIONS for all results, injury or direct or consequential losses or damages arising from the use of the Products as recommended above. on the overleaf or otherwise.

For product description refer to product data sheet

HEMPADUR 15570

BASE 15579 with CURING AGENT 95570

Physical data versus temperature:

Drying time and recoating interval vary with film thickness, temperature and later exposure conditions, thus:
(75-100 micron/3-4 mils dry film thickness of HEMPADUR 15570)

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Drying time, approx	36 hours	16 hours	8 hours	4 hours	3 hours
Curing time, approx	2 months	1 month	14 days	7 days	5 days
MINIMUM recoating interval related to later conditions of exposure:					
Interval for recoating with HEMPATEX HI-BUILDs					
Atmospheric, medium	18 hours	9 hours	4 hours	2 hours	1½ hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours	3 hours
Interval for recoating with HEMPASIL NEXUS 27302					
Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Immersion	Not relevant	Not relevant	11 hours	6 hours	4 hours
Interval for recoating with HEMPADUR and HEMPATHANE qualities					
Atmospheric, medium	36 hours	18 hours	8 hours	4 hours	3 hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours	3 hours
Immersion*	3 days	36 hours	16 hours	8 hours	6 hours
MAXIMUM recoating interval related to later conditions of exposure:					
Interval for recoating with HEMPATEX HI-BUILDs					
Atmospheric, medium	3 days	36 hours	16 hours	8 hours	6 hours
Atmospheric, severe	2 days	23 hours	10 hours	5 hours	4 hours
Interval for recoating with HEMPASIL NEXUS 27302					
Immersion	Not relevant	Not relevant	48 hours	24 hours	18 hours
Interval for recoating with itself or other HEMPADUR qualities as per specification					
Atmospheric, medium	None	None	None	None	None
Atmospheric, severe	None	None	None	None	None
Immersion	Extended**	Extended**	Extended**	Extended**	Extended**
Interval for recoating with HEMPATHANE qualities					
Atmospheric					
Medium	90 days	45 days	20 days	10 days	5 days
Severe	27 days	14 days	6 days	3 days	1½ days

* NOT relevant for HEMPATHANE Qualities.
** Extended recoating intervals can be utilised when the following is strictly observed:
The surface shall be thoroughly cleaned from all sorts of contaminants including deposits of water soluble salts, oil, grease and similar harmful chemical substances.
Surfaces having any degraded layer from exposure to UV radiation, heat etc. must have this layer removed by mechanical cleaning methods like, water jetting, abrading or sweep blasting.
The existing coating system must in all respects be sound and applied according to Product Data Sheets, Application Instructions and Specification.
The new coat is to be a HEMPADUR 15570 or equivalent, approved HEMPADUR.
To determine whether the quality of the surface cleaning is adequate, a test patch may be relevant. However, such a test is not the final proof of long-term durability, but if the result is doubtful, repeated cleaning will be relevant. If next coat is not HEMPADUR 15570 a "refresh" of the surface with a new thin (diluted) coat of HEMPADUR 15570 may be needed.

Maximum recoating intervals, for HEMPASIL NEXUS 27302:
If the maximum recoating interval is exceeded, apply a (thin) additional coat of HEMPADUR 15570 within the above directions for recoating.
Furthermore, reference is made to special Application Instructions/painting specifications for HEMPASIL paint systems.

Long recoating intervals, in general:
A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing. Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 1557012430CO0009

HEMPADUR 15590

BASE 15599 with CURING AGENT 95100

Description: HEMPADUR 15590 is a two-component epoxy primer coating especially for use on surfaces exposed to severe abrasion.

Recommended use: As a blast primer for heavy duty epoxy systems on submersed and none-submersed areas according to specification.
For use at temperatures of 5°C/41°F, preferably 10°C/50°F or higher.

Service temperatures: Maximum, dry exposure only: 140°C/284°F.

Certificates/Approvals: Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/56880
Finish:	Semi-gloss
Volume solids, %:	44 ± 1
Theoretical spreading rate:	11.0 m²/litre - 40 micron 441 sq.ft./US gallon - 1.6 mils
Flash point:	26°C/79°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Dry to touch:	3 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	515 g/litre - 4.3 lbs/US gallon
Shelf life:	1 year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio:	Base 15599 : Curing agent 95100 15 : 4 by volume	
Application method:	Airless spray	Air spray
Thinner (max.vol.):	08450 (5%)	08450 (15%)
Pot life:	2 hours (20°C/68°F)	
Nozzle orifice:	.017”-.019”.	
Nozzle pressure:	150 bar/2200 psi (Airless spray data are indicative and subject to adjustment)	
Cleaning of tools:	HEMPEL’S TOOL CLEANER 99610	
Indicated film thickness, dry:	40 micron/1.6 mils	
Indicated film thickness, wet:	100 micron/4 mils	
Recoat interval, min:	8 hours (20°C/68°F)	
Recoat interval, max:	1 month (20°C/68°F) *(See REMARKS overleaf)*	

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 15590

SURFACE PREPARATION:

New steel: Abrasive blasting to Sa 2½-3 depending on area of use. Minimum surface profile corresponding to Rugotest No. 3, BN11a, Keane-Tator Comparator, 5.5 G/S, or ISO Comparator Coarse (G) - or as per the specification for the subsequent coat(s). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water cleaning prior to blasting. After blasting, clean the surface carefully from abrasives and dust.
Maintenance: On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pitting may call for wet abrasive blasting followed by dry abrasive blasting. Alternatively, dry abrasive blasting followed by high pressure fresh water cleaning, drying, and finally, dry abrasive blasting again.

APPLICATION CONDITIONS:

Apply only to a dry and clean surface with a temperature above the dew point to avoid condensation. Minimum temperature for application is 5°C/41°F, preferably above 10°C/50°F. Relative humidity maximum 80%, preferably below 60%.
The temperature of the paint itself should preferably be between 15°C/59°F and 25°C/77°F.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:

None.

SUBSEQUENT COAT:

HEMPADUR MULTI-STRENGTH 35530 and HEMPADUR MULTI-STRENGTH 45751. May be used as a blast primer in HEMPADUR 15400 systems.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	12 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	515	550	550	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 30-50 micron/1.2-2 mils.
The stated minimum recoating interval may be halved for areas *not* intended for water immersion.
To secure good adhesion and the best possible mechanical properties, the following implies:

- The coating has been applied in a dry film thickness as near as possible to the specified 40 micron.
- The film formation has been of good quality and without any dry spray.
- The drying and curing conditions have been according to APPLICATION CONDITIONS, please see above. (In the case of long recoating intervals: until full curing has been obtained).
- No kind of surface contamination exists, except loose dust, etc. which is possible to *remove* by vacuum cleaning (tanks) / hosing down (exterior).
  The surface MUST be completely clean before recoating. The coating is checked carefully and should be without patchy, whitish, and/or greasy formations, which can hinder adhesion of subsequent coat. *Note:* Exudation of curing agent causes the mentioned patchy, whitish, and/or greasy formations which will take place if HEMPADUR 15590 is applied at low temperature without proper induction time and/or if the coating is exposed to water (rain, condensation) during drying and curing.
- Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. Before recoating after exposure in contaminated environment, clean surface thoroughly by (high pressure) fresh water hosing and allow to dry. HEMPADUR 15590 will resist a hosing down of the surface 8 hours after application at a steel temperature of 20°C/68°F.

Note:

HEMPADUR 15590 is for professional use only.

ISSUED BY:

HEMPEL A/S - 1559056880C0008

This Product Data Sheet supersedes those previously issued.
For explanations, definitions and scope, see "Explanatory Notes" in the HEMPEL Book.
Data, specifications, directions and recommendations given in this data sheet represent only test results or experience obtained under controlled or specially defined circumstances. Their accuracy, completeness or appropriateness under the actual conditions of any intended use of the Products herein must be determined exclusively by the Buyer and/or User.
The Products are supplied and all technical assistance is given subject to HEMPEL's GENERAL CONDITIONS OF SALES, DELIVERY AND SERVICE, unless otherwise expressly agreed in writing. The Manufacturer and Seller disclaim, and Buyer and/or User waive all claims involving, any liability, including but not limited to negligence, except as expressed in said GENERAL CONDITIONS for all results, injury or direct or consequential losses or damages arising from the use of the Products as recommended above, on the overleaf or otherwise.
Product data are subject to change without notice and become void five years from the date of issue.

HEMPEL'S GALVOSIL 15700

BASE 15709 with HEMPEL'S ZINC METAL PIGMENT 97170

Description:

HEMPEL'S GALVOSIL 15700 is a two-component, solvent-borne, self-curing, inorganic zinc silicate with outstanding resistance against weathering and abrasion.
It has excellent chemical resistance within the pH range 6-9. For service temperature range, see below. Applicable by airless spray. Offers cathodic protection of local mechanical damage.

Recommended use:

1. As a general purpose, heavy-duty, rust-preventing primer.
2. As a single, complete coating for long-term protection of steel exposed to moderately to severely corrosive environment and to abrasion.
3. As a tank lining in accordance with the CARGO PROTECTION GUIDE.

In compliance with SSPC-Paint 20, type 1, level 1 and ISO 12944-5.

Service temperatures:

- Resistant to permanent (non-cyclic) dry temperatures as well as occasionally dry peak temperatures up to max. 500°C/932°F.
  In case of service temperatures above 400°C/752°F, it is of advantage to apply a topcoat of HEMPEL'S SILICONE ALUMINIUM 56910.
- Resistant to cyclic dry temperatures up to 400°C/752°F.
- Resistance to higher temperatures under humid conditions, see REMARKS overleaf.

Certificates/Approvals:

Certificated by Scientific & Technical Services to comply with the requirements of low moisture fats and oil according to FDA.
Approved by Lloyd's Register of Shipping as a recognized corrosion control coating.
Meets the requirements laid down by ASTM A-490 Class "B" for Slip-Co-efficient and Creep Resistance.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Metal grey/19840
Finish:	Flat
Volume solids, %:	64 ± 1
Theoretical spreading rate:	12.8 m^2/litre - 50 micron 513 sq.ft./US gallon - 2 mils
Flash point:	14°C/57°F
Specific gravity:	2.65 kg/litre - 22.1 lbs/US gallon
Dry to touch:	30 (approx.) min. at 20°C/68°F (65-75% RH)
Fully cured:	16 hours at 20°C/68°F and min. 75% RH *(See REMARKS overleaf)*
V.O.C.:	435 g/litre - 3.6 lbs/US gallon
Shelf life:	1 year (25°C/77°F) for liquid 15709 and 3 years for Hempel's zinc metal pigment 97170 (stored in closed container) from time of production. Shelf life is dependent on storage temperature. Shelf life is reduced at storage temperatures above 25°C/77°F. Do not store above 40°C/104°F. Shelf life is exceeded if the liquid is gelled or if the mixed product forms gels before application.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15700:	Liquid 15709 : Hempel's zinc metal pigment 97170 3.1 parts by weight : 6.9 parts by weight (Mixing by volume - see REMARKS overleaf)		
Application method:	Airless spray	Air spray	Brush (touch-up)
Thinner (max.vol.)	08700 (30%)	08700 (50%)	08700 (10%)
Pot life:	4 hours (20°C/68°F)		
Nozzle orifice:	.019"-.023"		
Nozzle pressure:	100 bar/1500 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08700		
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	When fully cured *(See REMARKS overleaf)*		
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S GALVOSIL 15700

SURFACE PREPARATION:	Remove oil and grease, etc.with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting with sharp abrasive to minimum Sa 2½ with a surface profile equivalent to Rugotest No. 3, BN10, Keane-Tator Comparator, min. 3.0 G/S, or ISO Comparator rough Medium (G). In case of new steel to be exposed to no more than medium aggressive (industrial) environment and without any extraordinary demands to lifetime, a surface preparation degree of SSPC-SP6 may suffice. Consult separate APPLICATION INSTRUCTIONS, and - as relevant - the corresponding PAINTING SPECIFICATION for cargo tanks.
APPLICATION CONDITIONS:	The surface must be completely clean and dry with a temperature above the dew point to avoid condensation. At temperatures ranging from 0°C/32°F to 40°C/105°F, curing needs minimum 65% relative humidity and is very retarded at lower temperatures. Consult separate APPLICATION INSTRUCTIONS.
SUBSEQUENT COAT:	**As a tank coating:** None, i.e. no other paints are acceptable in combination with HEMPEL'S GALVOSIL 15700. Otherwise according to specification.
REMARKS:	Some of the **certificates** have been issued under the former quality number 1570.
Service temperatures:	If used as anticorrosive protection **under insulation** of high temperature equipment it is very important that NO moisture can penetrate during shut-down periods. This to avoid risk of "wet corrosion" when the temperature rises. **Wet service temperature**, non-saline water: Maximum 60°C/140°F. **Wet service temperature**, other liquids: Consult the corresponding CARGO PROTECTION GUIDE. Hot sea water washing and (low pressure) steam cleaning should never be executed on tank coatings which have not been in service for at least one month. Contact HEMPEL about temperatures permissible.
Film thicknesses:	If **topcoated** with a heavy- duty system, 50-80 micron/2-3,2 mils dry film thickness (75-125 micron/3-5 mils wet) is recommended. Consult separate APPLICATION INSTRUCTIONS before recoating. For long-term protection **without topcoat**, 75 micron/3 mils dry film thickness (100-125 micron/4-5 mils wet) is generally recommended. In tanks 100 micron/4 mils dry film thickness (150 micron/6 mils wet) is recommended but may be applied in 125 micron/5 mils dry film thickness (200 micron/8 mils wet). **High temperature service**: To avoid cracking during service, it is important to keep the dry film thickness at maximum 40-50 micron/1.6-2 mils, especially in cases where service conditions include sudden temperature changes. (The dry film thickness range does not take into account the correction factors for rough surfaces as listed in ISO 19840).
Mixing:	When mixing part of the content in a can the mixing ratio on volume should be made as follows: Measure 7.4 parts of liquid 15709, then add Hempel's zinc metal pigment 97170 up to a total of 10,0 parts by volume.
Thinning:	For application at high temperatures, a special thinner is available.
Recoating:	Recoating intervals are strongly dependent on both temperature and humidity. Deviations from the standard conditions may shorten or prolong the recoating intervals. Full curing will be obtained after: 0°C/32°F and min. 75% RH: 3 days 10°C/40°F and min. 75% RH: 36 hours 20°C/68°F and min. 75% RH: 16 hours (a certain curing does take place at temperatures below 0°C/32°F, but at an extremely low speed). Furthermore consult separate APPLICATION INSTRUCTIONS.
Curing, cargo tanks:	Before cargo tanks are taken into use, the coating must be completely through-cured. It is recommended to carry out low pressure hosing of the tanks with (fresh) water 2-3 times at ambient temperatures. Let the tanks remain wet between the washings. Reference is made to APPLICATION INSTRUCTIONS.
Note:	**HEMPEL'S GALVOSIL 15700 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1570019840CO028

For product description refer to product data sheet

HEMPEL'S GALVOSIL 15700

Scope:

These application instructions cover surface preparation, application equipment, and application of HEMPEL'S GALVOSIL 15700.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major new-buildings/new constructions or extensive repair jobs.

Steel work:

For optimum performance, eg. relevant for cargo tank coating, the following is recommended:
All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in welding seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be build-up on all surfaces. The radius of the rounding should be approximately 1-2 mm. Any laminations must be removed.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:2007.

Note: Porous surfaces such as certain types of cast iron cannot be properly protected with zinc silicate. Deeply corroded steel may also be difficult to protect with a zinc silicate.

All steel work (including welding, flame cutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed by high pressure fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes. Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

Old steel: Even after a very thorough cleaning, pits may typically contain contamination in the form of remnants of chemicals/water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary. After the first blasting, a very thorough vacuum cleaning is carried out in order to see if any "chemical bleeding" occurs as well as controls for water soluble salts (reference is made to separate instructions) are made. Special care should be taken in evaluating pitted areas - ask for special guidelines.

Abrasive blasting with sharp abrasive to min Sa 2½, ISO 8501-1:2007.

To obtain full chemical resistance according to the CARGO PROTECTION GUIDE, the steel surface must be abrasive blast cleaned according to ISO 8501-1:2007, very near to white metal Sa 2½-Sa 3. In practice, this requirement is to be understood as white metal Sa 3 at the moment of abrasive blasting, but allows for a slight reduction at the moment of paint application.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10, Keane-Tator Surface Comparator, G/S min 3.0 or ISO 8503/1 rough Medium (G).

In case of new steel to be exposed to no more than medium aggressive (industrial) environment and without any extraordinary demands to lifetime, a surface preparation degree of SSPC-SP6 may suffice.

Note: A lower surface profile than specified will cause reduced adhesion and increased tendency to mud cracking.

Use steel grit, aluminium silicate, or similar sharp edged abrasives of a good quality free of foreign matters, soft particles, and the like. Control for absence of contamination according to separate guidelines.

Steel grit with particle sizes of 0.2-1.2 mm or aluminium silicate of 0.4-1.8 mm will usually create the desired surface profile when the air pressure measured at the nozzle is 6-7 bar/85-100 psi.

The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

When the abrasive blasting is completed, remove residual grit and dust by vacuum cleaning. Abrasive particles not removed by vacuum cleaning are to be removed by brushing with clean brushes followed by vacuum cleaning.

The importance of systematic working must be stressed when blasting. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

Old tank coatings: Must be completely removed. If the steel is pit corroded, the above guidelines for "Old steel" must be followed.

Shopprimed surfaces: When shoppriming is required only zinc silicate shopprimer such as HEMPEL'S SHOPPRIMER ZS 15890 may be used and preferably in a reddish shade.

Before recoating with GALVOSIL 15700, intact shopprimer must be abrasive grit swept in order to obtain specified roughness. A uniform sweep blasting is required, removing minimum 70% of the shopprimer followed by vacuum cleaning to remove accumulated dirt and zinc salts and to ensure adhesion.

Welds, rusty spots, burned areas, and all areas with other types of shopprimers than zinc silicates of a type like HEMPEL'S SHOPPRIMER ZS 15890 must be completely abrasive grit blasted as described above.

Application equipment:

GALVOSIL 15700 can be applied by conventional spray equipment (pressure pot type), airless spray equipment, or by brush.

Conventional Spray equipment: Standard industrial spray equipment with mechanical agitator and pressure regulators, air filters, and water traps.

Air hose:	10 mm (3/8") internal diameter.
Material hose:	13 mm (1/2") internal diameter.

Hoses should be as short as possible, preferably not longer than 10 metres/30 feet.

Pot pressure:	2.5-5 bar (35-70 psi)
Atomization pressure:	1.5-2.5 bar (20-35 psi)
Nozzle orifice:	1.8-2.2 mm (.070"-.085")

(Spray-data are indicative and subject to adjustment).

Thinning, if required: max. 50% of THINNER 08700.

The pressure pot must be placed at the same level as or at a higher level than the spray gun when spraying, owing to the weight of the material. Alternatively a piston-pump (e.g. 10:1) may be used instead of the pressure pot. This will facilitate the use of longer hoses or having the spray gun at a higher level than the pump.

When painting undersides, the spray gun will need intermittent cleaning with THINNER 08700 to prevent clogging of the nozzle.

With conventional spray application regulation of the pot and the atomizing air pressures can be made as follows:

1. Shut off the atomizing air.
2. Regulate the pressure in the pot so that the material reaches approximately 60 cm/20" horizontally out from the gun before falling to the ground.
3. Turn on the atomizing air using lowest possible pressure.

Airless spray equipment: A large, slow-working pump is preferred, eg. 30:1, with a pump capacity of 8-12 litres/minute. The in-line filter should be 60 mesh.

Gaskets:	Teflon
Nozzle orifice:	.019" through .023".
Fan angle:	40° through 70°.
Nozzle pressure:	100-150 bar (1400-2100 psi).

(Spray data are indicative and subject to adjustment).

Thinning, if required: max. 30% of THINNER 08700.

Thinning:

The amount of thinning necessary will depend upon prevailing conditions: Temperature, humidity, wind/ventilation, method of spraying, spray equipment, etc.

In the case of a high level of thinning and/or long stops in application, the mixed paint must be re-circulated to avoid settlement of zinc particles in the spray hoses.

The coating **must** be wet and smooth just after application. Besides correct spray technique, the amount of thinner added must be selected securing this optimum film formation.

Too little thinning will typically lead to dry-spray and too much thinning to sagging and settling of zinc particles in the can or in the spray hoses.

Cleaning of equipment:

The whole equipment must be cleaned thoroughly with THINNER 08700 after use.

Additionally for conventional spray-guns:
In the case of short stops, prevent packing of zinc around the needle by placing the spray gun in THINNER 08700 and let some air pass the spray gun. In the case of longer stops, clean the spray gun with THINNER 08700.

Mixing:

a. Do not open packings until immediately before use. The entire content of the two packings must be used for each batch to ensure a correct mixture. Leftovers in the packings cannot be used later. Protect HEMPEL'S ZINC METAL PIGMENT 97170 against moisture before mixing.

b. Before mixing, shake or stir the GALVOSIL 15709 LIQUID very thoroughly.

c. Pour HEMPEL'S ZINC METAL PIGMENT 97170 slowly down into the LIQUID with constant mechanical stirring. Do not mix in the reverse order. Continue stirring until the mixture is free of lumps.

d. Strain the mixture through a screen, 60 - 80 mesh (250 - 160 DIN Norm. 4188).

Pot life:

4 hours (20°C/68°F)

Temperature of paint:

In a hot climate it is important that the cans with LIQUID are kept out of the sun and that the temperature of the liquid is kept below 30°C/86°F in order to avoid excessive dry spray.

Application procedure, general:

Maintain constant agitation of the mixture until the batch is depleted.

The spray gun should be kept at a distance of 30-50 cm from the surface. Hold the spray gun at a right angle to the surface, making even, parallel passes with about 50% overlap.

Besides correct spray technique the amount of thinner added must be carefully adjusted to secure optimum film formation. **The coating must be wet and smooth just after application. It is important to avoid dry-spraying.**

Select small nozzles (small orifice and small fan angle) for spray application of complicated structures, while bigger nozzles may be used for regular surfaces.

The wet film thickness must be checked immediately after application, but it can only be used as a rough guidance because of the fast drying.

Application procedure, tank coating:

When used as a tank coating, HEMPEL'S GALVOSIL 15700 is normally specified in 1 x 100 micron/1 x 4 mils - minimum 80 micron/3.2 mils, maximum 150 micron/6 mils.

To achieve a correct film formation within these limits, it is recommended to apply two coats "wet-in-almost-dry":

Apply one coat and apply the second coat within 15-30 minutes before the first coat has turned grey but is still dark.

When following this procedure, HEMPEL'S GALVOSIL 15700 must be thinned approximately 15% in order to avoid too high film thicknesses.

Too high film thicknesses on welds in corners must be smoothened by a flat brush, approximately 1" wide.

When coating tanks, it is of the utmost importance to avoid dry-spray, which is a typical indication of poor film formation.

Poor film formation of a one-coat tank coating system like HEMPEL'S GALVOSIL 15700 may result in immediate failure.

Any dry-sprayed areas must be smoothened by scraping with a spatula (rounded corners) or by light sandpapering or by using a cleaning sponge ("3M", "Scotch-brite" type).

After vacuum cleaning as necessary, the smoothened areas are applied a thin coat of HEMPEL'S GALVOSIL 15700 achieved by using 20-25% thinning.

Note: If working conditions ask for it some hours may elapse between the first and the second coat provided that the relative humidity is kept constantly low, but it is recommended to finalize the application as soon as possible and within the same working shift.

Stripe coating:

All places difficult to cover properly by spray application must be stripe coated with a brush immediately before or after the spray application

Microclimate:

The actual climatic conditions at the substrate during application and until acceptance:

Recommended minimum surface temperature is 0°C/32°F.

The maximum recommended surface temperature is approx. 40°C/104°F. Higher steel temperatures are acceptable provided dry-spray is avoided by (extra thinning and) proper spray application. In extreme cases a reduction of the dry film thickness may also be necessary. In a warm climate it is recommended to carry out application during night time.

The steel temperature must be above the dew point. As a rule of thumb a steel temperature which is 3°C/5°F above the dew point can be considered safe.

In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent. All surfaces must be ventilated. However, avoid ventilators blowing directly onto the freshly applied paint.

Drying and curing, ventilation:

Correct film formation depends on adequate ventilation during drying.

A good guideline for tank coating work is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPEL'S GALVOSIL 15700 gives off in total 160 litres solvent **vapour** until it is completely dry.

The lower explosive limit, LEL, is 0.5%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 320 m^3 per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the tank.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.

Actual safety precautions may require stronger ventilation.

It is recommended to keep the relative humidity low during application and drying. Thereafter, let the relative humidity raise by "natural means", i.e. the dehumidifiers are notched off and normal ventilation used. However, it is recommended to let dehumidifiers run until dry film thicknesses have been checked - and if needed - rectified by an extra paint application.

Curing time:

Curing is dependent on (steel) temperatures and relative humidity.

At 20°C/68°F and min. 75% RH, curing requires min. 16 hours. At lower temperatures and relative humidity, curing time will increase considerably - see Product Data Sheet.

The relative humidity should be minimum 65% - and the minimum temperature 0°C/32°F - during the period of curing. Hosing down of tanks can support curing, but should if possible await the state of "near to complete" curing - please see below.

The coating will resist light showers after 1-2 hours at 20°C/68°F and 75% relative humidity.
Curing may be promoted at low humidity by hosing down the surface with water 1-2 hours after application and keeping the surface constantly wet until curing is complete. If salt water is used, rinse with fresh water if the surface is to be recoated.

State of curing:

Can be checked by rubbing the coating with a rag soaked in THINNER 08700. If the coating remains unaffected, state of curing is sufficient for recoating with other paint materials (when used as a cargo tank coating this state of curing may be described as "near to complete").

Full curing for cargo loading:

Before tanks are taken into use, the coating must be completely through-cured. This is secured by low pressure hosing/washing the tanks with (fresh) water 2-3 times after the above described condition of "near to complete curing" has been obtained. By using the tank washing equipment, the normal ½ hour cycle is applied with half a day to one day between washings. Let the tanks remain wet between the washing.

Full curing is confirmed by rubbing the coating with methyl ethyl ketone.

The coating will now be fully resistant according to the CARGO PROTECTION GUIDE.

A hydrocarbon wall wash test is recommended to ascertain complete removal of hydrocarbon solvents present in HEMPEL'S GALVOSIL 15700 before loading hydrocarbon sensitive cargoes, e.g. methanol. If the test is positive, carry out additional fresh water washing.

Full hardness will be obtained after weathering for some time.

Recommended film thickness:

For long time protection, **when topcoated with heavy-duty systems:**
50 micron/2 mils dry; 75 micron/3 mils wet, (undiluted).

For long time protection, **without topcoat:**
75-100 micron/3-4 mils dry; 125-150 micron/5-6 mils wet, (undiluted).

In tanks: 100 micron/4 mils dry; 150 micron/6 mils wet, (undiluted), may be specified.

For a tank coating specification the film thickness should be controlled according to the 80-20 rule, ie 80% of the dry film thickness measurements must be equal to or greater than the specified film thickness (100 micron/4 mils) and of those below the specified film thickness, no measurements must be lower than 80% of the 100 micron/4 mils. For narrow frames, girders and similar areas not being very accessible the film thickness could be controlled according to the 70-30 rule,

Too high dry film thickness, ie above approximately 150 micron/6 mils dry, should be avoided due to the risk of mud cracking or peeling. Please observe that according to accepted rules of measuring "a measurement" is to be the mean of three single point measurements taken in close vicinity.

Note: Special care is necessary to ensure proper film thickness on welding seams, edges, corners, ribs, etc.

Extra coat recoating (by itself):

Too low film thickness can be made good by applying an extra coat of HEMPEL'S GALVOSIL 15700. Surface preparation procedure - if necessary - and dilution of paint according to page 4 "Application procedure, tank coating".

Application of an extra coat should be done before full curing is obtained, ie during the curing period with low relative humidity. The relative humidity must be kept below 60%, absolute maximum 65%, all the time until recoating and the painted surface is not exposed to open weather, contamination of the like.

Spreading rate:

Theoretical (on a smooth surface):

dft, micron	dft, mils	m^2/litre	sq.ft./US gallon
50	2	12.8	513
75	3	8.5	342
100	4	6.4	257

Practical (with a consumption factor of 1.8):

dft, micron	dft, mils	m^2/litre	sq.ft./US gallon
50	2	7.1	285
75	3	4.7	190
100	4	3.6	143

HEMPEL'S GALVOSIL 15700

Recoating interval (other paints):

HEMPEL'S GALVOSIL 15700 must be fully cured before recoating with a full paint system.

Topcoating procedure:

Non-weathered zinc silicate coatings are porous and popping may occur in the subsequent coat(s). One way to reduce the risk of popping is to apply a mist coat as the first pass of the subsequent coat, let the air escape, and then apply the remainder of the topcoat.

Some of HEMPEL's products will substantially reduce the risk of popping when applied directly on top of the zinc silicate. See painting specification.

Advanced paint systems are recommended for topcoating, e.g. HEMPADUR qualities.

Surface cleaning:

The cleaning before topcoating depends on the condition of the surface:

1. Intact zinc silicate surface with sporadic formation of "white rust" (zinc corrosion products).
   a. Remove oil, grease, dirt, etc. by detergent wash.
   b. Remove "white rust" by high pressure fresh water cleaning 200-350 bar (2900-5000 psi) at a nozzle-to-surface distance of 15-20 cm (6-8").

      If the surface is only slightly contaminated, corresponding to 1-2 months of exposure in a mildly corrosive environment, hosing down of the surface with fresh water and scrubbing with stiff brushes (nylon) may be sufficient and more practical. Check that the coating is through dry before recoating.
2. Zinc silicate surface with extreme formation of "white rust" which cannot be removed as described above.
   a. Remove oil, grease, dirt, etc. by detergent wash.
   b. Abrasive blast sweep to remove "white rust", followed by vacuum cleaning to remove abrasives and dust.
   c. Restore the zinc layer with any solvent-borne GALVOSIL quality or zinc epoxy (HEMPADUR ZINC).
3. Damaged areas, burns, weld spatters, etc.
   a. Remove oil, grease, dirt, etc. by detergent wash.
   b. Remove weld spatters.
   c. Abrasive blasting to min. Sa 2½, followed by thorough removal of abrasives and dust by vacuum cleaning.
   d. Restore the zinc layer with any solvent-borne GALVOSIL quality or zinc epoxy (HEMPADUR ZINC).

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 1570019840C0028

HEMPEL'S GALVOSIL 1571A

BASE 1571N with HEMPEL'S ZINC METAL PIGMENT 97170

Description:

HEMPEL'S GALVOSIL 1571A is a two-component, solvent-borne, fast cure, inorganic zinc silicate with outstanding resistance against weathering and abrasion. Can be applied by airless spray. Cures by the humidity.
It has excellent chemical resistance within the pH range 6-9. For service temperature range, see below. Offers cathodic protection of local mechanical damage.

Recommended use:

1. As a general purpose, heavy-duty, rust-preventing primer.
2. As a single, complete coating for long-term protection of steel exposed to moderately to severely corrosive environment and to abrasion. Intended for shop application.

Service temperatures:

- Resistant to permanent (non-cyclic) dry temperatures as well as occasionally dry peak temperatures up to max. 500°C/932°F.
  In case of service temperatures above 400°C/752°F, it is of advantage to apply a topcoat of HEMPEL'S SILICONE ALUMINIUM 56910.
- Resistant to cyclic dry temperatures up to 400°C/752°F.
- Resistance to higher temperatures under humid conditions, see REMARKS overleaf.

Approvals/certificates:

Approved by Lloyd's Register of Shipping as a corrosion control coating.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey-green/42200
Finish:	Flat
Volume solids, %:	58 ± 1
Theoretical spreading rate:	11.6 m^2/litre - 50 micron 465 sq.ft./US gallon - 2 mils
Flash point:	14°C/57°F
Specific gravity:	2.5 kg/litre - 20.9 lbs/US gallon
Dry to touch:	30 (approx.) minutes at 20°C/68°F *(75% RH)*
Fully cured:	16 (approx.) hours at 20°C/68°F *(75% RH) (see REMARKS overleaf)*
V.O.C.:	640 g/litre - 5.3 lbs/US gallon
Shelf life:	6 months (25°C/77°F) for liquid 1571N and 3 years for Hempel's zinc metal pigment 97170 (stored in closed container) from time of production. Shelf life is dependent on storage temperature. Shelf life is reduced at storage temperatures above 25°C/77°F. Do not store above 40°C/104°F. Shelf life is exceeded if the liquid is gelled or if the mixed product forms gels before application.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 1571A:	Liquid 1571N : Hempel's zinc metal pigment 97170 3.4 : 6.6 by weight (Mixing by volume - see REMARKS overleaf)		
Application method:	Airless spray	Air spray	Brush (touch-up)
Thinner (max.vol.):	08700 (30%)	08700 (50%)	08700 (10%)
Pot life:	2 hours (20°C/68°F)		
Nozzle orifice:	.019"-.023"		
Nozzle pressure:	100 bar/1500 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08700		
Indicated film thickness, dry:	50 micron/2 mils *(see REMARKS overleaf)*		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	See REMARKS overleaf		
Recoat interval, max:	None *(see REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S GALVOSIL 1571A

SURFACE PREPARATION:	Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting with sharp abrasive to minimum Sa 2½ with a surface profile equivalent to Rugotest No. 3, BN10, Keane-Tator Comparator, min. 3.0 G/S, or ISO Comparator rough Medium (G). In case of new steel to be exposed to no more than medium aggressive (industrial) environment and without any extraordinary demands to lifetime, a surface preparation degree of SSPC-SP6 may suffice. Consult separate APPLICATION INSTRUCTIONS.
APPLICATION CONDITIONS:	The surface must be completely clean and dry with a temperature above the dew point to avoid condensation. At temperatures ranging from -5°C/23°F to 40°C/105°F. Curing needs minimum 60% relative humidity for curing by itself. Lower humidity will require fresh water hosing during curing. **Do not hose down before initial drying and curing for minimum 7 hours at 20°C/68°F. Tolerates light showers after 7 hours. Consult separate Application Instructions.**
SUBSEQUENT COAT:	None or HEMPADUR systems as per specification.
REMARKS:	
Service temperatures:	If used as anticorrosive protection of high temperature equipment **under insulation**, it is very important that NO moisture can penetrate during slow-down periods. This to avoid risk of "wet corrosion" when the temperature rises. Wet service temperature, non-saline water: Maximum 60°C/140°F.
Film thickness:	If topcoated with a heavy- duty system, 50 micron/2 mils dry film thickness is recommended. Consult separate Application Instruction before overcoating. For long-term protection without topcoat, 75-100 micron/3-4 mils dry film thickness is recommended. (The dry film thickness range does not take into account the correction factors for rough surfaces as listed in ISO 19840).
Mixing:	When mixing part of the content in a can the mixing ratio on volume should be made as follows: Measure 7.75 parts of liquid 1571N and then add Hempel's zinc metal pigment 97170 up to a total of 10.00 parts by volume.
Recoating:	Recoating intervals are strongly dependent on both temperature and humidity. Deviations from the standard conditions may shorten or prolong the overcoating intervals. HEMPEL'S GALVOSIL 1571A must be fully cured before recoating. Full curing will be obtained after: -5°C/23°F and min. 75% RH: 1 month 0°C/32°F and min. 75% RH: 2 weeks 10°C/50°F and min. 75% RH: 5 days 20°C/68°F and min. 75% RH:16 hours Furthermore consult separate APPLICATION INSTRUCTIONS.
Note:	**HEMPEL'S GALVOSIL 1571A is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1571A42200CR001

For product description refer to product data sheet

HEMPEL'S GALVOSIL 1571A

Scope:

These application instructions cover surface preparation, application equipment, and application of HEMPEL'S GALVOSIL 1571A.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major new-buildings/new constructions or extensive repair jobs.

For optimum performance the following is recommended:

Steel work:

All welds must be free of pinholes and must be of highest quality so that they can be protected by the paint. This means perfectly filled, smooth welds with a slightly wavy surface.

All welds must be complete and continuous which will otherwise cause coating discontinuity.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be build-up on all surfaces. Recommended radius of the rounding is approximately 1-2 mm.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:2007.

Note: Porous surfaces such as certain types of cast iron cannot be properly protected with zinc silicate. Deeply corroded steel may also be difficult to protect with a zinc silicate.

All steel work (including welding, flame cutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed by high pressure fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes. Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

Old steel: Even after a very thorough cleaning pits may typically contain contamination in the form of oil and grease as well as water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary.
After the first blasting a very thorough vacuum cleaning is carried out in order to see if any "bleeding" occurs as well as controls for water soluble salts are made. Reference is made to separate instructions. Special care should be taken in evaluating pitted areas.

Abrasive blasting with sharp abrasive to min Sa 2½, ISO 8501-1:2007, SSPC-SP-10.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10, Keane-Tator Surface Comparator, G/S min 3.0 or ISO 8503/1 Medium (G).
Note: A lower surface profile than specified will cause reduced adhesion and increased tendency to mud cracking.

Use steel grit, silica sand, aluminium silicate, or similar sharp edged abrasives of a good quality free of foreign matters, soft particles, and the like. Control for absence of contamination according to separate guidelines.

Steel grit with particle sizes of 0.2-1.2 mm or aluminium silicate of 0.4-1.8 mm will usually create the desired surface profile when the air pressure measured at the nozzle is 6-7 bar/85-100 psi.

The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

When the abrasive blasting is completed, remove residual grit and dust by vacuum cleaning. Abrasive particles not removed by vacuum cleaning are to be removed by brushing with clean brushes followed by vacuum cleaning.

The importance of systematic working must be stressed when blasting. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

Shopprimed surfaces: When shoppriming is required only zinc silicate shopprimer such as HEMPEL'S SHOPPRIMER ZS 15890 may be used.

Before overcoating with GALVOSIL 1571A, intact shopprimer must be abrasive grit swept followed by vacuum cleaning to remove accumulated dirt and zinc salts and to ensure adhesion.

Welds, rusty spots, burned areas, and all areas with other types of shopprimers than zinc silicates of a type like HEMPEL'S SHOPPRIMER ZS 15890 must be completely abrasive grit blasted as described above.

Application equipment:

GALVOSIL 1571A can be applied by conventional spray equipment (pressure pot type), airless spray equipment, or by brush.

Conventional Spray equipment: Standard industrial spray equipment with mechanical agitator and pressure regulators, air filters, and water traps.

Air hose:	10 mm (3/8") internal diameter.
Material hose:	13 mm (1/2") internal diameter.

Hoses should be as short as possible, preferably not longer than 10 metres/30 feet.

Pot pressure:	2.5-5 bar (35-70 psi)
Atomization pressure:	1.5-2.5 bar (20-35 psi)
Nozzle orifice:	1.8-2.2 mm (.070"-.085")

(Spray-data are indicative and subject to adjustment).

Thinning, if required: max. 50% of THINNER 08700.

Note: The amount of thinning necessary will depend upon prevailing conditions: Temperature, humidity, wind/ventilation, method of spraying, etc.

The pressure pot must be placed at the same level as or at a higher level than the spray gun when spraying, owing to the weight of the material. Alternatively a piston-pump (e.g. 10:1) may be used instead of the pressure pot. This will facilitate the use of longer hoses or having the spray gun at a higher level than the pump.

When painting undersides, the spray gun will need intermittent cleaning with THINNER 08700 to prevent clogging of the nozzle.

With conventional spray application regulation of the pot and the atomizing air pressures can be made as follows:

1. Shut off the atomizing air.

2. Regulate the pressure in the pot so that the material reaches approximately 60 cm/20" horizontally out from the gun before falling to the ground.

3. Turn on the atomizing air using lowest possible pressure.

Airless spray equipment: A large, slow-working pump is preferred, eg. 30:1, with a pump capacity of 8-12 litres/minute. The in-line filter should be 60 mesh.

Gaskets:	Teflon
Nozzle orifice:	.019" through .023".
Fan angle:	40° through 70°.
Nozzle pressure:	100-150 bar (1400-2100 psi).

(Spray data are indicative and subject to adjustment).

Thinning, if required: max. 30% of THINNER 08700.

Thinning:

The amount of thinning necessary will depend upon prevailing conditions: Temperature, humidity, wind/ventilation, method of spraying, spray equipment, etc.

In the case of a high level of thinning and long stops in application, it might be necessary to recirculate the mixed paint to avoid settlement of zinc particles in the spray hoses.

The coating **must** be wet and smooth just after application. Besides correct spray technique, the amount of thinner added must be selected securing this optimum film formation.

Too little thinning will typically lead to dry-spray and too much thinning to sagging and settling of zinc particles in the can.

Cleaning of equipment:

The whole equipment to be cleaned thoroughly with THINNER 08700 after use.

Additionally for conventional spray-guns:

At short stops, prevent packing of zinc around the needle by placing the spray gun in THINNER 08700 and let some air pass the spray gun.

At longer stops, clean the spray gun with THINNER 08700.

Mixing:

a. Do not open packings until immediately before use. The entire content of the two packings must be used for each batch to ensure a correct mixture. Leftovers in the packings cannot be used later. Protect HEMPEL'S ZINC METAL PIGMENT 97170 against moisture before mixing.

b. Before mixing, shake or stir the GALVOSIL 1571N LIQUID very thoroughly.

c. Pour HEMPEL'S ZINC METAL PIGMENT 97170 slowly down into the LIQUID with constant mechanical stirring. **Do not mix in the reverse order.** Continue stirring until the mixture is free of lumps.

d. Strain the mixture through a screen, 60 - 80 mesh (250 - 160 DIN Norm. 4188).

Pot life:

2 hours at 20°C/68°F.

Temperature of paint:

In a hot climate it is important that the cans with LIQUID are kept out of the sun and that the temperature of the liquid is kept below 30°C/86°F in order to avoid excessive dry spray.

Application procedure:

Maintain constant agitation of the mixture until the batch is depleted.

The spray gun should be kept at a maximum distance of 25-30 cm/1 foot from the surface. Hold the spray gun at a right angle to the surface, making even, parallel passes with about 50% overlap.
Besides correct spray technique the amount of thinner added must be carefully adjusted to secure optimum film formation. **The coating must be wet and smooth just after application. It is important to avoid dry-spray**.

Select small nozzles for spray application of complicated structures, while bigger nozzles may be used for regular surfaces.

The wet film thickness must be checked immediately after application, but it can only be used as a rough guidance because of the fast drying.

"Wet-in-almost dry" application:

When coating complicated structures, it is recommended to do a "two-layer" application. Apply one layer and follow with the next within 15-30 minutes, ie "wet-in-almost-dry" (when the surface of first layer is still not grey-dry but dark only). Using this method the most even film thicknesses are obtained, especially on surfaces of a complicated structure. At the first pass usually sharp corners (ie for instance angle-welds) are fully coated whereas the second pass has to fulfil film thicknesses on adjacent areas. Yet, use a flat, approx. 1" brush to "smoothen" the paint film on welds in corners, if film thicknesses are too high. In order to avoid too high film thicknesses, it is recommended to dilute approximately 15% when following the "wet-in-almost dry" procedure.

Any dry-sprayed areas must be smoothened by scraping with a spatula (rounded corners) or by light sandpapering or by using a cleaning sponge ("3M", "Scotch-brite" type).

Any surfaces with dry-spray are to be scraped or light sandpapered followed by vacuum cleaning. Such surfaces are subsequently to be recoated with GALVOSIL 1571A diluted 20-25%.

Note: If working conditions ask for it some hours may elapse between the first and the second coat, but it is recommended to finalize the application as soon as possible and within the same working shift.

Stripe coating:

All places difficult to cover properly by spray application should be stripe coated with a brush immediately before the spray application - if necessary to obtain the specified film thickness also after the spray application.

Microclimate:

The actual climatic conditions at the substrate during application and until approval:

The minimum surface temperature is -5°C/23°F.

The maximum recommended surface temperature is approx. 40°C/104°F. Higher steel temperatures are acceptable provided dry-spray is avoided by (extra thinning and) proper spray application. In extreme cases a reduction of the dry film thickness may also be necessary. In a warm climate it is recommended to carry out application during night-time.

The steel temperature must be above the dew point. As a rule of thumb a steel temperature which is 3°C/5°F above the dew point can be considered safe.

With temperatures at or below the freezing point beware of ice on the surface, which will hinder the adhesion, and use a capacitive RH-meter for measuring the relative humidity.

Drying and curing, ventilation:

In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent. All surfaces must be ventilated. However, avoid ventilators blowing directly onto the freshly applied paint.

Correct film formation depends on an adequate ventilation during drying.
A good guideline is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPEL'S GALVOSIL 1571A gives off in total 174 litres solvent **vapour** until it is completely dry.

The lower explosive limit, LEL, is 0.5%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 350 m^3 per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the area where the paint application takes place.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.

Actual safety precautions may require stronger ventilation.

It is recommended to keep the relative humidity low during application and drying. Thereafter, let the relative humidity raise by "natural means", i.e. the dehumidifiers are notched off and normal ventilation used. However, it is recommended to let dehumidifiers run until dry film thicknesses have been checked - and if needed - rectified by an extra paint application.

The relative humidity should preferably be minimum 60% - and the minimum temperature -10°C/14°F - during curing. At 40-60% RH, hosing down to support curing, but **must await minimum 7 hours at 20°C/68°F**.

Curing time:

Curing is dependent on (steel) temperatures and relative humidities.

At 20°C/68°F and 75% RH, curing requires min. 16 hours. At lower temperatures and relative humidity, curing time will increase considerably - see Product Data Sheet.

The coating will resist light showers after 7 (seven) hours at 20°C/68°F and 75% relative humidity. **Curing may be promoted at low humidity (40-60% RH) by hosing down the surface with water after an initial curing at MINIMUM 7 (seven) hours at MINIMUM 40% RH (lower relative humidity do NOT add to the initial cure) after application. Repeat hosing 1-2 times until curing is complete. Condensing vapour is also suitable for the purpose.**

State of curing can be checked by rubbing the coating with a rag soaked in THINNER 08700. If the coating remains unaffected, the curing is near to complete (and sufficient for recoating).

Full hardness will be obtained after weathering for some time.

Recommended film thickness:

For long-term protection, with topcoat:
50 micron/2 mils dry; 75 micron/3 mils wet, (undiluted).
For long-term protection, without topcoat:
minimum 75 micron/3 mils dry; 125 micron/5 mils wet, (undiluted).

Too high dry film thickness, ie above approximately 150 micron/6 mils dry, should be avoided due to the risk of mud cracking or peeling. (Please observe that according to accepted rules of measuring "a measurement" is to be the mean of three single point measurements taken in a close vicinity).

Note: Special care is necessary to ensure proper film thickness on welding seams, edges, corners, ribs, etc.

Extra coat:

Too low film thicknesses can be made good by applying an extra coat, of diluted GALVOSIL 1571A. This must be done before full curing is obtained, i.e. during the curing period with low relative humidity. Light sandpapering of the surface is recommended in order to remove any spray dust before recoating takes place. Vacuum cleaning must be carried out if necessary. Dilute the extra coat approximately 20-25%.

Spreading rate:

Theoretical (on a smooth surface):

DFT, micron	DFT, mils	m^2/l	sq.ft./US gallon
50	2	11.6	465
75	3	7.7	310
100	4	5.8	233

Practical (with a consumption factor of 1.8):

DFT, micron	DFT, mils	m^2/l	sq.ft./US gallon
50	2	6.4	258
75	3	4.3	172
100	4	3.2	129

Recoating interval:

GALVOSIL 1571A must be fully cured before recoating with a full paint system.

Topcoating:

Non-weathered zinc silicate coatings are porous and popping may occur in the subsequent coat(s).

Procedure:

One way to reduce the risk of popping is to apply a mist coat as the first pass of the topcoat, let the air escape, and then apply the remainder of the topcoat.

Some of HEMPEL's products will substantially reduce the risk of popping when applied directly on top of the zinc silicate. See painting specifications.

Advanced paint systems are recommended for topcoating, eg HEMPADUR qualities.

In specifications with a high total film thickness the GALVOSIL 1571A film thickness can advantageously be kept at 50 micron/2 mils.

Surface cleaning:

The cleaning before topcoating depends on the condition of the surface:

1. Intact zinc silicate surface with sporadic formation of "white rust" (zinc corrosion products).

   a. Remove oil, grease, dirt, etc. by detergent wash.

   b. Remove "white rust" by high pressure fresh water cleaning 200-350 bar (2900-5000 psi) at a nozzle-to-surface distance of 15-20 cm (6-8"). If the surface is only slightly contaminated, corresponding to 1-2 months of exposure in a mildly corrosive environment, hosing down of the surface with fresh water and scrubbing with stiff brushes (nylon) may be sufficient and more practical. Check that the coating is through dry before recoating.

2. Zinc silicate surface with extreme formation of "white rust" which cannot be re moved as described above.

   a. Remove oil, grease, dirt, etc. by detergent wash.

   b. Abrasive blast sweep to remove "white rust", followed by vacuum cleaning to remove abrasives and dust.

   c. Restore the zinc layer with any solvent borne GALVOSIL quality, HEMPADUR ZINC 15360/16363 or HEMPEL'S ZINC PRIMER 16490.

   Please observe that abrasive blast sweeping may "open" porosities inside the "white-rusted" zinc silicate wherefore popping may occur in the following coats.

3. Damaged areas, burns, weld spatters, etc.

   a. Remove oil, grease, dirt, etc. by detergent wash.

   b. Remove weld spatters.

   c. Abrasive blasting to min. Sa 2½, followed by thorough removal of abrasives and dust by vacuum cleaning.

   d. Restore the zinc layer with any solvent borne GALVOSIL quality, HEMPADUR ZINC 15360/15363 or HEMPEL'S ZINC PRIMER 16490.

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 1571A42200CR001

HEMPEL'S GALVOSIL 15750

BASE 15759 with HEMPEL'S ZINC METAL PIGMENT 97170

Description:

HEMPEL'S GALVOSIL 15750 is a two-component, solvent-borne, self-curing, inorganic zinc silicate with outstanding resistance against weathering and abrasion.
It has excellent chemical resistance within the pH range 6-9. For service temperature range, see below. Applicable by airless spray. Offers cathodic protection of local mechanical damage.

Recommended use:

1. As a general purpose, heavy-duty, rust-preventing primer.
2. As a single, complete coating for long-term protection of steel exposed to moderately to severely corrosive environment and to abrasion.
3. In areas (e.g. corners) where high film thickness (up to 200 µm dry film thickness) locally can be expected.

In compliance with SSPC-Paint 20, type 1, level 2.

Service temperatures:

- Resistant to permanent (non-cyclic) dry temperatures as well as occasionally dry peak temperatures up to max. 500°C/932°F.
  In case of service temperatures above 400°C/752°F, it is of advantage to apply a topcoat of HEMPEL'S SILICONE ALUMINIUM 56910.
- Resistant to cyclic dry temperatures up to 400°C/752°F.
- Resistance to higher temperatures under humid conditions, see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.only.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Metal grey/19840
Finish:	Flat
Volume solids, %:	60 ± 1
Theoretical spreading rate:	12.0 m^2/litre - 50 micron 481 sq.ft./US gallon - 2 mils
Flash point:	14°C/57°F
Specific gravity:	2.42 kg/litre - 20.2 lbs/US gallon
Dry to touch:	30 (approx.) min. at 20°C/68°F (65-75% RH)
Fully cured:	16 hours at 20°C/68°F and min. 75% RH *(See REMARKS overleaf)*
V.O.C.:	540 g/litre – 4.5 lbs/US gallon
Shelf life:	1 year (25°C/77°F) for liquid 15759 and 3 years for Hempel's zinc metal pigment 97170 (stored in closed container) from time of production. Shelf life is dependent on storage temperature. Shelf life is reduced at storage temperatures above 25°C/77°F. Do not store above 40°C/104°F. Shelf life is exceeded if the liquid is gelled or if the mixed product forms gels before application.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15750:	Liquid 15759 : Hempel's zinc metal pigment 97170 9.2 parts by weight : 15.0 parts by weight (Mixing by volume - see REMARKS overleaf)		
Application method:	Airless spray	Air spray	Brush (touch-up)
Thinner (max.vol.)	08700 (30%)	08700 (50%)	08700 (10%)
Pot life:	4 hours (20°C/68°F)		
Nozzle orifice:	.019"-.023"		
Nozzle pressure:	100 bar/1500 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08700		
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	When fully cured *(See REMARKS overleaf)*		
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S GALVOSIL 15750

SURFACE PREPARATION:	Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting with sharp abrasive to minimum Sa 2½ with a surface profile equivalent to Rugotest No. 3, BN10, Keane-Tator Comparator, min. 3.0 G/S, or ISO Comparator rough Medium (G). In case of new steel to be exposed to no more than medium aggressive (industrial) environment and without any extraordinary demands to lifetime, a surface preparation degree of SSPC-SP6 may suffice. Consult separate APPLICATION INSTRUCTIONS, and - as relevant - the corresponding PAINTING SPECIFICATION for cargo tanks.
APPLICATION CONDITIONS:	The surface must be completely clean and dry with a temperature above the dew point to avoid condensation. At temperatures ranging from 0°C/32°F to 40°C/105°F, curing needs minimum 65% relative humidity and is very retarded at lower temperatures. Consult separate APPLICATION INSTRUCTIONS.
SUBSEQUENT COAT:	According to specification.
REMARKS:	
Service temperatures:	If used as anticorrosive protection **under insulation** of high temperature equipment it is very important that NO moisture can penetrate during shut-down periods. This to avoid risk of "wet corrosion" when the temperature rises. **Wet service temperature**, non-saline water: Maximum 60°C/140°F. **Wet service temperature**, other liquids: Consult the corresponding CARGO PROTECTION GUIDE. Hot sea water washing and (low pressure) steam cleaning should never be executed on tank coatings which have not been in service for at least one month. Contact HEMPEL about temperatures permissible.
Application Equipment:	A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	If **topcoated** with a heavy- duty system, 50-80 micron/2-3,2 mils dry film thickness (75-125 micron/3-5 mils wet) is recommended. Consult separate APPLICATION INSTRUCTIONS before recoating. For long-term protection **without topcoat**, 75 micron/3 mils dry film thickness (100-125 micron/4-5 mils wet) is generally recommended. In tanks 100 micron/4 mils dry film thickness (150 micron/6 mils wet) is recommended but may be applied in 125 micron/5 mils dry film thickness (200 micron/8 mils wet). **High temperature service**: To avoid cracking during service, it is important to keep the dry film thickness at maximum 40-50 micron/1.6-2 mils, especially in cases where service conditions include sudden temperature changes. (The dry film thickness range does not take into account the correction factors for rough surfaces as listed in ISO 19840).
Mixing:	When mixing part of the content in a can the mixing ratio on volume should be made as follows: Measure 7.85 parts of liquid 15759, then add Hempel's zinc metal pigment 97170 up to a total of 10,0 parts by volume.
Thinning:	For application at high temperatures, a special thinner is available.
Recoating:	Recoating intervals are strongly dependent on both temperature and humidity. Deviations from the standard conditions may shorten or prolong the recoating intervals. Full curing will be obtained after: 0°C/32°F and min. 75% RH: 3 days 10°C/40°F and min. 75% RH: 36 hours 20°C/68°F and min. 75% RH: 16 hours (a certain curing does take place at temperatures below 0°C/32°F, but at an extremely low speed). Furthermore consult separate APPLICATION INSTRUCTIONS.
Curing, cargo tanks:	Before cargo tanks are taken into use, the coating must be completely through-cured. It is recommended to carry out low pressure hosing of the tanks with (fresh) water 2-3 times at ambient temperatures. Let the tanks remain wet between the washings. Reference is made to APPLICATION INSTRUCTIONS.
Note:	**HEMPEL'S GALVOSIL 15750 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1575019840CR003

HEMPEL'S GALVOSIL FIBRE 15750

BASE 15759 with HEMPEL'S ZINC METAL PIGMENT 97170

Description:

HEMPEL'S GALVOSIL FIBRE 15750 is a two-component, solvent-borne, self-curing, inorganic zinc silicate with outstanding resistance against weathering and abrasion. It has excellent chemical resistance within the pH range 6-9. For service temperature range, see below. Applicable by airless spray. Offers cathodic protection of local mechanical damage.

Recommended use:

1. As a general purpose, heavy-duty, rust-preventing primer.
2. As a single, complete coating for long-term protection of steel exposed to moderately to severely corrosive environment and to abrasion.
3. In areas (e.g. corners) where high film thickness (up to 200 µm dry film thickness) locally can be expected.

In compliance with SSPC-Paint 20, type 1, level 2.

Service temperatures:

- Resistant to permanent (non-cyclic) dry temperatures as well as occasionally dry peak temperatures up to max. 500°C/932°F.
  In case of service temperatures above 400°C/752°F, it is of advantage to apply a topcoat of HEMPEL'S SILICONE ALUMINIUM 56910.
- Resistant to cyclic dry temperatures up to 400°C/752°F.
- Resistance to higher temperatures under humid conditions, see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.only.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Metal grey/19840
Finish:	Flat
Volume solids, %:	62 ± 1
Theoretical spreading rate:	12.0 m^2/litre - 50 micron 497 sq.ft./US gallon - 2 mils
Flash point:	14°C/57°F
Specific gravity:	2.42 kg/litre - 20.2 lbs/US gallon
Dry to touch:	30 (approx.) min. at 20°C/68°F (65-75% RH)
Fully cured:	16 hours at 20°C/68°F and min. 75% RH *(See REMARKS overleaf)*
V.O.C.:	450 g/litre – 3.8 lbs/US gallon
Shelf life:	1 year (25°C/77°F) for liquid 15759 and 3 years for Hempel's zinc metal pigment 97170 (stored in closed container) from time of production. Shelf life is dependent on storage temperature. Shelf life is reduced at storage temperatures above 25°C/77°F. Do not store above 40°C/104°F. Shelf life is exceeded if the liquid is gelled or if the mixed product forms gels before application.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15750:	Liquid 15759 : Hempel's zinc metal pigment 97170 9.2 parts by weight : 15.0 parts by weight (Mixing by volume - see REMARKS overleaf)		
Application method:	Airless spray	Air spray	Brush (touch-up)
Thinner (max.vol.)	08700 (30%)	08700 (50%)	08700 (10%)
Pot life:	4 hours (20°C/68°F)		
Nozzle orifice:	.019"-.023"		
Nozzle pressure:	100 bar/1500 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08700		
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	When fully cured *(See REMARKS overleaf)*		
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S GALVOSIL FIBRE 15750

SURFACE PREPARATION:	Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting with sharp abrasive to minimum Sa 2½ with a surface profile equivalent to Rugotest No. 3, BN10, Keane-Tator Comparator, min. 3.0 G/S, or ISO Comparator rough Medium (G). In case of new steel to be exposed to no more than medium aggressive (industrial) environment and without any extraordinary demands to lifetime, a surface preparation degree of SSPC-SP6 may suffice. Consult separate APPLICATION INSTRUCTIONS, and - as relevant - the corresponding PAINTING SPECIFICATION for cargo tanks.
APPLICATION CONDITIONS:	The surface must be completely clean and dry with a temperature above the dew point to avoid condensation. At temperatures ranging from 0°C/32°F to 40°C/105°F, curing needs minimum 65% relative humidity and is very retarded at lower temperatures. Consult separate APPLICATION INSTRUCTIONS.
SUBSEQUENT COAT:	According to specification.
REMARKS:	
Service temperatures:	If used as anticorrosive protection **under insulation** of high temperature equipment it is very important that NO moisture can penetrate during shut-down periods. This to avoid risk of "wet corrosion" when the temperature rises. **Wet service temperature**, non-saline water: Maximum 60°C/140°F. **Wet service temperature**, other liquids: Consult the corresponding CARGO PROTECTION GUIDE. Hot sea water washing and (low pressure) steam cleaning should never be executed on tank coatings which have not been in service for at least one month. Contact HEMPEL about temperatures permissible.
Application Equipment:	A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	If **topcoated** with a heavy- duty system, 50-80 micron/2-3,2 mils dry film thickness (75-125 micron/3-5 mils wet) is recommended. Consult separate APPLICATION INSTRUCTIONS before recoating. For long-term protection **without topcoat**, 75 micron/3 mils dry film thickness (100-125 micron/4-5 mils wet) is generally recommended. In tanks 100 micron/4 mils dry film thickness (150 micron/6 mils wet) is recommended but may be applied in 125 micron/5 mils dry film thickness (200 micron/8 mils wet). **High temperature service**: To avoid cracking during service, it is important to keep the dry film thickness at maximum 40-50 micron/1.6-2 mils, especially in cases where service conditions include sudden temperature changes. (The dry film thickness range does not take into account the correction factors for rough surfaces as listed in ISO 19840).
Mixing:	When mixing part of the content in a can the mixing ratio on volume should be made as follows: Measure 7.85 parts of liquid 15759, then add Hempel's zinc metal pigment 97170 up to a total of 10,0 parts by volume.
Thinning:	For application at high temperatures, a special thinner is available.
Recoating:	Recoating intervals are strongly dependent on both temperature and humidity. Deviations from the standard conditions may shorten or prolong the recoating intervals. Full curing will be obtained after: 0°C/32°F and min. 75% RH: 3 days 10°C/40°F and min. 75% RH: 36 hours 20°C/68°F and min. 75% RH: 16 hours (a certain curing does take place at temperatures below 0°C/32°F, but at an extremely low speed). Furthermore consult separate APPLICATION INSTRUCTIONS.
Curing, cargo tanks:	Before cargo tanks are taken into use, the coating must be completely through-cured. It is recommended to carry out low pressure hosing of the tanks with (fresh) water 2-3 times at ambient temperatures. Let the tanks remain wet between the washings. Reference is made to APPLICATION INSTRUCTIONS.
Note:	**HEMPEL'S GALVOSIL FIBRE 15750 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1575019840CR003

For product description refer to product data sheet

HEMPEL'S GALVOSIL FIBRE 15750

Scope:

These application instructions cover surface preparation, application equipment, and application of HEMPEL'S GALVOSIL FIBRE 15750.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major new-buildings/new constructions or extensive repair jobs.

Steel work:

For optimum performance, eg. relevant for cargo tank coating, the following is recommended:
All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in welding seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be build-up on all surfaces. The radius of the rounding should be approximately 1-2 mm. Any laminations must be removed.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:2007.

Note: Porous surfaces such as certain types of cast iron cannot be properly protected with zinc silicate. Deeply corroded steel may also be difficult to protect with a zinc silicate.

All steel work (including welding, flame cutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed by high pressure fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes. Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

Old steel: Even after a very thorough cleaning, pits may typically contain contamination in the form of remnants of chemicals/water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary. After the first blasting, a very thorough vacuum cleaning is carried out in order to see if any "chemical bleeding" occurs as well as controls for water soluble salts (reference is made to separate instructions) are made. Special care should be taken in evaluating pitted areas - ask for special guidelines.

Abrasive blasting with sharp abrasive to min Sa 2½, ISO 8501-1:2007.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10, Keane-Tator Surface Comparator, G/S min 3.0 or ISO 8503/1 rough Medium (G).

In case of new steel to be exposed to no more than medium aggressive (industrial) environment and without any extraordinary demands to lifetime, a surface preparation degree of SSPC-SP6 may suffice.

Note: A lower surface profile than specified will cause reduced adhesion and increased tendency to mud cracking.

Use steel grit, aluminium silicate, or similar sharp edged abrasives of a good quality free of foreign matters, soft particles, and the like. Control for absence of contamination according to separate guidelines.

Steel grit with particle sizes of 0.2-1.2 mm or aluminium silicate of 0.4-1.8 mm will usually create the desired surface profile when the air pressure measured at the nozzle is 6-7 bar/85-100 psi.

The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

When the abrasive blasting is completed, remove residual grit and dust by vacuum cleaning. Abrasive particles not removed by vacuum cleaning are to be removed by brushing with clean brushes followed by vacuum cleaning.

The importance of systematic working must be stressed when blasting. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

Old tank coatings: Must be completely removed. If the steel is pit corroded, the above guidelines for "Old steel" must be followed.

Shopprimed surfaces: When shoppriming is required only zinc silicate shopprimer such as HEMPEL'S SHOPPRIMER ZS 15890 may be used and preferably in a reddish shade.

Before recoating with GALVOSIL 15750, intact shopprimer must be abrasive grit swept in order to obtain specified roughness. A uniform sweep blasting is required, removing minimum 70% of the shopprimer followed by vacuum cleaning to remove accumulated dirt and zinc salts and to ensure adhesion.

Welds, rusty spots, burned areas, and all areas with other types of shopprimers than zinc silicates of a type like HEMPEL'S SHOPPRIMER ZS 15890 must be completely abrasive grit blasted as described above.

Application equipment:

GALVOSIL 15750 can be applied by conventional spray equipment (pressure pot type), airless spray equipment, or by brush.

Conventional Spray equipment: Standard industrial spray equipment with mechanical agitator and pressure regulators, air filters, and water traps.

Air hose:	10 mm (3/8") internal diameter.
Material hose:	13 mm (1/2") internal diameter.

Hoses should be as short as possible, preferably not longer than 10 metres/30 feet.

Pot pressure:	2.5-5 bar (35-70 psi)
Atomization pressure:	1.5-2.5 bar (20-35 psi)
Nozzle orifice:	1.8-2.2 mm (.070"-.085")

(Spray-data are indicative and subject to adjustment).

A **reversible nozzle** is recommended.
Filter: Surge tank filter and tip filter should be removed.

Thinning, if required: max. 50% of THINNER 08700.

The pressure pot must be placed at the same level as or at a higher level than the spray gun when spraying, owing to the weight of the material. Alternatively a piston-pump (e.g. 10:1) may be used instead of the pressure pot. This will facilitate the use of longer hoses or having the spray gun at a higher level than the pump.

When painting undersides, the spray gun will need intermittent cleaning with THINNER 08700 to prevent clogging of the nozzle.

With conventional spray application regulation of the pot and the atomizing air pressures can be made as follows:

1. Shut off the atomizing air.

2. Regulate the pressure in the pot so that the material reaches approximately 60 cm/20" horizontally out from the gun before falling to the ground.

3. Turn on the atomizing air using lowest possible pressure.

Airless spray equipment: A large, slow-working pump is preferred, eg. 30:1, with a pump capacity of 8-12 litres/minute. The in-line filter should be 60 mesh.

Gaskets:	Teflon
Nozzle orifice:	.019" through .023".
Fan angle:	40° through 70°.
Nozzle pressure:	100-150 bar (1400-2100 psi).

(Spray data are indicative and subject to adjustment).

A **reversible nozzle** is recommended.
Filter: Surge tank filter and tip filter should be removed.

Thinning, if required: max. 30% of THINNER 08700.

Thinning:

The amount of thinning necessary will depend upon prevailing conditions: Temperature, humidity, wind/ventilation, method of spraying, spray equipment, etc.

In the case of a high level of thinning and/or long stops in application, the mixed paint must be re-circulated to avoid settlement of zinc particles in the spray hoses.

The coating **must** be wet and smooth just after application. Besides correct spray technique, the amount of thinner added must be selected securing this optimum film formation.

Too little thinning will typically lead to dry-spray and too much thinning to sagging and settling of zinc particles in the can or in the spray hoses.

Cleaning of equipment:

The whole equipment must be cleaned thoroughly with THINNER 08700 after use.

Additionally for conventional spray-guns:
In the case of short stops, prevent packing of zinc around the needle by placing the spray gun in THINNER 08700 and let some air pass the spray gun. In the case of longer stops, clean the spray gun with THINNER 08700.

Mixing:

a. Do not open packings until immediately before use. The entire content of the two packings must be used for each batch to ensure a correct mixture. Leftovers in the packings cannot be used later. Protect HEMPEL'S ZINC METAL PIGMENT 97170 against moisture before mixing.

b. Before mixing, shake or stir the GALVOSIL 15759 LIQUID very thoroughly.

c. Pour HEMPEL'S ZINC METAL PIGMENT 97170 slowly down into the LIQUID with constant mechanical stirring. Do not mix in the reverse order. Continue stirring until the mixture is free of lumps.

d. Strain the mixture through a screen, 60 - 80 mesh (250 - 160 DIN Norm. 4188).

Pot life:

4 hours (20°C/68°F)

Temperature of paint:

In a hot climate it is important that the cans with LIQUID are kept out of the sun and that the temperature of the liquid is kept below 30°C/86°F in order to avoid excessive dry spray.

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Application procedure, general:

Maintain constant agitation of the mixture until the batch is depleted.

The spray gun should be kept at a distance of 30-50 cm from the surface. Hold the spray gun at a right angle to the surface, making even, parallel passes with about 50% overlap.

Besides correct spray technique the amount of thinner added must be carefully adjusted to secure optimum film formation. **The coating must be wet and smooth just after application. It is important to avoid dry-spraying.**

Select small nozzles (small orifice and small fan angle) for spray application of complicated structures, while bigger nozzles may be used for regular surfaces.

The wet film thickness must be checked immediately after application, but it can only be used as a rough guidance because of the fast drying.

Stripe coating:

All places difficult to cover properly by spray application must be stripe coated with a brush immediately before or after the spray application

Microclimate:

The actual climatic conditions at the substrate during application and until acceptance:

Recommended minimum surface temperature is 0°C/32°F.

The maximum recommended surface temperature is approx. 40°C/104°F. Higher steel temperatures are acceptable provided dry-spray is avoided by (extra thinning and) proper spray application. In extreme cases a reduction of the dry film thickness may also be necessary. In a warm climate it is recommended to carry out application during night time.

The steel temperature must be above the dew point. As a rule of thumb a steel temperature which is 3°C/5°F above the dew point can be considered safe.

In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent. All surfaces must be ventilated. However, avoid ventilators blowing directly onto the freshly applied paint.

Drying and curing, ventilation:

Correct film formation depends on adequate ventilation during drying.

A good guideline for tank coating work is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPEL'S GALVOSIL 15750 gives off in total 260 litres solvent **vapour** until it is completely dry.

The lower explosive limit, LEL, is 0.5%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 520 m^3 per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the tank.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.

Actual safety precautions may require stronger ventilation.

It is recommended to keep the relative humidity low during application and drying. Thereafter, let the relative humidity raise by "natural means", i.e. the dehumidifiers are notched off and normal ventilation used. However, it is recommended to let dehumidifiers run until dry film thicknesses have been checked - and if needed - rectified by an extra paint application.

HEMPEL'S GALVOSIL FIBRE 15750

Curing time:

Curing is dependent on (steel) temperatures and relative humidity.

At 20°C/68°F and min. 75% RH, curing requires min. 16 hours. At lower temperatures and relative humidity, curing time will increase considerably - see Product Data Sheet.

The relative humidity should be minimum 65% - and the minimum temperature 0°C/32°F - during the period of curing. Hosing down of tanks can support curing, but should if possible await the state of "near to complete" curing - please see below.

The coating will resist light showers after 1-2 hours at 20°C/68°F and 75% relative humidity.
Curing may be promoted at low humidity by hosing down the surface with water 1-2 hours after application and keeping the surface constantly wet until curing is complete. If salt water is used, rinse with fresh water if the surface is to be recoated.

State of curing:

Can be checked by rubbing the coating with a rag soaked in THINNER 08700. If the coating remains unaffected, state of curing is sufficient for recoating with other paint materials.

Full hardness will be obtained after weathering for some time.

Recommended film thickness:

For long time protection, **when topcoated with heavy-duty systems:**
50 micron/2 mils dry; 75 micron/3 mils wet, (undiluted).

For long time protection, **without topcoat:**
75-100 micron/3-4 mils dry; 125-150 micron/5-6 mils wet, (undiluted).

Too high dry film thickness, ie above approximately 250 micron/10 mils dry, should be avoided due to the risk of mud cracking or peeling. Please observe that according to accepted rules of measuring "a measurement" is to be the mean of three single point measurements taken in close vicinity.

Note: Special care is necessary to ensure proper film thickness on welding seams, edges, corners, ribs, etc.

Extra coat recoating (by itself):

Too low film thickness can be made good by applying an extra coat of HEMPEL'S GALVOSIL 15750. Surface preparation procedure - if necessary - and dilution of paint: Apply one coat and apply the second coat within 15-30 minutes before the first coat has turned grey but is still dark.

When following this procedure, HEMPEL'S GALVOSIL 15750 must be thinned approximately 15% in order to avoid too high film thicknesses.

Application of an extra coat should be done before full curing is obtained, ie during the curing period with low relative humidity. The relative humidity must be kept below 60%, absolute maximum 65%, all the time until recoating and the painted surface is not exposed to open weather, contamination of the like.

Spreading rate:

Theoretical (on a smooth surface):

dft, micron	dft, mils	m^2/litre	sq.ft./US gallon
50	2	12.4	497
75	3	8.3	332
100	4	6.2	249

Practical (with a consumption factor of 1.8):

dft, micron	dft, mils	m^2/litre	sq.ft./US gallon
50	2	6.9	276
75	3	4.6	184
100	4	3.4	138

Recoating interval (other paints):

HEMPEL'S GALVOSIL 15750 must be fully cured before recoating with a full paint system.

HEMPEL'S GALVOSIL FIBRE 15750

Topcoating procedure:

Non-weathered zinc silicate coatings are porous and popping may occur in the subsequent coat(s). One way to reduce the risk of popping is to apply a mist coat as the first pass of the subsequent coat, let the air escape, and then apply the remainder of the topcoat.

Some of HEMPEL's products will substantially reduce the risk of popping when applied directly on top of the zinc silicate. See painting specification.

Advanced paint systems are recommended for topcoating, e.g. HEMPADUR qualities.

Surface cleaning:

The cleaning before topcoating depends on the condition of the surface:

1. Intact zinc silicate surface with sporadic formation of "white rust" (zinc corrosion products).
   a. Remove oil, grease, dirt, etc. by detergent wash.
   b. Remove "white rust" by high pressure fresh water cleaning 200-350 bar (2900-5000 psi) at a nozzle-to-surface distance of 15-20 cm (6-8").

   If the surface is only slightly contaminated, corresponding to 1-2 months of exposure in a mildly corrosive environment, hosing down of the surface with fresh water and scrubbing with stiff brushes (nylon) may be sufficient and more practical. Check that the coating is through dry before recoating.
2. Zinc silicate surface with extreme formation of "white rust" which cannot be removed as described above.
   a. Remove oil, grease, dirt, etc. by detergent wash.
   b. Abrasive blast sweep to remove "white rust", followed by vacuum cleaning to remove abrasives and dust.
   c. Restore the zinc layer with any solvent-borne GALVOSIL quality or zinc epoxy (HEMPADUR ZINC).
3. Damaged areas, burns, weld spatters, etc.
   a. Remove oil, grease, dirt, etc. by detergent wash.
   b. Remove weld spatters.
   c. Abrasive blasting to min. Sa 2½, followed by thorough removal of abrasives and dust by vacuum cleaning.
   d. Restore the zinc layer with any solvent-borne GALVOSIL quality or zinc epoxy (HEMPADUR ZINC).

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY:

HEMPEL A/S - 1575019840CRO01

Product Data

HEMPEL'S GALVOSIL 15780

HEMPEL'S LIQUID 15789 with HEMPEL'S ZINC METAL PIGMENT 97170

Description:
HEMPEL'S GALVOSIL 15780 is a two-component, medium-zinc, solvent-borne, self-curing inorganic zinc silicate coating. Applicable by airless spray.

Recommended use:
As a general purpose rust-preventing primer in paint systems for long-life protection of steel exposed to moderately to severely corrosive environment.

Service temperatures:
Maximum service temperature is depending on the subsequent coat.
See REMARKS overleaf.

Certificates/Approvals:
Meets the requirements laid down in ASTM A-490 Class "B" for Slip-Co-efficient and Creep Resistance.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/shade nos:	Metal grey/19840
Finish:	Flat
Volume solids, %:	61 ± 1
Theoretical spreading rate:	12.2 m^2/litre - 50 micron 489 sq.ft./US gallon - 2 mils
Flash point:	14°C/57°F
Specific gravity:	2.4 kg/litre - 20.0 lbs/US gallon
Dry to touch:	30 (approx.) min. at 20°C/68°F (75% RH)
Fully cured:	16 (approx.) hours at 20°C/68°F (75% RH)
V.O.C.:	445 g/litre - 3.7 lbs/US gallon

Shelf life:
6 months (25°C/77°F) for liquid 15789 and 3 years for Hempel's zinc metal pigment 97170 (stored in closed container) from time of production.
Shelf life is dependent on storage temperature. Shelf life is reduced at storage temperatures above 25°C/77°F. Do not store above 40°C/104°F.
Shelf life is exceeded if the liquid is gelled or if the mixed product forms gels before application.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:
Consult separate APPLICATION INSTRUCTIONS

Mixing ratio for 15780:	Liquid 15789 : Hempel's zinc metal pigment 97170 4.1 parts by weight : 5.9 parts by weight (Mixing by volume - see REMARKS overleaf)		
Application method:	Airless spray	Air spray	Brush (touch-up)
Thinner (max.vol.):	08700 (30%)	08700 (50%)	08700 (10%)
Pot life:	4 hours (20°C/68°F)		
Nozzle orifice:	.019" - .023"		
Nozzle pressure:	100 bar/1500 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08700		
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	When fully cured		
Subsequent coat, max:	6 months		

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S GALVOSIL 15780

SURFACE PREPARATION:	Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting with sharp abrasive to minimum Sa 2½ with a surface profile equivalent to Rugotest No. 3, BN10, Keane-Tator Comparator, min. 3.0 G/S, or ISO Comparator rough Medium (G). In case of new steel to be exposed to no more than medium aggressive (industrial) environment and without any extraordinary demands to lifetime, a surface preparation degree of SSPC-SP6 may suffice. Consult separate APPLICATION INSTRUCTIONS.
APPLICATION CONDITIONS:	From 0°C/32°F to 40°C/104°F. Curing needs minimum 65% relative humidity and is very retarded at lower temperatures. Furthermore consult separate APPLICATION INSTRUCTIONS.
SUBSEQUENT COAT:	According to specification. Recoating is expected to take place within 6 months after application of HEMPEL'S GALVOSIL 15780.
REMARKS:	**Certificates** are issued under the former quality number 1578.
Service temperature:	HEMPEL'S GALVOSIL 15780 may be used for high temperature service if overcoated with HEMPEL'S SILICONE ALUMINIUM 56910. In such a case it will be resistant to permanent dry temperatures up to 500°C/932°F. In case of cyclic service conditions with regular periods of low and high temperatures it is recommended to keep the maximum temperature below 400°C/752°F.
Note:	If used as anticorrosive protection **under insulation** of high temperature equipment it is very important that NO moisture can penetrate during slowdown periods. This to avoid risk of "wet corrosion" when the temperature rises.
Film thicknesses:	50 micron/2 mils dry film thickness is recommended, but 75 micron/3 mils dry film thickness (125 micron/5 mil wet) may be specified, this will alter spreading rate and may influence drying time and recoating interval. (The dry film thickness range does not take into account the correction factors for rough surfaces as listed in ISO 19840).
Mixing:	When mixing part of the content in a can the mixing ratio on volume should be made as follows: Measure 8.0 parts of liquid 15789 and then add Hempel's zinc metal pigment 97170 up to a total of 10.0 parts by volume.
Thinning:	For application at high temperatures, a special thinner is available.
Recoating:	Recoating intervals are strongly dependent on both temperature and humidity. Deviations from the standard conditions may shorten or prolong the recoating intervals. Full curing will be obtained after: 0°C/32°F and min. 75% RH: 3 days 10°C/40°F and min. 75% RH: 36 hours 20°C/68°F and min. 75% RH: 16 hours (a certain curing does take place at temperatures below 0°C/32°F, but at an extreme low speed). Furthermore consult separate APPLICATION INSTRUCTIONS.
Note:	**HEMPEL'S GALVOSIL 15780 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1578019840CO0015

For product description refer to product data sheet

HEMPEL'S GALVOSIL 15780

Scope:

This application instruction covers surface preparation, application equipment and application of HEMPEL'S GALVOSIL 15780.

For optimum performance, the following is recommended:

Steel work:

All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in welding seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be build-up on all surfaces. The radius of the rounding should be approximately 1-2 mm. Any laminations must be removed.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:2007.

Note: Porous surfaces such as certain types of cast iron cannot be properly protected with zinc silicate. Pit-corroded steel (Grade D of ISO 8501-1:2007) may also be difficult to protect with a zinc silicate.

All steel work (including welding, flame cutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil and grease and other contamination with a suitable detergent followed by fresh water high pressure hosing. Alkali deposits on new welding seams as well as possible soap traces from pressure testing (tanks) are removed by fresh water wash (scrubbing with stiff brushes).

Abrasive blasting with sharp abrasive to min. Sa 2½, ISO 8501-1: 2007.
Surface profile equivalent to Rugotest No. 3, min. BN 10 Keane-Tator Surface Comparator, G/S min 3.0 or ISO 8503/1 rough Medium (G).

In case of new steel to be exposed to no more than medium aggressive (industrial) environment and without any extraordinary demands to lifetime, a surface preparation degree of SSPC-SP6 may suffice.

Use steel grit, aluminium silicate or similar sharp edged abrasive of a good quality free of foreign matters, soft particles and the like. Control for absence of contamination according to separate guidelines.

The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

Steel grit with a particle size of 0.2-1.0 mm or aluminium silicate of 0.4-1.8 mm will usually create the desired surface profile when the air pressure measured behind the nozzle is 6-7 bars/85-100 psi.

When blasting is completed, remove residual grit and dust.

Note: Lower surface profile than specified will cause reduced adhesion and increased tendency to mud cracking. On the other hand too high surface profile (steel grit) should be avoided as this may introduce a risk of pin-point rusting.

HEMPEL'S GALVOSIL 15780

Shopprimed surfaces:

If HEMPEL'S SHOPPRIMER ZS 15890 or other zinc silicate product is used for preliminary protection, abrasive sweep intact surface before final coating with GALVOSIL 15780 to remove accumulated dirt and zinc salts and to ensure adhesion.

Application:

GALVOSIL 15780 can be applied by conventional spray (pressure pot type), airless spray or brush.

Conventional Spray equipment: Standard industrial spray equipment with mechanical agitator and pressure regulators, air filters, and water traps.

Air hose:	10 mm (3/8") internal diameter.
Material hose:	13 mm (1/2") internal diameter.

Hoses should be as short as possible, preferably not longer than 10 metres/30 feet.

Pot pressure:	2.5-5 bar (35-70 psi)
Atomization pressure:	1.5-2.5 bar (20-35 psi)
Nozzle orifice:	1.8-2.2 mm (.070"-.085")

(Spray-data are indicative and subject to adjustment).

Thinning, if required: max. 50% of THINNER 08700.

The pressure pot must be placed at the same level as or at a higher level than the spray gun when spraying, owing to the weight of the material. Alternatively a piston-pump (e.g. 10:1) may be used instead of the pressure pot. This will facilitate the use of longer hoses or having the spray gun at a higher level than the pump.

When painting undersides, the spray gun will need intermittent cleaning with THINNER 08700 to prevent clogging of the nozzle.

With conventional spray application regulation of the pot and the atomizing air pressures can be made as follows:

1. Shut off the atomizing air.

2. Regulate the pressure in the pot so that the material reaches approximately 60 cm/20" horizontally out from the gun before falling to the ground.

3. Turn on the atomizing air using lowest possible pressure.

Airless spray equipment: A large, slow-working pump is preferred, e.g 30:1, with a pump capacity of 8-12 litres/minute. The in-line filter should be 60 mesh.

Gaskets:	Teflon
Nozzle orifice:	.019" through .023".
Fan angle:	40° through 70°.
Nozzle pressure:	100-150 bar (1400-2100 psi).

(Spray data are indicative and subject to adjustment).

Thinning, if required: max. 30% of THINNER 08700.

Wet film thickness:

Wet film thickness must be checked immediately after application, but can be used as a rough guidance only because of the fast drying.

Thinning:

The amount of thinning necessary will depend upon prevailing conditions: Temperature, humidity, wind/ventilation, method of spraying, spray equipment, etc.

Too little thinning will typically lead to dry-spray and too much thinning to sagging and settling of zinc particles in the can or in the spray hoses.

In the case of a high level of thinning and/or long stops in application, the mixed paint must be recirculated to avoid settlement of zinc particles in the spray hoses.

HEMPEL'S GALVOSIL 15780

Note:

The coating **must** be wet and smooth just after application. Besides correct spray technique, the amount of thinner added must be selected securing this optimum film formation.

Cleaning of equipment:

All equipment must be cleaned thoroughly with THINNER 08700 after use.

Additionally for conventional spray-guns:
In the case of short stops, prevent packing of zinc around the needle by placing the spray gun in THINNER 08700 and let some air pass the spray gun. In the case of longer stops, clean the spray gun with THINNER 08700.

Mixing:

a. Do not open packings until immediately before use. The entire content of the two packings must be used for each batch to ensure a correct mixture. Leftovers in the packings cannot be used later. Protect HEMPEL'S ZINC METAL PIGMENT 97170 against moisture before mixing.

b. Before mixing, shake or stir the GALVOSIL 15789 LIQUID very thoroughly.

c. Pour HEMPEL'S ZINC METAL PIGMENT 97170 slowly down into the LIQUID with constant mechanical stirring. **Do not mix in the reverse order.** Continue stirring until the mixture is free of lumps.

d. Strain the mixture through a screen, 60 - 80 mesh (250 - 160 DIN Norm. 4188).

Pot life:

4 hours (20°C/68°F)

Temperature of paint:

In a hot climate it is important that the cans with LIQUID are kept out of the sun and that the temperature of the liquid is kept below 30°C/86°F in order to avoid excessive dry spray.

Stripe coating:

All places difficult to cover properly by spray should be stripe coated with brush immediately before spray application - if necessary also after spray application.

Microclimate:

(Actual climatic conditions at substrate).

During application: minimum surface temperature 0°C/32°F. Maximum recommended temperature approx. 40°C (approximately 104°F), but higher steel temperatures will be possible provided dry-spray is avoided by extra thinning and proper spray application. In extreme cases reduction of dry film thickness may also be necessary.

If the surface temperature is higher than the ambient temperature, the relative humidity at the surface will be lower than ambient - this will affect the rate of curing. Wetting of the coated surface with fresh water may in such cases be required in order to accelerate or in some cases even enable curing.

Steel temperature has to be above the dew point. As a rule of thump a steel temperature 3°C (5°F) above the dew point can be considered safe.

In confined spaces, supply an adequate amount of fresh air during application and drying to assist solvent evaporation. Ventilation for this purpose is recommended to be a minimum corresponding to a few air shifts per hour along all surfaces. However, avoid ventilators blowing directly onto the freshly applied paint.

After application until complete curing: Minimum steel temperature 0°C/32°F, relative humidity minimum 65%.

Curing time:

Curing is dependent on (steel) temperatures and relative humidity.

At 20°C/68°F and 75% RH, curing requires approximately 16 hours. At lower temperatures and relative humidity, curing time will be considerably prolonged.
See Product Data Sheet.

The coating will resist light showers after 1-2 hours at 20°C (68°F) and 75% relative humidity.

To accelerate curing at lower humidity hose down surface with fresh water 1-2 hours after application and keep surface constantly wet until curing is complete.

Complete curing can be checked by rubbing the coating with a rag soaked in THINNER 08700. If the coating remains unaffected, the curing is complete and ready for recoating.

Film thickness, primer and full paint system:

Permanent protection, with topcoat:

Preferably 50 micron (2 mils) dry; however, 75 micron (3 mils) dry, may be specified. In case of a long-term durable paint system, the total thickness of the subsequent system is to be at least 150 micron (6 mils) dry.

Special care should be taken to ensure proper thickness on welding seams, edges, corners, ribs, etc.

Extra coat (recoating by itself):

Too low film thicknesses can be made good by applying an extra coat, of diluted HEMPEL'S GALVOSIL 15780. This should be done before full curing is obtained, ie during the curing period with low relative humidity. Light sandpapering of the surface is recommended in order to remove any spray dust before overcoating takes place. Vacuum cleaning should be carried out if necessary. Dilute the extra coat approximately 20-25%.

There is a risk of mud cracking or peeling if applied in too high film thickness (more than approx. 125 micron/5 mils dry film thickness).

Spreading rate:

	Micron	(Mils)	m^2/litre	(sq.ft./US gallon
Theoretical:	50	(2)	12.2	(489)
(on smooth surface):	75	(3)	8.1	(326)
Practical (consumption	50	(2)	6.8	(272)
factor 1.8):	75	(3)	4.5	(181)

Recoating (with other paints):

For recoating advanced paint systems shall be used, e.g. HEMPADUR.

Recoating is expected to take place within 6 months after application of GALVOSIL 15780.

Recoating interval:

When fully cured (see CURING TIME).

Non-weathered zinc silicate coatings are porous, and popping may occur in the subsequent coat. The best way to avoid popping is to apply a mist coat in the first pass of the topcoat. Let the air escape and apply the rest of the topcoat.

Some of HEMPEL's products will substantially reduce the risk of popping when applied directly on top of the zinc silicate. See painting specification.

Topcoating procedures depend on the condition of the surface as described below:

1. **Intact zinc silicate with sporadic formation of "white rust".**

   a. Remove oil, grease, dirt etc. by detergent wash.

   b. Remove "white rust" by high pressure water jetting with fresh water (250-300 bar (3625-4350 psi) at a nozzle distance of 15-20 cm (6-8")).

If the surface is only slightly contaminated, corresponding to 1-2 months of exposure in a mild climate, hosing down of the surface and scrubbing with stiff brushes (nylon) may be more practical.
Make sure that the film is through dry before recoating.

2. **Zinc silicate surface with extreme formation of "white rust" which cannot be removed as described above.**

   a. Remove oil, grease and dirt by a detergent wash (or solvent wash).

   b. Sandsweeping for removal of contaminants. Thorough removal of dust by vacuum cleaning.

   c. Touch up with a solvent-borne GALVOSIL quality or a HEMPADUR ZINC primer type.

3. **Damaged areas, burns, weld spatter, etc.**

   a. Remove oil, grease and dirt by a detergent wash (or solvent wash).

   b. Remove weld spatters.

   c. Blasting to min. Sa 2½, thorough removal of dust by vacuum cleaning.

   d. Restore the zinc layer with a solvent-borne GALVOSIL quality or a HEMPADUR ZINC primer type.

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 1578019840CO015

Product Data

HEMPEL'S SHOPPRIMER ZS 15890

BASE 15899 with HEMPEL'S LIQUID 99751

Description:

HEMPEL'S SHOPPRIMER ZS 15890 is a two-component, solvent-borne zinc ethyl silicate shopprimer, designed for automatic spray application. Especially suited, where welding (MIG/MAG) and gas-cutting properties are of importance.

Recommended use:

For short to medium-term protection of abrasive blast cleaned steel plates and other structural steel during the storage, fabrication, and construction periods.

Certificates/Approvals:

Approved as a welding primer by Lloyd's Register of Shipping, Det Norske Veritas, Germanischer Lloyd,Bureau Veritas, RINA, Italy and Maritime Register of Shipping, Russia.
See REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Reddish grey/19890 - Grey/19840
Finish:	Flat
Volume solids, %:	28 ± 1
Theoretical spreading rate:	18.7 m^2/litre - 15 micron 749 sq.ft./US gallon – 0,6 mils
Flash point:	22°C/72°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Dry to handle:	4-5 minutes at 20°C/68°F
Fully cured:	3 days at 20°C/68°F *(75% RH)*
V.O.C.:	620 g/litre - 5.15 lbs/US gallon *(According to EPA Fed Ref Method 24)*
Shelf life:	1 year (25°C/77°F) from time of production. Shelf life is dependent on storage temperature. Shelf life is reduced at storage temperatures above 25°C/77°F. Do not store above 40°C/104°F or below 5°C/40°F. Shelf life is exceeded if the liquid is gelled or if the mixed product forms gels before application.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 15890:	Base 15899 : Liquid 99751 2 : 3 by volume		
Application method:	Airless spray	Air spray	Brush (touch-up)
Thinner (max.vol.):	08570 or 08700 (30%) *(See REMARKS overleaf)*	08700 (30%)	08570 or 08700 (15%)
Pot life:	24 hours (20°C/68°F) *(Closed container, constant stirring) (See REMARKS overleaf)*		
Nozzle orifice:	.019"-.023"		
Nozzle pressure:	80 bar/1200 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08570 or 08700		
Indicated film thickness, dry:	15 micron/0.6 mil *(See REMARKS overleaf)*		
Indicated film thickness, wet:	Not relevant		
Recoat interval, min:	When fully cured		
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S SHOPPRIMER ZS 15890

SURFACE PREPARATION:	Remove oil and grease with suitable detergent. Abrasive blasting to minimum Sa 2½ with a surface profile equivalent to Rugotest No. 3, min. N9a, Keane-Tator Comparator, 2 mils segments or ISO Comparator Medium (G,S). For special purposes grit blasting is necessary.
APPLICATION CONDITIONS:	The surface must be completely clean and dry with a temperature above the dew point to avoid condensation. Minimum steel temperature 0°C/32°F, max. approximately 55°C/131°F: Curing: Minimum temperature for curing 0°C/32°F, minimum 30%, preferably above 65% relative humidity. Consult separate APPLICATION INSTRUCTIONS.
SUBSEQUENT COAT:	As per specification.
REMARKS:	**Certificates** may be issued under the former quality number 1589.
Ballast tanks:	For steel to be used for ballast tanks, IMO Resolution MSC.215(82) requires that the contamination with water soluble salts measured according to ISO 8502-9 must not exceed a conductivity equivalent to 50 mg/m^2 sodium chloride. The dust quantity rating assessed according to ISO 8502-3 must not exceed rating "1" for dust size classes "3", "4" or "5".
Film thicknesses	For this shopprimer, the indicated dry film thickness means the thickness measured on a smooth test panel and when the shopprimer is being applied to an abrasive blasted substrate with a roughness of approximately Rz 60 micron. A higher roughness may require upwards adjustment of the dry film thickness and correspondingly reduce the theoretical spreading rate. Actual specified dry film thickness may depend on welding requirements, exposure conditions and required protection time. Dry film thickness range with suitable thinning is 10-25 micron/0.4-1 mil. The shopprimer should be applied in a uniform film thickness. Avoid dry spray and exaggerated film thicknesses.
Thinning:	Selection of proper thinner is related to application conditions. At high temperatures, a special THINNER 08740 with a very slow flash-off may be used - please consult separate APPLICATION INSTRUCTIONS.
Curing:	Curing time is prolonged at relative humidity below 75%.
Recoating:	No maximum recoating interval for adhesion, but dictated by gradual breakdown and damage during exposure and fabrication. Regarding treatment before recoating, please consult the APPLICATION INSTRUCTIONS.
Shelf life:	If shelf life is exceeded, it is usually possible to use the zinc paste (BASE), if any settling can be remixed. The liquid may be used provided it shows no signs of turbidity, but pot life will be very much shortened, see below. In any case, possible surpassing of storage time will be of 1-2 months maximum (20°C/68°F) for the liquid.
Pot life:	The pot life may be gradually reduced to 8 hours (20°C/68°F) as the liquid approaches the end of its shelf life, assuming that it is stored under favourable conditions.
Local adjustments:	Today's requirements for efficiency, the more frequent use of plural component application equipment and variations in climatic application conditions may require local adjustments in solvent composition, degree of pre-thinning and degree of pre-hydrolosis for the shopprimer as supplied. As such adjustments may influence flash point and volume solids %, Hempel's quality control system requires separate product numbers, Product Data Sheets and Material Safety Data Sheets to be issued, even though the adjustments have no influence on the composition and properties of the final and cured shopprimer film. The following product numbers represent such adjustments: • HEMPEL'S SHOPPRIMER ZS 15893 • HEMPEL'S SHOPPRIMER ZS 1589B • HEMPEL'S SHOPPRIMER ZS 1589S • HEMPEL'S SHOPPRIMER ZS 1589K
Note:	**HEMPEL'S SHOPPRIMER ZS 15890 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1589019890CO0012

HEMPEL'S SHOPPRIMER ZS 15890

HEMPEL'S LIQUID 99751

Scope:

These Application Instructions cover surface preparation, application equipment, and application of HEMPEL'S SHOPPRIMER ZS 15890.

Surface preparation:

Note: For steel to be used for ballast tanks, IMO Resolution MSC.215(82) requires that the contamination with water soluble salts measured according to ISO 8502-9 must not exceed a conductivity equivalent to 50 mg/m^2 sodium chloride. The dust quantity rating assessed according to ISO 8502-3 must not exceed rating "1" for dust size classes "3", "4" or "5".

a. Prior to abrasive blast cleaning of the steel, remove oil and grease and other contamination with a suitable detergent, followed by high pressure fresh water hosing.

b. Abrasive blasting to Sa 2½, ISO 8501-1: 2007.
The abrasives must be capable of developing a surface profile equivalent to Rugotest No. 3, N9a to N10a (Ra = 6-12.5 micron/1/4-1/2 mil), Keane-Tator Surface Comparator, 2-3 mils segments (average maximum peak to valley roughness 50-75 micron/2-3 mils), or ISO Comparator, Medium (G,S).

Note: In case of abrasive blasting with shot instead of grit the resulting surface profile will give lower adhesive values and thereby reduced mechanical properties of the coating. Recoating with heavy-duty systems such as HEMPADUR qualities can then generally be recommended only after a very thorough abrasive grit sweeping. Also for recoating with zinc silicates such as GALVOSIL 15700 a thorough abrasive grit sweeping is mandatory to give the required surface profile.

c. When the abrasive blasting is completed, remove all grit and dust by vacuum cleaning.

Note: As abrasive blasted surfaces will rust rapidly, HEMPEL'S SHOPPRIMER ZS 15890 must be applied immediately after the abrasive blasting and de-dusting. If re-rusting occurs, re-blasting is necessary.

Application equipment:

HEMPEL'S SHOPPRIMER ZS 15890 can be applied by conventional spray equipment (pressure pot type only), airless spray equipment and brush.

Conventional spray equipment:
Standard industrial spray equipment with mechanical agitator, pressure regulator, air filters, and water traps.

Pot pressure:	2.5-5 bar (35-75 psi)
Atomizing pressure:	1.5-2.5 bar (20-35 psi)
Air hose:	10 mm (3/8") internal diameter
Material hose:	13 mm (1/2") internal diameter

(Spray data are indicative and subject to adjustment).

Note: The hoses should be as short as possible, preferable not longer than 10 metres/35 feet. Place the pressure pot at the same level as or at a higher level than the spray gun when spraying, owing to the weight of the paint.

The pressure pot may advantageously be replaced by a piston pump with a low ratio of pressures.

In case of application stops, if possible re-circulate the paint through the hoses to avoid settling.

Clean all equipment promptly after use with the THINNER used.

Leave THINNER in the hoses when the equipment is not in use.

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Airless spray equipment:
A large, slow-working, piston pump is recommended.

Gaskets:	Teflon
Nozzle orifice:	.019" through .023"
Fan angle:	65° through 80°.
Nozzle pressure:	80 bar (1200 psi).

(Spray data are indicative and subject to adjustment).

Note: During application stops, if possible re-circulate the paint through the hoses to avoid settling.
Clean all equipment promptly after use with the THINNER used.
Leave THINNER in the hoses when the equipment is not in use.

Mixing:

a. Do not open packing until immediately before use. The entire content of the two packing must be used for each batch to ensure a correct mixture. Left-overs in the packing cannot be used later.

b. Before mixing, shake or stir the liquid very thoroughly.

c. Mix only in the proportions supplied. Do not vary or sub-divide.

d. Pour the liquid slowly into the zinc paste with constant mechanical stirring. Do not mix in the reverse order. Continue stirring until the mixture is free of lumps.

e. Strain the mixture through a screen, 60-80 mesh (250-160 DIN Norm. 4188).

f. For use in automatic shoppriming plants, adjust the mixture to a viscosity of 15-18 sec/DIN 4 or equal with the prescribed thinner.

Thinning:

Dilute the mixed product only.
For airless spray application, add maximum 30% of THINNER.
For conventional spray application, add maximum 30% of THINNER.
For touch up by brush, add maximum 15% of THINNER.

Note: THINNER 08570 has a very fast flash-off which makes it suitable at low temperatures but gives risk for dry-spray at high temperatures. THINNER 08570 is generally not recommended for conventional spray application.

THINNER 08700 has a relative slow flash-off with good film formation at high temperatures but slower drying at low temperatures.

If application takes place at high temperatures, ie 40-55°C/104-131°F, a special THINNER 08740 with even lower flash-off than THINNER 08700 should be used.
Correct selection of thinner is dependent on the actual application conditions.

Pot life:

24 hours at 20°C/68°F in a tightly closed container.

Note: Prepare only the quantity that can be used within this period. Maintain constant agitation until the batch is depleted. After expiration of the pot life the mixture must not be used even if it may appear to be unchanged.

The pot life may be gradually reduced to 8 hours (20°C/68°F) as the liquid approaches the end of its shelf life, assuming that it is stored under favourable conditions.

Application:

The coating must be wet and smooth just after application. Avoid dry-spray and excessive film thicknesses, which especially may be encountered at manual spray application.

Micro climate:

Steel temperature: min 0°C/32°F, max. approximately 55°C/131°F.

Note: The temperature should be a few degrees above the dew point to avoid condensation. At the freezing point beware of ice on the surface.
For application beyond the stated intervals contact HEMPEL for guidance.

HEMPEL'S SHOPPRIMER ZS 15890

Drying time:

Dry to handle in 4-5 minutes at 20°C/68°F and sufficient ventilation in 15 micron/0.6 mil dry film thickness.

Note: These figures apply when the temperature of the steel does not differ appreciably from that of the surroundings.

Plates can be transported or stacked as soon as dry to handle.

Processing is only recommended when fully cured.

Curing time:

Dependent on temperature and humidity.
Relative humidity: preferably min. 50% or higher
Min. temperature for curing is 0°C/32°F.
At 20°C/68°F and min. 75% relative humidity the coating will be fully cured in 3 days.

At low humidity, curing can be promoted by hosing down the surface with water 24 hours after application and by keeping the surface constantly wet until curing is complete.

Complete curing, in the sense of being ready for recoating, can be checked by rubbing the coating with a rag soaked in THINNER 08700 used. If the coating remains unaffected, the curing is complete.

Recoating interval:

HEMPEL'S SHOPPRIMER ZS 15890 must be fully cured before recoating.

Recoating procedure:

Remove oil and grease, dirt, etc. with suitable detergent followed by fresh water hosing. Remove weld spatters. Damaged areas, burns, etc. to be cleaned by rotary wire brushing, by disc grinding, by abrasive sweeping, or by abrasive blasting according to specification and touch up with the primer of the coating system proper. In case of "white rust" on intact surfaces, it is recommended to clean by fresh water hosing and scrubbing with stiff brushes.

It is risky to make a general cleaning of the exposed surface by grinding, and especially by wire-brushing as this process easily tends to give a smooth, polished surface to which the adhesion of following coats usually will be reduced.

In any case abrasive grit sweep the entire surface if the subsequent coat is GALVOSIL 15700 or similar, or if the shopprimer is polished (smooth) and the following paint system will be exposed to aggressive environments during service.

Especially if the paint system will be exposed to heavy wear - for instance a MULTI-STRENGTH-system - a very thorough abrasive grit sweeping is recommended, in severe cases a full reblasting.

Removal of dust is mandatory before recoating.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED:

HEMPEL A/S - 1589019890CO012

HEMPEL'S ZINC PRIMER 16490

Description:

HEMPEL'S ZINC PRIMER 16490 is a one-component, high molecular weight, quick drying, phenoxy coating with a high content of zinc.

Recommended use:

1. As a protective primer on steel in severely corrosive environment.
2. For repair of GALVOSIL and other zinc rich coatings.
3. For repair of galvanized steel.

In compliance with SSPC-Paint 20, type 2, level 3.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F, however, depending on the subsequent coat.

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Metal grey/19840
Finish:	Flat
Volume solids, %:	33 ± 1
Theoretical spreading rate:	9.4 m^2/litre - 35 micron 378 sq.ft./US gallon - 1.4 mils
Flash point:	7°C/45°F
Specific gravity:	1.7 kg/litre - 14.2 lbs/US gallon
Surface dry:	15 *(app)* minutes at 20°C/68°F (ISO 1517)
Dry to touch:	30 *(app)* minutes at 20°C/68°F
V.O.C.:	595 g/litre - 5.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Brush
Thinner (max. vol.):	08450 (5%)	08450 (5%)
Nozzle orifice:	.019"-.021"	
Nozzle pressure:	200 bar/2900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	THINNER 08450 or HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	35 micron/1.4 mils	
Indicated film thickness, wet:	100 micron/4 mils	
Recoat interval, min:	30 minutes (20°C/68°F)	
Recoat interval, max:	None *(See REMARKS overleaf)*	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ZINC PRIMER 16490

SURFACE PREPARATION:

New steel: Abrasive blasting to minimum Sa 2½ with a surface profile corresponding to Rugotest No. 3, N9a to N10, preferably BN9a to BN10, Keane-Tator Comparator, 2.0 G/S or ISO Comparator, Medium (G).
Repair of galvanized steel or zinc-rich coating: Remove oil and grease, etc. with suitable detergent. Remove salts and others contaminants by (high pressure) fresh water cleaning. Remove rust and loose material by abrasive blasting or power tool cleaning (avoid burnishing the surface). Dust off residues.

APPLICATION CONDITIONS:

The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation.
Tolerates low temperature application which, however, will increase drying time. At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:

None.

SUBSEQUENT COAT:

Recommended are HEMPADUR or HEMPATEX Systems according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	595	600	600	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Note: Due to a risk of corrosion from possible moisture penetration, many experts advise against the use of zinc primers behind high temperature insulation.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. Normal range is 25-35 micron/1.0-1.4 mils.

Recoating:

If the coating has been exposed to the atmosphere for some time, the surface should be thoroughly hosed down and scrubbed with a stiff brush to remove “white rust” (zinc corrosion products) in addition to the usual cleaning for dirt, oil, grease, etc. Allow surface to dry before recoating.
When overcoated, the entire paint system must be through dry and fully cured before full mechanical strength is obtained.
Care should be taken to avoid water contamination in the cans to prevent gelling or gassing.

Note:

HEMPEL'S ZINC PRIMER 16490 is for professional use only.

ISSUED BY:

HEMPEL A/S - 1649019840CO009

HEMPEL'S SILICONE ZINC 16900

Description:
HEMPEL'S SILICONE ZINC 16900 is a heat resistant zinc pigmented silicone primer. It is air drying at ambient temperature and resists temperatures up to 400°C/750°F. (See REMARKS overleaf)

Recommended use:
As a primer for long-time corrosion protection of steel exposed to high temperatures (from 100°C/210°F to 400°C/750°F).

Service temperatures:
Maximum service temperature is depending on the subsequent coat. When topcoated with HEMPEL'S SILICONE ALUMINIUM 56910 dry service temperature is max. 400°C/750°F.

Certificates/Approvals:
Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Metal grey/19840
Finish:	Flat
Volume solids, %:	54± 1
Theoretical spreading rate:	13.5 m² itre - 40 micron 541 sq.ft./US gallon - 1.6 mil
Flash point:	25°C/77°F
Specific gravity:	2.6 kg/litre - 21.7 lbs/US gallon
Surface dry:	1 (approx.) hours at 20°C/68°F (ISO 1517)
Dry to touch:	2-3 hours at 20°C/68°F
V.O.C.:	415 g/litre - 3.5 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08080 (5%)	08080 (15%)	08080 (5%)
Nozzle orifice:	.017"		
Nozzle pressure:	125 bar/1800 psi *(Airless spray data are indicative and subject to adjustments)*		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	40 micron/1.6 mil		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	24 hours (20°C/68°F)		*(See REMARKS overleaf)*
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S SILICONE ZINC 16900

SURFACE PREPARATION: Remove oil and grease etc. thoroughly with suitable detergent. Remove salts and other contaminants by high pressure fresh water cleaning.
Abrasive blasting to Sa 2½. If shopprimer is required, only zinc silicate type is recommended.

APPLICATION CONDITIONS: Clean and dry surface with a temperature above the dew point to avoid condensation. In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: None, or zinc silicate shopprimer.

SUBSEQUENT COAT: HEMPEL'S SILICONE TOPCOAT 56900, HEMPEL'S SILICONE ALUMINIUM 56910, HEMPEL'S SILICONE ACRYLIC 56940 or similar according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	415	475	600	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Note: If used as anticorrosive protection under insulation of high temperature equipment it is very important that NO moisture can penetrate during slow-down periods. This to avoid risk of "wet corrosion" when the temperature rises.

Thermoplasticity: The paint film is somewhat thermoplastic also after heating.

Film thicknesses: It is recommended to avoid too high thicknesses of the paint as this will give a risk of blistering at later heating. THINNER 08080 must be added at application to secure the low dry film thickness.

High temperature service: For high temperature service, the total dry film thickness of the paint system should preferably be kept at 75 micron/3 mils as maximum.

First exposure to heat: On first exposure to heat the temperature increase from ambient temperature to the required service temperature must run over a period of 24 hours.

Curing: The coating will be fully cured after:
3 days at 100°C/212°F,
1 day at 150°C/302°F,
or 2 hours at 200°C/392°F

Recoating: May be recoated when through dry (24 hours at 20°C/68°F).
Before recoating after exposure in contaminated environment, clean surface thoroughly by high pressure fresh water hosing and allow to dry.

Note: **HEMPEL'S SILICONE ZINC 16900 is for professional use only.**

ISSUED BY: HEMPEL A/S - 1690019840CO005

HEMPADUR ZINC 17340

BASE 17349 with CURING AGENT 97040

Description:

HEMPADUR ZINC 17340 is a two-component zinc rich epoxy paint. It cures to a strong and corrosion resistant coating.

Recommended use:

1. As a "V.O.C. compliant" primer on steel in medium to severely corrosive environment. May be applied on zinc-shopprimed steel, where damaged spots, welds etc. have been power tool cleaned.

2. For on-line application on containers.

In compliance with SSPC-Paint 20, type 2, level 3.

Service temperatures:

Maximum, dry exposure only: 140°C/284°F.

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red-grey/19830
Finish:	Semi-flat
Volume solids, %:	66 ± 1
Theoretical spreading rate:	13.2 m^2/litre - 50 micron 529 sq.ft./US gallon - 2 mils
Flash point:	30°C/86°F
Specific gravity:	2.3 kg/litre - 19.2 lbs/US gallon
Surface dry:	2 (approx.) hrs at 20°C/68°F (ISO 1517)
Dry to touch:	3 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	330 g/litre - 2.8 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 17340:	Base 17349 : Curing agent 97040 4 : 1 by volume		
Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08450 (5%)	08450 (15%)	08450 (5%)
Pot life:	2 hours (20°C/68°F)		
Nozzle orifice:	.017"-.021"		
Nozzle pressure:	175 bar/2500 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610		
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	See REMARKS overleaf		
Recoat interval, max:	See REMARKS overleaf		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR ZINC 17340

SURFACE PREPARATION:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to Sa 2½.
For temporary protection, if required, use suitable zinc shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPADUR ZINC 17340.
Maintenance: Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material preferably by dry abrasive blasting. Minor areas may be power tool cleaned.

APPLICATION CONDITIONS:

Use only where application and curing can proceed at temperatures above -10°C/14°F.
At the freezing point and below be aware of ice on the surface, which will hinder the adhesion.
The temperature of the paint itself should be 15°C/60°F or above to secure proper application properties. In confined spaces provide adequate ventilation during application and drying.
Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.

SUBSEQUENT COAT:

According to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	330	400	550	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.
Note: If used as anticorrosive protection under insulation of high temperature equipment it is very important that NO moisture can penetrate during slow-down periods. This to avoid risk of "wet corrosion" when the temperature rises.
May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 50-75 micron/2-3 mils.
(The dry film thickness range does not take into account the correction factors for rough surfaces as listed in ISO 19840).

Recoating:

Recoating intervals, 50 micron/1 mil dry film thickness for HEMPADUR ZINC 17340:

	Minimum		Maximum
Surface temperature	20°C/68°F		20°C/68°F
	Atmospheric		Atmospheric
Recoated with (Quality numbers only)	As a container coating	As a general protective coating	·
58030	30 minutes	1 hour	8 hours
46410. 46370	30 minutes	1 hour	5 hours
HEMPADUR	30 minutes	4 hours	30 days*
HEMPATHANE	30 minutes	Not relevant	3 days

*If the coating has been subjected to direct sunlight for a short period only, the maximum recoating interval may be prolonged.

Before recoating after exposure in contaminated environment, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.
If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, grease, and other foreign matter must be removed with suitable detergent followed by (high pressure) fresh water cleaning. In addition, scrubbing with a stiff brush may be necessary to remove zinc corrosion products (white rust).

Note:

HEMPADUR ZINC 17340 is for professional use only.

ISSUED BY:

HEMPEL A/S - 1734019830CR004

Product Data

HEMPADUR ZINC 17360

BASE 17369 with CURING AGENT 97040

Description:

HEMPADUR ZINC 17360 is a two-component, zinc rich epoxy primer. It cures to a hard wearing and highly weather-resistant coating. Offers cathodic protection of local mechanical damage.

Recommended use:

As a "V.O.C.-compliant", versatile, long-term primer on steel for epoxy, vinyl and acrylic coating systems in medium to severely corrosive environments.
In compliance with SSPC-Paint 20, type 2, level 2 and ISO 12944-5.

Service temperatures:

Maximum, dry exposure only: 160°C/320°F (see REMARKS overleaf).

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red-grey/19830
Finish:	Flat
Volume solids, %:	65 ± 1
Theoretical spreading rate:	13.0 m^2/litre - 50 micron 521 sq.ft./US gallon - 2 mils
Flash point:	24°C/75°F
Specific gravity:	2.7 kg/litre - 22.5 lbs/US gallon
Surface dry:	½ (approx.) hour at 20°C/68°F (ISO 1517)
Dry to touch:	1 (approx.) hour at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	345 g/litre - 2.9 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1..

APPLICATION DETAILS:

Mixing ratio for 17360:	Base 17369 : Curing agent 97040 4 : 1 by volume		
Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08450 (5%)	08450 (15%)	08450 (5%) *(See REMARKS overleaf)*
Pot life:	2 hours (20°C/68°F)		
Nozzle orifice:	.017"-.021"		
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610		
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	See REMARKS overleaf		
Recoat interval, max:	See REMARKS overleaf		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR ZINC 17360

SURFACE PREPARATION: Remove oil and grease thoroughly with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning.
Abrasive blasting to Sa 2½ with a sharp-edged surface profile corresponding to Rugotest No. 3, BN9a, Keane-Tator Comparator, 2.0 G/S, 2 S, or ISO Comparator, Medium (G).

APPLICATION CONDITIONS: Use only where application and curing can proceed at temperatures above -10°C/15°F. The temperature of the surface must also be above this limit. The paint itself should be 15°C/59°F or above. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT: As listed below in accordance with specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	345	410	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.
Note: If used as anticorrosive protection under insulation of high temperature equipment it is very important that NO moisture can penetrate during slow-down periods. This to avoid risk of "wet corrosion" when the temperature rises.

Weathering/ service temperatures: The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. Most typical range is 40-50 micron/1.6-2 mils, but thicknesses down to 15 micron/0.6 mils (extra thinning) and up to 80 micron/3.2 mils may be possible. This will alter spreading rate and may influence amount of thinning necessary, drying time, and recoating interval.
(The dry film thickness range does not take into account the correction factors for rough surfaces as listed in ISO 19840).

Stirring: Before mixing with the curing agent stir the base thoroughly in order to redisperse any possible settling after storage. After mixing it is equally important to maintain stirring to keep the wet paint as a homogeneous mixture.
This is specifically important in case of a high level of thinning and/or long break in application, where the risk of settlement of zinc particles is the highest.

Recoating: Recoating intervals, 50 micron dry film thickness for HEMPADUR ZINC 17360:

	Minimum			Maximum		
Surface temperature	20°C/68°F			20°C/68°F		
	Atmospheric		Water immersion**	Atmospheric		Water immersion**
Recoated with (Quality numbers only)	Medium	Severe		Medium	Severe	
58030	30 minutes	1 hour	Not relevant	12 hours	8 hours	Not relevant
46410. 46370	30 minutes	1 hour	Not relevant	8 hours	5 hours	Not relevant
46330	30 minutes	1 hour	Not relevant	12 hours	8 hours	Not relevant
17630	2 hours	4 hours	4 hours	None	30 days*	30 days*
45880	2 hours	4 hours	Not relevant	None	30 days*	Not relevant

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.
** Water immersion service is only recommended if HEMPADUR ZINC 17360 is applied in maximum 30-40 micron/1.2-1.6 mils and recoated with en epoxy coating system in 250-300 micron/10-12 mils.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Note: Before recoating after exposure in contaminated environment, clean the surface thoroughly by high pressure fresh water hosing and allow drying. In addition, scrubbing with a stiff brush may be necessary to remove zinc corrosion products (white rust).
HEMPADUR ZINC 17360 is for professional use only.

ISSUED BY: HEMPEL A/S - 1736019830C0008

HEMPADUR PRO ZINC 17380

BASE 17389 with CURING AGENT 98382

Description:
HEMPADUR PRO ZINC 17380 is a two-component, zinc rich epoxy primer.
Offers cathodic protection of local mechanical damage.

Recommended use:
As a high solids, versatile, long-term primer on steel for epoxy coating systems in medium to severely corrosive environments.

Service temperatures:
Maximum, dry: 160°C/320°F, however, depends on the subsequent coat.

Certificates/Approvals:
Conforms with NORSOK M-501, rev. 5, system no. 1.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/10830
Finish:	Flat
Volume solids, %:	60 ± 1
Theoretical spreading rate:	12.0 m^2/litre - 50 micron 481 sq.ft./US gallon - 2 mils
Flash point:	24°C/85°F
Specific gravity:	2.8 kg/litre - 23.4 lbs/US gallon
Surface dry:	½ (approx.) hour at 20°C/68°F (ISO 1517)
Dry to touch:	1 (approx.) hour at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	340 g/litre - 2.8 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 17380:	Base 17389 : Curing agent 98382 4 : 1 by volume	
Application method:	Airless spray Air spray	Brush
Thinner (max.vol.):	08450 (5%) 08450 (15%)	08450 (5%) *(See REMARKS overleaf)*
Pot life:	2 hours (20°C/68°F)	
Nozzle orifice:	.017"-.021"	
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	75 micron/3 mils	
Recoat interval, min:	2 hours (20°C/68°F)	
Recoat interval, max:	30 days (20°C/68°F)	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR PRO ZINC 17380

SURFACE PREPARATION:	Remove oil and grease thoroughly with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. Abrasive blasting to Sa 2½ with a sharp-edged surface profile corresponding to Rugotest No. 3, BN9a, Keane-Tator Comparator, 2.0 G/S, 2 S, or ISO Comparator, Medium (G).
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above -10°C/15°F. The temperature of the surface must also be above this limit. The paint itself should be 15°C/59°F or above. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. In confined spaces provide adequate ventilation during application and drying.
SUBSEQUENT COAT:	HEMPADUR PRO 45601/45603, HEMPADUR MASTIC 45880/45881 or according to specification.
REMARKS:	**Note:** If used as anticorrosive protection under insulation of high temperature equipment it is very important that NO moisture can penetrate during slow-down periods. This to avoid risk of "wet corrosion" when the temperature rises.
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. Most typical range is 40-60 micron/1.6-2.4 mils. (The dry film thickness range does not take into account the correction factors for rough surfaces as listed in ISO 19840).
:	HEMPADUR PRO ZINC 17380 contains a high level of zinc dust and other active pigments. Application of the primer in too high film thickness may reduce the overall mechanical properties of the full coating system and/or lead to other problems. Special care should be taken to ensure that primer thickness when applied in practice does not exceed approx. 125 micron/5 mils per coat.
Stirring:	Before mixing with the curing agent stir the base thoroughly in order to re-disperse any possible settling after storage. **After mixing it is equally important to maintain stirring to keep the wet paint as a homogeneous mixture.** This is specifically important in case of a high level of thinning and/or long break in application, where the risk of settlement of zinc particles is the highest.
Recoating:	Depending on actual local conditions, extended maximum recoating interval may apply. Please contact HEMPEL for further advise. If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
Note:	Before recoating after exposure in contaminated environment, clean the surface thoroughly by high pressure fresh water hosing and allow to dry. In addition, scrubbing with a stiff brush may be necessary to remove zinc corrosion products (white rust). **HEMPADUR PRO ZINC 17380 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1738010830CR002

HEMPADUR 17630/ HEMPADUR 17633

17630: BASE 17639 with CURING AGENT 97330
17633: BASE 17639 with CURING AGENT 98420

Description:

HEMPADUR 17630/17633 is a two-component, high-build, polyamide adduct-cured epoxy paint which cures to a hard and tough coating with good resistance to abrasion, seawater and crude oils.

Recommended use:

As a selfprimed coating for ballast water tanks and similar. As a primer for epoxy systems for atmospheric or in-water service, eg ship hulls. Suitable for application down to -10°C/ 15°F.
HEMPADUR 17633 is intended for use in cold/temperate climates, HEMPADUR 17630 is intended for use in temperate to warm climates.

Service temperatures:

Dry exposure only:	Maximum 120°C/248°F *(See REMARKS overleaf)*
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	40°C/104°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

HEMPADUR 17630 has been classified B1 by Marintek, Norway.
Approved by Lloyd's Register of Shipping as a provisionally recognized corrosion control coating.
Approved as a corrosion control coating by Maritime Register of Shipping, Russia.
Approved as a ballast tank coating by Germanischer Lloyd, Germany.
HEMPADUR 17630 has been tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
HEMPADUR 17630 complies with Section 175.300 of the Code of Federal Regulations in respect of carriage of dry foodstuffs (FDA) in spaces with an internal surface area larger that 1000 m^2/10.750 sq.ft.
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

	17630	**17633**
Version; mixed product:		
Colours/Shade nos:	Grey/12170 - Red/50630	Grey/12170 - Red/50630
Finish:	Semi-flat	Semi-flat
Volume solids, %:	69 ± 1	69 ± 1
Theoretical spreading rate:	4.6 m^2/litre - 150 micron 184 sq.ft./S gallon - 6 mils	4.6 m^2/litre - 150 micron 184 sq.ft./S gallon - 6 mils
Flash point:	32°C/90°F	32°C/90°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon	1.4 kg/litre - 11.7 lbs/US gallon
Dry to touch:	7-8 hours at 20°C/68°F	16 hours *(app.)* at 5°C/41°F
Fully cured:	7 days at 20°C/68°F	20 days at 5°C/41°F
V.O.C.:	310 g/litre - 2.6 lbs/US gallon	305 g/litre - 2.5 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1..

APPLICATION DETAILS:

	17630		**17633**	
Mixing ratio:	Base 17639 : Curing agent 97330 4 : 1 parts by volume		Base 17639 : Curing agent 98420 4 : 1 parts by volume	
Application method:	Airless spray	Brush	Airless spray	Brush
Thinner (max.vol.):	08450 (5%)	08450 (5%)	08450 (5%)	08450 (5%)
Pot life:	2 hours (20°C/68°F)		2 hours (20°C/68°F)	
Induction time:	See REMARKS overleaf			
Nozzle orifice:	.021"-.025"			
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*			
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610			
Indicated film thickness, dry:	150 micron/6 mils			
Indicated film thickness, wet:	225 micron/9 mils			
Recoat interval, min:	8 hours (20°C/68°F)		24 hours (5°C/41°F)	
Recoat interval, max:	See separate APPLICATION INSTRUCTIONS			

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 17630/17633

SURFACE PREPARATION:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to Sa 2½. For temporary protection, if required, use a suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch up, use HEMPADUR 17630.
Ballast tanks: For PSPC type approved coating, consult separate APPLICATION INSTRUCTIONS - BALLAST TANKS for HEMPADUR 17630.
Repair and maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR 17630/17633.
As an alternative to dry cleaning, water jetting to sound, well adhering coat and/or to steel. Intact coat must appear with roughened surface after the water jetting. By water jetting to steel, cleanliness shall be Wa 2 - WA 2½ (atmospheric exposure) / minimum Wa 2½ (immersion) (ISO 8501-4:2006). A flash-rust degree of maximum M (atmospheric exposure) / M, preferably L (immersion) (ISO 8501-4:2006) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. Touch up to full film thickness.
On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

APPLICATION CONDITIONS:

Use only where application and curing can proceed at temperatures above -10°C/14°F (curing agent 98420) and 0°C/32°F (curing agent 97330). The temperature of the paint itself should be above 15°C/59°F for proper application. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT:

None or according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

17630				
	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	310	335	550	500
17633				
	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	305	330	550	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Certificates are issued under the former quality number 1763.

Weathering/ service temperatures:

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 125-200 micron/5-8 mils.

Curing agent:

Curing agent 98420 is hazy. This is intended and has no negative influence on the performance.

Mixing/ induction time:

To facilitate proper application properties it is recommended to allow the thoroughly mixed BASE and CURING AGENT to prereact before application. In case two-component spray-equipment is used consult separate APPLICATION INSTRUCTIONS.

Note:

HEMPADUR 17630/17633 is for professional use only.

ISSUED BY:

HEMPEL A/S - 1763012170CO0006 / 1763312170CO0003

For product description refer to product data sheet

HEMPADUR 17630/ HEMPADUR 17633

Medium to high temperatures: 17630 with CURING AGENT 97330
Low to medium temperatures: 17633 with CURING AGENT 98420

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR 17630/17633.

Ballast tanks, steel work:

For optimum performance the following is recommended:
All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in welding seams, undercuts, etc. should be avoided. If found, they may necessitate extra stripe coating or filling (however, the classification societies' recommendations are to be followed).

All sharp edges to be broken or rounded depending on the actual conditions and the design lifetime. Laminations to be removed. However, rolled profiles, etc. from the steel mills normally have acceptably rounded edges.

All loose weld spatters to be removed.

Well adhering, scattered weld spatters are acceptable, but will need additional touch-up. If dense, they must be removed by grinding.

Requirements to the "surface quality" of welds according to WELD REPLICA NACE RP 0178 minimum Grade E (NACE Standard RP0178-95).

Abrasive blasting/ abrasive sweep blasting:

Before blasting any deposits of grease or oil must be removed from the steel surface with a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

Repair:
Before blasting, old steel surfaces must be checked for any contamination. Possible blisters must be broken. If thick rust scale has been removed or deep pittings have been encountered, control procedures for contamination must be carried out. If still contaminated, the abrasive blast cleaned steel surface will need a repeated cleaning for salts and/or oil/grease followed by final abrasive blast cleaning.

Newbuilding/new steelwork: To obtain full performance of the ballast tank coating, welds, burns, damaged and rusty shopprimer must be abrasive blast cleaned to Sa 2½. Minor areas mechanically cleaned to St 3.

If welds have previously been coated with a (shop)primer just after welding this (shop)primer must be removed by abrasive blasting (sweeping) in order to obtain optimum performance.

Intact shopprimer:
Zinc salted surfaces, deposits of black iron oxides of plasma cutting and similar foreign matters to be removed by light abrasive sweep blasting. Chalk markings and plate marking of a non-compatible nature to be removed as well.

The shopprimer must have been checked randomly for excessive film thicknesses and areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be sweep blasted in order to remove most of the shopprimer.

Spot-checking for possible salt contamination of the surface to be executed before and after abrasive sweep blasting.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

In the case of abrasive blast cleaning, the surface profile must be equivalent to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S. According to ISO 8503-1 the grade will be MEDIUM (G).

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given greater and greater overlaps - old layers being roughened corresponding to these overlaps (when sand papering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible - or left with a **thin** zinc epoxy primer coat applied on these areas after secondary surface preparation at blockstage.

Secondary surface preparation of block assembly zones are preferably to be abrasive spot-blasted. However, mechanical cleaning to St 3 may be acceptable if zones are narrow and an extra coat of HEMPADUR 17630/17633 is applied to these areas. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Repair:
Corroded pits deeper than approx 2 mm, but not repaired by welding, are recommended to be filled with HEMPADUR EPOXY FILLER 35250 after blast priming has been carried out.

Stainless Steel: (Ballast tanks of chemical carriers) to be abrasive blast cleaned to a uniform, sharp, **dense**, profile (Rugotest No. 3, BN9-10, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. to be removed before abrasive blasting is commenced.

Water jetting:

This procedure will primarily be relevant for repair jobs. However, the very good removal of water-soluble salts may also make it useful in other cases.

The resulting standard is to be equal to the Wa 2½ (ISO 8501-4:2006).

Sufficient dehumidification equipment must be used to dry out the tanks as quickly as possible between the water jetting and the coating application.

Local ventilators may be required to distribute the drying air evenly in tanks. All "slurry" is to be removed before it dries. New rust will be acceptable as discoloration only, **not** as powdery, loose rust. Acceptable degree of flash rust is maximum M (ISO 8501-4:2006). Inhibitors are **not** to be used.

All surfaces must be free from contamination at the time of painting and the relative humidity is to be below 85%.

Refurbishment:

It is recommended to carry out rough abrasive blast cleaning - or water jetting - to facilitate visual inspection and any necessary repair of the existing steel work. In the case of pit-corroded tank bottoms this rough blasting will also provide a better basis for a decision between welding of corroded pits or repair by filling.

A main concern is the contamination from sea water (water-soluble, corrosive salts). The preventive method will be to include very thorough cleaning with plenty of fresh water, please see below.
The maximum allowable concentration of chlorides on steel surfaces immediately before application is 7.0 microgrammes/cm² as detected by the "Bresle Method".

In the case of contamination, cleaning procedures must be repeated and/or improved. Especially pit-corroded steel will need special attention and the only possible way to remove contamination from the pits may often be to carry out very thorough cleaning with fresh water after abrasive blast cleaning. After repeated control and drying, the entire surface will need abrasive blast cleaning to obtain the specified degree of cleaning. Alternatively, the pit-corroded areas are cleaned by water jetting, any surplus of water is mopped up or removed by vacuum cleaning, allow to dry.

Note: Actual type of steel work and surface preparation is dependent on factors such a shipyard technology, contractual specification, required lifetime, etc. Reference is also made to HEMPEL's Technical Standard for Ballast Tank Coating Work.

Application equipment:

HEMPADUR 17630/17633, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter
	max. 30 metres/100 feet, 3/8" internal diameter
	max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh
Nozzle size:	.021"-.025"
Fan angle:	60-80°.

To spray complicated surfaces smallest nozzles should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning.

Airless spray data are indicative and subject to adjustment.

Application:

Film-build/continuity: With this ballast tank coating it is of special importance that a continuous, pinhole-free paint film is obtained at application of each spray applied coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. The consumption of paint must be controlled to avoid exaggerated film thickness, eg by controlling paint consumption and/or measuring wet film thickness.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating: may either be applied by airless spray, (relatively small, narrow-angled nozzles) or by hand-tools. Apply the stripe coat as a uniform, regular film without excessive brush or roller marks in order to avoid cratering by entrapped air.

HEMPADUR 17630/17633

Application on zinc silicate:

A proper mist-coat technique is necessary in order to avoid/reduce the risk of popping"/"pinholes". Add up to 50% thinner depending on the actual conditions of application.

Pot life/mixing/ induction time: (both curing agents):

When measured under standard conditions the pot life is 3 hours at 15°C/59°F and 2 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 86 parts by weight of base and 14 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At **steel** temperatures below 5°C/41°F the paint may advantageously be prereacted 10-20 minutes before spray application (longer pre-reaction time at lower temperatures).

When two-component spray equipment is used, heating may be relevant to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Physical data versus temperature:

(HEMPADUR 17630 in a dry film thickness of 150 micron/6 mils):

Surface temperature	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Drying time	32 hours	14 hours	7 hours	5 hours
Curing time	28 days	14 days	7 days	3½ days
Initial curing*	20 days	10 days	5 days	2½ days

(HEMPADUR 17633 in a dry film thickness of 150 micron/6 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F
Drying time	45 hours	23 hours	10 hours
Curing time	56 days	28 days	14 days
Initial curing*	40 days	20 days	10 days

* When the state "initial curing" has been reached, the coating may exceptionally be exposed to ballast water provided it has been applied within the specified limits of film thicknesses **and** that all painted areas have been subject to thorough ventilation.

Recoating:

Recoating intervals (provided proper ventilation)
(150 micron/6 mils dry film thickness)

	17630				17633			
	Minimum		Maximum		Minimum		Maximum	
Steel temperature	10°C/50°F	20°C/68°F	10°C/50°	20°C/68°F	-10°C/14°F	0°C/32°F	-10°C/14°F	0°C/32°F
Recoated with: (quality no. only)								
Itself (ballast tanks)**	16 hours	8 hours	90 days*	30 days*	3 days	36 hours	(90 days)*	90 days*
45182	16 hours·	8 hours·	90 days·	30 days·	3 days·	36 hours'	(90 days)·	90 days

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.
** Stripe coat can be applied when it is possible to walk on the surface without damage to the coating.

Maximum recoating intervals:
If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR 17630/17633 within the following directions for recoating:

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing.

- **Any degraded surface layer, as a result of a long exposure period, must be removed as well**. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY:

HEMPEL A/S - 1763012170C0006/1763312170C0003

Application Instructions

BALLAST TANKS

For product description refer to product data sheet

HEMPADUR 17630

BASE 17639 with CURING AGENT 97330

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR 17630 when applied in ballast tanks according to the requirements in IMO Resolution MSC.215(82): Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers (PSPC). The Applications Instructions are applicable also for vessels not covered by PSPC.

Ballast tanks, steel work:

The steel shall preferably be Rust Grade A or B according to ISO 8501-1. The use of steel with Rust Grade C requires more tight inspection of surface profile after blasting as well as of possible salt contamination.

The steel surface shall be prepared so that the coating achieves an even distribution at the specified nominal dry film thickness of 320 micron and has an adequate adhesion by removing sharp edges, grinding weld beads and removing weld spatter and any other surface contamination. PSPC makes reference to ISO 8501-3: “Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness”.

For optimum performance the following is recommended: All welding seams shall be partially dressed to remove irregular profiles.

Surface pores, pits and craters shall be sufficiently open to allow penetration of the paint.

Sharp edges shall be treated to a rounded radius of minimum 2 mm, subjected to a three-pass grinding or treated with an equivalent process that produces an edge profile that results in a dry film thickness retention equivalent to or better than that of three pass grinding. Sharp edge means all edges except natural rounded/rolled edges of sections or profiled steel bars.

Visible roll overs/laminations shall be removed.

The surface shall be free of all loose welding spatter.

Abrasive blasting/ abrasive sweep blasting:

The coating system shall only be applied on steel primed with a pre-qualified zinc containing inhibitor free zinc silicate shopprimer according to PSPC, Table 1.2.1-3. Steel shopprimed with a shopprimer not pre-qualified must be abrasive blast cleaned to Sa 2 removing at least 70% of intact shopprimer, while steel, which has not been shopprimed must be blasted to Sa 2½.

Before blasting any deposits of grease or oil must be removed from the steel surface using a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

The shopprimer must have been checked randomly for excessive film thickness. Areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be blasted to Sa 2 removing at least 70% of the shopprimer.

Welds as well as shopprimed areas with damage, burn marks and rust must be blasted to Sa 2½.

Surfaces with zinc salts, deposits of black iron oxides from plasma cutting, markings and similar foreign matters shall be cleaned by light abrasive sweep blasting.

Welds coated with a temporary (shop)primer after welding must be cleaned by hard abrasive sweeping, preferably abrasive blasting.

Spot-checks for possible salt contamination of the surface must be executed after secondary surface preparation. The upper water soluble salts limit is 50 mg/m² sodium chloride equivalents when measured according to ISO 8502-6:2006 and ISO 8502-9:1998. To limit salt contamination from abrasives it is recommended to use abrasives showing a water-soluble contaminant level equivalent to less than 25 mS/m according to ISO 11127-6:1993.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

In the case of full or partial abrasive blast cleaning, the surface profile must conform to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S or to ISO 8503-1, grade Medium (G).

Dust must be removed just before application of the paint to a dust quantity rating "1" for dust size class "3", "4" or "5". Lower dust size classes shall be removed from the surface if visible without magnification.

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given larger and larger overlaps. Roughening must be carried out when the maximum recoating interval is exceeded (when sand papering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible. Application of a thin zinc epoxy primer coat on these areas after secondary surface preparation at block stage is acceptable if removed before the application of HEMPADUR 17630.

Secondary surface preparation of block assembly zones is preferably abrasive spot-blasting or mechanical cleaning to St 3. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Stainless steel: (Ballast tanks of chemical carriers) To be abrasive blast cleaned to a uniform, sharp, dense, profile (Rugotest No. 3, BN9-10, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. shall be removed before abrasive blasting is commenced. Surface preparation and paint application to be carried out concurrently with treatment of surrounding carbon steel.

Application equipment:

HEMPADUR 17630, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter max. 30 metres/100 feet, 3/8" internal diameter max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh
Nozzle size:	.021"-.025"
Fan angle:	60-80°.

To spray complicated surfaces a smaller nozzle size should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are used it may be necessary to increase the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by exaggerated thinning.

Airless spray data are indicative and subject to adjustment.

Application:

PSPC requires the application of minimum two spray applied coatings and minimum two stripe coats. The relative humidity shall be 85% or below or the steel temperature shall be 3°/5°F or above the dew point.

Spray application: A continuous, pinhole-free paint film must be obtained at application of each spray applied coat. An application technique which will ensure good film formation on all surfaces must be adopted. It is very important to use nozzles of the correct size, not too large, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. even though these areas also must be stripe coated. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust spray.

The paint layer must be applied homogeneously and as close to the specification as possible. Care shall be taken to avoid exaggerated film thicknesses. Wet film thickness shall be regularly checked during the application.

The finished coating must appear as a homogeneous film with a smooth surface. Any defective areas, e.g. pin-holes, bubbles, voids, visible abrasive residues, shall be marked up and appropriate repair effected.

Stripe coating: The required two stripe coats must each be applied as a coherent film showing good film formation and no visible defects such as pores or un-wetted areas. The application method must ensure that all areas which require stripe coating are properly stripe coated by alternative application methods which include brush or roller. Application by airless spray requires the use of relatively small, narrow-angled nozzles. PSPC accepts that the second stripe coat, by way of welded seams only, may be reduced in scope where it is proven that the nominal dry film thickness (NDFT) can be met by the coats applied. The first stripe coating should preferably be applied after first full coat to avoid contamination of the steel substrate.

Pot life/mixing/ induction time:

When measured under standard conditions the pot life is 3 hours at 15°C/59°F and 2 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 86 parts by weight of base and 14 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

BALLAST TANKS

HEMPADUR 17630

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At steel temperatures below 5°C/41°F the paint may advantageously be prereacted 10-20 minutes before spray application (longer prereaction time at lower steel temperatures).

Two-component spray equipment: Heating may be required to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Dry film thickness:

PSPC requires that the nominal dry film thickness (NDFT) shall be 320 micron and achieved by minimum two spray coats and two stripe coats. The dry film thickness distribution shall be evaluated according to the 90/10 rule.

Dry film thickness (DFT)	DFT micron/mils	Remark
Minimum DFT per coat	90/3.5	Value for undiluted paint at approximately 20°C/68°F. Lower DFT may be achieved by thinning
Maximum DFT (complete coating system)	2,000/80	The maximum DFT is valid for isolated spots less than 1% of the total surface area per tank. No more than 5% of the area must be above 1,300 micron/52 mils. The stated maximum DFT is for guidance and should be kept as close to the specified nominal DFT as possible. Frequent control of wet film thickness during application is recommended

Physical data versus temperature:

(HEMPADUR 17630 in a dry film thickness of 160 micron/6.4 mils):

Surface temperature	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Drying time	32 hours	14 hours	7 hours	5 hours
Walk-on time	32 hours	14 hours	7 hours	5 hours
Curing time	28 days	14 days	7 days	3½ days
Initial curing*	20 days	10 days	5 days	2½ days

* When the state "initial curing" has been reached, the coating may exceptionally be exposed to ballast water provided it has been applied within the specified limits of film thicknesses and that all painted areas have been subject to thorough ventilation.

Recoating:

Recoating intervals (provided proper ventilation)
(160 micron/6.4 mils dry film thickness)

Interval	Minimum				Maximum			
Steel temperature	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Recoating time**	17 hours	9 hours	7 hours	4 hours	60 days*	30 days*	22.5 days*	15 days*

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.
** Stripe coat can be applied when it is possible to walk on the surface without damage to the coating.

Maximum recoating intervals:
Roughening of the surface is necessary to ensure optimum intercoat adhesion if the maximum recoating interval is exceeded.

- **Long recoating intervals:**

A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg

suitable detergent followed by high pressure fresh water cleaning. Salts shall be removed by fresh water hosing

. Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

8.2 Repair process

During construction
Before mechanical surface preparation is started the areas to be repaired shall be cleaned for any salts and other contamination.

Overlap zones shall be suitably prepared and coated.

Small areas: Small areas in this context are areas up to approximately A4 size (20x30 cm) or scratches of up to a few millimetres across. Cracks, in corners or at single runners, may preferably be repaired according to this method, even if they fall outside the area definition.

The surface preparation can be executed by sanding or grinding to a clean rough metal surface, feathering edges of intact coating and slightly roughening the adjacent surface and remove all dust. Touch-up with the coating material specified using stippling for the first brush coat.

Contiguous areas: Contiguous areas over 25 m^2/270 sq.ft. or over 2% of the total area of the tank are to be repaired basically according to the original specification. Precautions must be taken against damage from overblasting.

During service
Maintenance and repair during service is subject to the actual condition of the area under consideration. Reference is made to IMO Guidelines for maintenance and repair of protective coatings (MSC.1/Circ.1330).

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 1763012170C0006

HEMPADUR QUATTRO 17634

BASE 17636 with CURING AGENT 97334

Description:

HEMPADUR QUATTRO 17634 is a two-component universal epoxy paint, which cures to a hard and tough coating with good resistance to abrasion, seawater and various oils.

Recommended use:

As a universal epoxy and self-primed high performance coating system for atmospheric or in-water service, including water ballast tanks to be coated according to IMO-PSPC requirements (Resolution MSC.215(82)). HEMPADUR QUATTRO 17634 is intended for all year application down to -10°C/15°F and for in-shop applications where fast recoating and handling is required.

Features:

Excellent anticorrosive and very good mechanical properties
Short drying time
Curing down to -10°C/14°F

Service temperatures:

Dry exposure only:	Maximum 120°C/248°F
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	40°C/104°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

PSPC type approved. (Consult Hempel for specific Type Approval Certificates)
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).
HEMPADUR QUATTRO 17634 has been tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.

Availability:

Part of Group Assortment. Local availability subject to confirmation.
HEMPADUR QUATTRO 17634 replaces HEMPADUR 17630/17633 and HEMPADUR 45141/45143.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/50630*
Finish:	Semi-flat
Volume solids, %:	72 ± 1
Theoretical spreading rate:	5.8 m²/litre - 125 micron 231 sq.ft./US gallon - 5 mils
Flash point:	27°C/81°F
Specific gravity:	1.4 kg/litre - 11.5 lbs/US gallon
Dry to touch:	4 hours at 20°C/68°F 9 hours *(app.)* at 5°C/41°F
Fully cured:	7 days at 20°C/68°F 20 days at 5°C/41°F
VOC:	275 g/litre - 2.3 lbs/US gallon

*other shades according to assortment list. See REMARKS overleaf

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1..

APPLICATION DETAILS:

Mixing ratio:	Base 17636 : Curing agent 97334 4 : 1 parts by volume	
Application method:	Airless spray	Brush
Thinner (max.vol.):	08450 (5%)	08450 (5%)
Pot life:	Airless spray: 2 hour (20°C/68°F) Brush 2 hours (20°C/68°F)	
Induction time:	See REMARKS overleaf	
Nozzle orifice:	.021"-.025"	
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	125 micron/5 mils	
Indicated film thickness, wet:	175 micron/7 mils	
Recoat interval, min:	4 hours (20°C/68°F) 12 hours (5°C/41°F)	
Recoat interval, max:	See separate APPLICATION INSTRUCTIONS	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR QUATTRO 17634

SURFACE PREPARATION:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to Sa 2½. For temporary protection, if required, use a suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch up, use HEMPADUR QUATTRO 17634.
Ballast tanks: For PSPC type approved coating, consult separate APPLICATION INSTRUCTIONS - BALLAST TANKS for HEMPADUR QUATTRO 17634.
Repair and maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR QUATTRO 17634.
As an alternative to dry cleaning, water jetting to sound, well adhering coat and/or to steel. Intact coat must appear with roughened surface after the water jetting. By water jetting to steel, cleanliness shall be Wa 2 - WA 2½ (atmospheric exposure) / minimum Wa 2½ (immersion) (ISO 8501-4:2006). A flash-rust degree of maximum M (atmospheric exposure), preferably L (immersion) (ISO 8501-4:2006) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. Touch up to full film thickness.
On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.
Other substrates: Contact Hempel.

APPLICATION

Use only where application and curing can proceed at temperatures above -10°C/14°. The temperature of the paint itself should be above 15°C/59°F for proper application. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT:

According to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase II, 2010
VOC in g/l	275	302	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Shades:

HEMPADUR QUATTRO 17634 also comes in colours: Black/19990, Green/40640, Light olive green 49980, Light red 50900 and MIO grey/red.

Weathering/ service temperatures:

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product. HEMPADUR QUATTRO 17634 has a tendency to yellow after application. This has no influence on the performance nor does the yellowing effect any topcoat applied.

Film thicknesses:

May be specified in other film thicknesses than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 100-200 micron/4-8 mils. For Ballast tanks at newbuilding stage the minimum specified dft is 2 x 160 micron. Please consult separate APPLICATION INSTRUCTIONS - BALLAST TANKS for HEMPADUR QUATTRO 17634.

Curing agent:

Curing agent 97334 is hazy. This is intended and has no influence on the performance.

Mixing/ Induction time:

In order to facilitate proper application properties it is recommended to allow the thoroughly mixed BASE and CURING AGENT to pre-react before application at temperatures below 15°C/59°F

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

In case two-component spray-equipment is used consult separate APPLICATION INSTRUCTIONS.

Note:

HEMPADUR QUATTRO 17634 is for professional use only.

ISSUED BY:

HEMPEL A/S - 1763450630CR002

For product description refer to product data sheet

HEMPADUR QUATTRO 17634

BASE 17636 with CURING AGENT 97334

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR QUATTRO 17634.

Ballast tanks:

See separate instructions for Ballast Tanks Applications.

Abrasive blasting/ abrasive sweep blasting:

Before blasting any deposits of grease or oil must be removed from the steel surface with a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

Repair:
Before blasting, old steel surfaces must be checked for any contamination. Possible blisters must be broken. If thick rust scale has been removed or deep pittings have been encountered, control procedures for contamination must be carried out. If still contaminated, the abrasive blast cleaned steel surface will need a repeated cleaning for salts and/or oil/grease followed by final abrasive blast cleaning.

Newbuilding/new steelwork: To obtain full performance of the ballast tank coating, welds, burns, damaged and rusty shopprimer must be abrasive blast cleaned to Sa 2½. Minor areas mechanically cleaned to St 3.

If welds have previously been coated with a (shop)primer just after welding this (shop)primer must be removed by abrasive blasting (sweeping) in order to obtain optimum performance.

Intact shopprimer:
Zinc salted surfaces, deposits of black iron oxides of plasma cutting and similar foreign matters to be removed by light abrasive sweep blasting. Chalk markings and plate marking of a non-compatible nature to be removed as well.

The shopprimer must have been checked randomly for excessive film thicknesses and areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be sweep blasted in order to remove most of the shopprimer.

Spot-checking for possible salt contamination of the surface to be executed before and after abrasive sweep blasting.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

In the case of abrasive blast cleaning, the surface profile must be equivalent to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S. According to ISO 8503-1 the grade will be MEDIUM (G).

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given greater and greater overlaps - old layers being roughened corresponding to these overlaps (when sand papering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible - or left with a **thin** zinc epoxy primer coat applied on these areas after secondary surface preparation at blockstage.

Secondary surface preparation of block assembly zones are preferably to be abrasive spot-blasted. However, mechanical cleaning to St 3 may be acceptable if zones are narrow and an extra coat of HEMPADUR QUATTRO 17634 is applied to these areas. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Repair:
Corroded pits deeper than approx 2 mm, but not repaired by welding, are recommended to be filled with HEMPADUR EPOXY FILLER 35250 after blast priming has been carried out.

Stainless Steel: (Ballast tanks of chemical carriers) to be abrasive blast cleaned to a uniform, sharp, **dense**, profile (Rugotest No. 3, BN9-10, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. to be removed before abrasive blasting is commenced.

Water jetting:

This procedure will primarily be relevant for repair jobs. However, the very good removal of water-soluble salts may also make it useful in other cases.

The resulting standard is to be equal to the Wa 2½ (ISO 8501-4:2006).

Sufficient dehumidification equipment must be used to dry out the tanks as quickly as possible between the water jetting and the coating application.

Local ventilators may be required to distribute the drying air evenly in tanks. All "slurry" is to be removed before it dries. New rust will be acceptable as discoloration only, **not** as powdery, loose rust. Acceptable degree of flash rust is maximum M (ISO 8501-4:2006). Inhibitors are **not** to be used.

All surfaces must be free from contamination at the time of painting and the relative humidity is to be below 85%.

Refurbishment:

It is recommended to carry out rough abrasive blast cleaning - or water jetting - to facilitate visual inspection and any necessary repair of the existing steel work. In the case of pit-corroded tank bottoms this rough blasting will also provide a better basis for a decision between welding of corroded pits or repair by filling.

A main concern is the contamination from sea water (water-soluble, corrosive salts). The preventive method will be to include very thorough cleaning with plenty of fresh water, please see below.
The maximum allowable concentration of chlorides on steel surfaces immediately before application is 7.0 microgrammes/cm² as detected by the "Bresle Method".

In the case of contamination, cleaning procedures must be repeated and/or improved. Especially pit-corroded steel will need special attention and the only possible way to remove contamination from the pits may often be to carry out very thorough cleaning with fresh water after abrasive blast cleaning. After repeated control and drying, the entire surface will need abrasive blast cleaning to obtain the specified degree of cleaning. Alternatively, the pit-corroded areas are cleaned by water jetting, any surplus of water is mopped up or removed by vacuum cleaning. Allow to dry.

Note: Actual type of steel work and surface preparation is dependent on factors such a shipyard technology, contractual specification, required lifetime, etc. Reference is also made to HEMPEL's Technical Standard for Ballast Tank Coating Work.

HEMPADUR QUATTRO 17634

Application equipment:

HEMPADUR QUATTRO 17634 being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter
	max. 30 metres/100 feet, 3/8" internal diameter
	max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh
Nozzle size:	.021"-.025"
Fan angle:	60-80°.

To spray complicated surfaces smallest nozzles should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning.

Airless spray data are indicative and subject to adjustment.

Application:

Film-build/continuity: With this coating it is of special importance that a continuous, pinhole-free paint film is obtained at application of each spray applied coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. The consumption of paint must be controlled to avoid exaggerated film thickness, e.g. by controlling paint consumption and/or measuring wet film thickness.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating: may either be applied by airless spray, (relatively small, narrow-angled nozzles) or by hand-tools. Apply the stripe coat as a uniform, regular film without excessive brush or roller marks in order to avoid cratering by entrapped air.

Application on zinc silicate:

A proper mist-coat technique is necessary in order to avoid/reduce the risk of popping"/"pinholes". Add up to 50% thinner depending on the actual conditions of application.

HEMPADUR QUATTRO 17634

Pot life/mixing/ induction time:

When measured under standard conditions the pot life for spraying is 3 hours at 15°C/59°F and 2 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 86 parts by weight of base and 14 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life (spray application)	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At **steel** temperatures below 5°C/41°F the paint may advantageously be pre-reacted e.g. 10-20 minutes (depending on paint temperature) before spray application (longer pre-reaction time at lower temperatures).

When two-component spray equipment is used, heating may be relevant to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Physical data versus temperature:

(HEMPADUR QUATTRO 17634 in a dry film thickness of 125-150 micron/5-6 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time	35 hours	14 hours	7 hours	4 hours	3 hours	2 hours
Curing time	56 days	28 days	14 days	7 days	3½ days	40 hours
Initial curing*	40 days	20 days	10 days	5 days	2½ days	30 hours

* When the state "initial curing" has been reached, the coating may exceptionally be exposed to ballast water provided it has been applied within the specified limits of film thicknesses **and** that all painted areas have been subject to thorough ventilation.

Recoating:

Recoating intervals (provided proper ventilation)

HEMPADUR QUATTRO 17634 in a dry film thickness of 125 micron/5 mils:

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°	20°C/68°F	30°C/86°F	40°C/104°F
MINIMUM recoating interval related to later conditions of exposure: **Interval for recoating with HEMPADUR**						
Atmospheric, medium	18 hours	9 hours	4 hours	2 hours	1,5 hours	1 hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours	3 hours	2 hours
Immersion	36 hours	18 hours	8 hours	4 hours	3 hours	2 hours
Interval for recoating with HEMPATHANE, HEMPAXANE and HEMPATEX qualities						
Atmospheric, medium	18 hours	9 hours	4 hours	2 hours	1,5 hours	1 hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours	3 hours	2 hours
Interval for recoating with HEMUCRUL qualities						
Atmospheric, medium	N.R.	N.R.	8 hours	4 hours	3 hours	2 hours
Atmospheric, severe	N.R.	N.R.	8 hours	4 hours	3 hours	2 hours
MAXIMUM recoating interval related to later conditions of exposure: **Interval for recoating with HEMPADUR qualities**						
Atmospheric, medium	None	None	None	None	None	None
Atmospheric, severe	90 days	90 days	60 days	30 days	22,5 days	15 days
Immersion*	90 days	90 days	60 days	30 days	22,5 days	15 days
Interval for recoating with HEMPATHANE and, HEMPAXANE qualities						
Atmospheric, medium	90 days	90 days	40 days	20 days	15 days	10 days
Atmospheric, severe	54 days	27 days	12 days	6 days	4,5 days	72 hours
Interval for recoating with HEMPATEX qualities						
Atmospheric, medium	68 hours	34 hours	15 hours	8 hours	6 hours	4 hours
Atmospheric, severe	68 hours	34 hours	15 hours	8 hours	6 hours	4 hours
Interval for recoating with HEMUCRYL qualities						
Atmospheric, medium	N.R.	N.R.	6 days	3 days	54 hours	36 hours
Atmospheric, severe	N.R.	N.R.	3 days	1½ days	27 hours	18 hours

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact Hempel for further advice.

Maximum recoating intervals:
If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR QUATTRO 17634 within the following directions for recoating:

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with e.g. suitable detergent followed by high pressure fresh water cleaning. Salts are to be removed by fresh water hosing.

- **Any degraded surface layer, as a result of a long exposure period, must be removed as well**. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant

Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
ISSUED BY:	HEMPEL A/S - 1763450630CR002

BALLAST TANKS

For product description refer to product data sheet

HEMPADUR QUATTRO 17634

BASE 17636 with CURING AGENT 97334

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR 17634 when applied in ballast tanks according to the requirements in IMO Resolution MSC.215(82): Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers (PSPC). The Applications Instructions are applicable also for vessels not covered by PSPC.

Ballast tanks, steel work:

The steel shall preferably be Rust Grade A or B according to ISO 8501-1. The use of steel with Rust Grade C requires more tight inspection of surface profile after blasting as well as of possible salt contamination.

The steel surface shall be prepared so that the coating achieves an even distribution at the specified nominal dry film thickness of 320 micron and has an adequate adhesion by removing sharp edges, grinding weld beads and removing weld spatter and any other surface contamination. PSPC makes reference to ISO 8501-3: “Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness”.

For optimum performance the following is recommended: All welding seams shall be partially dressed to remove irregular profiles.

Surface pores, pits and craters shall be sufficiently open to allow penetration of the paint.

Sharp edges shall be treated to a rounded radius of minimum 2 mm, subjected to a three-pass grinding or treated with an equivalent process that produces an edge profile that results in a dry film thickness retention equivalent to or better than that of three pass grinding. Sharp edge means all edges except natural rounded/rolled edges of sections or profiled steel bars.

Visible roll overs/laminations shall be removed.

The surface shall be free of all loose welding spatter.

Abrasive blasting/ abrasive sweep blasting:

The coating system shall only be applied on steel primed with a pre-qualified zinc containing inhibitor free zinc silicate shopprimer according to PSPC, Table 1.2.1-3. Steel shopprimed with a shopprimer not pre-qualified must be abrasive blast cleaned to Sa 2 removing at least 70% of intact shopprimer, while steel, which has not been shopprimed must be blasted to Sa 2½.

Before blasting any deposits of grease or oil must be removed from the steel surface using a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

The shopprimer must have been checked randomly for excessive film thickness. Areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be blasted to Sa 2 removing at least 70% of the shopprimer.

Welds as well as shopprimed areas with damage, burn marks and rust must be blasted to Sa 2½.

Surfaces with zinc salts, deposits of black iron oxides from plasma cutting, markings and similar foreign matters shall be cleaned by light abrasive sweep blasting.

Welds coated with a temporary (shop)primer after welding must be cleaned by hard abrasive sweeping, preferably abrasive blasting.

Spot-checks for possible salt contamination of the surface must be executed after secondary surface preparation. The upper water soluble salts limit is 50 mg/m² sodium chloride equivalents when measured according to ISO 8502-6:2006 and ISO 8502-9:1998. To limit salt contamination from abrasives it is recommended to use abrasives showing a water-soluble contaminant level equivalent to less than 25 mS/m according to ISO 11127-6:1993.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

In the case of full or partial abrasive blast cleaning, the surface profile must conform to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S or to ISO 8503-1, grade Medium (G).

Dust must be removed just before application of the paint to a dust quantity rating "1" for dust size class "3", "4" or "5". Lower dust size classes shall be removed from the surface if visible without magnification.

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given larger and larger overlaps. Roughening must be carried out when the maximum recoating interval is exceeded (when sand papering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible. Application of a thin zinc epoxy primer coat on these areas after secondary surface preparation at block stage is acceptable if removed before the application of HEMPADUR 17634.

Secondary surface preparation of block assembly zones is preferably abrasive spot-blasting or mechanical cleaning to St 3. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Stainless steel: (Ballast tanks of chemical carriers) To be abrasive blast cleaned to a uniform, sharp, dense, profile (Rugotest No. 3, BN9-10, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. shall be removed before abrasive blasting is commenced. Surface preparation and paint application to be carried out concurrently with treatment of surrounding carbon steel.

Application equipment:

HEMPADUR 17634, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter max. 30 metres/100 feet, 3/8" internal diameter max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh
Nozzle size:	.021"-.025"
Fan angle:	60-80°.

To spray complicated surfaces a smaller nozzle size should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are used it may be necessary to increase the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by exaggerated thinning.

Airless spray data are indicative and subject to adjustment.

Application:

PSPC requires the application of minimum two spray applied coatings and minimum two stripe coats. The relative humidity shall be 85% or below or the steel temperature shall be 3°/5°F or above the dew point.

Spray application: A continuous, pinhole-free paint film must be obtained at application of each spray applied coat. An application technique which will ensure good film formation on all surfaces must be adopted. It is very important to use nozzles of the correct size, not too large, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. even though these areas also must be stripe coated. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust spray.

The paint layer must be applied homogeneously and as close to the specification as possible. Care shall be taken to avoid exaggerated film thicknesses. Wet film thickness shall be regularly checked during the application.

The finished coating must appear as a homogeneous film with a smooth surface. Any defective areas, e.g. pin-holes, bubbles, voids, visible abrasive residues, shall be marked up and appropriate repair effected.

Stripe coating: The required two stripe coats must each be applied as a coherent film showing good film formation and no visible defects such as pores or un-wetted areas. The application method must ensure that all areas which require stripe coating are properly stripe coated by alternative application methods which include brush or roller. Application by airless spray requires the use of relatively small, narrow-angled nozzles. PSPC accepts that the second stripe coat, by way of welded seams only, may be reduced in scope where it is proven that the nominal dry film thickness (NDFT) can be met by the coats applied. The first stripe coating should preferably be applied after first full coat to avoid contamination of the steel substrate.

Pot life/mixing/ induction time:

When measured under standard conditions the pot life for spraying is 1½ hours at 15°C/59°F and 1 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 86 parts by weight of base and 14 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

BALLAST TANKS

HEMPADUR QUATTRO 17634

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life (spray application)	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At steel temperatures below 5°C/41°F the paint may advantageously be prereacted 10-20 minutes before spray application (longer prereaction time at lower steel temperatures).

Two-component spray equipment: Heating may be required to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Dry film thickness:

PSPC requires that the nominal dry film thickness (NDFT) shall be 320 micron and achieved by minimum two spray coats and two stripe coats. The dry film thickness distribution shall be evaluated according to the 90/10 rule.

Dry film thickness (DFT)	DFT micron/mils	Remark
Minimum DFT per coat	90/3.5	Value for undiluted paint at approximately 20°C/68°F. Lower DFT may be achieved by thinning
Maximum DFT (complete coating system)	2,000/80	The maximum DFT is valid for isolated spots less than 1% of the total surface area per tank. No more than 5% of the area must be above 1,300 micron/52 mils. The stated maximum DFT is for guidance and should be kept as close to the specified nominal DFT as possible. Frequent control of wet film thickness during application is recommended

Physical data versus temperature:

(HEMPADUR 17634 in a dry film thickness of 160 micron/6.4 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Drying time	35 hours	14 hours	7 hours	4 hours	3 hours
Walk-on time	42 hours	21 hours	9 hours	4½ hours	3½ hours
Curing time	56 days	28 days	14 days	7 days	3½ days
Initial curing*	40 days	20 days	10 days	5 days	2½ days

* When the state "initial curing" has been reached, the coating may exceptionally be exposed to ballast water provided it has been applied within the specified limits of film thicknesses and that all painted areas have been subject to thorough ventilation.

Recoating:

Recoating intervals (provided proper ventilation)
(HEMPADUR 17634 in a dry film thickness of 160 micron/6.4 mils dry film thickness)

Interval	Minimum					
Steel temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Recoating time**	49 hours	25 hours	11 hours	5 hours	4 hours	3 hours

Interval	Maximum					
Steel temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Recoating time**	90 days*	90 days*	60 days*	30 days*	22½ days*	15 days*

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.
** Stripe coat can be applied when it is possible to walk on the surface without damage to the coating.

Maximum recoating intervals:
Roughening of the surface is necessary to ensure optimum intercoat adhesion if the maximum recoating interval is exceeded.

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts shall be removed by fresh water hosing.

- Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

8.2 Repair process

During construction
Before mechanical surface preparation is started the areas to be repaired shall be cleaned for any salts and other contamination.

Overlap zones shall be suitably prepared and coated.

Small areas: Small areas in this context are areas up to approximately A4 size (20x30 cm) or scratches of up to a few millimetres across. Cracks, in corners or at single runners, may preferably be repaired according to this method, even if they fall outside the area definition.

The surface preparation can be executed by sanding or grinding to a clean rough metal surface, feathering edges of intact coating and slightly roughening the adjacent surface and remove all dust. Touch-up with the coating material specified using stippling for the first brush coat.

Contiguous areas: Contiguous areas over 25 m^2/270 sq.ft. or over 2% of the total area of the tank are to be repaired basically according to the original specification. Precautions must be taken against damage from overblasting.

During service
Maintenance and repair during service is subject to the actual condition of the area under consideration. Reference is made to IMO Guidelines for maintenance and repair of protective coatings (MSC.1/Circ.1330).

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 1763412170CR001

Product Data

HEMUCRYL PRIMER HI-BUILD 18032

Description:
HEMUCRYL PRIMER HI-BUILD 18032 is a water-borne, acrylic dispersion paint with good anticorrosive properties. Especially suited for application by airless spray.

Recommended use:
As a primer in water-borne paint systems on interior and exterior steelwork in mildly to moderately corrosive environment.
May also be used as a primer in water-borne paint systems on hot dip galvanized steel, aluminium, and stainless steel in mildly corrosive environment.

Service temperatures:
Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:
Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/12170 - Red/50710
Finish:	Flat
Volume solids, %:	43 ± 1
Theoretical spreading rate:	5.7 m^2/litre - 75 micron 230 sq.ft./US gallon - 3 mils
Flash point:	> 93°C/199°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	½ (approx.) hour at 20°C/68°F (ISO 1517)
Dry to touch:	1½ (approx.) hour at 20°C/68°F
V.O.C.:	45 g/litre - 0.3 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Brush (touch-up)
Thinner (max. vol.):	Fresh water (5%)	HEMUCRYL BRUSH AGENT 99810 (3-8%)
Nozzle orifice:	.015"-.019"	
Nozzle pressure:	130 bar/1900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	Fresh water *(See REMARKS overleaf)*	
Indicated film thickness, dry:	75 micron/3 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	175 micron/7 mils	
Recoat interval, min:	2 hours (20°C/68°F)	
Recoat interval, max:	None *(See REMARKS overleaf)*	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMUCRYL PRIMER HI-BUILD 18032

SURFACE PREPARATION:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to minimum Sa 2½. For temporary protection, if required, use suitable shopprimer. All damaged shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMUCRYL PRIMER HI-BUILD 18032.
Repair: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose paint by abrasive blasting or power tool cleaning to St 3 before recoating. Touch up bare spots with HEMUCRYL PRIMER HI-BUILD 18030.
Aluminium: Very careful degreasing, followed by high pressure fresh water cleaning to remove all salts and other contamination. Any anodizing must be completely removed. Thorough sand papering or abrasive sweeping with mineral abrasives is recommended.
Cast aluminium is recommended to be abrasive swept to a uniform, evenly grey appearance.
Hot dip galvanized steel: Wet rubbing/grinding with ammonia - water 1:20, followed by fresh water hosing. In case this method is not feasible, the procedure described for stainless steel may be used.
Stainless steel: Very careful degreasing, followed by fresh water hosing to remove all contamination.

APPLICATION CONDITIONS:

Use only where application can proceed at temperatures above 10°C/50°F. Apply on a clean and dry surface with a temperature above the dew point to avoid condensation. Relative humidity: during application above 60%, preferably 75-90% to avoid dry spray. During drying below 80%, preferably between 40-60%. (Contact HEMPEL for further advice). Good ventilation during application and drying is necessary. During drying it is of utmost importance that sufficient ventilation is covering all parts of the surfaces painted. Ventilation requirements to remove the water vapours liberated during application and drying are approximately 75 m^3/litre of the paint at 20°C/68°F. (Relative humidity of the air supply 40%).

SUBSEQUENT COAT: HEMUCRYL ENAMEL HI-BUILD 58030 or according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	45	45	140	140

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 50-100 micron/2-4 mils. When used in 50 micron dry film thickness, 3-5% thinning will be necessary to secure proper film formation. For proper film formation the recommended nozzle sizes should be used.

Good painting: practice: The durability/performance of water-borne coatings is to a very high degree depending on the fulfilment of good painting practice. For instance application to riveted and skip-welded constructions will require extra care when coating sharp edges, riveted joints, etc. Avoid too high thicknesses per coat. Preferably apply an extra stripe coat.

"Edge effect": As water-borne paints have a high tendency to "withdraw" from sharp edges, etc., proper corrosion protection will be highly supported by careful rounding of edges and that any joints are completely closed and tight.

Brush application: Add 3-8% by volume of HEMUCRYL BRUSH AGENT 99810. Typical dry film thickness per coat will be 30-40 micron/1.2-1.6 mils.

Exposure to low temperatures shortly after application: If the painted items will be exposed to humidity/water at temperatures below 5-10°C/40-50°F shortly after finishing the paint application, it is of utmost importance for later good performance that the following rules are complied with:

- Excessive film thickness must be avoided.
- The (last applied) paint layer must dry for at least 6 hours at 20°C/68°F - 40-60% RH, 9 hours at 15°C/59°F - 40-60% RH before exposure to temperatures below 10°C/50°F and/or condensation/water exposure.

Avoid outdoor application in seasons with low night temperatures especially in combination with condensation or rain.

Recoating: No maximum recoating interval, but after prolonged exposure to polluted atmosphere remove accumulated contamination by (high pressure) fresh water cleaning and allow to dry.

Cleaning of tools: Clean tools carefully with fresh water or lukewarm soap water immediately after use.
Dried remains of paint can be removed with HEMPEL'S TOOL CLEANER 99610.

Shelf life/ storage: Store at temperatures between 5-40°C/41-104°F. Shelf life is reduced at temperatures above 30°C/86°F. Do not expose to frost during storage and transport, or before the coating is dry.

Note: **HEMUCRYL PRIMER HI-BUILD 18032 is for professional use only.**

ISSUED BY: HEMPEL A/S - 1803212170CO002

For product description refer to product data sheet

HEMPEL'S HEMUCRYL product range

Scope:

These Application Instructions cover surface preparation and application conditions of HEMPEL'S HEMUCRYLs.

Surface preparation, primers:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to minimum Sa 2½. For temporary protection, if required, use suitable shopprimer. All damaged shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use the specified HEMUCRYL primer type.

Repair: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose paint by abrasive blasting or power tool cleaning to St 3 before recoating. Touch up bare spots with the specified HEMUCRYL primer type.

Aluminium: Very thorough degreasing, followed by (high pressure) fresh water cleaning to remove all salts and other contamination. Any anodizing must be completely removed. Thorough sand papering or abrasive sweeping with mineral abrasives is recommended. Cast aluminium is recommended to be abrasive swept to a uniform, evenly grey appearance.

Stainless steel: Very thorough degreasing with alkaline degreaser, ie HEMPEL'S LIGHT CLEANER 99350, followed by fresh water hosing to remove all contamination.

Hot-dipped galvanized steel: Wet rubbing/grinding with ammonia water 1:20 followed by fresh water hosing. In the case this method is not feasible, the procedure as described for stainless steel may be used.

Zinc silicate coated surfaces: Remove oil and grease, etc, with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. After exposure to high humidity, zinc salts ("white rust") must be removed carefully by (high pressure) fresh water cleaning - if necessary combined with scrubbing with stiff nylon brushes. Consult the APPLICATION INSTRUCTIONS for the relevant GALVOSIL product.

Note:
Among the HEMUCRYL primer types, HEMUCRYL TI-COAT 18200 is designed to be used as the first coat on aluminium, hot-dipped galvanized steel, stainless steel and on zinc silicate coated surfaces.

Surface preparation, topcoats:

Preceding coats should be sound and tightly adhering. Remove oil and grease with suitable detergent. Remove salts and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up to full system before recoating with specified HEMUCRYL topcoat type.

Concrete: Any oil, grease and other contaminants should be removed by eg volatilizing by flame cleaning or treatment with suitable detergent, the latter in the following way:

1) Saturation of the surface with fresh water
2) Washing with suitable detergent followed by fresh water hosing

Remove loose material eg by stiff brushes or blasting, high pressure jetting or flame cleaning followed by fresh water hosing depending on circumstances. Three last mentioned methods are also able to remove scum layer if necessary. After surface preparation the surface should feel solid and hard. Remove dust. Saturate surface with suitable sealer, eg micro dispersed acrylic type or by the HEMUCRYL topcoat diluted 15-20% with water.

HEMPEL'S HEMUCRYL product range

Application conditions:	Use only where application can proceed at temperatures above 5°C/41°F, preferably above 10°C/50°F. Apply on a clean and dry surface with a temperature above the dew point to avoid condensation. **Relative humidity:** During application above 60%, preferably 75-90%, to avoid dry spray. If RH is below 60%, special thinner may be added in order to reduce dry spray. During drying below 80%, preferably between 40-60%. (Contact HEMPEL for further advice). Good ventilation during application and drying is necessary. Especially during drying it is of utmost importance that sufficient ventilation is covering all parts of the surfaces painted. Ventilation requirements to remove water vapours liberated during application and drying are app. 75 m^3/litre of the paint at 20°C/68°F. (Relative humidity of the air supply 40%).
REMARKS:	
Good painting practice:	The durability/performance of water-borne coatings is to a very high degree depending on the fulfilment of good painting practice. For instance application to riveted and skip-welded constructions will require extra care when coating sharp edges, riveted joints, etc. Avoid too high thicknesses per coat. Preferably apply an extra stripe coat.
"Edge effect":	Furthermore, as water-borne paints have a high tendency to "withdraw" from sharp edges, etc., proper corrosion protection will be highly supported by careful rounding of edges and that any joints are completely closed and tight.
Exposure to low temperatures shortly after application:	If the painted items will be exposed to humidity/water at temperatures below 5-10°C/ 41-50°F shortly after finishing the paint application, it is of utmost importance for later good performance that following rules are complied with: • Excessive film thickness must be avoided. • The (last applied) paint layer must dry for at least 6 hours at 20°C/68°F - 40-60% RH, 12 hours at 10°C/50°F - 40-60% RH before exposure to temperatures below 5°C/41°F and/or condensation/water exposure. Avoid outdoor application in seasons with low night temperatures, frost and frost in combination with condensation or rain.
Shelf life/storage:	Store at temperatures between 5°C-40°C/41°F-104°F. Shelf life is reduced at temperatures above 30°C/86°F. Do not expose to frost during storage and transport, or before the coating is dry.
Cleaning of tools:	Tools must be cleaned immediately with lukewarm soap water and/or fresh water followed by thoroughly rinsing to remove residues of detergent. Dried remains of paint can be removed with HEMPEL'S TOOL CLEANER 99610.
Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
Note:	Any deviations from the above of a particular HEMUCRYL will be stated in the product data sheet for this paint.
ISSUED BY:	HEMPEL A/S

HEMUCRYL TI-COAT 18200

Description: HEMUCRYL TI-COAT 18200 is a water-borne acrylic dispersion paint with good adhesive properties.

Recommended use: In mild to moderate corrosive environment as a primer on hot dip galvanized steel, aluminium and stainless steel. See SUBSEQUENT COAT overleaf.

Service temperatures: Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals: Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/50710
Finish:	Flat
Volume solids, %:	38 ± 1
Theoretical spreading rate:	19.0 m^2/litre - 20 microns 762 sq.ft./US gallon - 0.8 mils
Flash point:	> 93°C/199°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	15 (approx.) min. at 20°C/68°F *(ISO 1517)*
Dry to touch:	30 (approx.) min. at 20°C/68°F
V.O.C.:	40 g/litre - 0.3 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Brush (touch-up)
Thinner (max. vol.):	Fresh water (5%)	Fresh water (5%)
Nozzle orifice:	.015"-.017"	
Nozzle pressure:	130 bar/1900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	Fresh water *(See APPLICATION INSTRUCTIONS)*	
Indicated film thickness, dry:	20 microns/0.8 mils	
Indicated film thickness, wet:	50 microns/2 mils	
Recoat interval, min:	24 hours (at 20°C/68°F) *(See REMARKS overleaf)*	
Recoat interval, max:	None *(See REMARKS overleaf)*	

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMUCRYL TI-COAT 18200

SURFACE PREPARATION: See separate HEMUCRYL APPLICATION INSTRUCTIONS.

APPLICATION CONDITIONS: See separate HEMUCRYL APPLICATION INSTRUCTIONS.

SUBSEQUENT COAT: HEMUCRYL, HEMPALIN, HEMPATEX systems or HEMPATHANE topcoats according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	40	40	140	140

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Recoating: If the subsequent coat is a HEMUCRYL-system the minimum recoating interval can be reduced to 2 hours at 20°C/68°F and ventilation. Reference is made to separate HEMUCRYL APPLICATION INSTRUCTIONS.
No maximum recoating interval, but after prolonged exposure to polluted atmosphere remove accumulated contamination by high pressure fresh water cleaning and allow to dry.

Other REMARKS: See separate HEMUCRYL APPLICATION INSTRUCTIONS.

Note: **HEMUCRYL TI-COAT 18200 is for professional use only.**

ISSUED BY: HEMPEL A/S - 1820050710C0008

For product description refer to product data sheet

HEMPEL'S HEMUCRYL product range

Scope:

These Application Instructions cover surface preparation and application conditions of HEMPEL'S HEMUCRYLs.

Surface preparation, primers:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to minimum Sa 2½. For temporary protection, if required, use suitable shopprimer. All damaged shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use the specified HEMUCRYL primer type.

Repair: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose paint by abrasive blasting or power tool cleaning to St 3 before recoating. Touch up bare spots with the specified HEMUCRYL primer type.

Aluminium: Very thorough degreasing, followed by (high pressure) fresh water cleaning to remove all salts and other contamination. Any anodizing must be completely removed. Thorough sand papering or abrasive sweeping with mineral abrasives is recommended. Cast aluminium is recommended to be abrasive swept to a uniform, evenly grey appearance.

Stainless steel: Very thorough degreasing with alkaline degreaser, ie HEMPEL'S LIGHT CLEANER 99350, followed by fresh water hosing to remove all contamination.

Hot-dipped galvanized steel: Wet rubbing/grinding with ammonia water 1:20 followed by fresh water hosing. In the case this method is not feasible, the procedure as described for stainless steel may be used.

Zinc silicate coated surfaces: Remove oil and grease, etc, with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. After exposure to high humidity, zinc salts ("white rust") must be removed carefully by (high pressure) fresh water cleaning - if necessary combined with scrubbing with stiff nylon brushes. Consult the APPLICATION INSTRUCTIONS for the relevant GALVOSIL product.

Note:
Among the HEMUCRYL primer types, HEMUCRYL TI-COAT 18200 is designed to be used as the first coat on aluminium, hot-dipped galvanized steel, stainless steel and on zinc silicate coated surfaces.

Surface preparation, topcoats:

Preceding coats should be sound and tightly adhering. Remove oil and grease with suitable detergent. Remove salts and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up to full system before recoating with specified HEMUCRYL topcoat type.

Concrete: Any oil, grease and other contaminants should be removed by eg volatilizing by flame cleaning or treatment with suitable detergent, the latter in the following way:

1) Saturation of the surface with fresh water
2) Washing with suitable detergent followed by fresh water hosing

Remove loose material eg by stiff brushes or blasting, high pressure jetting or flame cleaning followed by fresh water hosing depending on circumstances. Three last mentioned methods are also able to remove scum layer if necessary. After surface preparation the surface should feel solid and hard. Remove dust. Saturate surface with suitable sealer, eg micro dispersed acrylic type or by the HEMUCRYL topcoat diluted 15-20% with water.

HEMPEL'S HEMUCRYL product range

Application conditions:	Use only where application can proceed at temperatures above 5°C/41°F, preferably above 10°C/50°F. Apply on a clean and dry surface with a temperature above the dew point to avoid condensation. **Relative humidity:** During application above 60%, preferably 75-90%, to avoid dry spray. If RH is below 60%, special thinner may be added in order to reduce dry spray. During drying below 80%, preferably between 40-60%. (Contact HEMPEL for further advice). Good ventilation during application and drying is necessary. Especially during drying it is of utmost importance that sufficient ventilation is covering all parts of the surfaces painted. Ventilation requirements to remove water vapours liberated during application and drying are app. 75 m^3/litre of the paint at 20°C/68°F. (Relative humidity of the air supply 40%).
REMARKS:	
Good painting practice:	The durability/performance of water-borne coatings is to a very high degree depending on the fulfilment of good painting practice. For instance application to riveted and skip-welded constructions will require extra care when coating sharp edges, riveted joints, etc. Avoid too high thicknesses per coat. Preferably apply an extra stripe coat.
"Edge effect":	Furthermore, as water-borne paints have a high tendency to "withdraw" from sharp edges, etc., proper corrosion protection will be highly supported by careful rounding of edges and that any joints are completely closed and tight.
Exposure to low temperatures shortly after application:	If the painted items will be exposed to humidity/water at temperatures below 5-10°C/ 41-50°F shortly after finishing the paint application, it is of utmost importance for later good performance that following rules are complied with: • Excessive film thickness must be avoided. • The (last applied) paint layer must dry for at least 6 hours at 20°C/68°F - 40-60% RH, 12 hours at 10°C/50°F - 40-60% RH before exposure to temperatures below 5°C/41°F and/or condensation/water exposure. Avoid outdoor application in seasons with low night temperatures, frost and frost in combination with condensation or rain.
Shelf life/storage:	Store at temperatures between 5°C-40°C/41°F-104°F. Shelf life is reduced at temperatures above 30°C/86°F. Do not expose to frost during storage and transport, or before the coating is dry.
Cleaning of tools:	Tools must be cleaned immediately with lukewarm soap water and/or fresh water followed by thoroughly rinsing to remove residues of detergent. Dried remains of paint can be removed with HEMPEL'S TOOL CLEANER 99610.
Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
Note:	Any deviations from the above of a particular HEMUCRYL will be stated in the product data sheet for this paint.
ISSUED BY:	HEMPEL A/S

HEMUDUR 18500

BASE 18509 with CURING AGENT 97710

Description: HEMUDUR 18500 is a water-borne two-component polyamine cured epoxy primer containing corrosive inhibiting pigment. It cures to a strong and rust-preventing coat.

Recommended use: In mildly to moderately corrosive environments as a general purpose primer on steel constructions (see REMARKS overleaf).

Service temperatures: Maximum, dry exposure only: 140°C/284°F.

Certificates/Approvals: Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/12170 - Red/51320
Finish:	Semi-flat
Volume solids, %:	51 ± 1
Theoretical spreading rate:	6.8 m^2/litre - 75 micron
	273 sq.ft./US gallon - 3 mils
Flash point:	> 93°C/199°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Surface dry:	2 (approx) hours at 20°C/68°F
Dry to touch:	4 (approx) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	20 g/litre - 0.2 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 18500:	Base 18509 : Curing agent 97710	
	2 : 3 by volume	
Application method:	Airless spray	Brush
Thinner (max.vol.):	Fresh water (5%)	Fresh water (5%)
Pot life:	1 hour (20°C/68°F) *(See REMARKS overleaf)*	
	30 minutes (15°C/59°F)	
Nozzle orifice:	.015"-.019" *(See REMARKS overleaf)*	
Nozzle pressure:	Min. 150 bar/2200 psi	
	(Airless spray data are indicative and subject to adjustment)	
Cleaning of tools:	Fresh water *(See REMARKS overleaf)*	
Indicated film thickness, dry:	75 micron/3 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	150 micron/6 mils	
Recoating:	Recoating intervals related to later conditions of exposure:	
	(75 micron/3 mils dry film thickness of HEMUDUR 18500)	

	Minimum			Maximum		
Surface temperature	20°C/68°F			20°C/68°F		
	Atmospheric			Atmospheric		
Recoated with	Mild	Medium	Severe	Mild	Medium	Severe
HEMUCRYL	2 hours	6 hours	6 hours	None*	1 week*	24 hours*
HEMUDUR	2 hours	6 hours	6 hours	None*	None*	3 weeks*

* Before recoating, clean the surface thoroughly for all contamination. To check adequate quality of the preparatory cleaning, a test patch is recommended before actual recoating.

If the maximum interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMUDUR 18500

SURFACE PREPARATION: **New steel:** Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to minimum Sa 2½. For temporary protection, if required, use suitable shopprimer. All damaged shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMUDUR 18500.
Repair: Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose paint by abrasive blasting or power tool cleaning to St 3 (minor areas) before recoating. Touch up bare spots with HEMUDUR 18500.

APPLICATION CONDITIONS: Use only where application and curing can proceed at temperatures above 15°C/59°F.
Apply on a clean and dry surface with a temperature above the dew point to avoid condensation. Relative humidity: During drying below 80%, preferably between 40-60%. Good ventilation during application and drying is necessary. During drying it is of the utmost importance that sufficient ventilation is covering all parts of the surfaces painted. Ventilation requirements to remove the water vapours liberated during application and drying are approx. 75 m^3/litre of paint at 20°C/68°F. (Relative humidity of the air supply 40%.)

PRECEDING COAT: None, HEMPADUR ZINC 17360, HEMUDUR ZINC 18560 or according to specification.

SUBSEQUENT COAT: HEMUDUR, HEMUCRYL or according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	20	20	140	140

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Application: For proper film formation the recommended nozzle sizes should be used.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence amount of thinning necessary, drying time and recoating interval. Normal range is 50-100 micron/2-4 mils. Application at lower film thicknesses is possible, but requires thinning for proper film formation.

Good painting practice: The durability/performance of water-borne coatings is to a very high degree depending on the fulfilment of good painting practice. For instance application to riveted and skip-welded constructions will require extra care when coating sharp edges, riveted joints, etc. Avoid too high thicknesses per coat. Preferably apply an extra stripe coat.

"Edge effect": As water-borne paints have a high tendency to "withdraw" from sharp edges, etc., proper corrosion protection will be highly supported by careful rounding of edges and that any joints are completely closed and tight.

Exposure to low temperature shortly after application: If the painted items will be exposed to humidity/water at temperatures below 15°C/59°F shortly after finishing the paint application, it is of utmost importance for later good performance that the following rules are complied with:

- Excessive film thickness must be avoided
- The (last applied) paint layer must dry for at least 6 hours at 20°C/68°F - 40-60% RH before exposure to temperatures below 15°C/59°F and/or condensation/water exposure.

Avoid outdoor application in seasons with low night temperatures especially in combination with condensation or rain.

Cleaning of tools: Tools must be cleaned immediately with lukewarm soap water and/or fresh water followed by thoroughly rinsing to remove residues of detergent. Dried paint residues may be removed with HEMPEL'S TOOL CLEANER 99610.

Shelf life/storage: Store at temperatures between 5-40°C/41-105°F. The shelf life is reduced at temperatures above 30°C/86°F. Do not expose to frost during storage and transport.

Pot life: **The pot life time is not indicated eg by an increase in viscosity. Although the paint still looks usable after 1 hour at 20°C/68°F, it is important that the paint is no longer used as its protective properties are dramatically reduced after this time. Be aware that the pot life will decrease when the temperature decreases, eg to 30 minutes at 15°C/59°F. Use eg an alarm clock to indicate when the pot life has been exceeded.**

Note: **HEMUDUR 18500 is for professional use only.**

ISSUED BY: HEMPEL A/S - 1850012170C00011

Product Data

HEMUDUR ZINC 18560

HEMPEL'S ZINC METAL PIGMENT 97110
CURING AGENT 97700

Description:

HEMUDUR ZINC 18560 is a three-component, water-borne, zinc rich epoxy primer. It cures to a strong and anticorrosive coating that offers cathodic protection of local mechanical damage.

Recommended use:

In moderately to severely atmospheric exposure as an anticorrosive primer for water-borne paint systems.
In compliance with SSPC-Paint 20, type 2, level 1 and ISO 12944-5.

Service temperatures:

Maximum, dry exposure only: 140°C/284°F.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/19840
Finish:	Flat
Volume solids, %:	51 ± 1
Theoretical spreading rate:	10.2 m^2/litre - 50 micron 409 sq.ft/US gallon - 2 mils
Flash point:	> 93°C/199°F
Specific gravity:	2.5 kg/litre - 20.9 lbs/US gallon
Surface dry:	1 (approx) hour at 20°C/68°F *(ISO 1517)*
Dry to touch:	2 (approx) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	10 g/litre - 0.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 18560:

BASE 18569, 4.3 parts by volume : Hempel's zinc metal pigment 97110,
17.0 parts by weight (totally 6.7 parts by volume) : CURING AGENT 97700,
3.3 parts by volume.
Add Hempel's zinc metal pigment 97110 slowly while stirring to BASE 18569. Stir constantly with an efficient mechanical mixer and continue until a homogeneous mixture is obtained. Then mix with CURING AGENT 97700.

Application method:	Airless spray	Brush (touch-up)
Thinner (max.vol.):	Fresh water (10%)	Fresh water (5%)
Pot life:	3 hours (20°C/68°F) *(See REMARKS overleaf)*	
	1½ hours (15°C/59°F)	
Nozzle orifice:	.015"-.019"	
Nozzle pressure:	150 bar/2200 psi	
	(Airless spray data are indicative and subject to adjustment).	
Cleaning of tools:	Fresh water *(See REMARKS overleaf)*	
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	100 micron/4 mils	

Recoating:

Recoating intervals related to later conditions of exposure:
(50 micron/2 mils dry film thickness of HEMUDUR 18560, steel temp. 20°C/68°F)

	Minimum			Maximum		
	Atmospheric			Atmospheric		
Recoated with	Mild	Medium	Severe	Mild	Medium	Severe
HEMUCRYL	2 hours	3 hours	3 hours	None**	1 week**	24 hours**
HEMUDUR	2 hours*	3 hours	3 hours	None**	None**	3 weeks**

* HEMUDUR ZINC 18560 can be recoated with HEMUDUR 18500 with a minimum recoating interval of 10 minutes if both layers are specified in 30 micron/1.2 mils dry film thickness and are fully dried before applying a third coat.

** The surface must be completely clean before recoating. In the case of "white rust", scrubbing with a stiff brush and plenty of water may be necessary.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMUDUR ZINC 18560

SURFACE PREPARATION:	Remove oil and grease thoroughly with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. Abrasive blasting to Sa 2½ with a sharp-edged surface profile corresponding to Rugotest No. 3, BN9a, Keane-Tator Comparator, 2.0 G/S or ISO Comparator, Medium (G).
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above 15°C/59°F. Apply to a clean and dry surface with a temperature above the dew point to avoid condensation. Relative humidity: During drying below 80%, preferably between 40-60%. Good ventilation during application and drying is necessary. During drying it is of utmost importance that sufficient ventilation is covering all parts of the surfaces painted. Ventilation requirements to remove the water vapours liberated during application and drying are approx. 75 m^3/litre of paint at 20°C/68°F. (Relative humidity of the air supply 40%.)
SUBSEQUENT COAT:	HEMUDUR, HEMUCRYL or according to specification.
REMARKS:	**Note:** If used as anticorrosive protection under insulation of high temperature equipment it is very important that NO moisture can penetrate during slow-down periods. This to avoid risk of "wet corrosion" when the temperature rises.
Application:	For proper film formation the recommended nozzle sizes should be used.
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence amount of thinning necessary, drying time and recoating interval. Normal range is 30-75 micron/1.2-3.0 mils.
Good painting: practice:	The durability/performance of water-borne coatings is to a very high degree depending on the fulfilment of good painting practice. For instance application to riveted and skip-welded constructions will require extra care when coating sharp edges, riveted joints, etc. Avoid too high thicknesses per coat. Preferably apply an extra stripe coat.
"Edge effect":	As water-borne paints have a high tendency to "withdraw" from sharp edges, etc., proper corrosion protection will be highly supported by careful rounding of edges and that any joints are completely closed and tight.
Exposure to low temperature shortly after application:	If the painted items will be exposed to humidity/water at temperatures below 15°C/59°F shortly after finishing the paint application, it is of utmost importance for later good performance that the following rules are complied with: • Excessive film thickness must be avoided • The (last applied) paint layer must dry for at least 6 hours at 20°C/68°F - 40-60% RH before exposure to temperatures below 15°C/59°F and/or condensation/water exposure. Avoid outdoor application in seasons with low night temperatures especially in combination with condensation or rain.
Cleaning of tools:	Tools must be cleaned immediately with lukewarm soap water and/or fresh water followed by thoroughly rinsing to remove residues of detergent. Dried paint residues may be removed with HEMPEL'S TOOL CLEANER 99610.
Shelf life/storage:	Store at temperatures between 5-40°C/41-104°F. The shelf life is reduced at temperatures above 30°C/86°F. Do not expose to frost during storage and transport.
Pot life:	**The pot life time is not visible eg by an increase in viscosity. Although the paint still looks usable after 3 hours at 20°C/68°F, it is important that the paint is no longer used as its protective properties are dramatically reduced after this time. Be aware that the pot life will decrease when the temperature decreases eg to 1½ hour at 15°C/59°F. Use eg an alarm clock to indicate when the pot life has been exceeded. Temperatures indicated are understood as the common temperature for both paint material and the steel to be painted.**
Note:	**HEMUDUR ZINC 18560 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1856019840CO003

HEMPATEX E.V. PRIMER 19151

Former name: Werofa Spezial E-Firnis 19151D

Description:

HEMPATEX E.V. PRIMER 19151 is a paint based on a special resin for temporary corrosion protection of high temperature equipment.

Recommended use:

As a temporary corrosion protection during storage and fabrication of high temperature equipment such as pipes, heating coils and hot ventilation channels.
When heated, the paint decomposes slowly under moderate release of gases.

Approvals, certificates:

Approved as a welding primer according to DAST-Richtlinie 006 (20 micron/0.8 mil dry film thickness).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/50670
Finish:	Flat
Volume solids, %:	48 ± 1 *(DIN 53219)*
Theoretical spreading rate:	8 m^2/litre - 60 micron 321 sq.ft./US gallon - 2.4 mils
Flash point:	24°C/77°F
Specific gravity:	1.6 kg/litre - 13.4 lbs/US gallon
Dry to touch:	30 *(approx)* minutes at 20°C/68°F
V.O.C.:	410 g/litre - 3.4 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Brush	Roller
Thinner (max.vol.):	08080 (5%)	08080 (5%)	08080 (5%)
Nozzle orifice:	.013"-0.017"		
Nozzle pressure:	130 bar/1885 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	HEMPEL'S THINNER 08080		
Indicated film thickness, dry:	60 micron/2.4 mils		
Indicated film thickness, wet:	125 micron/5 mils		
Recoat interval, min:	When dry		
Recoat interval, max:	None		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPATEX E.V. PRIMER 19151

SURFACE PREPARATION:	Remove oil and grease etc. with suitable detergent. Remove salt and loose material. Blast cleaning will improve the anticorrosion properties.
APPLICATION AND CURING CONDITIONS:	Clean and dry surface with temperature above the dew point to avoid condensation. Use only where application and drying can proceed at temperatures above 0°C/30°F with a relative humidity below 80% RH.
SUBSEQUENT COAT:	None
REMARKS:	May be specified in another film thickness than indicated depending on purpose. This will alter spreading rate and may influence drying time.
Note:	**HEMPATEX E.V. PRIMER 19151 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 1915150670CS002

HEMPASIL NEXUS 27302

FOULING RELEASE TIECOAT
BASE 27309 with CURING AGENT 98100 and ADDITIVE 99701

Description: HEMPASIL NEXUS 27302 is a high solid three component silicone based product.

Recommended use: As a tiecoat for the HEMPASIL FOULING RELEASE System, securing adhesion between the anticorrosive system and the Hempasil Fouling Release topcoat.

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colour/Shade nos:	Light red 55001
Finish:	Semi-gloss
Volume solids, %:	70 (see REMARKS overleaf)
Theoretical spreading rate:	5.8 m²/litre - 120 micron 234 sq.ft./US gallon - 4.8 mils
Flash point:	30°C/86°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	2 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	265 g/litre - 2.3 lbs/US gallon
Shelf life:	1 year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage. If the shelf life is exceeded please contact HEMPEL for further advice.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio:	Shade 55001: Base 27309: Curing Agent 98100: Additive 99701 14,8 : 4,2 : 1 by volume *(See REMARKS overleaf)*
Application method:	Airless spray Brush/roller *(touch-up) (see REMARKS overleaf)*
Thinner:	No thinning *(see REMARKS overleaf)*
Nozzle orifice:	.019"-.021"
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080 *(see REMARKS overleaf)*
"Pot life":	1 hour (20°C/68°F) *(see REMARKS overleaf)*
Indicated film thickness, dry:	120 micron/4.8 mils
Indicated film thickness, wet:	175 micron/7 mils
Recoat interval, min:	6 hours (20°C/68°F) (see REMARKS overleaf)
Recoat interval, max:	24 hours (20°C/68°F)

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPASIL NEXUS 27302

SURFACE PREPARATION:	**New construction:** According to painting specification/product data sheet for the specified HEMPADUR system. **Maintenance, non-F/R systems:** This is feasible provided the general condition of the old paint system is good and very thorough cleaning is carried out. Spot repair is to be carried out with specified HEMPADUR system. A "bridge coating" is subsequently used as full coat before application of HEMPASIL NEXUS 27302. **Maintenance, old F/R systems:** Possible spot repair with specified HEMPADUR system followed by spot application of HEMPASIL NEXUS 27302. In any of the above-mentioned cases, a detailed working specification is available upon request.
APPLICATION CONDITIONS:	Use only where application can proceed at temperatures above 10°C/50°F. The temperature of the surface and that of the paint itself must also be above this limit. Apply only on a surface with a temperature above the dew point to avoid condensation. The surface should be clean and dry. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPADUR according to specification.
SUBSEQUENT COAT:	HEMPASIL FOULING RELEASE COATING according to specification.
REMARKS:	It is of the utmost importance that thorough protection and cleaning procedures are followed before and after application respectively. It is advisable to apply HEMPASIL system after all other exterior painting is complete. This is to avoid silicone contamination of other painted surfaces. **Before** application cover all surfaces surrounding the areas to be applied with plastic sheeting to avoid overspray. **After** application clean all equipment thoroughly, before re-using equipment. See below.
Volume solids:	The stated value is the theoretical volume solids: solid content of the mixed product. Due to the chemical reaction in the mixture the practical volume solid will be approx. 5% lower than indicated.
Mixing:	Add ADDITIVE 99701 to BASE 27309 while stirring. Immediately after add CURING AGENT 98100 and mix.
"Pot life":	The pot life is 1 hour at 20°C/68°F. No change in the paints physical properties (e.g. viscosity increase) is apparent when this time is exceeded. It is important that the paint is no longer used as its adhesion properties to the preceding coat are dramatically reduced after that time.
Application method:	A well executed spray application is necessary. This paint material has special application properties and it is recommended first to make a small-scale application to get familiar with the properties.
Thinning:	Not recommended. In exceptional cases use THINNER 08080 (max 5 vol.%).
Recoating by itself:	HEMPASIL NEXUS 27302 must be applied in one coat. In case HEMPASIL NEXUS 27302 has to be recoated by itself, application must be wet in wet.
Weather conditions:	Please refer to application manual.
Cleaning of tools:	Very thorough cleaning with THINNER 08080 is necessary. DISPOSE OF CLEANING SOLVENTS AFTER USE. DO NOT RE-USE SOLVENTS AFTER CLEANING.
Storage of cans:	Must be stored under absolutely dry conditions, protect against seeping humidity.
Note:	**HEMPASIL NEXUS 27302 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 2730255001CR001

Product Data

HEMPADUR FILLER 35250

BASE 35259 with CURING AGENT 95250

Description:

HEMPADUR FILLER 35250 is a two-component, solvent-free, epoxy filler, which when fully cured - is resistant to water, aliphatic hydrocarbons, and related products. Can be applied in thick coats up to approximately 5 mm without runs or sags.

Recommended use:

1. As a filler for metals, hardwood, and other rigid materials.
2. For filling of pinholes in weldings and similar irregularities in steel work not later exposed to strong chemicals.

Service temperatures:

	Dry exposure only:	In water (no temperature gradient):
Maximum:	140°C/284°F	35°C/95°F

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Light grey/19810
Finish:	Semi-gloss
Volume solids, %:	100
Flash point:	92°C/198°F
Specific gravity:	1.6 kg/litre - 13.4 lbs/US gallon
Dry to touch:	8 (approx.) hours at 20°C/68°F
Fully cured:	5 (approx.) days at 20°C/68°F
V.O.C.:	10 g/litre - 0.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances. Further reference is made to "Explanatory Notes" in the HEMPEL book.

APPLICATION DETAILS:

Mixing ratio for 35250:	Base 35259 : Curing agent 95250 1 : 1 by volume
Application method:	Putty knife, or similar.
Thinner (max.vol.):	Do not dilute
Pot life:	1 hour (20°C/68°F)
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Recoat interval, min:	8 hours (20°C/68°F)
Recoat interval, max:	24 hours (20°C/68°F) *(See REMARKS overleaf)*

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR FILLER 35250

SURFACE PREPARATION:	**Metal:** Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting, power tool cleaning or sanding, depending on material and condition of the surface. Pitted steel should be blast cleaned and/or ground with high speed burrs. Round off sharp edges. Finally clean the area with HEMPEL'S THINNER 08450. Priming after abrasive blast cleaning can be done with a thin layer of eg HEMPADUR 15590.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above 5°C/41°F. The temperature of the substrate should also be above this limit. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
SUBSEQUENT COAT:	Can be recoated with HEMPALIN, HEMPATEX or HEMPADUR qualities according to specification. High-gloss finishes such as HEMPATHANE TOPCOAT, should not be applied directly on top of HEMPADUR FILLER 35250. An intermediate coat eg of a suitable HEMPADUR coating is recommended.
REMARKS:	Mix and stir the two components thoroughly until an even light grey colour is achieved, where after the filler is ready for use. Do not mix more than is necessary for use within the pot life. If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. May be sanded after 16 hours (20°C/68°F).
Note:	**HEMPADUR FILLER 35250 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 3525019810CO0006

HEMPADUR SPRAY-GUARD 35490/ HEMPADUR SPRAY-GUARD 35493

High temperatures: 35490 with CURING AGENT 95690
Medium temperatures: 35493 with CURING AGENT 95790

Description:
HEMPADUR SPRAY-GUARD 35490/35493 is a solvent-free, two-component, epoxy coating. It cures to a hard, tough and well adhering protective coating. It can be spray applied in one coat at a minimum film thickness of 2.5 mm (100 mils).

Recommended use:
As a heavy duty coating on steel and concrete exposed to severe corrosive conditions and/or impact such as splash zones and decks. Colour retention will be of minor importance.
CURING AGENT 95690 suited for application at temperatures above 20°C/68°F.
CURING AGENT 95790 suited for application at temperatures between 10°C/50°F and 20°C/68°F.
Conforms with NORSOK M-501, system no. 4.

Service temperatures:

	Dry exposure only:	In water (no temperature gradient):
Maximum:	140°C/284°F	35°C/95°F

See REMARKS overleaf.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey-green/41690
Finish:	Semi-gloss, textured
Volume solids, %:	100
Theoretical spreading rate:	0.4 m^2/litre - 2.5 mm 16.0 sq.ft./US gallon - 100 mils
Flash point:	> 60°C/140°F
Specific gravity:	1.9 kg/litre - 15.8 lbs/US gallon
Surface dry:	See REMARKS overleaf
Dry to touch:	See REMARKS overleaf
Fully cured:	See REMARKS overleaf
V.O.C.:	0 g/litre - 0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances. Further reference is made to "Explanatory Notes" in the HEMPEL book.

APPLICATION DETAILS:	**35490**	**35493**
Mixing ratio:	Base 35499 : Curing agent 95690 5.6 : 1.0 by volume; 23.0 : 2.0 by weight	Base 35499 : Curing agent 95790 5.7 : 1.0 by volume; 23.0 : 2.15 by weight
Application method:	Spray *(small areas: notched trowel)* *(Consult separate Application Instructions)*	Spray *(small areas: notched trowel)* *(Consult separate Application Instructions)*
Thinner (max. vol.):	**Do not dilute** *(see REMARKS overleaf)*	**Do not dilute** *(see REMARKS overleaf)*
Pot life:	See REMARKS overleaf	See REMARKS overleaf
Recommended equipment:	Air spray by worm-pump equipment, by hose pump or by modified piston pump. *(Consult separate Application Instructions)* For small areas Quick Spray Hopper Gun.	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610.	
Indicated film thickness, dry:	2.5 mm/100 mils	
Indicated film thickness, wet:	2.5 mm/100 mils	
Recoating interval, min:	See REMARKS overleaf	
Recoating interval, max:	See REMARKS overleaf	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR SPRAY-GUARD 35490/35493

SURFACE PREPARATION:

Steel: Abrasive blasting to Sa 2½ or Sa 3 depending on area of use.
Surface profile corresponding to Rugotest No. 3 BN11, Keane-Tator Comparator 5.5 G/S, or ISO Comparator, Coarse (G). Oil and grease must be removed with suitable detergent, salt and other contaminants by (high pressure) fresh water cleaning prior to blasting. After blasting clean the surface carefully from abrasives and dust. The blasted and cleaned surface may advantageously be primed with HEMPADUR 15590.

Concrete: Remove slip agent and other possible contaminants by emulsion cleaning followed by high pressure hosing with fresh water. Remove scum layer and loose matter to a hard, rough and uniform surface, preferably by abrasive blasting, possibly by other mechanical treatment, flame cleaning or acid etching. Seal surface with suitable sealer, e.g. HEMPADUR SEALER 05990 (furthermore, see Product Data Sheet for 05990). Further information about surface preparation to be found in separate APPLICATION INSTRUCTIONS for 35490/35493.

APPLICATION CONDITIONS:

Use only on a clean and dry surface with a temperature above the dew point to avoid condensation when application and curing can proceed as listed:

Cured with	Curing agent 95690	Curing agent 95790
Minimum appl. temperature of substrate:	20°C/68°F	10°C/50°F
Curing will proceed down to:	10°C/50°F	2°C/36°F
Fully cured:	7 days at 20°C/68°F	7 days at 10°C/50°F
Surface dry (ISO 1517):	about 3 hrs at 20°C/68°F	about 3 hrs at 10°C/50°F
Dry to touch:	about 8 hrs at 20°C/68°F	about 8 hrs at 10°C/50°F
Dry to handle:	about 3 days at 20°C/68°F	about 3 days at 10°C/50°F

To facilitate stirring and mixing, the material temperature should in no case be less than approx 20°C/68°F.

PRECEDING COAT: None, HEMPADUR SEALER 05990, HEMPADUR 15590, or according to specification.

SUBSEQUENT COAT: None, or HEMPADUR qualities according to specification. In case a "smoothening" of the surface is required, HEMPADUR MULTI-STRENGTH 45751 may be used.

REMARKS:
Weathering/ temperatures: The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more service sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses: May be specified and applied in higher film thicknesses than indicated. **Not recommended below 2.5 mm /100 mils, since HEMPADUR SPRAY-GUARD 35490/35493 will not form a close and pinhole-free film at lower film thicknesses.**

Adhesion: Proper adhesion is obtained by applying HEMPADUR SPRAY-GUARD 35490/35493 directly to the steel. If a blast primer is required, HEMPADUR 15590 is recommended.

Thinning: **Do not dilute as this will influence adhesion and cohesion of the paint system.**

Pot life:

Material temperature	30°C/86°F	20°C/68°F	10°C/50°F
With curing agent 95690	30 minutes	1 hour	Not relevant
With curing agent 95790	Not relevant	30 minutes	1 hour

Recoating interval:

Substrate temperature		30°C/86°F	20°C/68°F	10°C/50°F
With curing agent 95690	Min	4 hours	8 hours	Not relevant
	Max	2 weeks	1 month	2 months
With curing agent 95790	Min	2 hours	4 hours	8 hours
	Max	2 weeks	1 month	2 months

In the case of contamination before recoating, very careful cleaning is a must.
Repair work should include recoating of a part of the surrounding, intact, original paint, which must be cleaned and roughened prior to application.
For further details consult separate Application Instructions.

Note: **HEMPADUR SPRAY-GUARD 35490/35493 is for professional use only.**

ISSUED BY: HEMPEL A/S - 35490416900007/35493416900004

For product description refer to product data sheet

HEMPADUR SPRAY-GUARD 35490/ HEMPADUR SPRAY-GUARD 35493

High temperatures: 35490 with CURING AGENT 95690
Medium temperatures: 35493 with CURING AGENT 95790

Scope:

These Application Instructions cover surface preparation and application in connection with HEMPADUR SPRAY-GUARD 35490/35493.

Surface preparation:

Steel: Heavily scaled surfaces may advantageously be descaled mechanically (e.g. hammering) prior to abrasive blasting.

Rough welds and sharp edges should be ground and rounded off prior to abrasive blasting. Weld spatters to be removed.

Prior to blast cleaning the steel, remove oil, grease, and other contamination with suitable detergent followed by (high pressure) fresh water cleaning. Other chemical contamination shall be neutralized and/or flushed.

Alkali deposits on new welding seams to be removed with fresh water.
All steel surfaces to be protected must be abrasive gritblasted to minimum "near white metal", Sa 2½, ISO 8501-1:2007.

For very severe service conditions, abrasive gritblasting to "white metal", Sa 3, ISO 8501-1: 2007 can be necessary.

The minimum required surface profile is Ra = 25 micron, corresponding to Rugotest No. 3, BN11, Keane-Tator Comparator 5.5 G/S, or ISO Comparator Coarse (G). The profile is obtained with sharp, angular abrasives.

All blasted surfaces must be cleaned from dust, abrasives, etc. prior to painting. HEMPADUR 15590 may be used as blast primer according to specification.

Concrete: The concrete must be of good quality and fully cured, eg 28 days for normal Portland cement, and completely dry with a humidity content in the surface below 4%. The concrete must also be controlled for absence of capillary water action or for subsoil water.

Minimum pull-off value should normally be 20 kilopond/cm^2 measured after surface preparation. Any cracks, crevices and voids must be repaired.

All possible slip agent, oil, grease and other contaminants must be removed by eg abrasive blasting, volatilizing by flame cleaning or treatment with suitable detergent. The last mentioned in the following way: Saturation of the surface with fresh water. Washing with detergent followed by fresh water hosing.

Depending on construction and purpose, abrasive blast, high pressure water jet or treat the concrete with power tools to obtain a rough and firm surface free of scum layer and other contamination. Remove dust and loose material.

If mechanical treatment is impossible, the surface may be treated with acid etching. For this purpose an approx. 5% w/w nitric or phosphoric acid solution is recommended.
Note: Strong acids, take necessary precautions, make sure that safety regulations are obeyed!

Prior to etching the concrete should be saturated with fresh water to prevent acid corrosion of the reinforcement bars. Leave the acid to act for 3-4 minutes and hose down the surface with fresh water - preferably first a 5% w/w sodium hydroxide solution - and scrub carefully. After that the surface must dry homogenously and appear as an even, rough surface free of a loose outer layer. The surface must have a pH reaction of between 6.5-8.0. If any of these conditions are not fulfilled, the process must be repeated. The surface must be dried with good ventilation for at least 2 days at 65% relative humidity and 20°C/68°F.

Pre-treatment is controlled by scraping with a strong knife. The surface must feel solid and hard, and the knife must only leave a clear scratch mark.

Seal the surface with HEMPADUR SEALER 05990 in such a way that the surface is just saturated. Any surplus must be removed (do also see the Product Data Sheet for HEMPADUR SEALER 05990).

Application equipment:

The following pumps are recommended for application of HEMPADUR SPRAY-GUARD 35490/35493:

For major jobs:

a. **Worm pump type, vertically situated, eg:**
PUTZMEISTER SPRAY BOY II
Model no. 20975.005 (air driven)
Worm pump, electrically or air driven. Pump house D 4 1/2, Art. 70829004.
Mantel material, benzene resistant, Neoprene, 70827006.
Best working temperatures between 10°C/50°F and 30°C/86°F

b. **Hose pump ("Carrousel" pump), eg:**
BREDEL Hosepump type SP 40. Pump hose 40 mm in diameter, preferably of synthetic rubber. Electrically or air driven. Motor power for instance 1.5 kW, geared to give an output speed of 7-55 rpm.
Best working temperatures between 10°C/50°F and 30°C/86°F.

c. **Piston pump type with hopper, eg:**
GROVER MFG CORP. Model 473 TSD
Modified, divorced piston pump 10:1 (7.5:1 can also be used).
Best working temperatures above 20°C/68°F

For small as well as major jobs:

d. GRACO President, Modified Model 225-841, 10:1 Piston Pump.

For repair and small constructions:

e. PUTZMEISTER QUICK SPRAY.

Note: Other Hopper guns are available.

Spray guns:
Ball Valve guns from Maskin A/B Tumac, Sweden

No. 04131.001, Putzmeister, West Germany

Serie 22517, Grover, Texas

Nozzle Orifice:
3-7 mm depending on circumstances

Material Hose:
Internally lined hose is recommended e.g. Uniroyal Mamili SAE 16CR 1T 3434. Length up to 15 metres/50 feet.
For piston pumps max. 10 metres/35 feet.
For hose pump max. 20 metres/70 feet.

Mixing machine:
For large jobs the use of a mixing machine is recommended, e.g.:
PENNINE G5 Mixer from: PENNINE Industrial Equipment Ltd., Great Britain.

Note: Other spray and mixing equipment than above mentioned may be usable.

Do not dilute.

Application by trowel is possible, but primarily relevant **for small horizontal areas**. Use a wide-notched trowel with an opening of 10 mm to ensure that a sufficient film thickness has been achieved. Smoothen out with a plain spatula dipped in THINNER 08080. Keep a uniform pressure with the spatula. Finally, if a textured surface is required, the wet coating is rolled over with a textured nylon roller dipped in THINNER 08080.

Mixing:

HEMPADUR SPRAY-GUARD 35490/35493 is delivered in two components, viz:
BASE 35499 and CURING AGENT 95690 for use at temperatures above 20°C/68°F, or
BASE 35499 and CURING AGENT 95790 for use at temperatures between 20°C/68°F and 10°C/50°F.

Stir the base thoroughly several minutes with a powerful, mechanical mixer.
Add the content of the smaller can, the CURING AGENT, into the larger can and stir again. Minimize the residues in the small can.

It is important to ensure that all BASE material is homogeneously incorporated into the mixture after which HEMPADUR SPRAY-GUARD 35490/35493 is ready for application.

If it is necessary to mix smaller portions than supplied, then **extreme** care must be taken to ensure that BASE as well as CURING AGENT separately are made completely homogenous by thorough stirring **before subdividing**.

The mixing ratio is:

"Medium temperatures", 35493:
BASE, HEMPADUR SPRAY-GUARD 35499 : 10.7 parts by weight or 5.7 parts by volume
CURING AGENT 95790 : 1.0 part by weight or 1.0 part by volume.

"High temperatures", 35490:
BASE, HEMPADUR SPRAY-GUARD 35499 : 11.5 parts by weight or 5.6 parts by volume
CURING AGENT 95690 : 1.0 part by weight or 1.0 part by volume.

Pot life:

CURING AGENT 95690		**CURING AGENT 95790**	
At 30°C/86°F:	30 minutes	At 20°C/68°F:	30 minutes
At 25°C/77°F:	45 minutes	At 15°C/59°F:	45 minutes
At 20°C/68°F:	1 hour	At 10°C/50°F:	1 hour

Do not mix more material than can be used during the pot life at the prevailing temperature. In hot climate it is recommended to mix only one set at a time just prior to use.

Procedure:

Worm and hose type pump:
Flush the pump with HEMPEL'S TOOL CLEANER 99610.
Empty the pump. Mix and add HEMPADUR SPRAY-GUARD 35490 or 35493 to the hopper.

Nozzle orifice: Approximately 5 mm, air pressure 4-6 bar/60-90 psi.

Pressure, air driven machinery, worm type pump:
Airmotor: 1.5-2 bar/20-30 psi

The best distance between gun and substrate is 25-50 cm/1-2 feet.

The hopper must be completely free of previous mixture before re-loading with HEMPADUR SPRAY-GUARD 35490 or 35493.

To avoid material being pressed into the air chamber of the gun, turn on the atomizing air before starting the pump.

Piston pump:
Flush the pump and the hose with HEMPEL'S TOOL CLEANER 99610.
Remove HEMPEL'S TOOL CLEANER 99610 from the pump by opening lower ball valve.
Mix HEMPADUR SPRAY-GUARD 35490 or 35493 and load the pump.

Nozzle orifice: Approximately 7 mm.

Air pressure:
Nozzle: 3-6 bar/45-90 psi
Input, 10:1 pump: 1.5-4 bar/20-60 psi
Open the relax-a-valve a little before spraying.

The best distance between gun and substrate is 25-40 cm/1-1.5 foot.

Stop of spray application:

Even for short interruptions of spraying it is important to stop the gun **and** the pump simultaneously to prevent paint build-up in hoses and gun. Automatic devices for this purpose can be delivered as standard for most equipment.

If the nozzle is blocked, the following procedure is mandatory:

- Remove and clean cap and nozzle separately.
- Circulate the material at equal pressures (**do not** increase the pressure on the material hose).

Control of wet film thickness:

The applied paint film thickness must be measured immediately after application with a wet film thickness gauge suitable for this range of thicknesses (scale: 1-5 mm/40-200 mils).

Besides, control of consumption in relation to the area coated is carried out regularly. Theoretically, a film thickness of 2.5 mm corresponds to a consumption of 2.5 litres HEMPADUR SPRAY-GUARD 35490 or 35493 per square metre.

Additional material must be applied in case the thickness is insufficient, and in case of improper film formation.

Equipment cleaning:

Thorough cleaning of equipment is essential for a continuous, problem-free operation.

During application:
Keep the sides of the hopper free of "old" material by scraping the sides regularly.

After application:
Immediately after finishing the application pump a high viscosity lubricating oil through the equipment to press out the sandy remnants of HEMPADUR SPRAY-GUARD 35490/35493 to avoid settling around fittings, nozzle, piston, etc. Then follow by flushing pump, hose, and the relax-valve, if any, with HEMPEL'S TOOL CLEANER 99610.

Take cup and nozzle off the gun and flush the system at maximum speed.
To ease cleaning insert a sponge in the material hose and pump it through the hose several times. In case the material hose is not internally lined finalize by rinsing with high viscosity lubricating oil to prevent drying out of the hose. If the above-mentioned precautions are not taken, there is a risk of problematic starting-up later on.

Take the pump house apart and ensure it is thoroughly clean. In mortar type machinery lubricate the worm. Leave the pump unassembled after cleaning.

For the piston pump types HEMPADUR SPRAY-GUARD 35490/35493 will cause a relatively high degree of wearing of packings for which reason extra sets should always be at hand.

HEMPADUR SPRAY-GUARD 35490/35493

Check of the dry film:

The dry film is checked all over for discontinuities and correct minimum thickness with a High Voltage Holiday Detector operating at 12 KV. These checks can take place on HEMPADUR SPRAY-GUARD 35490 after curing with CURING AGENT 95690 for minimum 24 hours at 20°C/68°F, on HEMPADUR SPRAY-GUARD 35493 after curing with CURING AGENT 95790 for minimum 24 hours at 10°C/50°F.

Discontinuities and areas with too low film thickness showing spark discharge must be touched up.

Touch-up:

For repair and touch-up HEMPADUR SPRAY-GUARD 35490/35493 can be used. On minor spots HEMPADUR SPRAY-GUARD 35490/ 35493 may be applied by spatula. Large areas are repaired by applying the specified film thickness after proper surface preparation as described above.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 3549041690C0007 / 3549341690C0004

INSTRUCTIONS FOR MANUAL APPLICATION OF

Supplementary to the Product Data Sheet with Application Instructions

HEMPADUR SPRAY-GUARD 35490/ HEMPADUR SPRAY-GUARD 35493

Surface preparation:

According to Product Data Sheet.

HEMPADUR 15590 in a dry film thickness of 50 micron can be used as a blast primer, reference is made to the Product Data Sheet.

Application:

After careful mixing, HEMPADUR SPRAY-GUARD 35490/35493 is applied by a wide-notched trowel with 10 mm clearance.

In order to remove irregularities caused by application using a trowel, and obtain a uniform layer, smoothen with a spatula dipped into HEMPEL'S THINNER 08080. Maintain a uniform pressure when using a spatula.

To obtain a non-skid surface, roll the surface with a nylon roller with hair of a medium length. Should be dipped into HEMPEL'S THINNER 08080.

Checking:

The film thickness is checked by measuring the wet film as well as by calculating the consumption corresponding to the area. Theoretically, a film thickness of 2.5 mm corresponds to 2.5 litres of HEMPADUR SPRAY-GUARD 35490/35493 per square metre.

The coating is checked all over for pinholes by high-voltage pinhole detection with 12 kilovolt. Where sparks are observed the spots are marked and repaired with specified thickness as a minimum.

ISSUED BY: HEMPEL A/S

HEMPADUR MULTI-STRENGTH 35530

BASE 35539 with CURING AGENT 95530

Description:

HEMPADUR MULTI-STRENGTH 35530 is a solvent-free, two-component, high-build, polyamine cured epoxy paint, which cures to a coating with good resistance to fresh water, sea water, crude oil, and to abrasion.
Applicable in thick coats by standard heavy duty airless spray equipment.
Harmless to grain cargo.

Recommended use:

1. As a heavy duty coating on steel exposed to abrasion where solvent-free materials are required. Full colour retention will be of secondary importance.
   If solvent containing paints are accepted, HEMPADUR MULTI-STRENGTH 45751 substitutes.
2. As a lining in potable water tanks and pipelines. Please see Certificates/Approvals.
   For application in warm climates. Please see APPLICATION CONDITIONS overleaf.

Service temperatures:

	Dry exposure only:	In fresh water (directly on steel):
Maximum:	140°C/284°F	35°C/95°F (no temperature gradient)

See REMARKS overleaf.

Certificates/Approvals:

Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
Approved by Water Research Centre, Great Britain, for potable water up to 23°C/73°F.
Approved by Ministry of Electricity & Water, Bahrain, for potable water.
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/10500 - Red/51320
Finish:	Semi-gloss
Volume solids, %:	100
Theoretical spreading rate:	3.3 m^2/litre - 300 micron 134 sq.ft./US gallon - 12 mils
Flash point:	> 100°C/212°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Surface dry:	12 (approx.) hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	24 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	10 g/litre - 0.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances. The theoretical spreading rate has been calculated on the basis of a 100% solids volume.

APPLICATION DETAILS:

Mixing ratio for 35530:	Base 35539 : Curing agent 95530 3 : 1 by volume Stir CURING AGENT before adding it to the BASE.
Application method:	Airless spray Brush (touch up) *(Consult the separate APPLICATION INSTRUCTIONS)*
Thinner (max.vol.):	Do not dilute *(Consult the separate APPLICATION INSTRUCTIONS)*
Pot life:	1 hour (20°C/68°F) *(Consult the separate APPLICATION INSTRUCTIONS)*
Nozzle orifice:	.019" -.031"
Nozzle pressure:	min. 250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	300 micron/12 mils *(See REMARKS overleaf)*
Indicated film thickness, wet:	300 micron/12 mils
Recoat interval, min:	See REMARKS overleaf and separate APPLICATION INSTRUCTIONS
Recoat interval, max:	See REMARKS overleaf and separate APPLICATION INSTRUCTIONS

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR MULTI-STRENGTH 35530

SURFACE PREPARATION:

When used as a heavy duty coating or in potable water tanks and pipelines:
Abrasive blasting to min. Sa 2½ with a surface profile corresponding to ISO Comparator Rough Medium (G).Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust.
On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again. Alternatively, water jetting may be used provided the steel surface has already the surface profile as described above.
Concrete: Remove slip agent and other possible contaminants by emulsion washing followed by high pressure hosing with fresh water. Remove scum layer and loose matter to a hard, rough and uniform surface, preferably by abrasive blasting, possibly by other mechanical treatment, flame cleaning or acid etching. Seal surface with suitable sealer, eg HEMPADUR SEALER 05990 (furthermore, please see Product Data Sheet for 05990).

APPLICATION CONDITIONS:

Use only where application and curing can proceed at temperatures above 10°C/50°F at all times until curing is completed. The temperature of the paint itself must be above 15°C/59°F for proper application. In-can temperature of the paint should preferably be below 25°C/77°F.
Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Relative humidity max 85%.
For application in warm climates, HEMPADUR MULTI-STRENGTH 45751 may preferably replace HEMPADUR MULTI-STRENGTH 35530 as a heavy duty coating. For potable water tanks and pipes please check local product assortment.

PRECEDING COAT: None, HEMPADUR SEALER 05990, HEMPADUR 15590 or according to specification.

SUBSEQUENT COAT: None, HEMPADUR or HEMPATHANE qualities as per specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	0 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	10	10	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Certificates have been issued under the former quality number 3553.

Weathering/ service temperatures: The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 200-300 micron/8-12 mils.

Recoating: Recoating intervals related to later conditions of exposure:
(300 micron/12 mils dry film thickness of HEMPADUR MULTI-STRENGTH 35530)

	Minimum		Maximum	
Surface temperature	20°C/68°F		20°C/68°F	
	Atmospheric	Water immersion	Atmospheric	Water immersion
Recoated with	Severe		Severe	
HEMPADUR HEMPATHANE	24 hours 12 hours	24 hours Not relevant	5 days 24 hours	5 days Not relevant

Mix and stir the two components until an even colour is achieved, where after the paint is ready for use. If improved colour stability is requested for exposure to sunshine, it is recommended to topcoat with e.g. HEMPATHANE TOPCOAT 55210.
Potable water tanks: See APPLICATION INSTRUCTIONS, as to time before taking into use and post treatment of coated surfaces to be in contact with potable water.

Note: **HEMPADUR MULTI-STRENGTH 35530 is for professional use only.**

ISSUED BY: HEMPEL A/S - 3553010500CO0004

This Product Data Sheet supersedes those previously issued.
For explanations, definitions and scope, see "Explanatory Notes" in the HEMPEL Book.
Data, specifications, directions and recommendations given in this data sheet represent only test results or experience obtained under controlled or specially defined circumstances. Their accuracy, completeness or appropriateness under the actual conditions of any intended use of the Products herein must be determined exclusively by the Buyer and/or User.
The Products are supplied and all technical assistance is given subject to HEMPEL's GENERAL CONDITIONS OF SALES, DELIVERY AND SERVICE, unless otherwise expressly agreed in writing. The Manufacturer and Seller disclaim, and Buyer and/or User waive all claims involving, any liability, including but not limited to negligence, except as expressed in said GENERAL CONDITIONS for all results, injury or direct or consequential losses or damages arising from the use of the Products as recommended above, on the overleaf or otherwise.

For product description refer to product data sheet

HEMPADUR MULTI-STRENGTH 35530

BASE 35539 with CURING AGENT 95530

Scope:

These Application Instructions cover surface preparation, application equipment, and application details for HEMPADUR 35530.

Surface preparation:

Steel:
Abrasive blasting to min. Sa 2½ with a surface profile corresponding to ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. HEMPADUR 15590 may be used as a blast primer/hold-coat.

On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again. Alternatively, water jetting may be used provided the steel surface has already the surface profile as described above.

In case of extensively pit-corroded surfaces (tank bottoms): Remove oil and grease with suitable detergent. Blasting to Sa 2, ISO 8501-1: 2007. Pittings on tank bottoms are often omega-shaped (typically in the case of chloride-induced corrosion) for which reason the following procedure is recommended:

After rough cleaning for dust and abrasives, the tank surfaces are to be thoroughly high pressure fresh water hosed. Let the water remain in the tank so that all pit corroded areas are covered by approx 5 cm/2" of water.

After 24 hours the water is removed by wet vacuum cleaning and the tank is dried. If needed, i.e. if there is still salt contamination to be found in the pits, the washing treatment has to be repeated. After cleaning, the surfaces are blasted to min. Sa 2½ with a surface roughness profile as described above. After blasting clean the surface carefully for abrasives and dust. Special care must be taken when cleaning the tank bottom.

Concrete: The concrete must be of good quality and fully cured, eg 28 days for normal Portland cement, and completely dry with a humidity content in the surface below 4%. The concrete must also be controlled for absence of capillary water action or for subsoil water.

Minimum pull-off value should normally be 20 kilopond/cm^2 measured after surface preparation. Any cracks, crevices and voids must be repaired.

All possible slip agent, oil, grease and other contaminants must be removed by eg abrasive blasting, volatilising by flame cleaning or treatment with suitable detergent. The last mentioned in the following way: Saturation of the surface with fresh water. Washing with suitable detergent followed by fresh water hosing.

Depending on construction and purpose, abrasive blast, high pressure water jet or treat the concrete with power tools to obtain a rough and firm surface free of scum layer and other contamination. Remove dust and loose material.

If mechanical treatment is impossible, the surface may be treated with acid etching. For this purpose an approx. 5% w/w nitric or phosphoric acid solution is recommended.
Note: Strong acids, take necessary precautions, make sure that safety regulations are obeyed!

Prior to etching the concrete should be saturated with fresh water to prevent acid corrosion of the reinforcement bars. Leave the acid to act for 3-4 minutes and hose down the surface with fresh water - preferably first a 5% w/w sodium hydroxide solution - and scrub carefully. After that the surface must dry homogeneously and appear as an even, rough surface free of a loose outer layer. The surface must have a pH reaction of between 6.5-8.0. If any of these conditions are not fulfilled, the process must be repeated. The surface must be dried with good ventilation for at least 2 days at 65% relative humidity and 20°C/68°F. The pre-treatment is controlled by scraping with a strong knife. The surface must feel solid and hard, and the knife must only leave a clear scratch mark.

Seal the surface with HEMPADUR SEALER 05990 in such a way that the surface **is just saturated. Surplus must be removed** (do also see the Product Data sheet for HEMPADUR SEALER 05990).

Application equipment:

HEMPADUR MULTI-STRENGTH 35530, being a solvent free, high viscosity material, requires special measures to be taken at application.

Standard airless heavy duty spray equipment:

Pump ratio:	min 45:1 (See Note below)
Pump output:	12 litres/minute (theoretical)
Input pressure:	min 6 bar/90 psi
Spray hoses:	max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter

Regular surfaces:

Nozzle size:	.023" through .031"
Fan angle:	40-60°.

Complicated surfaces:

Nozzle size:	.019" through .023"
Fan angle:	40°

Note: Avoid the use of a suction hose. Use an interchangeable pipe, which makes it possible to remove cured paint If longer spray hoses are necessary the pump ratio must be raised to 60:1 or more, yet the high output capacity of the pump must be maintained.

Thinning:

Alternatively 1-2% THINNER 08450 may be added, but thinning must be done with care as the antisagging properties are drastically reduced by overthinning. **Do NOT use thinning when coating surfaces to be in contact with potable water.**

Airless spray data are indicative and subject to adjustment.

Mixing:

Stir the CURING AGENT 95530 well before mixing with BASE. Continue the mixing until a complete uniform colour is achieved.

Hot airless spray equipment:

Use the same airless spray pump as described above.

On the output side of the pump an electrically heated, explosion proof, high pressure, material heater is fitted. For instance 2500 Watt, max. working pressure well above 300 bar (4-1 safety factor) equipment.

Spray hoses:	45 metres/150 feet, 3/8" internal diameter. 3 metres/10 feet, 1/4" internal diameter.

Regular surfaces:

Nozzle size:	.023" through .031"
Fan angle:	40-60°

Complicated surfaces:

Nozzle size:	.019" through .023".
Fan angle:	40°.

HEMPADUR MULTI-STRENGTH 35530

Procedure for hot airless spray:

a) Follow the supplier's instructions for the use of the heater.

b) At surrounding temperatures below approximately 15°C/59°F start by heating up the hoses by recirculation of THINNER 08450 or HEMPEL'S TOOL CLEANER 99610.

c) Keep THINNER 08450 or HEMPEL'S TOOL CLEANER 99610 readily available for fast cleaning of the equipment.

d) Start spraying immediately after proper mixing and mechanical stirring of BASE 35539 and CURING AGENT 95530.

e) Adjust the heater to approximately 50°C/122°F and check this temperature at short intervals.

f) The spraying should as far as possible run continuously. At any break longer than 2-3 minutes, switch off the heat and flush the equipment immediately and thoroughly with one of the solvents mentioned above under c).

g) After finishing the application, switch off the heat and clean the equipment immediately with THINNER 08450 or HEMPEL'S TOOL CLEANER 99610. Continue the cleaning by re-circulation for at least 30 minutes.

Pit-corroded surfaces: In case of extensive pit corrosion (old tank bottoms) it is advisable to apply the first coat by brush. The coating must be worked well into all pits facilitating a good wetting of the steel and closing the porosities. The following coat(s) can be applied by brush as well as by airless spray (as per above) securing full covering of the uneven/rough surface.

Pot life:

When measured under standard conditions the pot life is one hour at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT is so intense that the corresponding practical pot life is **substantially shorter**.

Therefore:

- Irrespective of equipment, use the paint immediately after mixing. At a normal application speed the 20 litres/5 US gallons are used in approx. 10 minutes.
- Keep an eye on the paint temperature frequently for instance by touching the can with your hand. If it feels more than hand warm, discard the paint and flush the equipment immediately irrespective of type of spray equipment.

Paint temperature:

If the in-can temperature is below approximately 15°C/59°F viscosity will be too high for application. If the paint temperature at mixing is 25°C/77°F or higher a substantial risk of shortened pot life and curing in can/spray equipment exists. **When working in warm, subtropical/ tropical climates a refrigerated container can be used for storing/ cooling of the paint before application.**

Application:

Film-build/continuity: With this typical one-coat tank coating it is of great importance that a continuous, pinhole-free paint film is obtained. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. The usual way of obtaining this result is to spray-coat all these areas separately followed by a full coat all over. Furthermore, stripe coating by brush will typically be required. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity.

The paint layer must be applied homogenously and as close to the specification as possible. The consumption of paint must be controlled to avoid exaggerated film thickness, eg by controlling paint consumption and/or measuring wet film thickness. The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

HEMPADUR MULTI-STRENGTH 35530

Stripe coating:

Edges, corners, manual welds, and places difficult to cover properly by spray application should be stripe coated (touched up) either before or after the spray application.

One or two stripe coats will usually be necessary, but depending on actual conditions.

HEMPADUR MULTI-STRENTGH 35530 may be slightly thinned with THINNER 08450, except for stripe coating of surfaces to be in contact with potable water.

Extra film thickness:

Extra thickness - extra layer(s) - may be necessary in case of severely pitted and/or where very high degrees of antiabrasive properties are needed.

Two- coat application:

When applied in two coats it is an advantage to apply the first coat thicker than the second coat, for instance 300 micron for first, 200 micron for the second layer.

Recoating intervals:

Within a maximum of 85% Relative Humidity the following recoating intervals apply (d=days h=hours):

Steel temperature °C/°F		10/50	15/59	20/68	25/77	30/86	35/95	40/104
HEMPADUR qualities	Min	60 h	38 h	24 h	16 h	12 h	9 hours	8 hours
	Max	13 d	8 d	5 d	3½ d	2½ d	44 hours	36 hours
HEMPATHANE qualities	Min	30 h	19 h	12 h	8 h	6 h	4½ h	4 h
	Max	60 h	38 h	24 h	16 h	12 h	9 h	8 h

The layer of HEMPADUR MULTI-STRENGTH 35530 must NOT be exposed to (steel) temperatures below 10°C/50°F, to condensing humidity nor to relative humidities higher than 85% before recoating.

Curing table:

The following curing times apply:

Steel temperature °C/°F	10/50	15/59	20/68	25/77	30/86	35/95	40/104
Fully cured	18 days	11 days	7 days	5 days	3½ days	2½ days	2 days
"Initial curing"	7½ days	5 days	3 days	2 days	1½ days	1 day	1 day

Time before taking into use:

Tanks or pipelines should generally not be taken into use before HEMPADUR MULTI-STRENGTH 35530 is fully cured (see above).

Full curing is mandatory in case of potable water service.

Exposure to ballast water and crude oil may exceptionally take place after an "initial curing" time as listed above.

Water resistance:

HEMPADUR MULTI-STRENGTH 35530 is resistant to light showers and condensation after an initial curing time as listed:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F
Minimum time	60 hours	32 hours	24 hours	20 hours	15 hours

Note: HEMPADUR 35530 **must not be exposed to water or high humidity between stripe coating and full coating respectively between full coating and any necessary second full coating** as there is a certain risk of curing agent exudation which will hinder adhesion. If exudation is present on the surface this must be removed by very thorough cleaning. Cleaning should be carried out by hand-warm fresh water washing at a pressure of approx 60 bar. Such cleaning must not take place before the minimum curing time for obtaining water resistance as listed above has elapsed. Contact the nearest Hempel office for further details.

Ventilation during application:

Ventilation is not required for drying/curing of the coating, but some ventilation is recommended in order to remove eg spray dust from application.

HEMPADUR MULTI-STRENGTH 35530

Minimum out-docking interval of ships:

When the painted surface will be exposed to abrasion shortly after out-docking, the recommended minimum drying/curing time before out-docking is:

Steel temperature °C/°F	10/50	15/59	20/68	25/77	30/86	(35/95)	(40/104)
Minimum days	12½	8	5	3½	2½	(2)	(1½)

When out-docking takes place into water with a temperature at or above 10°C/50°F, and sufficient time afterwards is allowed for full cure before the coating is exposed to abrasion, the recommended minimum time before out-docking is:

Steel temperature °C/°F	10/50	15/59	20/68	25/77	30/86	(35/95)	(40/104)
Minimum days	7½	5	3	2	1½	(1)	(1)

Notes:

1. The temperatures in the tables above are mean values, but the temperature during curing should at no time come below 10°C/50°F.
2. Curing will proceed under water when the water temperature is above 10°C/50°F.

Remarks:

Stripe coating is recommended in tanks.

In case of deep pittings higher film thickness is recommended on areas with pittings.

Post treatment of coated surfaces to be in contact with potable water:

After complete curing, i.e. minimum 7 days at 20°C/68°F, and before being taken into use, the surfaces must be cleaned properly. This will be subject to local/individual specification or regulation but as a minimum for tanks a careful hosing down with clean fresh water (max. 40°C/104°F if warm water is used) and/or - ideally - by filling with water allowed to stand for at least 24 hours. Drain and repeat the procedure, and finally flush with clean fresh water. Disinfection by for instance chlorination can be very aggressive towards the coating and separate instructions are available.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 3553010500C0004

HEMPADUR 35560

BASE 35569 with CURING AGENT 98560

Description:
HEMPADUR 35560 is a solvent-free, two-component, high-build, polyamine adduct cured epoxy paint, which cures to a coating with good resistance to fresh water.

Recommended use:
As a lining in potable water tanks and pipelines.

Features:
Excellent anticorrosive properties.
Solvent free.
Benzyl alcohol free.

Service temperatures:

	Dry exposure only:	In fresh water (directly on steel):
Maximum	140°C/284°F	45°C/113°F (no temperature gradient)

Certificates/Approvals:
Approved by Water Research Centre (WRAS), Great Britain, for potable water up to 23°C/73°F according to BS 6920.
Approved by Folkehelseinstituttet, Norway, for use in tanks for potable water offshore.
Certified to NSF standard 61 by NSF international for use in potable water tanks with volumes of 100 gallon/380 litres or greater, pipes at 8 inches (20 cm) or greater see REMARKS overleaf.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Cream/20320 - Light red/50900 *(See REMARKS overleaf)*
Finish:	Semi-gloss
Volume solids, %:	100
Theoretical spreading rate:	5.0 m²/litre - 200 micron 201 sq.ft./US gallon - 8 mils
Flash point:	> 100°C/212°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	10 (approx.) hours at 20°C/68°F
Fully cured:	12 days at 20°C/68°F
V.O.C.:	0 g/litre - 0 lbs/US gallon
Shelf life:	3 years (25°C/77°F) for base 35569 and 1 year (25°C/77°F) for curing agent 98560 from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances. The theoretical spreading rate has been calculated on the basis of a 100% solids volume.

APPLICATION DETAILS:

Mixing ratio for 35560:	Base 35569 : Curing agent 98560 6.8 : 2 by volume
Application method:	Airless spray Brush (touch up)
Thinner (max.vol.):	Do not dilute
Pot life:	1½ hours (20°C/68°F) 45 minutes (35°C/95°F)
Nozzle orifice:	.021"
Nozzle pressure:	min. 220 bar/3200 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	200 micron/8 mils
Indicated film thickness, wet:	200 micron/8 mils
Recoat interval, min:	1 day at 20°C/68°F
Recoat interval, max:	30 days at 20°C/68°F

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 35560

SURFACE PREPARATION:	**When used in potable water tanks and pipelines:** Abrasive blasting to min. Sa 2½ with a surface profile corresponding to ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again. Alternatively, water jetting may be used provided the steel surface has already the surface profile as described above.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above 10°C/50°F at all times until curing is completed. The temperature of the paint itself must be above 15°C/59°F for proper application. In-can temperature of the paint should preferably be below 30°C/86°F. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Relative humidity max. 85%, but at temperatures (10-15°C/50-59°F) the first two days of curing will require a relative humidity of max. 60%.
PRECEDING COAT:	None. If a blast primer/hold-coat is required use HEMPADUR 15590.
SUBSEQUENT COAT:	None.
REMARKS:	
Weathering/ service temperatures:	The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range Is 200-400 micron/8-16 mils dry film thickness. May be specified in higher thickness for controlled application e.g. on pipelines, contact Hempel for more information.
Induction time:	At a paint temperature of 20°C/68°F the paint may advantageously be prereacted 10 minutes before spray application (20 minutes at 15°C/59°F).
NSF certification:	NSF certification apply for the product as well as production site – at present the NSF certificate is valid only for paint material produced at the Hempel factory in Denmark.
Colours:	Light red 50900 to be applied as first coat.
Post treatment of coated surfaces to be in contact with potable water:	After complete curing, i.e. minimum 12 days at 20°C/68°F, and before being taken into use, the surfaces must be cleaned properly. This will be subject to local/individual specification or regulation but as a minimum for tanks a careful hosing down with clean fresh water (max. 40°C/104°F if warm water is used) and/or - ideally - by filling with water allowed to stand for at least 24 hours. Drain and repeat the procedure, and finally flush with clean fresh water. Disinfection by for instance chlorination can be very aggressive towards the coating and separate instructions are available.
Note:	**HEMPADUR 35560 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 3556020320CR003

For product description refer to product data sheet

HEMPADUR 35560

BASE 35569 with CURING AGENT 98560

Scope:

These Application Instructions cover surface preparation, application equipment, and application details for HEMPADUR 35560.

Surface preparation:

Steel:
Abrasive blasting to min. Sa 2½ with a surface profile corresponding to ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust.
HEMPADUR 15590 may be used as a blast primer/hold-coat.

On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again. Alternatively, water jetting may be used provided the steel surface has already the surface profile as described above.

In case of extensively pit-corroded surfaces (tank bottoms): Remove oil and grease with suitable detergent. Blasting to Sa 2, ISO 8501-1: 2007. Pittings on tank bottoms are often omega-shaped (typically in the case of chloride-induced corrosion) for which reason the following procedure is recommended:

After rough cleaning for dust and abrasives, the tank surfaces are to be thoroughly high pressure fresh water hosed. Let the water remain in the tank so that all pit corroded areas are covered by approx 5 cm/2" of water.

After 24 hours the water is removed by wet vacuum cleaning and the tank is dried. If needed, i.e. if there is still salt contamination to be found in the pits, the washing treatment has to be repeated. After cleaning, the surfaces are blasted to min. Sa 2½ with a surface roughness profile as described above. After blasting clean the surface carefully for abrasives and dust. Special care must be taken when cleaning the tank bottom.

Concrete: The concrete must be of good quality and fully cured, eg 28 days for normal Portland cement, and completely dry with a humidity content in the surface below 4%. The concrete must also be controlled for absence of capillary water action or for subsoil water.

Minimum pull-off value should normally be 20 kilopond/cm^2 measured after surface preparation. Any cracks, crevices and voids must be repaired.

All possible slip agent, oil, grease and other contaminants must be removed by eg abrasive blasting, volatilising by flame cleaning or treatment with suitable detergent. The last mentioned in the following way: Saturation of the surface with fresh water. Washing with suitable detergent followed by fresh water hosing.

Depending on construction and purpose, abrasive blast, high pressure water jet or treat the concrete with power tools to obtain a rough and firm surface free of scum layer and other contamination. Remove dust and loose material.

If mechanical treatment is impossible, the surface may be treated with acid etching. For this purpose an approx. 5% w/w nitric or phosphoric acid solution is recommended.
Note: Strong acids, take necessary precautions, make sure that safety regulations are obeyed!

Prior to etching the concrete should be saturated with fresh water to prevent acid corrosion of the reinforcement bars. Leave the acid to act for 3-4 minutes and hose down the surface with fresh water - preferably first a 5% w/w sodium hydroxide solution - and scrub carefully. After that the surface must dry homogeneously and appear as an even, rough surface free of a loose outer layer. The surface must have a pH reaction of between 6.5-8.0. If any of these conditions are not fulfilled, the process must be repeated. The surface must be dried with good ventilation for at least 2 days at 65% relative humidity and 20°C/68°F. The pre-treatment is controlled by scraping with a strong knife. The surface must feel solid and hard, and the knife must only leave a clear scratch mark.

Seal the surface with HEMPADUR SEALER 05990 in such a way that the surface **is just saturated. Surplus must be removed** (do also see the Product Data sheet for HEMPADUR SEALER 05990).

Application equipment:

HEMPADUR 35560, being a solvent free, high viscosity material, requires special measures to be taken at application.

Standard airless heavy duty spray equipment:

Pump ratio:	min 45:1 (See Note below)
Pump output:	12 litres/minute (theoretical)
Input pressure:	min 6 bar/90 psi
Spray hoses:	max 15 metres/50 feet, 3/8" internal diameter
	max 3 metres/10 feet, 1/4" internal diameter

Regular surfaces (pipes):

Nozzle size:	.021" through .027"
Fan angle:	40-60°.

Complicated surfaces (tanks):

Nozzle size:	.019" through .023"
Fan angle:	40°

Note: Avoid the use of a suction hose. Use an interchangeable pipe, which makes it possible to remove cured paint If longer spray hoses are necessary the pump ratio must be raised to 60:1 or more, yet the high output capacity of the pump must be maintained.

Airless spray data are indicative and subject to adjustment.

Thinning:

Do NOT thin.

Pit-corroded surfaces:

In case of extensive pit corrosion (old tank bottoms) it is advisable to apply the first coat by brush. The coating must be worked well into all pits facilitating a good wetting of the steel and closing the porosities. The following coat(s) can be applied by brush as well as by airless spray (as per above) securing full covering of the uneven/rough surface.

Pot life:

When measured under standard conditions the pot life is 1 ½ hour at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT is so intense that the corresponding practical pot life is **substantially shorter**.

Therefore:

- Irrespective of equipment, use the paint immediately after mixing. At a normal application speed the 20 litres/5 US gallons are used in approx. 10 minutes.
- Keep an eye on the paint temperature frequently for instance by touching the can with your hand. If it feels more than hand warm, discard the paint and flush the equipment immediately irrespective of type of spray equipment.

Paint temperature:

If the in-can temperature is below approximately 15°C/59°F viscosity will be too high for application. If the paint temperature at mixing is 25°C/77°F or higher a substantial risk

of shortened pot life and curing in can/spray equipment exists. **When working in warm, subtropical/ tropical climates a refrigerated container can be used for storing/ cooling of the paint before application.**

Application:

Film-build/continuity:
Hempadur 35560 may be used in one-coat and two coat specifications. Especially in one-coat specifications it is of great importance that a continuous, pinhole-free paint film is obtained. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. The usual way of obtaining this result is to spray-coat all these areas separately followed by a full coat all over. Furthermore, stripe coating by brush will typically be required. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity.

The paint layer must be applied homogenously and as close to the specification as possible. The consumption of paint must be controlled to avoid exaggerated film thickness, e.g. by controlling paint consumption and/or measuring wet film thickness. The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Wet/dry film thickness:

Due to thixotropic nature, the surface tension of the product and entrapped air after spray application, there will often be a deviation between the measured wet film thickness (WFT) and the later measured dry film thickness (DFT).
In practice this can be compensated by applying approx. 50 µm WFT extra in addition to the specified DFT. The extra wet film thickness will compensate the wavy surface structure that will become more smooth upon curing as well as entrapped air that is released during curing, This extra wet film thickness will consequently not cause a higher paint consumption.

Stripe coating:

Edges, corners, manual welds, and places difficult to cover properly by spray application should be stripe coated (touched up) either before or after the spray application.

One or two stripe coats will usually be necessary, but depending on actual conditions.

Extra film thickness:

Extra thickness - extra layer(s) - may be necessary in case of severely pitted steel.

Recoating intervals:

Within a maximum of 85% Relative Humidity the following recoating intervals apply (d=days h=hours):

Steel temperature °C/°F		10/50	15/59	20/68	25/77	30/86	35/95	40/104
HEMPADUR qualities	Min	60 h	41 h	24 h	16 h	12 h	9 h	7 h
	Max	75 d	51 d	30 d	21 d	15 d	10 d	9 d

Before recoating, the layer of HEMPADUR 35560 must NOT be exposed to (steel) temperatures below 10°C/50°F, to condensing humidity or to relative humidity higher than 85% before recoating.
At low temperature (10°C-15°C / 50°F-59°F), the relative humidity should be 60% or lower during the first 2 days of curing, also before recoating.

Curing table:

The following curing times apply:

Steel temperature °C/°F	10/50	15/59	20/68	25/77	30/86	35/95	40/104
Fully cured	24 days	18 days	12 days	10 days	7 days	6 days	5 days

Time before taking into use:

Tanks or pipelines should not be taken into use before HEMPADUR 35560 is fully cured as full curing is mandatory in case of potable water service.

Note: HEMPADUR 35560 **must not be exposed to water or high humidity between stripe coating and full coating respectively between full coating and any necessary second full coating** as there is a certain risk of curing agent exudation which will hinder

adhesion. If exudation is present on the surface this must be removed by very thorough cleaning. Cleaning should be carried out by hand-warm fresh water washing at a pressure of approx 60 bar. Such cleaning must not take place before the minimum curing time for obtaining water resistance as listed above has elapsed. Contact the nearest Hempel office for further details.

Ventilation during application:

Ventilation is not required for drying/curing of the coating, but some ventilation is recommended in order to remove e.g. spray dust from application.

Post treatment of coated surfaces to be in contact with potable water:

After complete curing, i.e. minimum 12 days at 20°C/68°F, and before being taken into use, the surfaces must be cleaned properly. This will be subject to local/individual specification or regulation but as a minimum for tanks a careful hosing down with clean fresh water (max. 40°C/104°F if warm water is used) and/or - ideally - by filling with water allowed to stand for at least 24 hours. Drain and repeat the procedure, and finally flush with clean fresh water. Disinfection by for instance chlorination can be very aggressive towards the coating and separate instructions are available.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 3556020320CR003

Product Data

HEMPADUR 35600

BASE 35609 with CURING AGENT 98600

Description:

HEMPADUR 35600 is a solvent-free, two-component, high-build, polyamine cured epoxy paint, which cures to a coating with good resistance to fresh water.

Recommended use:

As a lining in potable water tanks up to 60°C/140°F. Please see Certificates/Approvals. For application in warm climates. Please see APPLICATION CONDITIONS overleaf.

Service temperatures:

	Dry exposure only:	In fresh water (directly on steel):
Maximum:	140°C/284°F	60°C/140°F (no temperature gradient)

See REMARKS overleaf.

Certificates/Approvals:

Approved by Water Research Centre, Great Britain, for potable water up to 60°C/140°F.

Availability:

Part of Group Assortment. Local availability subject to confirmation..

PHYSICAL CONSTANTS:

Colours/Shade nos:	Cream/20320 - Light red/50900
Finish:	Semi-gloss
Volume solids, %:	100
Theoretical spreading rate:	4.0 m^2/litre - 250 micron 160 sq.ft./US gallon - 10 mils
Flash point:	None
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Dry to touch:	24 (approx.) hours at 20°C/68°F
Fully cured:	10 days at 20°C/68°F
V.O.C.:	7 g/litre - 0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances. The theoretical spreading rate has been calculated on the basis of a 100% solids volume.

APPLICATION DETAILS:

Mixing ratio for 35600:	Base 35609 : Curing agent 98600 14.8 : 5.2 by volume Stir CURING AGENT before adding it to the BASE.
Application method:	Airless spray Brush (touch up) *(Consult the separate APPLICATION INSTRUCTIONS)*
Thinner (max.vol.):	Do not dilute *(Consult the separate APPLICATION INSTRUCTIONS)*
Pot life:	50 minutes (20°C/68°F) *(Consult the separate APPLICATION INSTRUCTIONS)*
Nozzle orifice:	.017" -.021"
Nozzle pressure:	min. 250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	250 micron/8-10 mils *(See REMARKS overleaf)*
Indicated film thickness, wet:	250 micron/8-10 mils
Recoat interval, min:	24 hours (20°C/68°F)
Recoat interval, max:	5 days (20°C/68°F)

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 35600

SURFACE PREPARATION:	**When used in potable water tanks and pipelines:** Abrasive blasting to min. Sa 2½. Grit-blasted surfaces: recommended profile is Rz minimum 100 micron/4 mils - maximum 150 micron/6 mils corresponding to ISO Comparator Coarse (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again. Alternatively, water jetting may be used provided the steel surface has already the surface profile as described above.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above 15°C/59°F at all times until curing is completed. The temperature of the paint itself must be above 20°C/68°F for proper application. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Relative humidity within the first 24 hours max 60% at 20°C/68°F and max 50% at 15°C/59°F.
PRECEDING COAT:	None.
SUBSEQUENT COAT:	None.
REMARKS:	
Weathering/ service temperatures:	The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.
Mixing/ induction time:	To facilitate proper application properties it is recommended to allow the thoroughly mixed BASE and CURING AGENT to prereact 15 minutes before application.
Recoating:	Potable water tanks: See APPLICATION INSTRUCTIONS, as to time before taking into use and post treatment of coated surfaces to be in contact with potable water.
Note:	**HEMPADUR 35600 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 3560020320CR003

For product description refer to product data sheet

HEMPADUR 35600

BASE 35609 with CURING AGENT 98600

Scope:

These Application Instructions cover surface preparation, application equipment, and application details for HEMPADUR 35600.

Surface preparation:

Steel:
Abrasive blasting to min. Sa 2½. Grit-blasted surfaces: recommended profile is Rz minimum 100 micron/4 mils - maximum 150 micron/6 mils corresponding to ISO Comparator Coarse (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust.

On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again. Alternatively, water jetting may be used provided the steel surface has already the surface profile as described above.

In case of extensively pit-corroded surfaces (tank bottoms): Remove oil and grease with suitable detergent. Blasting to Sa 2, ISO 8501-1: 1988. Pittings on tank bottoms are often omega-shaped (typically in the case of chloride-induced corrosion) for which reason the following procedure is recommended:

After rough cleaning for dust and abrasives, the tank surfaces are to be thoroughly high pressure fresh water hosed. Let the water remain in the tank so that all pit corroded areas are covered by approx 5 cm/2" of water.

After 24 hours the water is removed by wet vacuum cleaning and the tank is dried. If needed, i.e. if there is still salt contamination to be found in the pits, the washing treatment has to be repeated. After cleaning, the surfaces are blasted to min. Sa 2½ with a surface roughness profile as described above. After blasting clean the surface carefully for abrasives and dust. Special care must be taken when cleaning the tank bottom.

Application equipment:

HEMPADUR 35600, being a solventfree, high viscosity material, requires special measures to be taken at application.

Standard airless heavy duty spray equipment:

Pump ratio:	min 45:1 (See Note below)
Pump output:	12 litres/minute (theoretical)
Input pressure:	min 6 bar/90 psi
Spray hoses:	max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter
Nozzle size:	.017" through .021"
Fan angle:	60°

Note: Avoid the use of a suction hose. Use an interchangeable pipe, which makes it possible to remove cured paint. If longer spray hoses are necessary the pump ratio must be raised to 60:1 or more, yet the high output capacity of the pump must be maintained.

Airless spray data are indicative and subject to adjustment.

Mixing:

Stir the CURING AGENT 98600 well before mixing with BASE. Continue the mixing until a complete uniform colour is achieved.

Pit-corroded surfaces:

In case of extensive pit corrosion (old tank bottoms) it is advisable to apply the first coat by brush. The coating must be worked well into all pits facilitating a good wetting of the steel and closing the porosities. The following coat(s) can be applied by brush as well as by airless spray (as per above) securing full covering of the uneven/rough surface.

Pot life:

When measured under standard conditions the pot life is 50 minutes at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may be so intense that the corresponding practical pot life is **shorter**.

Therefore:

- Irrespective of equipment, use the paint respecting the 15 minutes prereaction period after mixing. At a normal application speed the 20 litres/5 US gallons are used in approx. 10 minutes.
- Keep an eye on the paint temperature frequently for instance by touching the can with your hand. If it feels more than hand warm, discard the paint and flush the equipment immediately irrespective of type of spray equipment.

Paint temperature:

If the in-can temperature is below approximately 20°C/68°F viscosity will be too high for application. If the paint temperature at mixing is 30°C/86°F or higher a substantial risk of shortened pot life and curing in can/spray equipment exists. **When working in warm, subtropical/ tropical climates a refrigerated container can be used for storing/ cooling of the paint before application.**

Application:

Film-build/continuity: With this tank coating it is of great importance that a continuous, pinhole-free paint film is obtained. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. The usual way of obtaining this result is to spray-coat all these areas separately followed by a full coat all over. Furthermore, stripe coating by brush will typically be required. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity.

The paint layer must be applied homogenously and as close to the specification as possible. The consumption of paint must be controlled to avoid exaggerated film thickness, eg by controlling paint consumption and/or measuring wet film thickness. The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating:

Edges, corners, manual welds, and places difficult to cover properly by spray application should be stripe coated (touched up) either before or after the spray application.

One or two stripe coats will usually be necessary, but depending on actual conditions.

Extra film thickness:

Extra thickness - extra layer(s) - may be necessary in case of severely pitted surfaces.

Recoating intervals:

Within a maximum of 60% Relative Humidity the following recoating intervals apply (d=days h=hours):

Steel temperature °C/°F		20/68	25/77	30/86	35/95	40/104
HEMPADUR qualities	Min	24 h	16 h	12 h	9 h	8 h
For potable water service	Min	3 d	2 d	36 h	27 h	24 h
	Max	5 d	3½ d	2½ d	44 h	36 h

The layer of HEMPADUR 35600 must NOT be exposed to (steel) temperatures below 15°C/59°F, to condensing humidity nor to relative humidity higher than 60% before recoating.

HEMPADUR 35600

Curing table:

The following curing times apply:

Steel temperature °C/°F	20/68	25/77	30/86	35/95	40/104
Fully cured	10 d	7.5 d	5 d	4 d	2½ d
Fully cured, potable water service	21 d	16 d	10 d	8 d	5 d

Time before taking into use:

Tanks should generally not be taken into use before HEMPADUR 35600 is fully cured (see above). Full curing is mandatory in case of potable water service.

Water resistance:

HEMPADUR 35600 is resistant to light showers and condensation after an initial curing time as listed:

Steel temperature	20°C/68°F	25°C/77°F	30°C/86°F
Minimum time	48 h	40 h	30 h

Note: HEMPADUR 35600 **must not be exposed to water or high humidity between stripe coating and full coating respectively between full coating and any necessary second full coating** as there is a certain risk of curing agent exudation which will hinder adhesion. If exudation is present on the surface this must be removed by very thorough cleaning. Cleaning should be carried out by hand-warm fresh water washing at a pressure of approx 60 bar. Such cleaning must not take place before the minimum curing time for obtaining water resistance as listed above has elapsed. Contact the nearest Hempel office for further details.

Ventilation during application:

Ventilation is not required for drying/curing of the coating, but some ventilation is recommended in order to remove eg spray dust from application.

Remarks:

In case of deep pittings higher film thickness is recommended on areas with pittings.

Post treatment of coated surfaces to be in contact with potable water:

After complete curing, i.e. minimum 21 days at 20°C/68°F, and before being taken into use, the surfaces must be cleaned properly. This will be subject to local/individual specification or regulation but as a minimum for tanks a careful hosing down with clean fresh water (max. 40°C/104°F if warm water is used) and/or - ideally - by filling with water (35°C/95°F) allowed to stand for at least 24 hours. Drain and repeat the procedure, and finally flush with clean fresh water. Disinfection by for instance chlorination can be very aggressive towards the coating and separate instructions are available.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY:

HEMPEL A/S - 3560020320CR001

HEMPADUR 35760

BASE 35769 with CURING AGENT 98760

Description:

HEMPADUR 35760 is a solvent-free, two-component, high-build phenolic epoxy (novolac) paint, which cures to a durable tank lining with very high corrosion protection properties and excellent chemical resistance.

Recommended use:

As a tank lining for new and old storage tanks containing oils, fuels, bio fuels and a wide range of chemicals.,

Service temperatures:

Dry exposure only:		In water (no temperature gradient):
Maximum:	140°C/284°F	45°C/140°F

Wet service temperatures, other liquids:
Consult the corresponding RESISTANCE GUIDE.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Cream/20320 – Light red/50900
Finish:	Semi-gloss
Volume solids, %:	100
Theoretical spreading rate:	3.0 m^2/litre - 300 micron 134 sq.ft./US gallon - 12 mils
Flash point:	> 100°C/212°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Dry to touch:	9 (approx.) hours at 20°C/68°F
Fully cured:	5 days at 20°C/68°F
V.O.C.:	40 g/litre – 0.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances. The theoretical spreading rate has been calculated on the basis of a 100% solids volume.

APPLICATION DETAILS:

Mixing ratio 35760:	Base 35769 : Curing agent 98760 6.4 : 3.6 by volume Stir CURING AGENT before adding it to the BASE.
Application method:	Airless spray Brush (touch up) Roller
Thinner (max.vol.):	Do not dilute
Pot life:	40 minutes (20°C/68°F)
Nozzle orifice:	.019" -.031"
Nozzle pressure:	min. 250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	250-600 micron/10-24 mils
Indicated film thickness, wet:	250-600 micron/10-24 mils
Recoat interval, min:	1 day at 20°C/68°F
Recoat interval, max:	30 days at 20°C/68°F

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 35760

SURFACE PREPARATION:	Abrasive blasting to min. Sa 2½ with a surface profile corresponding to ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again. Alternatively, water jetting may be used provided the steel surface has already the surface profile as described above.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above 10°C/50°F at all times until curing is completed. The temperature of the paint itself must be above 15°C/59°F for proper application. In-can temperature of the paint should preferably be below 25°C/77°F. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
PRECEDING COAT:	None, HEMPADUR 15590 or 85671.
SUBSEQUENT COAT:	None.

REMARKS:

Weathering/ service temperatures:	The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.
Application:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence the drying time. Normal range is 250-600 micron/10-24 mils. Stir the individual BASE and CURING AGENT thoroughly before mixing and again after mixing until a uniformly coloured mixture is obtained.
Pit corroded surfaces:	In case of extensive pit corrosion (old tank bottoms) it is advisable to apply the first coat by brush. The coating must be worked well into the pits facilitating a good wetting of the steel and closing the porosities. The following coat(s) can be applied by brush as well as by airless spray (as per above) securing full covering of the uneven/rough surface.
Curing:	Do not put tanks into service until the paint system is completely cured.

Note:	**HEMPADUR 35760 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 35760-20320CR001

For product description refer to product data sheet

HEMPADUR 35760

BASE 35769 with CURING AGENT 98760

Scope:

These Application Instructions cover surface preparation, application equipment, and application details for HEMPADUR 35760.

Surface preparation:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to Sa 2½-3, ISO 8501-1:1988 and a roughness profile corresponding to Rugotest No. 3, BN 10a (Ra=12,5 micron), ISO Comparator Medium (G), Keane-Tator Comperator 3.0 G/S. After blasting, clean the surface carefully from abrasives and dust.

Pit-corroded surfaces (tank bottoms): Remove oil and grease with suitable detergent. Blasting to Sa 2, ISO 8501-1: 1988. Pittings on tank bottoms are often omega-shaped (typically in the case of chloride-induced corrosion) for which reason the following procedure is recommended:

After rough cleaning for dust and abrasives, the tank surfaces are to be thoroughly high pressure fresh water hosed. Let the water remain in the tank so that all pit corroded areas are covered by approx 5 cm/2" of water.

After 24 hours the water is removed by wet vacuum cleaning and the tank is dried. If needed, i.e. if there is still salt contamination to be found in the pits, the washing treatment has to be repeated. After cleaning, the surfaces are blasted to Sa 2½-3, ISO 8501-1: 1988, with a surface roughness profile corresponding to Rugotest No. 3, BN 10a. After blasting clean the surface carefully for abrasives and dust. Special care must be taken when cleaning the tank bottom.

Application equipment:

HEMPADUR 35760, being a solvent free, high viscosity material, requires special measures to be taken at application.

Standard airless heavy duty spray equipment:

Pump ratio:	min 45:1 (See Note below)
Pump output:	12 litres/minute (theoretical)
Input pressure:	min 6 bar/90 psi
Spray hoses:	max 15 metres/50 feet, 3/8" internal diameter
	max 3 metres/10 feet, 1/4" internal diameter

Regular surfaces:

Nozzle size:	.023" through .031"
Fan angle:	40-60°.

Complicated surfaces:

Nozzle size:	.019" through .023"
Fan angle:	40°

Note: Avoid the use of a suction hose. Use an interchangeable pipe, which makes it possible to remove cured paint If longer spray hoses are necessary the pump ratio must be raised to 60:1 or more, yet the high output capacity of the pump must be maintained.
Airless spray data are indicative and subject to adjustment.

Mixing:

Stir the CURING AGENT 98760 well before mixing with BASE 35769. Continue the mixing until a complete uniform colour is achieved.

Paint temperature: In order to obtain the best application properties, the temperature of the paint must when mixed be 20-25°C/68-77°F. If the temperature of the paint exceeds 25°C/77°F it should be stored in cooled places (see pot life below).

Pit-corroded surfaces: In case of extensive pit corrosion (old tank bottoms) it is advisable to apply the first coat by brush. The coating must be worked well into all pits facilitating a good wetting of the steel and closing the porosities. The following coat(s) can be applied by brush as well as by airless spray (as per above) securing full covering of the uneven/rough surface.

Pot life:

When measured under standard conditions the pot life is 40 minutes at 20°C/68°F.

- Irrespective of equipment, use the paint immediately after mixing. At a normal application speed the 20 litres/5 US gallons are used in approx. 10 minutes.

- Keep an eye on the paint temperature frequently for instance by touching the can with your hand. If it feels more than hand warm, discard the paint and flush the equipment immediately irrespective of type of spray equipment.

Stripe coating:

Edges, corners, uneven (manual) welds, and places difficult to cover properly by spray application should be stripe coated (touched up) either before or after the spray application.
One or two stripe coats will usually be necessary, but depending on actual conditions.

Extra film thickness:

Extra thickness - extra coat(s) - may be necessary in case of severely pitted and/or where very high degrees of antiabrasive properties are needed.

Recoating intervals:

Within a maximum of 80% Relative Humidity the following recoating intervals apply:

Steel temperature		10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	40°C/104°F
HEMPADUR 35760	min	40 hours	27 hours	16 hours	11 hours	8 hours	5 hours
	max	60days	45 days	30 days	23 days	15 days	7 days

HEMPADUR 35760 should not be exposed to sunshine, water/condensation or any contamination before recoating. If necessary the surface is cleaned by vacuuming before recoating.

HEMPADUR 35760

Curing table: The following curing times apply:

Steel temperature0C/°F	10/50	15/59	20/68	25/77	30/86	35/95	40/104
Fully cured	12 days	8 days	5 days	4 days	3 days	2½ days	2 days

Note: The above given temperatures are mean temperatures. Curing temperatures, however, should never be lower than 10°C/50°F.

Filling of tanks: Tanks should generally not be taken into use before HEMPADUR 35760 is fully cured (see above).

Ventilation during application: Ventilation is not required for drying/curing of the coating, but some ventilation is recommended in order to remove e.g. spray-dust from application.

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S – 3576020320CR001

HEMPADUR GLASS FLAKE 35851/ HEMPADUR GLASS FLAKE 35853

Medium to high temperatures: 35851: BASE 35858 with CURING AGENT 97652
Low to medium temperatures: 35853: BASE 35858 with CURING AGENT 98750

Description:

HEMPADUR GLASS FLAKE 35851/35853 is a two-component, high solids, glass flake pigmented polyamide/amine cured epoxy paint with good wetting properties and low water permeability. It is selfpriming and forms a hard and tough coating which has good resistance against abrasion and impact as well as to seawater, mineral oils, aliphatic hydrocarbons and splashes from petrol, jet fuel, lubrication oil and related products.

Recommended use:

As a coating for steel exposed to abrasion and/or severe corrosive environment.

Service temperatures:

Dry exposure only:	Maximum 140°C/284°F *(See REMARKS overleaf)*
In seawater:	Maximum 50°C/140°F (No temperature gradient)
Other liquids:	Contact Hempel

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Version; mixed product:	**35851**	**35853**
Colours/Shade nos:	Grey/12340 - Red/50630	Grey/12340 - Red/50630
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	78 ± 1	74 ± 1
Theoretical spreading rate:	3.9 m^2/litre - 200 micron 156 sq.ft./US gallon - 8 mils	3.6 m^2/litre - 200 micron 148 sq.ft./US gallon - 8 mils
Flash point:	25°C/77°F	27°C/81°F
Specific gravity:	1.6 kg/litre - 13.4 lbs/US gallon	1.6 kg/litre - 13.4 lbs/US gallon
Dry to touch:	7-8 hours at 20°C/68°F	8-10 hours at 10°C/50°F
Fully cured:	7 days at 20°C/68°F	14 days at 10°C/50°F
V.O.C.:	260 g/litre - 2.1 lbs/US gallon	245 g/litre - 2.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio:	**35851**		**35853**	
	Base 35858 : Curing agent 97652 3 : 1 by volume		Base 35858 : Curing agent 98750 3 : 1 by volume	
Application method:	Airless spray	Brush (touch-up)	Airless spray	Brush (touch-up)
Thinner (max.vol.):	08450 (2%)	08450 (2%)	08450 (2%)	08450 (2%)
Pot life:	1 hour (20°C/68°F)		1 hour (20°C/68°F)	
Nozzle orifice:	.021"-.023" (Reversible)		.021"-.023" (Reversible)	
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*		250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610		HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	200 micron/8 mils		200 micron/8 mils	
Indicated film thickness, wet:	275 micron/11 mils		275 micron/11 mils	
Recoat interval, min:	6 hours (20°C/68°F)		12 hours (10°C/50°F)	
Recoat interval, max:	30 days (20°C/68°F		60 days (10°C/50°F)	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR GLASS FLAKE 35851/35853

SURFACE PREPARATION:	**New steel, "heavy duty use":** Abrasive blasting to min. Sa 2½ according to ISO 8501-1:2007 with a surface profile equivalent to Rugotest No. 3 BN10, Keane-Tator Comparator 3.0 G/S or ISO Comparator, rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasive and dust. **Repair and maintenance:** Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by abrasive blasting or power tool cleaning (minor areas only). Feather edges to sound intact areas. Dust off residues. Touch-up to full film thickness. **On old ship bottoms** and similar pit corroded surfaces, excessive amounts of salt residues may call for dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again. Alternatively, water jetting may be used provided the steel surface has already the surface profile as described above: New steel, "heavy duty use".
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above -10°C/14°F for HEMPADUR GLASS FLAKE 35853 and above 10°C/50°F for HEMPADUR GLASS FLAKE 35851. The temperature of the paint itself should be above 15°C/59°F, preferably above 20°C/68°F for HEMPADUR GLASS FLAKE 35851 for proper application. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Relative humidity max. 90%. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	None, but HEMPADUR 15590 can be used as a "blast primer" for HEMPADUR GLASS FLAKE 35851. HEMPADUR GLASS FLAKE 35853 can be used as a “blast primer” for HEMPADUR GLASS FLAKE 35853 when diluted 15-25% with HEMPEL’S THINNER 08450.
SUBSEQUENT COAT:	None or HEMPADUR-paint as per specification, depending on area of use.
REMARKS:	
Colour of Curing agent:	The curing agent 98750 has a tendency to become darker at storage. This has no influence on performance, but may influence the shade of the mixed product.
Weathering/ service temperatures:	The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 150-250 micron/6-10 mils. It is recommended to use heavy airless spray equipment with a pump transmission rate of 60:1 (approximately), and a theoretical output of min. 12 litres per minute.
Curing agent:	Curing agents 97652 and 98750 are hazy. This is intended and has no negative influence on the performance.
Application equipment:	A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Recoating:	The long maximum recoating interval for HEMPADUR will be reduced if the coating is more than just scarcely exposed to direct sunshine before recoating. If the interval is exceeded, roughening of surface is necessary to ensure intercoat adhesion.
Thinning:	Normally not to be diluted.
Note:	**HEMPADUR GLASS FLAKE 35851/35853 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 3585112340CR004/3585312340CR003

HEMPADUR MULTI-STRENGTH GF 35870

BASE 35879 with CURING AGENT 98870

Description:

HEMPADUR MULTI-STRENGTH GF 35870 is an amine-adduct cured epoxy coating - the product is reinforced with Glassflakes. It is a hard, impact and abrasion resistant coating with good resistance to sea water, mineral oils, aliphatic hydrocarbons and splashes from petrol and related products.

Recommended use:

As a self-primed, high build coating primarily for areas subject to abrasion and/or to a highly corrosive environment. E.g. splash zones, jetty pilings and working decks.
Can be used as interior lining for crude oil and fuel oil storage tanks.

Service temperatures:

	Dry exposure only:	In water (no temperature gradient):
Maximum:	140°C/284°F	60°C/140°F *(See REMARKS overleaf)*

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Black/19990
Finish:	Glossy
Volume solids, %:	87 ± 1
Theoretical spreading rate:	2.5 m^2/litre - 350 microns 100 sq.ft./US gallon - 14 mils
Flash point:	35°C/95°F
Specific gravity:	1.3 kg/litre 10.8 lbs/US gallon
Surface dry:	4 (approx.) hours at 20°C/68°F
Dry to touch:	6 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	180 g/litre - 1.5 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 35870:	Base 35879 : Curing agent 98870 3 : 1 by volume
Application method:	Airless spray
Thinner (max.vol.):	08450 (5%)
Pot life:	1 hour (20°C/68°F)
Nozzle orifice:	.023"-.027" (Reversible)
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	350 micron/14 mils
Indicated film thickness, wet:	400 micron/16 mils
Recoat interval, min:	*See REMARKS overleaf*
Recoat interval, max:	*See REMARKS overleaf*

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR MULTI-STRENGTH GF 35870

SURFACE PREPARATION:

New steel (dry conditions): Abrasive blasting to Sa 2½, (ISO 8501-1:2007) with a surface profile equivalent to Rugotest No. 3 BN 10, Keane-Tator Comparator 3.0 G/S or ISO Comparator, ROUGH MEDIUM (G).
Remove any oil, grease and other contaminants by detergent and salts by high fresh water hosing prior to abrasive blasting.
Maintenance: Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by wet or dry abrasive blasting or for minor areas power tool cleaning. Feather edges to sound and intact areas. After wet abrasive blasting hose down the surface by hot water rinsing ("steam cleaning"). Touch up bare spots to full film thickness when the surface has become visually dry.

APPLICATION CONDITIONS:

HEMPADUR MULTI-STRENGTH GF 35870 may be applied and will cure at temperatures down to 5°C/41°F.
The temperature of the paint itself should be above 15°C/59°F. The best result is obtained at 20-30°C/68-86°F.
In confined spaces provide adequate ventilation.

PRECEDING COAT: None. If a blast primer is required use HEMPADUR 15590.

SUBSEQUENT COAT: None or according to specification.

REMARKS:

Weathering/ service temperatures: The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Colour: Light shades will have a tendency to yellow when exposed to sunshine and darken when exposed to heat.

Service temperatures: Maximum peak temperature in water is 80°C/176°F.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 350-500 micron/14-20 mils.

Application equipment: Standard airless heavy-duty spray equipment:

Pump ratio:	min 45:1 (see Note below)
Pump output:	min 12 litres/minute (theoretical)
Spray hoses:	max 15 metres/50 feet, 3/8" internal diameter
	max 3 metres/10 feet, 1/4" internal diameter

Note: If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. Bigger spray nozzles will also call for increased pump size.
A **reversible nozzle** is recommended.
Filter: Surge tank filter and tip filter should be removed.

Recoating: Recoating intervals related to later conditions of exposure at 20°C/68°F :
(350 micron/14 mils dry film thickness of HEMPADUR MULTI-STRENGHT GF 35870).

Recoated with	Minimum			Maximum		
	Atmospheric			Atmospheric		
	Medium	Severe	Immersion	Medium	Severe	Immersion
HEMPATHANE	4 hours	6 hours	NR	10 Days	3 Days	NR
HEMPADUR	6 hours	8 hours	16 hours	60 Days	30 Days	30 Days

If the maximum recoat interval is exceeded, roughening of the surface is necessary to ensure adhesion.

Note: **HEMPADUR MULTI-STRENGTH GF 35870 is for professional use only.**

ISSUED BY: HEMPEL A/S - 3587019990CR002

Product Data

HEMPEL'S VINYL ESTER GF 35910
(formerly 359QA)

BASE 35919 with HARDENER 99410

Description:

HEMPEL'S VINYL ESTER GF 35910 is a two component cold cured vinyl ester/acrylic copolymer, reinforced with glass flakes. Applicable in thick coats by standard heavy duty airless spray equipment.

Recommended use:

As a lining in immersed environments where superior resistance to chemical attack is required, HEMPEL'S VINYL ESTER GF 35910 is suitable for most chemical environments within the pH range of 0 to 13. The product also has excellent resistance to demineralised water and a range of solvents.
The product is also suited for aggressive atmospheric and spillage conditions.

Service temperatures:

	Dry exposure only:	In seawater:	Other immersion service:
Maximum:	160°C/320°F	95°C/203°F	Contact HEMPEL A/S

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Finish:	Flat
Colours/Shade nos:	Off-white/11630
Volume solids, %:	100 *(See REMARKS overleaf)*
Theoretical spreading rate:	1.5 m^2/litre - 650 micron 62 sq.ft./US gallon - 26 mils
Flash point:	28°C/82°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Dry to touch:	6 (approx.) hours at 20°C/68°F
Fully cured:	4 days at 20°C/68°F
V.O.C.:	35 g/litre - 0.3 lbs/US gallon
Shelf life:	6 months (20°C/68°F) from time of production. Shelf life is dependent on storage temperature. Shelf life is reduced at storage temperatures above 20°C/68°F. *(See separate Application instructions)*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio:	Base 35919 : Hardener 99410 98 : 2 by volume
Application method:	Airless spray Brush/roller *(See separate Application instructions)*
Thinner:	Do not dilute *(See separate Application instructions)*
Pot life:	45 minutes (20°C/68°F) *(See separate Application instructions)*
Nozzle orifice:	.030"-.060" *(Reversible)*
Nozzle pressure:	Min 275 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	Styrene and methyl ethyl ketone *(See separate Application instructions)*
Indicated film thickness, dry:	650 micron/26 mils
Indicated film thickness, wet:	725 micron/29 mils (See remarks on volume solids overleaf)
Recoating interval, min:	5 hours (20°C/68°F)
Recoating interval, max:	2 days (20°C/68°F)

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S VINYL ESTER GF 35910

SURFACE PREPARATION:	**New steel:** Abrasive blasting to min. Sa 2½. Minimum surface profile corresponding to Rugotest No. 3, BN 11, Keane-Tator Comparator, 5.5 G/S, or ISO Comparator Coarse (G). Oil and grease must be removed by suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting clean the surface carefully from abrasives and dust. **Maintenance:** On old exposed areas excessive amounts of soluble salt residues (in pittings) may call for water jet cleaning or wet abrasive blasting followed by dry abrasive blasting. Alternatively dry abrasive blasting, high pressure fresh water hosing, drying and finally, dry abrasive blasting again. **Galvanized, Zinc primed steel etc.**: Metallic zinc inhibits the curing process - the product is not compatible with galvanized steel or other zinc coated substrates. Steel primed with zinc dust containing pre-fabrication primers must be re-blasted to min. Sa 2½-3 to remove all traces of zinc.
APPLICATION CONDITIONS:	Use only when application and curing can proceed at temperatures above 10°C/50°F. The in-can temperature of the product material should be between 15°C/59°F and 25°C/77°F to facilitate proper application properties. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Relative humidity max. 85%. In confined spaces provide adequate ventilation during application and curing. RETARDER 99190 should be added when application temperatures exceed 25°C/77°F - see separate application instructions.
PRECEDING COAT:	None.
SUBSEQUENT COAT:	None, or HEMPEL'S VINYL ESTER GF 35910
REMARKS:	
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. Normal range dry is 500 - 1200 micron/20-48 mils per coat.
Volume solids:	Theoretically, the products contains 100% solid. Depending on the application and curing conditions some of the volatile reactants may evaporate. Furthermore, the curing process is accompanied by a contraction. These two factors result in a "theoretical" volume solids of 90% and a spreading rate of 1.4 m²/l at 650 micron (56 sq.ft./US gallon). By unfavourable application conditions, higher losses may result in a practical spreading rate of approximately 1.2 m²/l at 650 micron (49 sq.ft./US gallon).
Note:	**HEMPEL'S VINYL ESTER GF 35910 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 3591011630

For product description refer to product data sheet

HEMPEL'S VINYL ESTER GF 35910

HARDENER 99410

Scope:

These Application Instructions cover surface preparation, application equipment, and application details for HEMPEL'S VINYL ESTER GF 35910.

Surface preparation:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to Sa 2½. Minimum surface profile corresponding to Rugotest No. 3, BN11, Keane-Tator Comparator, 5.5 G/S, or ISO Comparator Coarse (G). After blasting, clean the surface carefully from abrasives and dust.

On pit-corroded surfaces, excessive amounts of salt residues may call for dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again as described above.

Galvanized, Zinc primed steel etc.: Metallic zinc inhibits the curing process - the product is not compatible with galvanized steel or other zinc coated substrates. Steel primed with zinc dust containing pre-fabrication primers must be re-blasted to min. Sa 2½-3 to remove all traces of zinc.

Application equipment:

HEMPEL'S VINYL ESTER GF 35910, being a high-viscosity material, requires special measures to be taken at application.

Standard airless heavy-duty spray equipment:

Pump ratio:	min 45:1 (See Note below)
Pump output:	min. 12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 15 metres/50 feet, 3/8" internal diameter, nylon lined max. 3 metres/10 feet, 1/4" internal diameter
Regular surfaces:	
Nozzle size:	.030" through .060" reversible tip
Fan angle:	40-60°

Filter: Surge tank filter and tip filter should be removed.

Note: Avoid the use of a suction hose. Use an interchangeable pipe, which makes it possible to remove cured paint.

The pump should preferably be fitted with leather seals although Teflon (PTFE) seals are acceptable for small jobs.

If longer spray hoses are necessary, up to 50 metres/150 feet hose (Min. ½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, yet the high output capacity of the pump must be maintained. Before application starts, the filter should be removed and hoses should be washed with styrene.

Thinning:

Do not thin. Alternatively max. 5% styrene may be added, but this must be done with care as the anti-sagging properties are drastically reduced and chemical resistance may be affected.

Airless spray data are indicative and subject to adjustment.

HEMPEL'S VINYL ESTER GF 35910

Mixing:

Steel temperature between 10°C/50°F and 20°C/68°F:

Add ½ a bottle of HARDENER 99410 into the BASE 35919 and mix for 1 minute. Add the second half of HARDENER 99410 and continue to stir until contents are thoroughly mixed (approx. 2 minutes).

Before start-up, the pump must be flushed with styrene.

At spray stop the equipment should be flushed out using a small amount of styrene, followed by methyl ethyl ketone (MEK) for at least 15 minutes. Where spraying is to continue, flush with styrene.

The pump should work fast during flushing operations and care taken to ensure that equipment is thoroughly cleaned.

Steel temperature at and above 25°C/77°F:

1. Add the content of 1 bottle of RETARDER 99190 and mix thoroughly by mechanical agitation with BASE 35919 only.

   After mixing RETARDER 99190 with BASE 35919 it is essential that at least 5 minutes are allowed before commencing the addition of the HARDENER 99410.

2. HARDENER 99410 should **then** be added as described above.

   UNDER NO CIRCUMSTANCES RETARDER 99190 SHOULD BE ADDED AFTER THE HARDENER 99410 HAS BEEN ADDED. THIS WILL TOTALLY NEGATE THE CURING REACTION.

Pot life:

When measured under standard conditions the pot life is 45 minutes at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction is so intense that the corresponding practical pot life is substantially shorter.

Therefore:

- Irrespective of equipment, use the paint immediately after mixing. At a normal application speed the 20 litres/5 US gallons are used in approx. 10 minutes.

- Observe the paint temperature frequently for instance by touching the can with your hand. If it feels more than hand warm (above approx. 50°C/120°F, discard the paint and flush the equipment immediately irrespective of type of spray equipment.

Paint temperature:

If the temperature in the can is below approximately 15°C/59°F, the viscosity will be too high for application. If the paint temperature when mixing is 25°C/77°F or higher, a substantial risk of shortened pot life and curing in can/spray equipment exists. When working in warm, subtropical/tropical climates a refrigerated container can be used for storing/cooling of the paint before application.

Stripe coating:

Edges, corners, manual welds, and places difficult to cover properly by spray application should be stripe coated either before or after the spray application.
One or two stripe coats will usually be necessary, but depending on actual conditions.

For service in corrosive chemicals a thorough stripe coating procedure is mandatory.

Extra film thickness:

Extra thickness - extra layer(s) - may be necessary in case of severely pitted and/or for exposure to highly corrosive chemicals.

Indicated film thickness:

Between 500 and 3000 micron in one or more coats depending on later service conditions.

Recoating intervals:

Within a maximum of 85% Relative Humidity the following recoating intervals apply:

Steel temperature		10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F*	30°C/86°F*	(35°C/95°F)*
With 35910	Min	12 hours	9 hours	5 hours	5 hours	4 hour	(4 hours)
	Max	3 days	3 days	2 days	2 days	1 day	(18 hours)

HEMPEL'S VINYL ESTER GF 35910

HEMPEL'S VINYL ESTER GF 35910 MUST NOT be exposed to condensation or Relative Humidity higher than 85% before recoating.
*Intervals at and above 25°C/77°F is based on an addition of Retarder 99190.
Strong ultraviolet/sunlight will reduce maximum recoating interval significantly.

Cleaning of tools:

The equipment should be flushed out and cleaned using styrene followed by methyl ethyl ketone (MEK).

Curing table:

The following curing times apply:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)
Fully cured	8 days	6 days	4 days	3 days	2 days	(2 days)

Time before taking into service:

When the painted surface will be exposed to heavy duty service (e.g. exposure to chemicals, heavy wear and tear), the recommended minimum curing time is:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)
Minimum	8 days	6 days	4 days	3 days	2 days	(2 days)

HEMPEL'S VINYL ESTER GF 35910 is resistant to immersion in calm seawater and other less aggressive water immersion service after an initial curing time as listed hereunder:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)
Minimum	60 hours	40 hours	24 hours	24 hours	18 hours	(12 hours)

Notes:

1. The temperatures in the tables above are mean values.
2. Curing will proceed under water.
3. Less curing than stated above before exposure to seawater may result in significant discoloration of the surface.

Post curing:

Post-cure of HEMPEL'S VINYL ESTER GF 35910 is possible and may be mandatory in case of special service conditions. The following procedure must be followed:-
- Allow the lining to cure for a minimum of 12 hours after application of last coat.
- Raise the temperature within the vessel to between 60°C and 80°C using dry heat (The temperature must not exceed 100°C).
- Maintain this temperature for between 6 and 8 hours.

Remarks:

In case of deep pittings higher film thickness is recommended on areas with pittings. To secure sufficient curing at low surface temperatures as well as to secure a pinhole-free paint film at any temperature, the product should always be applied in a wet film thickness above 600 micron.

Quality Control:

As HEMPEL'S VINYL ESTER GF 35910 is often used in highly corrosive service proper quality control is of particular importance. Such controls should include following:

1. Control that the proper dry film thickness has been achieved
2. Holiday/pinhole detection at high voltage (Voltage according to specified thickness)
3. Test of full cure (Acetone test)
    a. A small area should be washed with clean Acetone to dissolve the surface inhibited film and remove stickiness; the area should then be allowed to dry.
    b. Gently rub the washed surface with a piece of cloth soaked with Acetone. Should the surface become tacky or if it was impossible to obtain a tack free surface under a), then the coating is not fully cured.

Repairs:

It is of great importance that all damage to the coating is repaired.

Repair must be started up as soon as possible. Repair of mountings for staging, pinholes etc. must take place in connection with the dismantling of the staging, the tempo of which shall be adjusted to the touch-up procedure.

It is important that the repaired areas, as well as the rest of the coated areas, are fully cured before the tank is taken into use.

The repair process:

General: Before mechanical treatment, surfaces to be repaired have to be cleaned for any salts and other contamination.

Small areas and single pinholes.

The surface preparation can be executed by grinding to a clean rough metal surface, feathering edges of intact coating and slightly sanding the adjacent surface.

Pinholes are best treated by using a 3 mm flat bottomed drill to enlarge the pinhole down to the substrate.

Clean and wash with HEMPEL'S THINNER 08450.

Work HEMPEL'S VINYL ESTER GF 35910 into the hole before brushing a small amount of the material over the top and immediately surrounding zone. Ensure that the specified total thickness is achieved.

Larger areas or areas with extensive pin holing.

Treatment: Repeat the original specification.

Shelf life

Shelf life is dependent on storage temperature. Shelf life is reduced at storage temperatures above 20°C/68°F. HEMPEL'S VINYL ESTER GF 35910 should never be stored in direct sunlight. It is recommended to keep the storage temperature a low as possible - if necessary via refrigeration. Recommended storage temperature is 5 - 20°C (41 - 68°F).

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 3591011630

Product Data

HEMPEL'S POLYESTER GF 35920

BASE 35929 with HARDENER 99020

Description:

HEMPEL'S POLYESTER GF 35920 is a high solid, two-component heavy duty lining system based on isophthalic polyester acrylic copolymer reinforced with glass flakes. Applicable in thick coats by standard heavy duty airless spray equipment.

Recommended use:

1. As rust preventing coating for areas exposed to high abrasion and impact.

2. As rust preventing coating for areas requiring short interval between application and seawater immersion - 6 hours at 20°C/68°F is required.

Service temperatures:	Dry exposure only:	In water (maximum temperature gradient 35°C/63°F):
Maximum:	140°C/284°F	80°C/176°F

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Finish:	Flat
Colours/Shade nos:	Off-white/11630 - Yellow/20820 *(RAL 1006)*
Volume solids, %:	90 *(See REMARKS overleaf)*
Theoretical spreading rate:	1.4 m^2/litre - 650 micron 56 sq.ft./US gallon - 26 mils
Flash point:	26°C/79°F
Specific gravity:	1.2 kg/litre - 10.2 lbs/US gallon
Dry to touch:	4 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	35 g/litre - 0.3 lbs/US gallon
Shelf life:	6 months (25°C/77°F) from time of production. Shelf life is dependent on storage temperature. Shelf life is reduced at storage temperatures above 25°C/77°F. Do not store above 40°C/104°F.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio:	Base 35929 : Hardener 99020 97.5 : 1.5 by volume
Application method:	Airless spray Brush/roller *(See separate Application instructions)*
Thinner:	Do not dilute *(See separate Application instructions)*
Pot life:	45 minutes (20°C/68°F) *(See separate Application instructions)*
Nozzle orifice:	.030"-.060" *(Reversible)*
Nozzle pressure:	min 275 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	Styrene and methyl ethyl ketone *(See separate Application instructions)*
Indicated film thickness, dry:	650 micron/26 mils
Indicated film thickness, wet:	725 micron/29 mils
Recoating interval, min:	**with itself:** 2 hours (20°C/68°F); **others:** 16 hours (20°C/68°F)
Recoating interval, max:	3 days (20°C/68°F)

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S POLYESTER GF 35920

SURFACE PREPARATION:	**New steel:** Abrasive blasting to min. Sa 2½. Minimum surface profile corresponding to Rugotest No. 3, BN 11, Keane-Tator Comparator, 5.5 G/S, or ISO Comparator Coarse (G). Oil and grease must be removed by suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting clean the surface carefully from abrasives and dust. **Maintenance:** On old exposed areas excessive amounts of soluble salt residues (in pittings) may call for water jet cleaning or wet abrasive blasting followed by dry abrasive blasting. Alternatively dry abrasive blasting, high pressure fresh water hosing, drying and finally, dry abrasive blasting again. **Galvanized, Zinc primed steel etc.**: Metallic zinc inhibits the curing process - the product is not compatible with galvanized steel or other zinc coated substrates. Steel primed with zinc dust containing pre-fabrication primers must be re-blasted to min. Sa 2½-3 to remove all traces of zinc.
APPLICATION CONDITIONS:	Use only when application and curing can proceed at temperatures above 10°C/50°F. The in-can temperature of the polyester material should be between 15°C/59°F and 25°C/77°F to facilitate proper application properties. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Relative humidity max. 85%. In confined spaces provide adequate ventilation during application and curing.
PRECEDING COAT:	None.
SUBSEQUENT COAT:	None, or solvent-based coatings as per specification.
REMARKS:	
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. Normal range dry is 650-750 micron/26-30 mils. Absolute minimum is 500 micron/20 mils. Maximum not more than 1250 micron/50 mils.
Volume solids:	Theoretically, the products contains 100% solid. By practical spray application, however, one of the reactive components added in surplus will be lost as volatile in an amount of approx 0.035 kg per litre. Furthermore, the curing process is accompanied by a contraction of approximately 6%. These two factors result in a volume solids of 90% and a spreading rate of 1.4 m^2/l at 650 micron. By extremely unfavourable application conditions, higher losses may result in a "theoretical" spreading rate of approximately 1.2 m^2/l at 650 micron. The curing is, however, not affected by the higher loss.
Note:	**HEMPEL'S POLYESTER GF 35920 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 3592011630

For product description refer to product data sheet

HEMPEL'S POLYESTER GF 35920

HARDENER 99020

Scope:

These Application Instructions cover surface preparation, application equipment, and application details for HEMPEL'S POLYESTER GF 35920.

Surface preparation:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to Sa 2½. Minimum surface profile corresponding to Rugotest No. 3, BN11, Keane-Tator Comparator, 5.5 G/S, or ISO Comparator Coarse (G). After blasting, clean the surface carefully from abrasives and dust.

On pit-corroded surfaces, excessive amounts of salt residues may call for dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again as described above.

Application equipment:

HEMPEL'S POLYESTER GF 35920, being a high-viscosity material, requires special measures to be taken at application.

Standard airless heavy-duty spray equipment:

Pump ratio:	min 45:1 (See Note below)
Pump output:	min. 12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 15 metres/50 feet, 3/8" internal diameter, nylon lined max. 3 metres/10 feet, 1/4" internal diameter
Regular surfaces:	
Nozzle size:	.030" through .060" reversible tip
Fan angle:	40-60°

Note: Avoid the use of a suction hose. Use an interchangeable pipe, which makes it possible to remove cured paint.

The pump should preferably be fitted with leather seals although Teflon (PTFE) seals are acceptable for small jobs.

If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, yet, the high output capacity of the pump must be maintained. Before application starts, the filter should be removed and hoses should be washed with styrene.

Thinning:

Alternatively max. 5% styrene may be added, but thinning must be done with care as the anti-sagging properties are drastically reduced by overthinning.

Airless spray data are indicative and subject to adjustment.

Mixing:

Steel temperature between 10°C/50°F and 20°C/68°F:
Add ½ a bottle of HARDENER 99020 into the BASE 35929 and mix for 1 minute. Add the second half of HARDENER 99020 and continue to stir until contents are thoroughly mixed (approx. 2 minutes).

Before start-up, the pump must be flushed with styrene.

At spray stop the equipment should be flushed out using a small amount of styrene, followed by methyl ethyl ketone (MEK) for at least 15 minutes. Where spraying is to continue, flush with styrene.

The pump should work fast during flushing operations and care taken to ensure that equipment is throughly cleaned.

Steel temperature at and above 20°C/68°F:

1. Add the content of 1 bottle of RETARDER 99190 and mix thoroughly by mechanical agitation with BASE 35929 only.

   After mixing RETARDER 99190 with BASE 35929 it is essential that at least 5 minutes are allowed before commencing the addition of the HARDENER 99020 .

2. HARDENER 99020 should **then** be added as described on page 1.

   UNDER NO CIRCUMSTANCES RETARDER 99190 SHOULD BE ADDED AFTER THE HARDENER 99020 HAS BEEN ADDED. THIS WILL TOTALLY NEGATE THE CURING REACTION.

Pot life:

When measured under standard conditions the pot life is 45 minutes at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction is so intense that the corresponding practical pot life is substantially shorter.

Therefore:

- Irrespective of equipment, use the paint immediately after mixing. At a normal application speed the 20 litres/5 US gallons are used in approx. 10 minutes.
- Keep an eye on the paint temperature frequently for instance by touching the can with your hand. If it feels more than hand warm, discard the paint and flush the equipment immediately irrespective of type of spray equipment.

Paint temperature:

If the temperature in the can is below approximately 15°C/59°F, the viscosity will be too high for application. If the paint temperature when mixing is 25°C/77°F or higher, a substantial risk of shortened pot life and curing in can/spray equipment exists. When working in warm, subtropical/tropical climates a refrigerated container can be used for storing/cooling of the paint before application.

Stripe coating:

Edges, corners, manual welds, and places difficult to cover properly by spray application should be stripe coated (touched up) either before or after the spray application.

One or two stripe coats will usually be necessary, but depending on actual conditions.

Extra film thickness:

Extra thickness - extra layer(s) - may be necessary in case of severely pitted and/or where very high degrees of antiabrasive properties are needed.

Indicated film thickness:

1500 micron on splash zone areas, 1000 micron on immersed areas below splash zone, and 750 micron on decks are recommend.

Recoating intervals:

Within a maximum of 85% Relative Humidity the following recoating intervals apply:

Steel temperature		10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)
With 35920	Min Max	5 hours 7½ days	3 hours 5 days	2 hours 3 days	1½ hours 2 days	1 hour 1½ days	(45 min.) (1 day)
With other paints (solvent-based)	Min Max	32 hours 7½ days	24 hours 5 days	16 hours 3 days	12 hours 2 days	8 hours 1½ days	(6 hours) (1 day)

The polyester MUST NOT be exposed to (steel) temperatures below 10°C/50°F nor to condensation or Relative Humidity higher than 85% before recoating.

Cleaning of tools:

The equipment should be flushed out and cleaned using styrene followed by methyl ethyl ketone (MEK).

HEMPEL'S POLYESTER GF 35920

Curing table:

The following curing times apply:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)
Fully cured	18 days	11 days	7 days	5 days	3½ days	(2½ days)

Time before taking into service:

When the painted surface will be exposed to heavy duty service (e.g. exposure to chemicals, heavy wear and tear), the recommended minimum curing time is:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)
Minimum	7½ days	5 days	3 days	2 days	1½ days	(1 day)

If not exposed to heavy duty service (eg exposure to light traffic only):

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)
Minimum	60 hours	40 hours	24 hours	16 hours	12 hours	(8 hours)

HEMPEL'S POLYESTER GF 35920 is resistant to immersion in calm seawater after an initial curing time as listed hereunder:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)
Minimum	15 hours	10 hours	6 hours	5 hours	4 hours	(3 hours)

Notes:

1. The temperatures in the tables above are mean values, but the temperature during curing should at no time come below 10°C/50°F.
2. Curing will proceed under water when the water temperature is above 10°C/50°F.
3. Less curing than stated above before exposure to seawater may result in significant discoloration of the surface.

Remarks:

Stripe coating is recommended on surfaces difficult to cover properly by spray.
In case of deep pittings higher film thickness is recommended on areas with pittings.
To secure sufficient curing at low surface temperatures as well as to secure a pinhole-free paint film at any temperature, the product should always be applied in a wet film thickness above 600 micron.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 3592011630

Product Data

HEMPALIN UNDERCOAT 42460

Description: HEMPALIN UNDERCOAT 42460 is a fairly quick-drying alkyd paint.

Recommended use: As a general purpose undercoating in alkyd paint systems on exterior and interior steelwork, wood, plaster, etc. in mildly to moderately corrosive environment.

Service temperatures: Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals: Approved as a low flame spread material by Danish, French, Spanish and Singaporean authorities according to IMO resolution MSC 61 (67).
Has a Danish, French, Spanish, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.
Complies with EU Directive 2004/42/EC, subcategory i.
Please see REMARKS overleaf.

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	White/10000
Finish:	Flat
Volume solids, %:	53 ± 1
Theoretical spreading rate:	13.3 m²/litre - 40 micron 531 sq.ft./US gallon - 1.6 mils
Flash point:	38°C/100°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Dry to touch:	4 (approx.) hours at 20°C/68°F
V.O.C.:	385 g/litre - 3.2 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush	
Thinner (max.vol.):	08230 (5%)	08230 (15%)	08230 (5%)	*(See REMARKS overleaf)*
Nozzle orifice:	.015"-.018"			
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*			
Cleaning of tools:	THINNER 08230			
Indicated film thickness, dry:	40 micron/1.6 mils			
Indicated film thickness, wet:	75 micron/3 mils			
Recoat interval, min:	See REMARKS overleaf			
Recoat interval max:	See REMARKS overleaf			

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPALIN UNDERCOAT 42460

APPLICATION CONDITIONS: As dictated by normal good painting practice.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: HEMPALIN PRIMERS or according to specification.

SUBSEQUENT COAT: HEMPALIN ENAMELS or according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	395	450	600	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Some of the **certificates** have been issued under the former quality number 4246.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 30-40 micron/1.2-1.6 mils.

Thinning: THINNER 08080 may be used for spray application, however, with a certain risk of wrinkling of a preceding **fresh** HEMPALIN coat.

Recoating: Recoating intervals related to later conditions of exposure:
(40 micron/1.6 mils dry film thickness of HEMPALIN UNDERCOAT 42460)

	Minimum		Maximum	
Surface Temperature	20°C/68°F		20°C/68°F	
Recoated with	Atmospheric		Atmospheric	
	Mild	Medium	Mild	Medium
HEMPALIN (white spirit only)	5 hours	8 hours	None	7 days

If this maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
Before recoating after exposure in contaminated environment, clean surface thoroughly by (high pressure) fresh water cleaning and allow to dry.

Note: **HEMPALIN UNDERCOAT 42460 is for professional use only.**

ISSUED BY: HEMPEL A/S - 42460100000C0020

HEMPADUR 45080/ HEMPADUR 45083

Medium to high temperatures 45080: BASE 45089 with CURING AGENT 95010
Low to medium temperatures 45083: BASE 45089 with CURING AGENT 97480

Description:

HEMPADUR 45080/45083 is a high-build, modified, two-component epoxy paint, which cures to a coating with good resistance to water, splashes of mineral oils, aliphatic hydrocarbons, and to abrasion and impact. Limited resistance to aromatic and stronger solvents, and to acids and oxidizing materials.

Recommended use:

As an intermediate coat with prolonged recoating interval in HEMPADUR/ HEMPATHANE systems.
CURING AGENT 95010, polyamide, is typically for use above 10°C/50°F, CURING AGENT 97480, polyamide adduct, facilitates curing down to -10°C/14°F.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F *(see REMARKS overleaf)*.

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

	45080	**45083**
Version; mixed product:		
Colours/Shade nos:	Off-white/11630	Off-white/11630
Finish:	Flat	Flat
Volume solids, %:	48 ± 1	45 ± 1
Theoretical spreading rate:	6.4 m^2/litre - 75 micron 257 sq.ft./US gallon - 3 mils	6.0 m^2/litre - 75 micron 241 sq.ft./US gallon - 3 mils
Flash point:	30°C/86°F	30°C/86°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon	1.4 kg/litre - 11.7 lbs/US gallon
Surface dry:	1½ *(app)* hours at 20°C/68°F *(ISO 1517)*	3 *(app)* hours at 10°C/50°F *(ISO 1517)*
Dry to touch:	4 *(app)* hours at 20°C/68°F	6 *(app)* hours at 10°C/50°F
Fully cured:	7 days at 20°C/68°F	14 days at 10°C/50°F
V.O.C.:	500 g/litre - 4.2 lbs/US gallon	520 g/litre - 4.3 lbs/US gallon

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

	45080		**45083**	
Mixing ratio:	Base 45089 : Curing agent 95010 8.4 : 1.6 by volume		Base 45089 : Curing agent 97480 8.4 : 1.6 by volume	
Application method:	Airless spray	Brush	Airless spray	Brush
Thinner (max.vol.):	08450 (5%)	08450 (5%)	08450 (5%)	08450 (5%)
Pot life:	6 hours (20°C/68°F) 8 hours (20°C/68°F)		4 hours (10°C/50°F) *(Airless)* 8 hours (10°C/50°F) *(Brush)*	
Nozzle orifice:	.015"-.021"			
Nozzle pressure:	150 bar/2100 psi *(Airless spray data are indicative and subject to adjustment)*			
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610 or THINNER 08450			
Indicated film thickness, dry:	75 micron/3 mils *(See REMARKS overleaf)*			
Indicated film thickness, wet:	150 micron/6 mils			
Recoat interval, min:	See REMARKS overleaf			
Recoat interval, max:	See REMARKS overleaf			

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 45080/45083

APPLICATION CONDITIONS:
Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
Use only where application and curing can proceed at temperatures above 10°C/50°F when using CURING AGENT 95010, and above -10°C/14°F when using CURING AGENT 97480. The temperature of the paint itself should be minimum 15°C/59°F.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:
HEMPADUR primers/intermediate coats or according to specification.

SUBSEQUENT COAT:
HEMPATHANE topcoats according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

45080				
	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	500	515	550	500
45083				
	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	520	535	550	500

VOC:
For VOC of other shades, please refer to Safety Data Sheet.

Weathering/ service temperatures:
The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses:
May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 50-125 micron/2-5 mils.

Recoating:
Before recoating, clean the surface thoroughly of all contamination. Especially at long intervals before recoating very careful cleaning is required.
To check adequate quality of the preparatory cleaning a test patch is recommended before actual recoating.
Recoating intervals related to later conditions of exposure:
(75 micron/3 mils dry film thickness of HEMPADUR 45080/45083)

	Curing agent 95010				**Curing agent 97480**			
	Minimum		Maximum		Minimum		Maximum	
Surface temperature	20°C/68°F				10°C/50°F			
Recoated with	Atmospheric				Atmospheric			
	Medium	Severe	Medium	Severe	Medium	Severe	Medium	Severe
HEMPATHANE topcoats	4 hours	8 hours	None*	14 days	6 hours	12 hours	None*	28 days
HEMPADUR	4 hours	8 hours	None*	None*	6 hours	12 hours	None*	None*

*If there is any doubt about the adequacy of the surface preparation, a thin, fresh coat of HEMPADUR 45080/45083 is applied to secure adhesion of the following coat.

Note:
HEMPADUR 45080/45083 is for professional use only.

ISSUED BY:
HEMPEL A/S - 4508011630CO004/4508311630CO003

HEMPADUR 45141/ HEMPADUR 45143

45141: BASE 45148 with CURING AGENT 97820
45143: BASE 45148 with CURING AGENT 97430

Description:

HEMPADUR 45141/45143 is a two-component, polyamide adduct cured epoxy paint with good wetting properties and low water permeability. It is selfpriming and forms a hard and tough coating which has good resistance against abrasion and impact as well as to seawater, mineral oils, aliphatic hydrocarbons and splashes from petrol and related products. Harmless to grain cargoes.

Recommended use:

1. As a high build primer, intermediate and/or finishing coat in (heavy duty) paint systems according to specification. (As a finishing coat where a cosmetic appearance is of less importance).
2. For repair and maintenance work at application temperatures above -10°C/15°F on hatch covers, decks, in cargo holds, etc.
3. As a ballast tank coating.

HEMPADUR 45143 is intended for use in cold/temperate climates, HEMPADUR 45141 for warmer climates - see APPLICATION CONDITIONS overleaf.

Service temperatures:

Dry exposure only:	Maximum 150°C/302°F *(See REMARKS overleaf)*
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	40°C/104°F (no temperature gradient)

Other liquids: Contact HEMPEL
**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory j.
See REMARKS overleaf.
HEMPADUR 45143 has a French EC-type Examination Certificate.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

	45141	**45143**
Version; mixed product:		
Colours/Shade nos:	Red/50630*	Red/50630*
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	60 ± 1	60 ± 1
Theoretical spreading rate:	4.0 m^2/litre - 150 micron 160 sq.ft./US gallon - 6 mils	4.0 m^2/litre - 150 micron 160 sq.ft./US gallon - 6 mils
Flash point:	26°C/79°F	26°C/79°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon	1.3 kg/litre - 10.8 lbs/US gallon
Surface dry:	4 (approx.) hrs at 20°C/68°F *(ISO 1517)*	5 (approx.) hrs at 5°C/41°F *(ISO 1517)*
Dry to touch:	7 (approx.) hours at 20°C/68°F	11 (approx.) hours at 5°C/41°F
Fully cured:	7 (approx.) days at 20°C/68°F	20 (approx.) days at 5°C/41°F
V.O.C.:	380 g/litre - 3.2 lbs/US gallon	375 g/litre - 3.1 lbs/US gallon

**Other shades including a MIO version, colour no. 12430, according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

	45141	**45143**
Mixing ratio:	Base 45148 : Curing agent 97820 3 : 1 by volume	Base 45148 : Curing agent 97430 3 : 1 by volume
Application method:	Airless spray Brush	Airless spray Brush
Thinner (max.vol.):	08450 (5%) 08450 (5%) *(See REMARKS overleaf)*	08450 (5%) 08450 (5%) *(See REMARKS overleaf)*
Pot life:	2 hrs (20°C/68°F) 4 hrs (20°C/68°F) *(See REMARKS overleaf)*	2 hrs (15°C/59°F) 4 hrs (15°C/59°F) *(See REMARKS overleaf)*
Nozzle orifice:	.019"-.023"	
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610 or THINNER 08450	
Indicated film thickness, dry:	150 micron/ 6 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	250 micron/10 mils	
Recoat interval, min:	As per separate APPLICATION INSTRUCTIONS	
Recoat interval, max:	As per separate APPLICATION INSTRUCTIONS	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 45141/45143

SURFACE PREPARATION:

New steel: When used selfprimed surface preparation as to specification. When being an integral part in heavy duty systems abrasive blasting to Sa 2½. Reference is made to separate APPLICATION INSTRUCTIONS.
New steel, ballast tanks and similar areas: Abrasive blasting to Sa 2½. For temporary protection, if required, use a suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting - preferably by abrasive blasting. For repair and touch-up, use HEMPADUR 45141/45143.
Stainless steel: (Ballast tanks in chemical carriers) to be abrasive blasted to a uniform, sharp, *dense* profile, ISO Comparator Medium (G), corresponding to Rz minimum 50 micron. Any salts, grease, oil, etc. to be removed before abrasive blasting is commenced.
Repair and maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (spot-repairs) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR 45141/45143.
As an alternative to dry cleaning, water jetting to sound, well adhering coat and/or to steel. Intact coat must appear with roughened surface after the water jetting. By water jetting to steel, cleanliness shall be Wa 2 - Wa 2½ (atmospheric exposure) / minimum Wa 2½ (immersion) (ISO 8501-4:2006). A flash-rust degree of maximum M (atmospheric exposure) / M, preferably L (immersion) (ISO 8501-4:2006) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting, wet abrasive blasting, alternatively dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

APPLICATION CONDITIONS:

Apply only on a dry an clean surface with a temperature above the dew point to avoid condensation. HEMPADUR 45143 is intended for curing conditions down to -10°C/14°F, HEMPADUR 45141 is to be selected in warmer climates. A shift from 45143 to 45141 is most convenient to take place when the temperature is between 15°C/59°F and 25°C/77°F, however, HEMPADUR 45141 may be used for curing conditions down to 0°C/32°F in cases where surfaces are not to be immersed. Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warm climates, the paint should be stored in a cool place. At paint temperatures below 15°C/59°F or in the case of very long spray hoses, thinning may be necessary. This will cause lower film build and longer drying time.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: None or according to specification.

SUBSEQUENT COAT: None or according to specification.

REMARKS: See separate APPLICATION INSTRUCTIONS.

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	375	400	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Certificates/ Approvals:

Certificates have been issued under the former quality number 4514.
Approved by Lloyd's Register of Shipping as a recognised corrosion control coating. Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
Approved as a ballast tank coating by Germanischer Lloyd, Germany.
Classified as a class 1 material according to BS 476, Part 7: 1987 (fire testing).
Accepted as a corrosion control coating by Maritime Register of Shipping, Russia.
Complies with Section 175.300 of the Code of Federal Regulations in respect of carriage of dry foodstuffs (FDA) in spaces with an internal surface area larger than 1000 m^2/10,750 sq.ft.

Weathering/ service temperatures: The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Colour: Light shades will have a tendency to yellow when exposed to sunshine.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 125-175 micron/5-7 mils.

Curing agent: Curing agent 97820 and 97430 are hazy. This is intended and has no negative influence on the performance.

Thinning: Thinning above 5% may cause lower film build and slower drying/curing. Mix the components thoroughly.

Induction time: If the paint temperature, as an exception, is below approx. 10°C/50°F, allow the mixture to pre-react 30 minutes before use.

HEMPADUR 45141/45143

Recoating:	Recoat intervals related to later conditions of exposure: Consult separate APPLICATION INSTRUCTIONS. Before recoating after exposure in contaminated environment, clean the surface thoroughly by (high pressure) fresh water hosing and allow drying. If the maximum recoat interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
Note:	**HEMPADUR 45141/45143 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 4514350630CO005/45141506300007

For product description refer to product data sheet

HEMPADUR 45141/ HEMPADUR 45143

45141: BASE 45148 with CURING AGENT 97820
45143: BASE 45148 with CURING AGENT 97430

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR 45141/45143.

Surface preparation:

General: In order to obtain best performance, abrasive blast cleaning is recommended. However, HEMPADUR 45141/45143 may be applied on rusty steel surfaces where higher performance is needed than obtainable with conventional coatings but where mechanical cleaning and dust removal can only be carried out (beside the removal of salts and of oily contaminants).

Remove oil and grease with suitable detergent, salt and other contaminants by (high pressure) fresh water cleaning.

REPAIR AND MAINTENANCE:

Spot-repairs:
Clean damaged areas thoroughly by power tool cleaning to St 3 or by abrasive blasting to minimum Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of HEMPADUR 45141/45143. As an alternative to dry cleaning, water jetting to sound, well adhering coat and/or to steel. Intact coat must appear with roughened surface after the water jetting. By water jetting to steel, cleanliness shall be Wa 2 to Wa 2½ (atmospheric exposure) / minimum Wa 2½ (immersion) (ISO 8501-4:2006). A flash-rust degree of maximum M (atmospheric exposure) / M, preferably L (immersion) (ISO 8501-4:2006) is acceptable before application. Feather edges to sound and intact areas. Brush off loose material. Touch up to full film thickness.

Compatibility: HEMPADUR 45141/45143 may be used in connection with other generic paint systems than epoxy and polyurethanes.

In any case it is a must that the old paint system is tightly adhering and is properly prepared before the touch-up is performed. It is recommended to make a test patch.

Full coating:

Compatibility with old system: HEMPADUR 45141/45143 may exceptionally be applied directly on top of an old alkyd paint system provided this is tightly adhering. It is furthermore preferable that the old system is less than approximately 500 micron in film thickness. A test patch should always be performed before full coating is decided. Even old chlorinated rubber and vinyl systems may be overcoated but with an inherent risk of later tendency to "liftings" along mechanical damage and similar weaknesses.
Removal of old system: Full coating after mechanical removal of an old paint system is possible too. Yet, it must be considered that mechanical cleaning may produce a very smooth surface giving reason to reduced adhesive forces.

Note: Another risk is left over of a hard black rustscale being cleaned to an apparent brightness without showing any adhesive defects. Yet, the exposure to open air during cleaning may have started a continuous oxidation of the hard black rust making it mechanically weak and of poor adhesion to the underlying steel surface. Later, during service, the scale plus overlaying paint material may flake off.

When used for immersion service:

1. Abrasive blasting to Sa 2½. After abrasive blasting, clean the surface carefully from abrasives and dust. For temporary protection, if required, use suitable shopprimer. All damage to shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting.

Stainless steel: (Ballast tanks in chemical carriers) to be abrasive blasted to a uniform, sharp, dense profile, ISO Comparator Medium (G), corresponding to Rz minimum 50 micron. Any salts, grease, oil, etc. to be removed before abrasive blasting is commenced.

2. If the HEMPADUR 45141/45143 will form an integral part of heavy duty systems (impact and antiabrasion purposes) best performance will be obtained by applying it directly to the blast-cleaned steel, subsidiary using HEMPADUR 15590 as "blast primer".

Note: On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for high pressure water jetting, wet abrasive blasting, alternatively dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Application equipment:

HEMPADUR 45141/45143 being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max 100 metres/300 feet, ½" internal diameter max. 30 metres/100 feet, 3/8" internal diameter max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh

Regular surfaces:

Nozzle size:	.021"-.023"
Fan angle:	60-80°.

Complicated surfaces (and touch up):

Nozzle size:	.019"
Fan angle:	40°.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may increase paint flow, thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning.

Airless spray data are indicative and subject to adjustment.

Application:

Film-build/continuity: With this paint material applied in one/few coat(s) it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripecoat will usually be necessary. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogenously and as close to the specification as possible. Avoid exaggerated film thickness due to the risk of sagging, cracks and solvent retention. The paint consumption must be controlled.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

On **poorly prepared surfaces** it is always recommended to apply first coat by brush. Extra thinning will facilitate the penetration of the paint material but will also require an extra layer to be applied.

Wet/dry film thickness:

The thixotropic nature of HEMPADUR 45141/45143 may give a rather "wavy" surface of the paint just after application. This smoothens at drying but can make it necessary to let the wet film readings be of a higher value than indicated. In many cases, the wet film thickness reading should be 25-50 micron/1-2 mils higher than calculated. As the wavy surface becomes smoother at drying this extra wet film thickness readings will not cause higher paint consumption than otherwise stipulated.

Pot life:

When measured under standard conditions the pot life is 2 hours at 15°C/59°F when using CURING AGENT 97430. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

At these temperatures therefore: Irrespective of equipment, use the paint immediately after mixing. (At a normal application speed the 20 litres/5 US gallons are used in approx. 10 minutes.) Anyhow, at paint temperatures, as an exception, being lower than 15°C/59°F allow the mixture to pre-react approximately 30 minutes before use. After this induction time, apply the paint immediately.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY:

HEMPEL A/S - 4514350630C0005/45141506 30C0007

Attached:

Tables of "physical data versus temperature"

In relation to recoating intervals the following is very important:

Maximum recoating intervals:
If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR 45141/45143 within the following directions for recoating:

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing.

- **Any degraded surface layer, as a result of a long exposure period, must be removed as well**. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

HEMPADUR 45141/45143

Physical data versus temperature: (HEMPADUR 45141 in a dry film thickness of 150 micron/6 mils):

Surface temperature	20°C/68°F	30°C/86°F
Drying time	7 hours	3½ hours
Curing time	7 days	3½ days
MINIMUM recoating interval related to later conditions of exposure:		
Interval recoating with 46410, 56360		
Atmospheric, medium	6 hours	3 hours
Atmospheric, severe	8 hours	4 hours
Interval for recoating with 58030		
Atmospheric, medium	11 hours	6 hours
Atmospheric, severe	11 hours	6 hours
Interval for recoating with HEMPADUR and HEMPATHANE qualities		
Atmospheric, medium	8 hours	4 hours
Atmospheric, severe	9 hours	5 hours
Immersion*	12 hours	6 hours
MAXIMUM recoating interval related to later conditions of exposure:		
Interval for recoating with 46410		
Atmospheric, medium	12 hours	6 hours
Atmospheric, severe	12 hours	6 hours
Interval for recoating with 56360		
Atmospheric, medium	10 hours	5 hours
Atmospheric, severe	10 hours	5 hours
Interval for recoating with 58030		
Atmospheric Medium	3 days	36 hours
Severe	1½ days	18 hours
Interval for recoating with HEMPADUR qualities		
Atmospheric, medium	None	None
Atmospheric, severe	None	None
Immersion**	30 days	15 days
Interval for recoating with HEMPATHANE qualities		
Atmospheric, medium	10 days	5 days
Atmospheric, severe	3 days	36 hours
Immersion	Not relevant	Not relevant

* Not relevant for HEMPATHANE qualities.
** Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

Furthermore, please see page 3.

HEMPADUR 45141/45143

Physical data versus temperature: (HEMPADUR 45143 in a dry film thickness of 150 micron/6 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F
Drying time	35 hours	14 hours	7 hours	4 hours
Curing time	2 months	28 days	14 days	7 days
MINIMUM recoating interval related to later conditions of exposure:				
Interval for recoating with 46410, 56360				
Atmospheric, medium	28 hours	14 hours	6 hours	3 hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours
Interval for recoating with 58030				
Atmospheric, medium	Not relevant	Not relevant	12 hours	6 hours
Atmospheric, severe	Not relevant	Not relevant	12 hours	6 hours
Interval for recoating with HEMPADUR and HEMPATHANE qualities				
Atmospheric, medium	36 hours	18 hours	8 hours	4 hours
Atmospheric, severe	45 hours	23 hours	10 hours	5 hours
Immersion*	54 hours	27 hours	12 hours	6 hours
MAXIMUM recoating interval related to later conditions of exposure:				
Interval for recoating with 46410				
Atmospheric, medium	4 days	45 hours	20 hours	10 hours
Atmospheric, severe	4 days	45 hours	20 hours	10 hours
Interval for recoating with 56360				
Atmospheric, medium	2½ days	34 hours	15 hours	7½ hours
Atmospheric, severe	2½ days	34 hours	15 hours	7½ hours
Interval for recoating with 58030				
Atmospheric, medium	Not relevant	Not relevant	6 days	3 days
Atmospheric, severe	Not relevant	Not relevant	3 days	1½ days
Interval for recoating with HEMPADUR qualities				
Atmospheric, medium	None	None	None	None
Atmospheric, severe	None	None	None	None
Immersion**	(90 days)	90 days	60 days	30 days
Interval for recoating with HEMPATHANE qualities				
Atmospheric. medium	90 days	45 days	20 days	10 days
Atmospheric, severe	30 days	15 days	6 days	3 days

* Not relevant for HEMPATHANE qualities.
** Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

Furthermore, please see page 3.

HEMPADUR 45182

CURING AGENT 98180

Description:

HEMPADUR 45182 is a two-component, low-temperature curing, modified polyamide adduct cured epoxy.

Recommended use:

For marine and protective use as a "tiecoat" (“tackcoat”) between epoxy and physically drying coatings. For marine use also as a “sealer” of old antifouling.

Service temperatures:

Maximum, dry exposure only: 80°C/176°F

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	Yellowish grey/25150
Finish:	Flat
Volume solids, %:	46 ± 1
Theoretical spreading rate:	4.6 m^2/litre - 100 micron 184 sq.ft./US gallon - 4 mils
Flash point:	23°C/73°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	6 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	485 g/litre - 4.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 45182:	Base 45187 : Curing agent 98180 4 : 1 by volume	
Application method:	Airless spray	Brush (touch up)
Thinner (max.vol.):	08450 (5%)	08450 (5%)
Pot life:	3 hours (20°C/68°F)	
Nozzle orifice:	.023"	
Nozzle pressure:	200 bar/2900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL’S TOOL CLEANER 99610	
Indicated film thickness, dry:	100 micron/4 mils *(see REMARKS overleaf)*	
Indicated film thickness, wet:	225 micron/9 mils	
Recoat interval, min:	6 hours (20°C/68°F)	
Recoat interval, max:	Antifoulings: 5 days (20°C/68°F) Other topcoats, for areas above water: according to separate painting specification.	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 45182

SURFACE PREPARATION:	**New steel:** Abrasive blasting to Sa 2½. For temporary protection if required use suitable shopprimer. Any damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For priming purposes, specified HEMPADUR paint. **Maintenance:** Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. When used as "tiecoat": remove all rust and other loose material by abrasive blasting or power tool cleaning. Feather edges to sound and intact areas. Dust off residues. Touch up to full film thickness with specified HEMPADUR paint (see REMARKS below). When used as "sealer" on old antifouling: a very careful high pressure freshwater cleaning -or jetting, if needed - to remove possible leached layer of antifouling and make sure that old layers of weak intercoat adhesion ("sandwich structure") really are removed.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures higher than -10°C/14°F. The temperature of the surface and that of the paint itself must also be above this limit. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. In confined spaces such as sea chest or stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPADUR systems according to specification. In case of an old antifouling system this must be well cleaned and in good condition.
SUBSEQUENT COAT:	Antifouling or other physically drying solvent-borne paints according to specification.
REMARKS:	
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 75-125 micron/3-5 mils. As "sealer" typically to be specified in 50 -75 micron/2-3 mils dry film thickness. Thinning may be required to facilitate proper film formation.
Film thicknesses, subsequent coats:	HEMPADUR 45182 is designed for recoating with antifoulings in any normal specified total film thicknesses. HEMPADUR 45182 is not designed for recoating with heavy duty epoxy systems. Later maintenance of paint systems with HEMPADUR 45182 as a part of the system is accordingly most conveniently carried out by touch-up with a "mastic" type epoxy and with a proper overlap of intact surrounding paint system.
Recoating:	A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing. **Any degraded surface layer, as a result of a long exposure period, must be removed as well**. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. To check whether the quality of the surface cleaning is adequate, a test patch may be relevant. A thin extra coat of HEMPADUR 45182 may advantageously be applied if there is any doubt about suitability of cleaning process.
Note:	**HEMPADUR 45182 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 4518225150CR002

HEMPADUR HI-BUILD 45200

BASE 45209 with CURING AGENT 95040

Description:

HEMPADUR HI-BUILD 45200 is a two-component, high build epoxy paint. It forms a hard and tough coating resistant to seawater, mineral oils and splashes from petrol and related products.

Recommended use:

As an intermediate or finishing coat designed for on-line application of containers.

Service temperatures:

	Dry exposure only:
Maximum:	140°C/284°F

See REMARKS overleaf.

Certificates/Approvals:

Complies with Section 175.300 of U.S. Federal Regulations in respect of carriage of dry foodstuffs.
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/12170*
Finish:	Semi-flat
Volume solids, %:	58 ± 1
Theoretical spreading rate:	7.3 m^2/litre - 80 micron 291 sq.ft./US gallon - 3.2 mils
Flash point:	26°C/79°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Surface dry:	2 (approx.) hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	5-7 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	390 g/litre - 3.3 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 45200:	Base 45209 : Curing agent 95040 3 : 1 by volume	
Application method:	Airless spray	Brush *(touch up)*
Thinner (max. vol.):	08450 (10%)	08450 (10%)
	For on-line container production thinning according to specification	
Pot life:	5 hours (20°C/68°F) *(airless)* 8 hours (20°C/68°F) *(brush)*	
Nozzle orifice:	.018"-.021"	
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	80 micron/3.2 mils *(see REMARKS overleaf)*	
Indicated film thickness, wet:	150 micron/6 mils	
Recoat interval, min:	See REMARKS overleaf	
Recoat interval, max:	See REMARKS overleaf	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR HI-BUILD 45200

SURFACE PREPARATION:
New steel: Abrasive blasting to Sa 2½. For temporary protection, if required, use suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPADUR HI-BUILD 45200 or other specified HEMPADUR paint.
Maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and other loose material by abrasive blasting or power tool cleaning. Feather edges to sound and intact areas. Dust off residues. Touch up to full film thickness.

APPLICATION CONDITIONS:
Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Use only when application and curing can proceed at temperatures above 10°C/50°F, preferably above 15°C/59°F. The temperature of the surface must also be above this limit. The temperature of the paint itself should be 15°C/60°F or above to secure proper application properties. In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:
None, HEMPADUR PRIMER 15300, HEMPADUR ZINC 15360 or according to specification.

SUBSEQUENT COAT:
None, HEMPATHANE qualities or according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	425	445	550	500

VOC:
For VOC of other shades, please refer to Safety Data Sheet.

Colours:
Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere.
Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.
To obtain full opacity, an extra coat may be necessary, especially for certain lead-free colours in eg red, orange, yellow and green.

Weathering/ service temperatures:
The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses:
May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 60-90 micron/2.4-3.6 mils for use on containers. For other uses (contact Hempel) normal range is 100-125 micron/4-5 mils which is achieved by none or limited diluting at application.

Recoating interval:
According to relevant container painting specification.

Note:
HEMPADUR HI-BUILD 45200 is for professional use only.

ISSUED BY:
HEMPEL A/S - 45200121700O0014

HEMPADUR MULTI-STRENGTH 45540

BASE 45549 with CURING AGENT 97531

Description:
HEMPADUR MULTI-STRENGTH 45540 is an amine-adduct cured epoxy coating. It is a hard, impact and abrasion resistant coating eg for splash zones.

Recommended use:
As a self-primed, high build coating primarily for maintenance of eg splash zones, jetty pilings and bridge under decks.

Service temperatures:	Dry exposure only:	In water (no temperature gradient):
Maximum:	140°C/284°F	80°C/176°F *(See REMARKS overleaf)*

Certificates/Approvals:
Conforms with NORSOK M-501, rev. 4, system no. 7 below splash zone.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Black/19990
Finish:	Glossy
Volume solids, %:	84 ± 1
Theoretical spreading rate:	2.4 m^2/litre - 350 microns 96 sq.ft./US gallon - 14 mils
Flash point:	26°C/79°F
Specific gravity:	1.7 kg/litre 14.2 lbs/US gallon
Surface dry:	4 (approx.) hours at 20°C/68°F
Dry to touch:	6 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	180 g/litre - 1.5 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 45540:	Base 45549 : Curing agent 97531 4 : 1 by volume
Application method:	Airless spray
Thinner (max.vol.):	08450 (5%)
Pot life:	1 hour at 20°C/68°F
Nozzle orifice:	.021"-.023"
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	350 micron/14 mils
Indicated film thickness, wet:	425 micron/17 mils
Recoat interval, min:	16 hours (20°C/68°F)
Recoat interval, max:	5 days (20°C/68°F) *(See REMARKS overleaf)*

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR MULTI-STRENGTH 45540

SURFACE PREPARATION:	**New steel (dry conditions):** Abrasive blasting to Sa 2½, (ISO 8501-1:2007) with a surface profile equivalent to Rugotest No. 3 BN 10, Keane-Tator Comparator 3.0 G/S or ISO Comparator, rough Medium (G). Remove any oil, grease and other contaminants by detergent and salts by high fresh water hosing prior to abrasive blasting. **Maintenance:** Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by wet or dry abrasive blasting or for minor areas power tool cleaning. Feather edges to sound and intact areas. After wet abrasive blasting hose down the surface by hot water rinsing ("steam cleaning"). Touch up bare spots to full film thickness when the surface has become visually dry.
APPLICATION CONDITIONS:	HEMPADUR MULTI-STRENGTH 45540 may be applied and will cure at temperatures down to 5°C/41°F. The temperature of the paint itself should be above 15°C/59°F. The best result is obtained at 20-30°C/68-86°F. In confined spaces provide adequate ventilation.
PRECEDING COAT:	None.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	
Weathering/ service temperatures:	The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.
Colour:	Being an epoxy paint this product is not colour stable, therefore light shades will have a strong tendency to yellow when exposed to sunshine and darken when exposed to heat.
Service temperatures:	Maximum peak temperature in water is 90°C/194°F.
Recoating:	If the maximum recoat interval is exceeded, roughening of the surface is necessary to ensure adhesion.
Note:	**HEMPADUR MULTI-STRENGTH 45540 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 4554019990CR005

HEMPADUR QUATTRO ALU 45604

BASE 45606 with CURING AGENT 97334

Description:

HEMPADUR QUATTRO ALU 45604 is a two-component aluminium pigmented universal epoxy paint, which cures to a hard and tough coating with superior anticorrosive properties and good resistance to abrasion, seawater and various oils.

Recommended use:

As a universal epoxy and self-primed high performance coating system for atmospheric or in-water service, including water ballast tanks to be coated according to IMO-PSPC requirements (Resolution MSC.215(82)). HEMPADUR QUATTRO ALU 45604 is intended for all year application down to -10°C/ 15°F and for in-shop applications where fast recoating and handling is required.

Features:

Superior anticorrosive and very good mechanical properties
Short drying time
Curing down to -10°C/14°F

Service temperatures:

Dry exposure only:	Maximum 120°C/248°F
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	40°C/104°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

PSPC type approved. (Consult Hempel for specific Type Approval Certificates)
Certificates issued under former product name HEMPADUR PRO 45604
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.
HEMPADUR QUATTRO ALU 45604 replaces HEMPADUR PRO 45601/3

PHYSICAL CONSTANTS:

Colours/Shade nos:	Reddish alu/19530*
Finish:	Semi-flat
Volume solids, %:	70 ± 1
Theoretical spreading rate:	5.6 m^2/litre - 125 micron 225 sq.ft./S gallon - 5 mils
Flash point:	27°C/81°F
Specific gravity:	1.3 kg/litre – 11 lbs/US gallon
Dry to touch:	4 hours at 20°C/68°F 9 hours *(app.)* at 5°C/41°F
Fully cured:	7 days at 20°C/68°F 20 days at 5°C/41°F
VOC:	300 g/litre - 2.5 lbs/US gallon *other shades according to assortment list. *(See REMARKS overleaf)*

The physical constants stated are nominal data according to the HEMPELGroup's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1..

APPLICATION DETAILS:

Mixing ratio:	Base 45606 : Curing agent 97334 4 : 1 parts by volume	
Application method:	Airless spray	Brush
Thinner (max.vol.):	08450 (5%)	08450 (5%)
Pot life:	Airless spray: 2 hour (20°C/68°F) Brush 2 hours (20°C/68°F)	
Induction time:	See REMARKS overleaf	
Nozzle orifice:	.021"-.025"	
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	125 micron/5 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	approx 175 micron/7 mils	
Recoat interval, min:	4 hours (20°C/68°F) 12 hours (5°C/41°F)	
Recoat interval, max:	See separate APPLICATION INSTRUCTIONS	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR QUATTRO ALU 45604

SURFACE PREPARATION:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to Sa 2½. For temporary protection, if required, use a suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch up, use HEMPADUR QUATTRO ALU 45604.
Ballast tanks: For PSPC type approved coating, consult separate APPLICATION INSTRUCTIONS - BALLAST TANKS for HEMPADUR QUATTRO ALU 45604.
Repair and maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR QUATTRO ALU 45604. As an alternative to dry cleaning, water jetting to sound, well adhering coat and/or to steel. Intact coat must appear with roughened surface after the water jetting. By water jetting to steel, cleanliness shall be Wa 2 - WA 2½ (atmospheric exposure) / minimum Wa 2½ (immersion) (ISO 8501-4:2006). A flash-rust degree of maximum M (atmospheric exposure), preferably L (immersion) (ISO 8501-4:2006) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. Touch up to full film thickness.
On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.
Other substrates: Contact Hempel.

APPLICATION

Use only where application and curing can proceed at temperatures above -10°C/14°F. The temperature of the paint itself should be above 15°C/59°F for proper application. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT:

According to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase II, 2010
VOC in g/l	300	326	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Shades:

Other shades are available according to assortment list. Shade 19530 contains approx. 9.5% aluminium on weight in the dry film.

Weathering/ service temperatures:

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product. HEMPADUR QUATTRO ALU 45604 has a tendency to yellow after application. This has no influence on the performance nor does the yellowing effect any topcoat applied.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry film thickness (dft) is 100-200 micron/4-8 mils. For Ballast tanks at newbuilding stage the minimum specified dft is 2 x 160 micron. Please consult separate APPLICATION INSTRUCTIONS - BALLAST TANKS for HEMPADUR QUATTRO ALU 45604.

Curing agent:

Curing agent 97334 is hazy. This is intended and has no influence on the performance.

Mixing/ Induction time:

In order to facilitate proper application properties it is recommended to allow the thoroughly mixed BASE and CURING AGENT to pre-react before application at temperatures below 15°C/59°F

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

In case two-component spray-equipment is used consult separate APPLICATION INSTRUCTIONS.

Note:

HEMPADUR QUATTRO ALU 45604 is for professional use only.

ISSUED BY:

HEMPEL A/S - 4560419530CR001

For product description refer to product data sheet

HEMPADUR QUATTRO ALU 45604

BASE 45606 with CURING AGENT 97334

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR QUATTRO ALU 45604.

Ballast tanks:

See separate instructions for Ballast Tanks Applications.

Abrasive blasting/ abrasive sweep blasting:

Before blasting any deposits of grease or oil must be removed from the steel surface with a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

Repair:
Before blasting, old steel surfaces must be checked for any contamination. Possible blisters must be broken. If thick rust scale has been removed or deep pittings have been encountered, control procedures for contamination must be carried out. If still contaminated, the abrasive blast cleaned steel surface will need a repeated cleaning for salts and/or oil/grease followed by final abrasive blast cleaning.

Newbuilding/new steelwork: To obtain full performance of the ballast tank coating, welds, burns, damaged and rusty shopprimer must be abrasive blast cleaned to Sa 2½. Minor areas mechanically cleaned to St 3.

If welds have previously been coated with a (shop)primer just after welding this (shop)primer must be removed by abrasive blasting (sweeping) in order to obtain optimum performance.

Intact shopprimer:
Zinc salted surfaces, deposits of black iron oxides of plasma cutting and similar foreign matters to be removed by light abrasive sweep blasting. Chalk markings and plate marking of a non-compatible nature to be removed as well.

The shopprimer must have been checked randomly for excessive film thicknesses and areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be sweep blasted in order to remove most of the shopprimer.

Spot-checking for possible salt contamination of the surface to be executed before and after abrasive sweep blasting.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

In the case of abrasive blast cleaning, the surface profile must be equivalent to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S. According to ISO 8503-1 the grade will be MEDIUM (G).

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given greater and greater overlaps - old layers being roughened corresponding to these overlaps (when sand papering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible - or left with a **thin** zinc epoxy primer coat applied on these areas after secondary surface preparation at blockstage.

Secondary surface preparation of block assembly zones are preferably to be abrasive spot-blasted. However, mechanical cleaning to St 3 may be acceptable if zones are narrow and an extra coat of HEMPADUR QUATTRO ALU 45604 is applied to these areas. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Repair:
Corroded pits deeper than approx 2 mm, but not repaired by welding, are recommended to be filled with HEMPADUR EPOXY FILLER 35250 after blast priming has been carried out.

Stainless Steel: (Ballast tanks of chemical carriers) to be abrasive blast cleaned to a uniform, sharp, **dense**, profile (Rugotest No. 3, BN9-10, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. to be removed before abrasive blasting is commenced.

Water jetting:

This procedure will primarily be relevant for repair jobs. However, the very good removal of water-soluble salts may also make it useful in other cases.

The resulting standard is to be equal to the Wa 2½ (ISO 8501-4:2006).

Sufficient dehumidification equipment must be used to dry out the tanks as quickly as possible between the water jetting and the coating application.

Local ventilators may be required to distribute the drying air evenly in tanks. All "slurry" is to be removed before it dries. New rust will be acceptable as discoloration only, **not** as powdery, loose rust. Acceptable degree of flash rust is maximum M (ISO 8501-4:2006). Inhibitors are **not** to be used.

All surfaces must be free from contamination at the time of painting and the relative humidity is to be below 85%.

Refurbishment:

It is recommended to carry out rough abrasive blast cleaning - or water jetting - to facilitate visual inspection and any necessary repair of the existing steel work. In the case of pit-corroded tank bottoms this rough blasting will also provide a better basis for a decision between welding of corroded pits or repair by filling.

A main concern is the contamination from sea water (water-soluble, corrosive salts). The preventive method will be to include very thorough cleaning with plenty of fresh water, please see below.
The maximum allowable concentration of chlorides on steel surfaces immediately before application is 7.0 microgrammes/cm² as detected by the "Bresle Method".

In the case of contamination, cleaning procedures must be repeated and/or improved. Especially pit-corroded steel will need special attention and the only possible way to remove contamination from the pits may often be to carry out very thorough cleaning with fresh water after abrasive blast cleaning. After repeated control and drying, the entire surface will need abrasive blast cleaning to obtain the specified degree of cleaning. Alternatively, the pit-corroded areas are cleaned by water jetting, any surplus of water is mopped up or removed by vacuum cleaning. Allow to dry.

Note: Actual type of steel work and surface preparation is dependent on factors such a shipyard technology, contractual specification, required lifetime, etc. Reference is also made to HEMPEL's Technical Standard for Ballast Tank Coating Work.

HEMPADUR QUATTRO ALU 45604

Application equipment:

HEMPADUR QUATTRO ALU 45604, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter max. 30 metres/100 feet, 3/8" internal diameter max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh
Nozzle size:	.021"-.025"
Fan angle:	60-80°.

To spray complicated surfaces smallest nozzles should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning.

Airless spray data are indicative and subject to adjustment.

Application:

Film-build/continuity: With this coating it is of special importance that a continuous, pinhole-free paint film is obtained at application of each spray applied coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. The consumption of paint must be controlled to avoid exaggerated film thickness, e.g. by controlling paint consumption and/or measuring wet film thickness.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating: may either be applied by airless spray, (relatively small, narrow-angled nozzles) or by hand-tools. Apply the stripe coat as a uniform, regular film without excessive brush or roller marks in order to avoid cratering by entrapped air.

Application on zinc silicate:

A proper mist-coat technique is necessary in order to avoid/reduce the risk of popping"/"pinholes". Add up to 50% thinner depending on the actual conditions of application.

HEMPADUR QUATTRO ALU 45604

Pot life/mixing/ induction time:

When measured under standard conditions the pot life for spraying is 3 hours at 15°C/59°F and 2 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 86 parts by weight of base and 14 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life (spray application)	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At **steel** temperatures below 5°C/41°F the paint may advantageously be pre-reacted e.g. 10-20 minutes (depending on paint temperature) before spray application (longer pre-reaction time at lower temperatures).

When two-component spray equipment is used, heating may be relevant to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Physical data versus temperature:

(HEMPADUR QUATTRO ALU 45604 in a dry film thickness of 125-150 micron/5-6 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time	35 hours	14 hours	7 hours	4 hours	3 hours	2 hours
Curing time	56 days	28 days	14 days	7 days	3½ days	40 hours
Initial curing*	40 days	20 days	10 days	5 days	2½ days	30 hours

* When the state "initial curing" has been reached, the coating may exceptionally be exposed to ballast water provided it has been applied within the specified limits of film thicknesses and that all painted areas have been subject to thorough ventilation.

Recoating:

Recoating intervals (provided proper ventilation)

HEMPADUR QUATTRO ALU 45604 in a dry film thickness of 125 micron/5 mils:

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°	20°C/68°F	30°C/86°F	40°C/104°F
MINIMUM recoating interval related to later conditions of exposure: **Interval for recoating with HEMPADUR**						
Atmospheric, medium	18 hours	9 hours	4 hours	2 hours	1,5 hours	1 hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours	3 hours	2 hours
Immersion	36 hours	18 hours	8 hours	4 hours	3 hours	2 hours
Interval for recoating with HEMPATHANE, HEMPAXANE and HEMPATEX qualities						
Atmospheric, medium	18 hours	9 hours	4 hours	2 hours	1,5 hours	1 hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours	3 hours	2 hours
Interval for recoating with HEMUCRUL qualities						
Atmospheric, medium	N.R.	N.R.	8 hours	4 hours	3 hours	2 hours
Atmospheric, severe	N.R.	N.R.	8 hours	4 hours	3 hours	2 hours
MAXIMUM recoating interval related to later conditions of exposure: **Interval for recoating with HEMPADUR qualities**						
Atmospheric, medium	None	None	None	None	None	None
Atmospheric, severe	90 days	90 days	60 days	30 days	22,5 days	15 days
Immersion*	90 days	90 days	60 days	30 days	22,5 days	15 days
Interval for recoating with HEMPATHANE and, HEMPAXANE qualities						
Atmospheric, medium	90 days	90 days	40 days	20 days	15 days	10 days
Atmospheric, severe	54 days	27 days	12 days	6 days	4,5 days	72 hours
Interval for recoating with HEMPATEX qualities						
Atmospheric, medium	68 hours	34 hours	15 hours	8 hours	6 hours	4 hours
Atmospheric, severe	68 hours	34 hours	15 hours	8 hours	6 hours	4 hours
Interval for recoating with HEMUCRYL qualities						
Atmospheric, medium	N.R.	N.R.	6 days	3 days	54 hours	36 hours
Atmospheric, severe	N.R.	N.R.	3 days	1½ days	27 hours	18 hours

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact Hempel for further advice.

Maximum recoating intervals:
If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR QUATTRO ALU 45604 within the following directions for recoating:

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with e.g. suitable detergent followed by high pressure fresh water cleaning. Salts are to be removed by fresh water hosing.

- **Any degraded surface layer, as a result of a long exposure period, must be removed as well**. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant

HEMPADUR QUATTRO ALU 45604

Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
ISSUED BY:	HEMPEL A/S - 4560419530CR001

Product Data

HEMPADUR MULTI-STRENGTH 45751/ HEMPADUR MULTI-STRENGTH 45753

Medium to high temperatures: 45751: BASE 45755 with CURING AGENT 97652
Low to medium temperatures: 45753: BASE 45755 with CURING AGENT 98750

Description:

HEMPADUR MULTI-STRENGTH 45751/45753 is a self-priming, two-component, high-build, epoxy-polyamide/amine paint which cures to an abrasion and corrosion resistant coating. Applicable by standard heavy duty airless spray equipment.

Recommended use:

As a heavy duty coating for areas exposed to abrasion and aggressive corrosive climate such as ramps, ship hulls and holds of bulk carriers.
As a ballast tank coating for special purposes such as chemical carriers carrying hot cargoes and other purposes where "pure epoxy coating" is requested.
As a finishing coat where a cosmetic appearance is of less importance.
HEMPADUR MULTI-STRENGTH 45751 is intended for use in warm climates.
HEMPADUR MULTI-STRENGTH 45753 is intended for use in cold climates - see APPLICATION CONDITIONS overleaf.

Service temperatures:

Dry exposure only:	Maximum 140°C/284°F *(See REMARKS overleaf)*
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	50°C/122°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain. Approved by Lloyd's Register of Shipping as a recognized corrosion control coating. Approved as a ballast tank coating by Germanischer Lloyd, Germany.
HEMPADUR MULTI-STRENGTH 45753 has been classified B1 by DNV, Norway.
Recognized by Lloyd's Register of Shipping as a low friction surface coating for ships navigating in first year ice conditions. Conforms with Norsok M-501, system no. 7.
HEMPADUR MULTI-STRENGTH 45753 has been tested by Teknologisk Institutt AS, Norway, and approved for internal use in pipe lines for water power generation according to NS 5417.
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Version; mixed product:	**45751**	**45753**
Colours/Shade nos:	Grey/12340 - Red/50630	Grey/12340 - Red/50630
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	79 ± 1	79 ± 1
Theoretical spreading rate:	4.0 m²/litre - 200 micron 158 sq.ft./US gallon - 8 mils	4.0 m²/litre - 200 micron 158 sq.ft./US gallon - 8 mils
Flash point:	27°C/81°F	27°C/81°F
Specific gravity:	1.6 kg/litre - 13.4 lbs/US gallon	1.6 kg/litre - 13.4 lbs/US gallon
Dry to touch:	7-8 hours at 20°C/68°F	8-10 hours at 10°C/50°F
Fully cured:	7 days at 20°C/68°F	14 days at 10°C/50°F
V.O.C.:	260 g/litre - 2.2 lbs/US gallon	245 g/litre - 2.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio:	**45751** Base 45755 : Curing agent 97652 3 : 1 by volume	**45753** Base 45755 : Curing agent 98750 3 : 1 by volume
Application method:	Airless spray	
Thinner (max.vol.):	08450 (5%)(See PRECEDING COAT overleaf and separate APPLICATION INSTRUCTIONS)	
Pot life:	1 hour (20°C/68°F)	1 hour (20°C/68°F)
Nozzle orifice:	.021"-.023"	.021"-.023"
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*	250 bar/3600 psi
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	200 micron/8 mils	200 micron/8 mils
Indicated film thickness, wet:	250 micron/10 mils	250 micron/10 mils
Recoat interval, min:	6 hours (20°C/68°F)	12 hours (10°C/50°F)
Recoat interval, max:	See REMARKS overleaf	See REMARKS overleaf

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR MULTI-STRENGTH 45751/45753

SURFACE PREPARATION:

New steel:
"Heavy duty use": Abrasive blasting to min. Sa 2½ with a surface profile corresponding to Rugotest No. 3, min. BN10, Keane-Tator Comparator 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasive and dust.
Ballast tanks: For PSPC type approved coating, consult separate APPLICATION INSTRUCTIONS - BALLAST TANKS for HEMPADUR MULTI-STRENGTH 45753.
Stainless steel: (Ballast tanks in chemical carriers) to be abrasive blasted to a uniform, sharp, dense profile, ISO Comparator Medium (G), corresponding to Rz minimum 50 micron. Any salts, grease, oil, etc. to be removed before abrasive blasting is commenced.
Repair and maintenance: The actual purpose and conditions may make other types and degrees of surface preparation than the above described relevant. Reference is made to separate application instructions.

APPLICATION CONDITIONS:

Use only where application and curing can proceed at temperatures above -10°C/14°F for HEMPADUR MULTI-STRENGTH 45753 and above 10°C/50°F for HEMPADUR MULTI-STRENGTH 45751. The temperature of the paint itself should be above 15°C/59°F, preferably above 20°C/68°F for HEMPADUR MULTI-STRENGTH 45751, for proper application. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Relative humidity max. 90%. In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:

None, but HEMPADUR 15590 can be used as a "blast primer" for HEMPADUR MULTI-STRENGTH 45751. HEMPADUR MULTI-STRENGTH 45753 can be used as a "blast primer" for HEMPADUR MULTI-STRENGTH 45753 when diluted 25-30% with HEMPEL'S THINNER 08450.

SUBSEQUENT COAT:

None, HEMPADUR or HEMPATHANE-paint as per specification, depending on area of use.

REMARKS:

VOC - EU directive 2004/42/EC:

45751				
	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	260	290	550	500
45753				
	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	245	275	550	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Colour of curing agent:

The curing agent 98750 has a tendency to become darker at storage. This has no influence on performance, but may influence the shade of the mixed product.

Some **certificates** have been issued under the former quality numbers 45750 or 4575. HEMPADUR MULTI-STRENGTH 45751 is identical with the former 45750 except that mixing ratio and thixotropy properties have been adjusted to specific demands of application, for instance dual feed two component spray equipment and supply in 1000 litres paint containers.

Weathering/ service temperatures:

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 150-250 micron/6-10 mils. It is recommended to use heavy airless spray equipment with a pump transmission rate of 60:1 (approximately), and a theoretical output of min. 12 litres per minute.

Curing agent:

Curing agents 97652 and 98750 are hazy. This is intended and has no negative influence on the performance.

HEMPADUR MULTI-STRENGTH 45751/45753

Recoating: Recoating intervals related to later conditions of exposure:
(200 micron/8 mils dry film thickness of HEMPADUR MULTI-STRENGTH 45751/45753)

	Curing agent 97652						Curing agent 98750					
	Minimum			Maximum			Minimum			Maximum		
Surface temp.	20°C/68°F						10°C/50°F					
Recoated with	Atmospheric		Immer-sion *	Atmospheric		Immer-sion *	Atmospheric		Immer-sion *	Atmospheric		Immer-sion *
	Medium	Severe		Medium	Severe		Medium	Severe		Medium	Severe	
HEMPADUR	4 hours	5 hours	6 hours	None	None	30 days	8 hours	10 hours	12 hours	None	None	60 days
HEMPATHANE Topcoat	4 hours	5 hours	N/R	10 days	3 days	N/R	8 hours	10 hours	N/R	20 days	6 days	N/R

* and heavy wear - eg bulk cargo holds and fender areas. If such areas are to be topcoated with HEMPATHANE, same max as for atmospheric/severe apply. The long maximum recoating interval for HEMPADUR will be reduced if the coating is more than just scarcely exposed to direct sunshine before recoating. If the interval is exceeded, roughening of surface is necessary to ensure intercoat adhesion.

Thinning: Normally not to be diluted.

Note: **HEMPADUR MULTI-STRENGTH 45751/45753 is for professional use only.**

ISSUED BY: HEMPEL A/S - 4575112340C0007/4575312340C0005

For product description refer to product data sheet

HEMPADUR MULTI-STRENGTH 45751/ HEMPADUR MULTI-STRENGTH 45753

Medium to high temperatures: 45751: BASE 45755 with CURING AGENT 97652
Low to medium temperatures: 45753: BASE 45755 with CURING AGENT 98750

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR MULTI-STRENGTH 45751/45753.

Surface preparation:

The specific type and degree of surface preparation depends on type and condition of the actual substrate and on desired performance. The better the surface preparation the better the performance, but it will not always be economic feasible to go for the highest degree within a given type of surface preparation.

For use as a heavy duty coating:
Bulk cargo holds, fender areas, hulls of ice-going vessels, ramps, splash zones etc.:
New steel:
Abrasive blasting to min. Sa 2½ with a surface profile corresponding to Rugotest No. 3, min. BN10, Keane-Tator Comparator 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasive and dust. HEMPADUR 15590 may be used as a blast primer/hold-coat (min. temperature 10°C/50°F) or alternatively HEMPADUR MULTI-STRENGTH 45751 or HEMPADUR MULTI-STRENGTH 45753 (for temperatures below 10°C/50°F) diluted 15-25% with HEMPEL'S THINNER 08450.
Old steel:
For old steel with widespread surface corrosion, often in the state of large areas of fine, dense pit-corrosion - like Grade D, ISO 8501-1:2007 - an overall degree of cleaning corresponding to Sa 2 can be the economical optimum treatment of surfaces exposed to combined mechanical abrasion/impact and atmospheric corrosion in marine environments. May advantageously be combined with a thorough fresh water hosing - or replaced by a water jetting - (degree Wa 2½ according to ISO 8501-4:2006) as long as the formation of flash rust is low, (maximum degree M as per ISO 8501-4:2006).

The fresh water cleaning will assist in removal of salt residues, yet total removal of salts embedded in the pittings will in practise, on large areas, be extremely difficult irrespective of method of cleaning.

In cases where elimination of risk of osmotic blistering is important, for instance frequently/permanently immersed surfaces or fresh water exposure a combined dry abrasive blasting, to remove "black scale" and water jetting (minimum Wa 2½) may be relevant (possible formation of flash rust to be maximum, L).

After water jetting as surface preparation it is recommended to apply a diluted HEMPADUR MULTI-STRENGTH 45751/45753 (15-25% THINNER 08450) as an (extra) first coat. Surfaces to be dry at application.

Concrete: The concrete must be of good quality and fully cured, eg 28 days for normal Portland cement, and completely dry with a humidity content in the surface below 4%. The concrete must also be controlled for absence of capillary water action or for subsoil water.

Minimum pull-off value should normally be 20 kilopond/cm^2 measured after surface preparation. Any cracks, crevices and voids must be repaired (see below).

All possible slip agent, oil, grease and other contaminants must be removed by eg abrasive blasting, volatilising by flame cleaning or treatment with suitable detergent. The last mentioned in the following way: Saturation of the surface with fresh water. Washing with suitable detergent followed by fresh water hosing.

Depending on construction and purpose, abrasive blast, high pressure water jet or treat the concrete with power tools to obtain a rough and firm surface free of scum layer and other contamination and possible old paint/lining. Remove dust and loose material.

If mechanical treatment is impossible, the surface of new concrete may be treated with acid etching. For this purpose an approx. 5% w/w nitric or phosphoric acid solution is recommended.

Note: Strong acids, take necessary precautions, make sure that safety regulations are obeyed!

Prior to etching the concrete should be saturated with fresh water to prevent acid corrosion of the reinforcement bars. Leave the acid to act for 3-4 minutes and hose down the surface with fresh water - preferably first a 5% w/w sodium hydroxide solution - and scrub carefully. After that the surface must dry homogeneously and appear as an even, rough surface free of a loose outer layer. The surface must have a pH reaction of between 6.5-8.0. If any of these conditions are not fulfilled, the process must be repeated. The surface must be dried with good ventilation for at least 2 days at 65% relative humidity and 20°C/68°F. The pre-treatment is controlled by scraping with a strong knife. The surface must feel solid and hard, and the knife must only leave a clear scratch mark.

Cracks, voids and crevices must be opened and made good down to firm and hard material. After sealing - as described below - fill these openings with a suitable epoxy mortar.

Seal the surface with HEMPADUR SEALER 05990 in such a way that the surface is just saturated. Surplus must be removed (do also see the Product Data sheet for HEMPADUR SEALER 05990).

For use as a ballast tank coating:

Ballast tanks, steel work:

For optimum performance the following is recommended:
All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in welding seams, undercuts, etc. should be avoided. If found, they may necessitate extra stripe coating or filling (however, the classification societies' recommendations are to be followed).

All sharp edges to be broken or rounded depending on the actual conditions and the design lifetime. Laminations to be removed. However, rolled profiles, etc. from the steel mills normally have acceptably rounded edges.

All loose weld spatters to be removed.

Well adhering, scattered weld spatters are acceptable, but will need additional touch-up. If dense, they must be removed by grinding.

Further reference is made to ISO 8501-3 – minimum recommended preparation grade is P2

Ballast tanks, surface preparation:

Before blasting any deposits of grease or oil must be removed from the steel surface with a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

Newbuilding/new steelwork: To obtain full performance of the ballast tank coating, welds, burns, damaged and rusty shopprimer must be abrasive blast cleaned to Sa 2½. Minor areas mechanically cleaned to St 3.

If welds have previously been coated with a (shop)primer just after welding this (shop)primer must be removed by abrasive blasting (sweeping) in order to obtain optimum performance.

Intact shopprimer:
Zinc salted surfaces, deposits of black iron oxides of plasma cutting and similar foreign matters to be removed by light abrasive sweep blasting. Chalk markings and plate marking of a non-compatible nature to be removed as well.

The shopprimer must have been checked randomly for excessive film thickness and areas detected to have a film thickness above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be sweep blasted in order to remove most of the shopprimer.

Spot-checking for possible salt contamination of the surface to be executed before and after abrasive sweep blasting.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

The surface profile to be equivalent to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S. According to ISO 8503-1 the grade will be MEDIUM (G).

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given greater and greater overlaps - old layers being roughened corresponding to these overlaps (when sandpapering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible - or left with a **thin** zinc epoxy primer coat applied on these areas after secondary surface preparation at blockstage.

Secondary surface preparation of block assembly zones are preferably to be abrasive spot-blasted. However, mechanical cleaning to St 3 may be acceptable if zones are narrow and an extra coat of HEMPADUR MULTI-STRENGTH 45751/45753 diluted approx. 10-15% is applied to these areas as the first coat. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Stainless Steel: (Ballast tanks of chemical carriers) to be abrasive blast cleaned to a uniform, sharp, **dense**, profile (Rugotest No. 3, BN9, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. to be removed before abrasive blasting is commenced.

Refurbishment:

It is recommended to carry out rough abrasive blast cleaning - or water jetting - to facilitate visual inspection and any necessary repair of the existing steel work. In the case of pit-corroded tank bottoms this rough blasting will also provide a better basis for a decision between welding of corroded pits or repair by filling.

Corroded pits deeper than approx. 2 mm, but not repaired by welding, are recommended to be filled with HEMPADUR EPOXY FILLER 35250 after blast priming has been carried out.

At refurbishment, a main concern is the contamination from sea water (water-soluble, corrosive salts). The preventive method will be to include very thorough cleaning with plenty of fresh water, please see below.

The maximum allowable concentration of chlorides on steel surfaces immediately before application is 7.0 microgrammes/cm² as detected by the "Bresle Method".

In the case of contamination, cleaning procedures must be repeated and/or improved. Especially pit-corroded steel will need special attention and the only possible way to remove contamination from the pits may often be to carry out very thorough cleaning with fresh water after abrasive blast cleaning. After repeated control and drying, the entire surface will need abrasive blast cleaning to obtain the specified degree of cleaning. Alternatively, the pit-corroded areas are cleaned by water jetting, any surplus of water is mopped up or removed by vacuum cleaning, allow drying.

Note: Actual type of steel work and surface preparation is dependent on factors such a shipyard technology, contractual specification, required lifetime, etc. Reference is also made to HEMPEL's Technical Standard for Ballast Tank Coating Work.

Application equipment:

HEMPADUR MULTI-STRENGTH 45751/45753, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter
	max. 30 metres/100 feet, 3/8" internal diameter
	max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh

Regular surfaces:	Ballast tanks	Exterior hull and similar large regular areas
Nozzle size:	.021"-.023"	.023"-.027"
Fan angle:	60-80°	60°-80°

Complicated surfaces:

Nozzle size:	.019"
Fan angle:	40°.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing spray hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning. Airless spray data are indicative and subject to adjustment.

Application:

Film-build/continuity: It is especially important that a continuous, pinhole-free paint film is obtained at application of each spray applied coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.
The paint layer must be applied homogeneously and as close to the specification as possible. Avoid exaggerated film thickness.
Saggings/"pools" of paint in corners are to be remedied to avoid later cracking and as a general rule highest acceptable dry film thickness will be 3 times the specified film thickness or 1000 micron.
The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating: may either be applied by airless spray, (relatively small, narrow-angled nozzles) or by hand-tools. Apply the stripe coat as a uniform, regular film without excessive brush or roller marks in order to avoid cratering by entrapped air.

HEMPADUR MULTI-STRENGTH 45751/45753

Pot life/mixing/ induction time: (both curing agents):

When measured under standard conditions the pot life is 2 hours at 15°C/59°F and 1 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent. The weight ratio for HEMPADUR MULTI-STRENGTH 45751/45753 is 135 parts by weight of base and 25 parts by weight of curing agent or by volume: 3.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	2 hours	1 hour	½ hour	(1/4 hour)

1) At 15°C/59°F and below, the viscosity will be too high for airless spray application.
2) Temperatures above 30°C/86°F should be avoided.

Induction time:
At **Steel** temperatures below 5°C/41°F the paint may advantageously be prereacted 10 minutes before spray application (longer prereaction time at lower steel temperatures).

When two-component spray equipment is used, heating may be relevant to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Physical data versus temperature:

(HEMPADUR MULTI-STRENGTH 45751 in a dry film thickness of 200 micron/8 mils):

Surface temperature	10°C/50°F	20°C/68°F	30°C/86°F
Drying time	20 hours	8 hours	4 hours
Curing time*	18 days	7 days	3½ days
Initial curing*	13 days	5 days	2½ days

(HEMPADUR MULTI-STRENGTH 45753 in a dry film thickness of 200 micron/8 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F
Drying time	45 hours	23 hours	10 hours
Curing time*	63 days	32 days	14 days
Initial curing*	45 days	23 days	10 days

* Filling of ballast tanks/exposure to water: ask for special instructions.

Ventilation:

Correct film formation depends on adequate ventilation during drying.

The total volume of solvent vapour released until the coating is completely dry is 66 litres for one litre of undiluted HEMPADUR MULTI-STRENGTH 45751/45753.

The lower explosive limit, LEL, is 1.0%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 66m³ per litre paint.

Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
ISSUED BY:	HEMPEL A/S - 4575112340C0007/45753123 40C0005

Product Data

HEMPADUR MASTIC 45880/ HEMPADUR MASTIC 45881

High temperatures: 45881: BASE 45889 with CURING AGENT 95881
Low to medium temperatures: 45880: BASE 45889 with CURING AGENT 95880

Description:

HEMPADUR MASTIC 45880/45881 is a two-component polyamide adduct cured, high solids, high build epoxy paint. It forms a hard and tough coating, has good wetting properties and low temperature curing.

Recommended use:

As a selfprimed, surface tolerant paint system or as an intermediate or finishing coat in heavy duty paint systems where low VOC and high film build are required.
Multipurpose coating as per specification for maintenance including ballast tanks and underwater hull and new steel in those cases, where a need for few products outweighs more specialised coatings.
Can be specified where extended recoating properties for polyurethane topcoats are requested (typically travel coating). May be used directly on cured zinc silicate (GALVOSIL products) or spray-metallized surfaces to minimize popping.
As a topcoat where the usual outdoor cosmetic appearance of epoxy paints is acceptable.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F

Certificates/Approvals:

Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain. Complies with Section 175.300 of the Code of Federal Regulations in respect of carriage of dry foodstuffs (FDA) in spaces with an internal surface area larger than 1000 m²/10,750 sq.ft.
HEMPADUR MASTIC 45881 is in accordance with Aramco's specification APCS 1, APCS 12, APCS 26 and 26T.
Classified as class 1 material according to BS 476: Part 7: 1997 (fire testing).
HEMPADUR MASTIC 45880 is approved as a low flame spread material by Danish, French, Spanish, Singaporean, Malaysian and Indonesian authorities according to IMO resolution MSC 61 (67).
Has a French, Spanish, Danish, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.
Complies with EU Directive 2004/42/EC, subcategory j.
Please see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

	45880	**45881**
Version, mixed product:		
Colours/Shade nos:	Grey/12170*	Grey/12170*
Finish:	Semi–gloss	Semi–gloss
Volume solids, %:	80 ± 1	80 ± 1
Theoretical spreading rate:	4 m²/litre - 200 micron 160 sq.ft./US gallon - 8 mils	4 m²/litre - 200 micron 160 sq.ft./US gallon - 8 mils
Flash point:	39°C/102°F	39°C/102°F
Specific gravity:	1.5 kg/litre - 12.5 lbs/US gallon	1.5 kg/litre - 12.5 lbs/US gallon
Dry to touch:	4 *(approx)* hours at 20°C/68°F	3 *(approx)* hours at 30°C/86°F
Fully cured:	7 days at 20°C/68°F	5 days at 30°C/86°F
V.O.C.:	220 g/litre - 1.8 lbs/US gallon	220 g/litre - 1.8 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*
The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Version:	**45880**	**45881**
Mixing ratio:	Base 45889 : Curing agent 95880 3 : 1 by volume	Base 45889 : Curing agent 95881 3 : 1 by volume
Application method:	Airless spray Brush *(touch up)*	Airless spray Brush *(touch up)*
Thinner (max. vol.):	Depending on purpose usually less than 5%	THINNER 08450 *(See REMARKS overleaf)*
Pot life:	1 hour (20°C/68°F) *(Airless spray)* 2 hours (20°C/68°F) *(Brush)*	1½ hour (30°C/86°F) *(Airless spray)* 2 hours (30°C/86°F) *(Brush)*
Nozzle orifice:	.017"-.023" *(See separate APPLICATION INSTRUCTIONS)*	
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610 or HEMPEL'S THINNER 08450	
Indicated film thickness, dry:	200 micron/8 mils *(see REMARKS overleaf)*	
Indicated film thickness, wet:	275 micron/11 mils	
Recoat interval, min/max:	According to separate APPLICATION INSTRUCTIONS	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas

HEMPADUR MASTIC 45880/45881

SURFACE PREPARATION:

New steel: When used as an intermediate or finishing coat please refer to the data sheet for the preceding GALVOSIL or HEMPADUR primer. When used as a primer please refer to the specification.

Zinc silicate painted or spray-metallized surfaces: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Zinc salts (white rust) must be removed by high pressure hosing combined with rubbing with a stiff nylon brush if necessary. It is recommended to recoat spray-metallized surfaces as soon as possible to avoid possible contamination.

Concrete: Remove slip agent and other possible contaminants by emulsion washing followed by high pressure hosing with fresh water. Remove scum layer and loose matter to a hard, rough and uniform surface, preferably by abrasive blasting, possibly by other mechanical treatment or acid etching. Seal surface with suitable sealer, as per relevant painting specification.

Repair and maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to minimum St 2 (spot-repairs) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR MASTIC 45880/45881. As an alternative to dry cleaning, water jetting to min. Wa 2½ (ISO 8501-4:2006)(or according to specification), may be used. A flash-rust degree of maximum M (ISO 8501-4:2006) is acceptable before application. Feather edges to sound and intact paint. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting, wet abrasive blasting, alternatively dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

APPLICATION CONDITIONS:

Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Use only when application and curing can proceed at temperatures above -5°C/23°F (recommended lowest temperature is 0°C/32°F) for HEMPADUR MASTIC 45880 and above approx 15°C/59°F for HEMPADUR MASTIC 45881. The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties. Optimal spraying properties are obtained at a paint temperature of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place and the paint temperature should preferably be kept below 30°C/86°F. In confined spaces provide adequate ventilation during application and drying. In cases where faster drying at very low temperatures is required, HEMPADUR MASTIC 45880 may advantageously be replaced by HEMPADUR 45143. Please also see separate APPLICATION INSTRUCTIONS.

PRECEDING and SUBSEQUENT COAT:

None or according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

45880			
	As supplied	5 vol. % thinning	Limit phase II, 2010
VOC in g/l	220	250	500
45881			
	As supplied	5 vol. % thinning	Limit phase II, 2010
VOC in g/l	220	250	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Certificates have been issued under the former quality number 4588.

Colours/Colour-stability:

Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

Like other epoxy coatings in white/whitish colour a yellowing may take place in cases of application under unfavourable weather conditions, especially sudden drops in temperature during drying and initial cure and/or lack of ventilation.

Weathering/service temperatures:

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses/ thinning:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 125-200 micron/5-8 mils. May be specified in lower film thickness for which purpose additional thinning is required, please see separate APPLICATION INSTRUCTIONS.

Avoid application of excessive film thicknesses.

Shades:

The product is also available in a Micaceous Iron Oxide (MIO) pigmented shade (Shade no. 12430 – reddish grey) and in aluminium pigmented shades (Shade nos. 19870 - dark alu and 19000 - light alu).

HEMPADUR MASTIC 45880/45881

Application onto zinc silicate or spray-metallized surfaces (thinning):	It is recommended to apply HEMPADUR MASTIC 45880/45881 by using a "mist-coat" procedure **Provided** the paint temperature is approximately above 20°C/68°F: A thin, undiluted coat is applied (the mist coat) and after a few minutes, a second coat is applied in the full specified film thickness. If the paint temperature is below 20°C/68°F, thinning (max 15%) may be required.
Curing agents:	Curing agents 95880 and 95881 are hazy. This is intended and has no negative influence on the performance.
Note:	**HEMPADUR MASTIC 45880/45881 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 4588012170CO011/4588112170CO0013

For product description refer to product data sheet

HEMPADUR MASTIC 45880/ HEMPADUR MASTIC 45881

High temperatures: 45881: BASE 45889 with CURING AGENT 95881
Low to medium temperatures: 45880: BASE 45889 with CURING AGENT 95880

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR MASTIC 45880/45881.

Surface preparation:

General: In order to obtain best performance, abrasive blast cleaning is recommended. However, HEMPADUR MASTIC 45880/45881 has “surface tolerant” properties and offers higher performance than many other coatings when applied to surfaces mechanically cleaned only (salts, oil, grease etc. shall always be removed).

Remove oil and grease with suitable detergent, salt and other contaminants by (high pressure) fresh water cleaning.

NEW STEEL:
When used as intermediate and/or finishing coat, surface preparation according to Product Data Sheet for the preceding primer coat (HEMPADUR primers). When used as a selfpriming coat, surface preparation according to specification.

When applied to GALVOSILS:
HEMPADUR MASTIC 45880/45881 can be applied when the GALVOSIL is cured. Consult APPLICATION INSTRUCTIONS for the relevant GALVOSIL. Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. After exposure to high humidity, zinc salts, "white rust", must be removed carefully by high pressure fresh water cleaning, if necessary combined with scrubbing with stiff nylon brushes.

REPAIR AND MAINTENANCE:

Spot-repairs:
Clean damaged areas thoroughly by power tool cleaning to minimum St 2 (spot-repairs) or by abrasive blasting to minimum Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of HEMPADUR MASTIC 45880/45881. As an alternative, water jetting to minimum Wa 2½ (ISO 8501-4:2006)(or according to specification) may be used. A flash-rust degree of maximum M (ISO 8501-4:2006) is acceptable before application. Feather edges to sound and intact areas. Brush off loose material. Touch up to full film thickness.

Compatibility: HEMPADUR MASTIC 45880/45881 **may** be used in connection with other generic paint systems than epoxy and polyurethanes.
It is recommended to make a test patch. In any case it is a must that the old paint system is tightly adhering and is properly prepared before the touch-up is performed.

Full coating:

Compatibility with old system: In general full compatibility can be expected with old epoxy systems. A test patch should always be performed before full coating is decided. If the old epoxy is not weathered/chalked or if it is topcoated with polyurethane, it is recommended to roughen the surface before recoating. Furthermore, very thorough cleaning is a must. Any dirt, chalked surface material, oil and grease should be removed with suitable detergent followed by high pressure fresh water hosing of the entire surface.

Removal of old system: Full coating after complete mechanical removal of an old paint system is possible too. Yet, it must be considered that mechanical cleaning by disc grinding or by rotating wire brushing may produce a very smooth surface which reduce the adhesive forces of the primer coat

Note: Another risk is remains of a hard black rust scale being cleaned to an apparent brightness without showing any adhesive defects. Yet, the exposure to open air during cleaning may have started a further oxidation of the hard black rust making it mechanically weak and of poor adhesion to the underlying steel surface. Later, during service, the scale plus overlaying paint material may flake off.

When used for immersion service, repair:
Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of HEMPADUR MASTIC 45880/45881. As an alternative to dry cleaning, water jetting to minimum Wa 2½ (ISO 8501-4:2006), may be used. A flash rust degree of M, preferably L (ISO 8501-4:2006) is acceptable before application. Feather edges to sound intact areas. Dust off residues. Touch up to full film thickness

Note: On old steel surfaces having been exposed to salty water, excessive amounts of salt residues in pittings may call for high pressure water jetting, wet abrasive blasting, alternatively dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Application equipment:

HEMPADUR MASTIC 45880/45881 being a high solids and a relatively high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min. 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter max. 30 metres/100 feet, 3/8" internal diameter max. 6 metres/20 feet, 1/4" internal diameter

Regular surfaces:	Complicated surfaces (and touch up):
Nozzle size:.021" through .023"	Nozzle size: .017" through .021"
Fan angle: 60°.	Fan angle: 40°.

After finishing the application, clean the equipment immediately with THINNER 08450 or HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may increase paint flow, thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approx. 5% THINNER 08450 may be added, but thinning must be done with care as the anti-sagging properties are drastically reduced by overthinning.

Airless spray data are indicative and subject to adjustment.

Induction time:

Should the paint temperature as an exception be 15°C/59°F or below, it is an advantage to allow the two components to prereact before application. This is especially relevant in the case of substrate temperatures also being below 15°C/59°F.

In case of a paint or substrate temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint or substrate temperature at 10°C/50°F, an induction time of 25 minutes is recommended. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F. Yet for substrate temperatures below 10°C/50°F an induction time of 30 minutes is recommended.

HEMPADUR MASTIC 45880/45881

Spray application:

Film-build/continuity: With this paint material applied in one/few coat(s) it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas application of a stripe coat will therefore be good painting practice. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. Avoid exaggerated film thickness due to the risk of sagging, cracks and solvent retention. The paint consumption must be controlled.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Brush and roller application:

At application with hand tools, brush, but especially by roller the natural tendency to a more uneven paint film obtained by these methods, is to be counteracted by more coats applied. If at all possible each coat is to be applied across the preceding one - in general follow good painting practise.

On **poorly prepared surfaces** it is always recommended to apply the first coat by brush. Extra thinning will facilitate the penetration of the paint material, but will also require an extra layer to be applied.

Wet/dry film thickness:

Please note that the thixotropic nature of HEMPADUR MASTIC 45880/45881 may give a rather "wavy" surface of the paint just after application. This smoothens at drying, but can make it necessary to let the wet film readings be of a higher value than indicated. In many cases the wet film thickness, reading should be 25-50 micron/1-2 mils higher than calculated. As the wavy surface becomes more smooth during drying these extra wet film thickness readings will not cause a higher paint consumption than otherwise stipulated.

Film thickness/thinning:

HEMPADUR MASTIC 45880/45881 is normally specified in 125-200 micron/5-8 mils. Depending on ambient conditions, usually maximum 5% thinning with THINNER 08450 is relevant, however, increasing at high temperatures to ensure proper film formation and avoid dust spray. May be specified down to 75 micron/3 mils. To obtain optimum film formation in film thicknesses lower than 125 micron/5 mils dry film thickness additional thinning with 5-10% THINNER 08450 is recommended.

Pot life:

When measured under standard conditions the pot life is 1 hour at 20°C/68°F for HEMPADUR MASTIC 45880 respectively 1½ hours at 30°C/86°F for HEMPADUR MASTIC 45881. However, for a 20 litres/5 US gallons mix, and used under warm climate conditions, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.
Therefore: At high temperatures, use the paint immediately after mixing irrespective of equipment.

Attached:

Tables of "physical data versus temperature".

HEMPADUR MASTIC 45880/45881

Physical data versus temperature:

Drying time and recoating interval vary with film thickness, temperature and later exposure conditions:

HEMPADUR MASTIC 45880 in a dry film thickness of 100-150 micron/4-6 mils:

Surface temperature:	-5°C/23°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time (approx)	3 days	36 hours	12 hours	4 hours	3 hours	2 hours
Curing time (approx)	2½ months	1 month	14 days	7 days	5 days	3 days
MINIMUM recoating interval related to later conditions of exposure:						
Interval for recoating with HEMPADUR and HEMPATHANE qualities						
Atmospheric, medium	3½ days	45 hours	15 hours	5 hours	4 hours	3 hours
Atmospheric, severe	5 days	63 hours	21 hours	7 hours	5 hours	4 hours
Immersion[1]	7 days	3 days	24 hours	8 hours	6 hours	5 hours
Interval for recoating with HEMPATEX qualities						
Atmospheric, medium	3½ days	45 hours	15 hours	5 hours	4 hours	3 hours
Atmospheric, severe	3½ days	45 hours	15 hours	5 hours	4 hours	3 hours
Interval for recoating with HEMUCRYL topcoats						
Atmospheric, medium	N/R	N/R	12 hours	5 hours	4 hours	3 hours
Atmospheric, severe	N/R	N/R	18 hours	7 hours	5 hours	4 hours

1. Not relevant for HEMPATHANE qualities

Notes:
- Avoid sudden drops in (substrate) temperatures during drying/initial curing. It is especially important that the substrate temperature does not drop significantly before application of the acrylic or polyurethane finish and that proper ventilation is maintained.
- If faster handling or recoating at lower temperatures is required, HEMPADUR 45143 may be used.
- In case of low temperatures, it is recommended that HEMPADUR MASTIC 45880 has been given a proper induction time before application. Under such conditions, consider paint temperature equal to substrate temperature and follow the rules given on page 2.

HEMPADUR MASTIC 45880 in a dry film thickness of 200 micron/8 mils:

Surface temperature:	-5°C/23°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time (approx)	6 days	54 hours	18 hours	6 hours	5 hours	4 hours
Curing time (approx)	2½ months	1 month	14 days	7 days	5 days	3 days
MINIMUM recoating interval related to later conditions of exposure:						
Interval for recoating with HEMPADUR and HEMPATHANE qualities						
Atmospheric, medium	5 days	63 hours	21 hours	7 hours	5 hours	4 hours
Atmospheric, severe	7 days	4 days	30 hours	10 hours	8 hours	6 hours
Immersion[1]	8½ days	4½ days	36 hours	12 hours	9 hours	7 hours
Interval for recoating with HEMPATEX qualities						
Atmospheric, medium	5 days	63 hours	21 hours	7 hours	5 hours	4 hours
Atmospheric, severe	5 days	63 hours	21 hours	7 hours	5 hours	4 hours
Interval for recoating with HEMUCRYL topcoats						
Atmospheric, medium	N/R	N/R	21 hours	7 hours	5 hours	4 hours
Atmospheric, severe	N/R	N/R	30 hours	10 hours	8 hours	6 hours

1. Not relevant for HEMPATHANE qualities

Notes:
- Avoid sudden drops in (substrate) temperatures during drying/initial curing. It is especially important that the substrate temperature does not drop significantly before application of the acrylic or polyurethane finish and that proper ventilation is maintained.
- If faster handling or recoating at lower temperatures is required, HEMPADUR 45143 may be used.
- In case of low temperatures, it is recommended that HEMPADUR MASTIC 45880 has been given a proper induction time before application. Under such conditions, consider paint temperature equal to substrate temperature and follow the rules given on page 2.

HEMPADUR MASTIC 45880 (independent on dry film thicknesses):

Surface temperature:	-5°C/23°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
MAXIMUM recoating interval related to later conditions of exposure:						
Interval for recoating with HEMPADUR qualities						
Atmospheric, medium	Extended*	Extended*	Extended*	Extended*	Extended*	Extended*
Atmospheric, severe	Extended*	Extended*	Extended*	Extended*	Extended*	Extended*
Immersion[1]	3 months	3 months	2 months	1 months	23 days	15 days
Interval for recoating with HEMPATHANE topcoats						
Atmospheric, medium	Extended*	Extended*	Extended*	Extended*	Extended*	Extended*
Atmospheric, severe	Extended*	Extended*	Extended*	Extended*	Extended*	Extended*
Interval for recoating with HEMPATEX qualities						
Atmospheric, medium	10 days	45 hours	36 hours	12 hours	9 hours	6 hours
Atmospheric, severe	10 days	45 hours	36 hours	12 hours	9 hours	6 hours
Interval for recoating with HEMUCRYL topcoats						
Atmospheric, medium	N/R	N/R	9 days	3 days	2 days	36 hours
Atmospheric, severe	N/R	N/R	4½ days	1½ days	1 day	18 hours

1. Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact Hempel for further advice.

Notes:
- Avoid sudden drops in (substrate) temperatures during drying/initial curing.
- If faster handling is required at low temperatures, HEMPADUR 45143 may be used.

HEMPADUR MASTIC 45881 in a dry film thickness of 100-150 micron/4-6 mils:

Surface temperature:	20°C/68°F	30°C/86°F	40°C/104°F
Drying time (approx)	4 hours	3 hours	2 hours
Curing time (approx)	7 days	5 days	3 days
MINIMUM recoating interval related to later conditions of exposure:			
Interval for recoating with: HEMPADUR, HEMPATHANE, HEMPATEX and HEMUCRYL qualities			
Atmospheric, medium	5 hours	4 hours	3 hours
Atmospheric, severe	7 hours	6 hours	4 hours
Immersion[1](only HEMPADUR qualities)	8 hours	6 hours	5 hours

HEMPADUR MASTIC 45881 in a dry film thickness of 200 micron/8 mils:

Surface temperature:	20°C/68°F	30°C/86°F	40°C/104°F
Drying time (approx)	6 hours	5 hours	4 hours
Curing time (approx)	7 days	5 days	3 days
MINIMUM recoating interval related to later conditions of exposure:			
Interval for recoating with: HEMPADUR, HEMPATHANE, HEMPATEX and HEMUCRYL qualities			
Atmospheric, medium	7 hours	6 hours	4 hours
Atmospheric, severe	10 hours	8 hours	6 hours
Immersion (only HEMPADUR qualities)	12 hours	10 hours	8 hours

HEMPADUR MASTIC 45881 (independent on dry film thickness):

Surface temperature:	20°C/68°F	30°C/86°F	40°C/104°F
MAXIMUM recoating interval related to later conditions of exposure:			
Interval for recoating with HEMPADUR qualities			
Atmospheric, medium	Extended*	Extended*	Extended*
Atmospheric, severe	Extended*	Extended*	Extended*
Immersion	1 months	23 days	15 days
Interval for recoating with HEMPATHANE topcoats			
Atmospheric, medium	Extended*	Extended*	Extended*
Atmospheric, severe	Extended*	Extended*	Extended*
Interval for recoating with HEMPATEX qualities			
Atmospheric	12 hours	9 hours	6 hours
Interval for recoating with HEMUCRYL topcoats			
Atmospheric, medium	3 days	2 days	1 day
Atmospheric, severe	1½ days	1 day	12 hours

*** Notes on extended recoating Intervals with HEMPADUR and HEMPATHANE qualities**

Extended recoating intervals can be utilised when the following is strictly observed:

- The surface shall be thoroughly cleaned from all sorts of contaminants including invisible deposits of water soluble salts, oil, grease and similar harmful chemical substances.
- Surfaces having any degraded layer from exposure to UV radiation, heat etc. must have this layer removed by mechanical cleaning methods like, water jetting, abrading or sweep blasting.
- The existing coating system must in all respects be sound and applied according to Product Data Sheets, Application Instructions and Specification,

It should be recognised that the optimal intercoat adhesion is best ensured by observing the interval between the stated minimum and "Cured Time". Utilising extended recoating intervals it should further be understood that by chemical nature the intercoat adhesion between HEMPADUR qualities are better than between HEMPADUR and HEMPATHANE qualities. To determine whether the quality of the surface cleaning is adequate, a test patch may be relevant. However, such a test is not the final proof of long-term durability, but if the result is doubtful, repeated cleaning will be relevant. A more safe solution could be to refresh the surface with a new thin (diluted) coat of HEMPADUR MASTIC 45880/45881.

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 4588012170C0011/45881121 70C0008

Product Data

HEMPATEX HI-BUILD 46330

Description: HEMPATEX HI-BUILD 46330 is based on chlorinated rubber. Physically drying. Resistant to salt water, splashes of mineral oils, aliphatic solvents and a wide range of chemicals, but not to animal and vegetable oils or aromatic solvents.

Recommended use: Selfprimed, or as an intermediate or finishing coat on steel structures in moderately to severely corrosive environment, including permanently submerged surfaces.

Service temperatures: Maximum, dry exposure only: 80°C/176°F (see remarks overleaf).

Certificates/Approvals: Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/11480 - Red/50630
Finish:	Flat
Volume solids, %:	42 ± 1
Theoretical spreading rate:	5.3 m²/litre - 80 micron 211 sq.ft./US gallon - 3.2 mils
Flash point:	32°C/90°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	8 (approx.) hours at 20°C/68°F
V.O.C.:	510 g/litre - 4.3 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush (touch-up)
Thinner (max.vol.):	08080 (5%)	08080 (15%)	08080 (5%)
Nozzle orifice:	.021"-.023"		
Nozzle pressure:	150 bar/2200 psi		
	(Airless spray data are indicative and subject to adjustment)		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	80 micron/3.2 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	175 micron/7 mils		
Recoat interval, min:	8 hours (20°C/68°F) *(See REMARKS overleaf)*		
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPATEX HI-BUILD 46330

SURFACE PREPARATION:

New steel: Abrasive blasting to Sa 2½. For temporary protection, if required, use suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPATEX HI-BUILD 46330.
Maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up to full film thickness.

APPLICATION CONDITIONS:

As dictated by normal good painting practice.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:

None or according to specification.

SUBSEQUENT COAT:

None, or HEMPATEX system as per specification.
Ship bottoms: Antifouling according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	510	560	600	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Service temperatures:

As HEMPATEX HI-BUILD 46330 is a thermoplastic product, prolonged mechanical exposure at temperatures above approximately 40°C/105°F may cause film indentation. When temperature drops below, mechanical strength is recovered.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 40-100 micron/1.6-4 mils. A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended **not** to apply HEMPATEX HI-BUILD 46330 in excessive film thickness.

Recoating:

In case of multi-coat application, drying time and minimum recoating interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification.
No maximum recoating interval, but before recoating after exposure in contaminated environment, clean the surface thoroughly by high pressure fresh water cleaning and allow drying.

Note:

HEMPATEX HI-BUILD 46330 is for professional use only.

ISSUED BY:

HEMPEL A/S - 4633011480CO003

HEMPATEX HI-BUILD 46370

Description:

HEMPATEX HI-BUILD 46370 is a physically drying high build paint with optimum colour retention. Based on acrylic resin and chlorinated plasticizer. Resistant to salt water, splashes of aliphatic hydrocarbons, animal and vegetable oils.

Recommended use:

1. As an exterior finishing coat on containers.
2. As an intermediate or finishing coat in HEMPATEX systems in moderately to severely corrosive environment.

Service temperatures:

Maximum, dry exposure only: 80°C/175°F (see REMARKS overleaf).

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:

Normally available on orders for container new-buildings only.

PHYSICAL CONSTANTS:

Colours/Shade Nos:	White/10000*
Finish:	Semi-flat
Volume solids, %:	40 ± 1
Theoretical spreading rate:	4.7 m^2/litre - 85 micron 189 sq.ft./US gallon - 3.4 mils
Flash point:	25°C/77°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	½ *(approx)* hour at 20°C/68°F *(ISO 1517)*
Dry to touch:	4 *(approx)* hours at 20°C/68°F
V.O.C.:	535 g/litre - 4.5 lbs/US gallon

**Concerning other shades, reference is made to HEMPEL'S CONTAINER COLOUR CARD.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush
Thinner (max. vol.):	08080 (20%)	08080 (30%)	08080 (5%)
	For on-line container production thinning according to specification		
Nozzle orifice:	.017"-.021"		
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	85 micron/3.4 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	200 micron/8 mils		
Recoat interval, min:	4 hours (20°C/68°F) *(See REMARKS overleaf)*		
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPATEX HI-BUILD 46370

SURFACE PREPARATION:

Repair and Maintenance: Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. Followed by:
For steel: Remove all rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up bare spots with e.g. suitable primer followed by HEMPATEX HI-BUILD 46370 to full film thickness.
For other metals, concrete: Reference is made to the corresponding painting specification and to the Product Data Sheet for the primer/sealer.

APPLICATION CONDITIONS:

As dictated by normal good painting practice.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:

HEMPADUR ZINC 15360, HEMPADUR PRIMER 15300 or according to specification.

SUBSEQUENT COAT:

None, HEMPATEX ENAMEL 56360, or as per specification depending on area of use.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	26 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	535	600	600	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Colours:

Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere.
Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.
To obtain full opacity, an extra coat may be necessary, especially for certain lead-free colours in eg red, orange, yellow and green.

Service temperatures:

As HEMPATEX HI-BUILD 46370 is a thermoplastic product, prolonged mechanical exposure at temperatures above approx. 40°C/104°F may cause film indentation. When temperature drops below, mechanical strength is recovered.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoat interval. Normal range is 75-100 microns/3-4 mils. A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended **not** to apply HEMPATEX HI-BUILD 46370 in excessive film thickness.

Recoating:

In case of multicoat application, drying time and minimum recoat interval are influenced by the actual film thickness and number of coats applied. Reference is made to the corresponding painting specification.
No maximum recoating interval, but before recoating after exposure in contaminated environment, clean the surface thoroughly by high pressure fresh water hosing and allow to dry.

Note:

HEMPATEX HI-BUILD 46370 is for professional use only.

ISSUED BY:

HEMPEL A/S - 4637010000CO016

HEMPATEX HI-BUILD 46410

Description:

HEMPATEX HI-BUILD 46410 is physically drying high build paint with good colour retention as a flat finish. Based on acrylic resin and non-chlorinated plasticizer. Contains zinc phosphate. Resistant to salt water, splashes of aliphatic hydrocarbons, animal and vegetable oils.

Recommended use:

1. As a primer, intermediate or finishing coat in HEMPATEX-systems in moderately corrosive environment.
2. As a selfprimed repair and touch-up coating for containers as well as other cases where a fast and economic repair job is desired.
3. As a finishing coat for containers.

Service temperatures:

Maximum, dry exposure only: 80°C/176°F *(See REMARKS overleaf).*

Certificates/Approvals:

Approved by CSIRO, Australia for carriage of foodstuffs.
Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/11480* - Red/50630*
Finish:	Flat
Volume solids, %:	42 ± 1
Theoretical spreading rate:	4.2 m^2/litre - 100 micron 168 sq.ft./US gallon - 4 mils
Flash point:	24°C/75°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	1 (approx.) hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	4 (approx.) hours at 20°C/68°F
V.O.C.:	515 g/litre - 4.3 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush/Roller
Thinner (max. vol.):	08080 (5%)	08080 (15%)	08080 (5%)
Nozzle orifice:	.017"-.021"		
Nozzle pressure:	175 bar/2500 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	100 micron/4 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	225 micron/9 mils		
Recoat interval, min:	When dry *(See REMARKS overleaf)*		
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPATEX HI-BUILD 46410

SURFACE PREPARATION:

New steel: Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to Sa 2½. For temporary protection, if required, use suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPATEX HI-BUILD 46410.
Repair and maintenance: Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning.
Remove all rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up bare spots with HEMPATEX HI-BUILD 46410 to full film thickness.

APPLICATION CONDITIONS:

As dictated by normal good painting practice.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:

None, or according to specification.

SUBSEQUENT COAT:

None, or as per specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	530	580	600	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Colours:

Certain lead-free red and yellow colours may discolour when exposed to sulphide and chlorine-containing atmosphere.
To obtain full opacity, an extra coat may be necessary, especially for certain lead-free colours in eg red, orange, yellow and green.

Service temperatures:

As HEMPATEX HI-BUILD 46410 is a thermoplastic product, prolonged, mechanical exposure at temperatures above approx. 40°C/104°F may cause film indentation. When temperature drops below, mechanical strength is recovered.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 75-125 micron/3-5 mils. To obtain an even dry film thickness (of 125 micron), application in two passes (wet-in-wet) is recommended. If applied by roller, e.g. as deck coating, usual dry film thickness is approx. 50 microns per coat. A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended **not** to apply HEMPATEX HI-BUILD 46410 in excessive film thickness.

Deck coating:

If a skid-proof surface is desired, sprinkle HEMPEL'S ANTI-SLINT 67500 evenly on the first coat of HEMPATEX HI-BUILD 46410 while still wet (consumption approx. 2.5 kg/5.5 lbs to 25 m^2 /270 sq.ft.). When the paint is dry, sweep up surplus grit and apply a second coat of HEMPATEX HI-BUILD 46410. Antiskid properties can also be obtained by mixing 1.0 kg of HEMPEL'S ANTISLIP BEADS 67420 into 20 litre of HEMPATEX HI-BUILD 46410.

Recoating:

For multicoat application minimum recoating interval is influenced by the actual film thickness and number of coats applied. Reference is made to the corresponding painting specification.
No maximum recoating interval, but before recoating after exposure in contaminated environment, clean the surface thoroughly by high pressure fresh water hosing and allow drying.

Note:

HEMPATEX HI-BUILD 46410 is for professional use only.

ISSUED BY:

HEMPEL A/S - 4641011480CO004

HEMPATEX HI-BUILD 46820

Description:

HEMPATEX HI-BUILD 46820 is based on acrylic resin, physically drying. Optimum colour retention. Resistant to salt water, splashes of aliphatic hydrocarbons, animal and vegetable oils.

Recommended use:

1. As a finishing coat on structural steel in moderately to severely corrosive environments.
2. As a finishing coat on containers, rolling stocks, etc.

Note about application and touch-up, please see REMARKS overleaf.

Service temperatures:

Maximum, dry exposure only: 80°C/176°F (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Light alu./19000
Finish:	Semi-flat
Volume solids, %:	31 ± 1
Theoretical spreading rate:	3.9 m²/litre - 80 micron 155 sq.ft/US gallon - 3.2 mils
Flash point:	25°C/77°F
Specific gravity:	1.0 kg/litre - 8.4 lbs/US gallon
Dry to touch:	3-4 hours at 20°C/68°F
V.O.C.:	600 g/litre - 5.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush (touch up)
Thinner (max. vol.):	08080 (5%)	08080 (20%)	08080 (5%)
Nozzle orifice:	.017"-.021" *(See REMARKS overleaf)*		
Nozzle pressure:	175 bar/2500 psi *(See REMARKS overleaf)* *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	80 microns/3.2 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	250 microns/10 mils		
Recoat interval, min.:	When dry *(See REMARKS overleaf)*		
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPATEX HI-BUILD 46820

SURFACE PREPARATION:	Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Prime/touch up with suitable primer followed by HEMPATEX 46820 to full film thickness.
APPLICATION CONDITIONS:	The surface must be completely clean and dry, its temperature must be above the dew point to avoid condensation. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPADUR PRIMER 15300, HEMPADUR ZINC 15360 or according to specification.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	
Service temperatures:	Being a thermoplastic product, prolonged direct contact at temperatures above approximately 40°C/104°F may cause film indentation. When temperature drops below, mechanical strength is recovered.
Application:	Way of application will influence the appearance of the paint film. Spray application, especially by conventional spray, will facilitate optimum appearance. If applied by brush, use a flat brush not more than 10 cm/4" wide. After the paint has been distributed it should be laid off with light strokes and in one direction only. If the paint is worked too much with brush or roller, it will become streaky and greyish and loose its lustre. **Irrespective of measures taken during application, touch-up may, however, cause areas of different visual appearance as to different gloss or sheen.** This effect is cosmetic only and has no influence on the protective properties.
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoat interval. Normal range is 60-100 micron/2.4-4 mils. A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended **not** to apply HEMPATEX HI-BUILD 46820 in excessive film thickness. In any case, avoid exaggerated filmthicknesses. For this reason it is also recommended to use lowest possible nozzle orifice and pressure when applied by airless spray.
Recoating:	In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Before recoating after exposure in contaminated environment, clean the surface thoroughly by high pressure fresh water cleaning and allow to dry.
Note:	**HEMPATEX HI-BUILD 46820 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 4682019000C0006

HEMPADUR 47140

BASE 47149 with CURING AGENT 98140

Description:

HEMPADUR 47140 is a two-component polyamide adducts cured, high build epoxy paint which combines a relatively high volume solids content with a short drying time. VOC compliant.

Recommended use:

As a primer in mild to medium atmospheric environments.
As an intermediate or finishing coat in epoxy systems in medium to severely corrosive atmospheric environment.
As a finishing coat where the usual outdoor cosmetic appearance of epoxy paints is acceptable.
May be used directly on cured zinc silicate (GALVOSIL products) or spray-metallised surfaces to minimise popping.

Service temperatures:

Maximum, dry exposure only: 140°C/284°F

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Cream/20450 (RAL 9001) - Light grey/11150 (RAL 7035)
Finish:	Semi–gloss
Volume solids, %:	70 ± 1
Theoretical spreading rate:	5.6 m²/litre - 125 micron 225 sq.ft./US gallon - 6 mils
Flash point:	23°C/73°F
Specific gravity:	1.6 kg/litre - 13.4 lbs/US gallon
Dry to touch:	2 *(app.)* hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	300 g/litre - 2.5 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 47140:	Base 47149 : Curing agent 98140 4 : 1 by volume
Application method:	Airless spray Brush *(touch up)*
Thinner (max. vol.):	Depending on purpose usually less than 5% THINNER 08450 *(See REMARKS overleaf)*
Pot life:	1 hour (20°C/68°F)
Nozzle orifice:	.019"-.021"
Nozzle pressure:	225 bar/3300 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	125 micron/5 mils *(see REMARKS overleaf)*
Indicated film thickness, wet:	175 micron/7 mils
Recoat interval, min:	2 hours (20°C/68°F)
Recoat interval, max:	3 days (20°C/68°F) *(HEMPATHANE)*

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 47140

APPLICATION CONDITIONS:
Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Use only when application and curing can proceed at temperatures above 0°C/32°F.
The temperature of the paint itself should be 15-25°C/59-77°F to secure proper application properties.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:
It is important that the surface is completely clean to ensure the adhesion. Any oil, grease, etc. to be removed by suitable detergent.
Spray metallisation, HEMPADUR ZINC 17360, HEMPEL'S GALVOSIL 15700, HEMPEL'S GALVOSIL 1571A or according to specification.

SUBSEQUENT COAT:
None, HEMPATHANE, HEMPAXANE or according to specification.

REMARKS:
VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	302	330	550	500

VOC:
For VOC of other shades, please refer to Safety Data Sheet.

Weathering/ service temperatures:
The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses:
May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 80-150 micron/3.2-6 mils.

Irregular surfaces:
Special care should be taken in relation to irregular surfaces (welding seams, undercuts etc.) as application with an excessive film thickness - typically being more than 400 micron/16 mils per coat may result in cracking especially on such areas.

Thinner:
Type and amount of thinner depend on application conditions, - method, temperature, ventilation and substrate. HEMPEL'S THINNER 08450 is normally recommended. HEMPEL'S THINNER 08700 can be used alternatively depending on the local conditions.

Application onto zinc metallised and zinc silicate primed surfaces:
It is recommended to apply HEMPADUR 47140 by using a "mist-coat" procedure. A thin, undiluted spray-coat is applied (the mist coat) and after a few minutes, a second coat is applied in the full silicate painted specified film thickness.
Depending on actual conditions of application, such as temperature, porosity of substrate, method of spray, a sealer coat (thinned up to 30%) can be applied as an alternative method to reduce popping, followed by application of the full coat.

Note:
HEMPADUR 47140 is for professional use only.

ISSUED BY:
HEMPEL A/S - 4714020450CS009

HEMPADUR 47200

BASE 47209 with CURING AGENT 97100

Description:

HEMPADUR 47200 is a two-component, polyamine adduct cured epoxy paint with a very short drying time. Contains micaceous iron oxide and zinc phosphate.
The product cures at temperatures above -10°C/32°F and form a tough and hardwearing coating.

Recommended use:

As a fast drying primer or intermediate coat in HEMPADUR systems especially suited for fast recoatable shop applications. Can be specified for on-site application.
The product can also be specified where long overcoating intervals to polyurethane topcoats are expected (typically as travel coat).

Service temperatures:

Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/13610 - Red/50630
Finish:	Flat
Volume solids, %:	63 ± 1
Theoretical spreading rate:	6.3 m^2/litre - 100 micron 253 sq.ft./US gallon - 4 mils
Flash point:	30°C/86°F
Specific gravity:	1.6 kg/litre - 11.6 lbs/US gallon
Surface dry:	15 minutes at 20°C/68°F (ISO 1517)
Dry to touch:	1 hour at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	355 g/litre - 3.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1..

APPLICATION DETAILS:

Mixing ratio for 47200:	Base 47209 : Curing agent 97100 4 : 1 by volume		
Application method:	Airless spray	Air Spray	Brush
Thinner (max. vol.):	08450 (5%)	08450 (15%)	08450 (5%)
Pot life:	3 hours (20°C/68°F)		
Nozzle orifice:	.015"-.021"		
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610/HEMPEL THINNER 08450		
Indicated film thickness, dry:	100 micron/4 mils *(See REMARKS overleaf)*		
Indicated film thickness, wet:	175 micron/7 mils		
Recoat interval, min:	1 hour (20°C/68°C)		
Recoat interval, max:	See REMARKS overleaf		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 47200

SURFACE PREPARATION:

New steel (dry conditions): Abrasive blasting to minimum Sa 2½ according to ISO 8501-1:2007. For temporary protection, if required, use suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPADUR 47200.
Maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by wet or dry abrasive blasting or power tool cleaning. Feather edges to sound and intact areas. After wet abrasive blasting hose down the surface with fresh water and allow to dry. Touch up bare spots to full film thickness.

APPLICATION CONDITIONS:

Use only where application and curing can proceed at temperatures above -10°C/32°F. At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion. The temperature of the paint itself should be 15°C/60°F or above to secure proper application properties.
In order to obtain the best possible spray properties, mix the components thoroughly and allow the mixture to pre-react for 10 - 15 minutes before use (Induction time).
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:

None, or according to specification.

SUBSEQUENT COAT:

HEMPADUR, HEMPATHANE, or as per specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	355	425	550	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Weathering/Service temperatures:

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Film thicknesses:

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 75-200 micron/3-8 mils.

Recoating:

Recoating intervals related to later conditions of exposure (100 micron/4 mils dry):

	Maximum Independent of filmthickness	
Surface temperature	20°C/68°F	
Exposure during service	Atmospheric	
Recoated with	Medium	Severe
HEMPADUR	None	None
HEMPATHANE	None	5 days

If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR 47200 within the above directions for recoating.
A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing.
Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.
To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

Note:

HEMPADUR 47200 is for professional use only.

ISSUED BY:

HEMPEL A/S - 4720013610CR001

This Product Data Sheet supersedes those previously issued.
For explanations, definitions and scope, see "Explanatory Notes" in the HEMPEL Book.
Data, specifications, directions and recommendations given in this data sheet represent only test results or experience obtained under controlled or specially defined circumstances. Their accuracy, completeness or appropriateness under the actual conditions of any intended use of the Products herein must be determined exclusively by the Buyer and/or User.
The Products are supplied and all technical assistance is given subject to HEMPEL's GENERAL CONDITIONS OF SALES, DELIVERY AND SERVICE, unless otherwise expressly agreed in writing. The Manufacturer and Seller disclaim, and Buyer and/or User waive all claims involving, any liability, including but not limited to negligence, except as expressed in said GENERAL CONDITIONS for all results, injury or direct or consequential losses or damages arising from the use of the Products as recommended above, on the overleaf or otherwise.
Product data are subject to change without notice and become void five years from the date of issue.

Product Data

HEMPADUR ULTRA-STRENGTH 47500

BASE 47509 with CURING AGENT 98510

Description:

HEMPADUR ULTRA-STRENGTH 47500 is a self-priming, two-component, high-build, epoxy-polyamine paint which cures to a very abrasion, impact and corrosion resistant coating. Applicable by standard heavy duty airless spray equipment.

Recommended use:

As a heavy duty coating for areas exposed to abrasion and aggressive corrosive climate such as hatch coamings and cargo holds of bulk carriers.

Service temperatures:

Dry exposure only: Maximum 140°C/284°F

Certificates/Approvals:

Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Light Olive Green/49980 - Red/50630*
Finish:	Semi-gloss
Volume solids, %:	75 ± 1
Theoretical spreading rate:	6.0 m^2/litre - 125 micron 241 sq.ft./US gallon - 5 mils
Flash point:	26°C/79°F
Specific gravity:	1.5 kg/litre - 12.5 lbs/US gallon
Dry to touch:	3 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	310 g/litre - 2.6 lbs/US gallon

*other shades according to assortment list.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Base 47509 : Curing agent 98510
3 : 1 by volume

Application method:	Airless spray
Thinner (max.vol.):	08450 (5%)
Pot life:	1 hour (20°C/68°F)
Nozzle orifice:	.021"-.023"
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	125 micron/5 mils
Indicated film thickness, wet:	175 micron/7 mils
Recoat interval, min:	4 hours (20°C/68°F) - 12 hours (5°C/41°F)
Recoat interval, max:	30 days (20°C/68°F) - 90 days (5°C/41°F)

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR ULTRA-STRENGTH 47500

SURFACE PREPARATION:	**New steel:** **"Heavy duty use":** Abrasive blasting to min. Sa 2 with a surface profile corresponding to Rugotest No. 3, min. BN10, Keane-Tator Comparator 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasive and dust. **Repair and maintenance:** The actual purpose and conditions may make other types and degrees of surface preparation than the above described relevant. Reference is made to separate application instructions.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above -5°C/23°F. The temperature of the paint itself should be above 15°C/59°F, preferably above 20°C/68° for proper application. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. In confined spaces provide adequate ventilation during application and drying. To achieve full mechanical properties the coating require a period of cure above 5°C. Consult Hempel.
PRECEEDING COAT:	None, but HEMPADUR 15590 can be used as a "blast primer" for HEMPADUR ULTRA-STRENGTH 47500
SUBSEQUENT COAT:	None.
REMARKS:	
Colour of curing agent:	The curing agent 98510 has a tendency to become darker at storage. This has no influence on performance, but may influence the shade of the mixed product.
Weathering/ service temperatures:	The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 125-150 micron/5-6 mils. It is recommended to use heavy airless spray equipment with a pump transmission rate of 60:1 (approximately), and a theoretical output of min. 12 litres per minute.
Curing agent:	Curing agent 98510 is hazy. This is intended and has no negative influence on the performance.
Thinning:	Normally not to be diluted.
Note:	**HEMPADUR ULTRA-STRENGTH 47500 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 4750050630CR001

For product description refer to product data sheet

HEMPADUR ULTRA-STRENGTH 47500

BASE 47509 with CURING AGENT 98510

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR ULTRA-STRENGTH 47500 when used as a coating for cargo holds of dry bulk cargoes.

Surface preparation:

Newbuildings:
For optimum performance the following is recommended:
Pores in welds to be sufficiently open to allow penetration of the paint.Undercuts, sharp edges of end craters to be avoided. Careful stripe coating or filling should be carried out.

All sharp edges to be broken or rounded. Laminations to be removed. Rolled profiles, etc. from the steel mills normally have acceptably rounded edges.

All loose weld spatters to be removed. Well adhering, scattered weld spatter is acceptable, but will need additional touch-up. If dense, they must be removed by grinding.

Further reference is made to ISO 8501-3:2006, surface preparation grade P2.

Welds and damages to be abrasive grit blasted to minimum Sa 2. Approved zinc silicate shop primer to be removed to Sa 2. Other types of shop primer to be removed to minimum Sa 2½. The surface profile to be equivalent to Rugotest No. 3, BN9-BN10, Keane-Tator Comparator, 3.0 G/S or ISO 8503-1:2007, MEDIUM (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting.

Block assembly zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given greater and greater overlaps - old layers being roughened corresponding to these overlaps (when sandpapering, use free-cut paper, grain size 80).

Block assembly zones are preferably to be abrasive spot-blasted. However, mechanical cleaning to St 3 may be acceptable if zones are narrow and an extra coat of HEMPADUR ULTRA-STRENGTH 47500 diluted approx. 10-15% is applied to these areas as the first coat.

Abrasive residues and visible dust must be removed.

HEMPADUR 15590 may be used as a blast primer/hold-coat (min. temperature10°C/50°F) or alternatively HEMPADUR ULTRA-STRENGTH 47500 diluted 15-25% with HEMPEL'S THINNER 08450.

Major refurbishments and repairs:
Previously coated steel to be abrasive blast cleaned to min. Sa 2, ISO 8501-1:2007. High pressure water cleaning or water jetting is recommended to precede abrasive blast cleaning for heavily corroded steel, including pitted steel to remove salt contamination. Minimum water pressure is 400 bar, preferably above 500 bar.

The fresh water cleaning will assist in removing salt residues, yet total removal of salts embedded in the pits will in practise, on large areas, be extremely difficult irrespective of method of cleaning.

Application equipment: HEMPADUR ULTRA-STRENGTH 47500, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter
	max. 30 metres/100 feet, 3/8" internal diameter
	max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh
Regular surfaces:	Corrugated bulkheads, hoppers and similar large regular areas
Nozzle size:	.021"-.023"
Fan angle:	60-80°
Complicated surfaces:	
Nozzle size:	.019"
Fan angle:	40°.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing spray hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning. Airless spray data are indicative and subject to adjustment.

Application:

Film-build/continuity: It is especially important that a continuous, pinhole-free paint film is obtained at application of each spray applied coat. An application technique which will ensure good film formation on all surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, the viscosity of the paint must suitable for obtaining proper and steady atomising. The spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

Dry film thickness: The time to first loading of cargo, particular hard, angular cargoes, as well as general performance are strongly influenced by the dry film thickness. The total dry film thickness should be between 80% and 200% of the specified dry film thickness or between 200 micron/8 mils and 500 micron/20 mils for a 250 micron/10 mils specification. The average dry film thickness should not exceed 350 micron/14 mils. Areas which due to their structural design such as rear side of shell frames and brackets are allowed a maximum of 220% of the specified dry film thickness or 550 micron/22 mils. Sagging, particularly in corners and along edges must be remedied. Frequent control of wet film thickness during application as well as dry film thickness between coats is strongly recommended.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating: Apply one or two stripe coats as a uniform, coherent film showing good film formation without excessive brush or roller marks in order to avoid entrapped air and subsequent popping.

Pot life/mixing/ induction time:

When measured under standard conditions the pot life is 2 hours at 15°C/59°F and 1 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must be done properly, preferably by weighing base and curing agent. The weight ratio for HEMPADUR ULTRA-STRENGTH 47500 is 130 parts by weight of base and 25 parts by weight of curing agent. The mixing rate by volume is 3.0 parts of base and 1.0 part of curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	2 hours	1 hour	½ hour	(1/4 hour)

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
The paint material itself should preferably be min 15°C/59°F. At steel temperatures below 5°C/41°F the paint may advantageously be prereacted 10 minutes before spray application (longer prereaction time at lower steel temperatures).

When two-component spray equipment is used, heating may be relevant to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Physical data versus temperature:

(HEMPADUR ULTRA-STRENGTH 47500 in a dry film thickness of 125 micron/5 mils):

Surface temperature	10°C/50°F	20°C/68°F	30°C/86°F
Drying time	8 hours	3 hours	1 ½ hours
Curing time*	18 days	7 days	3½ days
Initial curing*	13 days	5 days	2½ days

* exposure to water: ask for special instructions.

Surface temperature	5°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Drying time	32 hours	14 hours	7 hours	5 hours
Curing time	28 days	14 days	7 days	3½ days
Initial curing*	20 days	10 days	5 days	2½ days

Ventilation:

Correct film formation depends on adequate ventilation during drying.

The total volume of solvent vapour released until the coating is completely dry is 57 litres for one litre of undiluted HEMPADUR ULTRA-STRENGTH 47500.

The lower explosive limit, LEL, is 0.6%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 95 m^3 per litre paint.

Time to first cargo:

The time for first loading of cargo depends to a large extent on the application conditions and how effectively solvents are removed by ventilation.

The temperature during application and curing is a major factor as solvent releases faster at higher temperatures.

Excessive dry film thickness retards evaporation of solvent. The dry film thickness to be kept within the limits described above.

Provided that the dry film thickness is kept within the defined limits and all coated surfaces are properly ventilated during application and curing the cargoes can be loaded according to the following table:

Surface temperature	5°C/41°F	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F
Type of cargo	Soft cargoes	Physically hard and angular cargoes				
Days to first loading	7	9	7	6	5	3

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S – 4750011480CR001.

HEMPADUR FIBRE 47601/ HEMPADUR FIBRE 47603

47601: BASE 47609 with CURING AGENT 97330
47603: BASE 47609 with CURING AGENT 98420

Description:

HEMPADUR FIBRE 47601/47603 is a two-component, high-build, polyamide adduct-cured epoxy paint which cures to a hard and tough abrasion resistant anticorrosive coating with improved crack resistance. Reinforced with inorganic fibres**.**

Recommended use:

For ballast water tanks and similar areas.
HEMPADUR FIBRE 47603 is intended for use in cold/temperate climates and for in-shop applications where fast handling is required, HEMPADUR FIBRE 47601 is intended for use in temperate to warm climates. Reddish-grey aluminium shade (19530) can advantageously be used as first coat.

Features:

- Improved crack resistance
- Excellent anticorrosive and mechanical properties
- Tough and anticorrosive
- Short drying time
- Curing down to -10°C/14°F
- VOC compliant

Service temperatures:

Dry exposure only:	Maximum 140°C/284°F *(See REMARKS overleaf)*
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	40°C/104°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

Classified B1 by DNV, Norway.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

	47601	**47603**
Version; mixed product:		
Colours/Shade nos:	Grey/12170*	Grey/12170*
Finish:	Semi-flat	Semi-flat
Volume solids, %:	70 ± 1	70 ± 1
Theoretical spreading rate:	4.7 m^2/litre - 150 micron 187 sq.ft./US gallon - 6 mils	4.7 m^2/litre - 150 micron 187sq.ft./US gallon - 6 mils
Flash point:	32°C/90°F	32°C/90°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon	1.4 kg/litre - 11.7 lbs/US gallon
Dry to touch:	7 hours *(app.)* at 20°C/68°F	16 hours (app.) at 5°C/41°F
Fully cured:	7 days at 20°C/68°F	20 days at 5°C/41°F
V.O.C.:	305 g/litre - 2.5 lbs/US gallon ** See REMARKS overleaf.*	305 g/litre - 2.5 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

	47601		**47603**	
Mixing ratio:	Base 47609 : Curing agent 97330 4 : 1 parts by volume		Base 47609 : Curing agent 98420 4 : 1 parts by volume	
Application method:	Airless spray	Brush	Airless spray	Brush
Thinner (max.vol.):	08450 (5%) *See REMARKS overleaf*	08450 (5%)	08450 (5%)	08450 (5%)
Pot life:	2 hours (20°C/68°F)		2 hours (20°C/68°F)	
Induction time:	See REMARKS overleaf			
Nozzle orifice:	.023"-.025"			
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*			
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610			
Indicated film thickness, dry:	150 micron/6 mils (See REMARKS overleaf)			
Indicated film thickness, wet:	225 micron/9 mils			
Recoat interval, min:	See separate APPLICATION INSTRUCTIONS			
Recoat interval, max:	See separate APPLICATION INSTRUCTIONS			

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR FIBRE 47601/47603

SURFACE PREPARATION:	**New steel:** When used selfprimed surface preparation as to specification. When being an integral part in heavy duty systems abrasive blasting to Sa 2½. Reference is made to separate APPLICATION INSTRUCTIONS. **Ballast tanks:** For PSPC type approved coating, consult separate APPLICATION INSTRUCTIONS - BALLAST TANKS for HEMPADUR FIBRE 47601/47603. **Stainless steel:** (Ballast tanks in chemical carriers) to be abrasive blasted to a uniform, sharp, *dense* profile, ISO Comparator Medium (G), corresponding to Rz minimum 50 micron. Any salts, grease, oil, etc. to be removed before abrasive blasting is commenced. **Repair:** Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR FIBRE 47601/47603. As an alternative to dry cleaning, water jetting to sound, well adhering coat and/or to steel. Intact coat must appear with roughened surface after the water jetting. By water jetting to steel, cleanliness shall be Wa 2 - WA 2½ (atmospheric exposure) / minimum Wa 2½ (immersion) (ISO 8501-4:2006). A flash-rust degree of maximum M (atmospheric exposure) / M, preferably L (immersion) (ISO 8501-4:2006) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. Touch up to full film thickness.
APPLICATION CONDITIONS:	Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Use only where application and curing can proceed at temperatures above -10°C/14°F (curing agent 98420) and 0°C/32°F (curing agent 97330). The temperature of the paint itself should be above 15°C/59°F for proper application. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	None or according to specification.
REMARKS:	
Weathering/ service temperatures:	The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.
Application equipment:	A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 125-200 micron/5-8 mils.
Shades:	Other shades are available according to assortment list. The aluminium pigmented version, shade no. 19530, reddish grey, is designed for primer-coat application, holds a lower volume solids (65%) and a slightly higher VOC (335 g/litre - 2.8 lbs/US gallon) than the other shades. The aluminium pigmented version, shade no. 19530 contains approximately 9.5% aluminium on weight in the dry film.
Thinning:	Max. 5% thinning is recommended in order to ensure proper filmformation.
Mixing/ induction time:	To facilitate proper application properties it is recommended to allow the thoroughly mixed BASE and CURING AGENT to pre-react before application. In case two-component spray-equipment is used, paint material is to be heated. Consult separate APPLICATION INSTRUCTIONS.
Curing agent:	Curing agent 98420 is hazy. This is intended and has no negative influence on the performance.
Note:	**HEMPADUR FIBRE 47601/47603 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 4760112170CR001/4760312170CR001

For product description refer to product data sheet

HEMPADUR FIBRE 47601/ HEMPADUR FIBRE 47603

47601: BASE 47609 with CURING AGENT 97330
47603: BASE 47609 with CURING AGENT 98420

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR FIBRE 47601/47603.

Surface preparation:

New steel: When used selfprimed surface preparation as to specification. When being an integral part in heavy duty systems abrasive blasting to Sa 2½.
New steel, ballast tanks and similar areas: Abrasive blasting to Sa 2½. For temporary protection, if required, use a suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting - preferably by abrasive blasting. For repair and touch-up, use HEMPADUR 47601/47603. Reference is made to separate Application Instructions - Ballast Tanks

Repair: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR FIBRE 47601/47603.

Application equipment:

HEMPADUR FIBRE 47601/47603 being a high viscosity material may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter max. 30 metres/100 feet, 3/8" internal diameter max. 6 metres/20 feet, 1/4" internal diameter
Filter:	Should be removed
Nozzle size:	.023"-.025"
Fan angle:	60-80°.

To spray complicated surfaces smallest nozzles should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by excessive thinning.

Airless spray data are indicative and subject to adjustment

HEMPADUR FIBRE 47601/47603

Application:

Film-build/continuity: For high performance paint specifications it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. Avoid exaggerated film thickness due to the risk of sagging, cracks and solvent retention. The paint consumption must be controlled.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating: may either be applied by airless spray, (relatively small, narrow-angled nozzles) or by hand-tools. Apply the stripe coat as a uniform, regular film without excessive brush or roller marks in order to avoid cratering by entrapped air.

First coat on steel substrates:

HEMPADUR FIBRE 47601/3 in shade 19530 (Reddish grey) is recommended as first coat when the product is applied directly to steel substrates - independent of method of surface preparation.

Pot life/mixing/ induction time (both curing agents):

When measured under standard conditions the pot life is 3 hours at 15°C/59°F and 2 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 86 parts by weight of base and 14 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At **steel** temperatures below 5°C/41°F the paint may advantageously be prereacted 10-20 minutes before spray application (longer pre-reaction time at lower temperatures).

When two-component spray equipment is used, heating may be relevant to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

HEMPADUR FIBRE 47601/47603

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY:

HEMPEL A/S - 4760112170CR001/4760312170CR001

Attached:

Tables of "physical data versus temperature"

In relation to recoating intervals the following is very important:

Maximum recoating intervals:
If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR and HEMPADUR FIBRE, apply a (thin) additional coat of HEMPADUR FIBRE 47601/47603 within the following directions for recoating:

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing.

- **Any degraded surface layer, as a result of a long exposure period, must be removed as well**. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

Physical data versus temperature:

(HEMPADUR FIBRE 47601 in a dry film thickness of 150 micron/6 mils):

Surface temperature	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time	32 hours	14 hours	7 hours	5 hours	3 hours
Curing time	28 days	14 days	7 days	3½ days	2 days
Initial curing	20 days	10 days	5 days	2½ days	1½ days

(HEMPADUR FIBRE 47603 in a dry film thickness of 150 micron/6 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Drying time	45 hours	23 hours	10 hours	5 hours	4 hours
Curing time	56 days	28 days	14 days	7 days	3½ days
Initial curing	40 days	20 days	10 days	5 days	2½ days

Recoating: Recoating intervals (provided proper ventilation)

(HEMPADUR FIBRE 47601 in a dry film thickness of 150 micron/6 mils):

Surface temperature	10°C/50°	20°C/68°F	30°C/86°F
MINIMUM recoating interval related to later conditions of exposure:			
Interval for recoating with 58030			
Atmospheric, medium	24 hours	12 hours	6 hours
Atmospheric, severe	24 hours	12 hours	6 hours
Interval for recoating with HEMPADUR, HEMPADUR FIBRE, HEMPATHANE and HEMPAXANE qualities			
Atmospheric, medium	12 hours	6 hours	4 hours
Atmospheric, severe	14 hours	7 hours	5 hours
Immersion*	16 hours	8 hours	5 hours
MAXIMUM recoating interval related to later conditions of exposure:			
Interval for recoating with 58030			
Atmospheric, medium	6 days	3 days	36 hours
Atmospheric, severe	3 days	1½ days	18 hours
Interval for recoating with HEMPADUR and HEMPADUR FIBRE qualities			
Atmospheric, medium	None	None	None
Atmospheric, severe	None	None	None
Immersion**	90 days	30 days	15 days
Interval for recoating with HEMPATHANE qualities			
Atmospheric, medium	20 days	10 days	5 days
Atmospheric, severe	6 days	3 days	36 hours
Immersion	Not relevant	Not relevant	Not relevant
Interval for recoating with HEMPAXANE qualities			
Atmospheric, medium	60 days	30 days	15 days
Atmospheric, severe	42 days	21 days	10 days
Immersion	Not relevant	Not relevant	Not relevant

* Only relevant for HEMPADUR qualities.
** Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

Furthermore, please see page 3.

HEMPADUR FIBRE 47601/47603

Physical data versus temperature Infield application:

(HEMPADUR FIBRE 47603 in a dry film thickness of 150 micron/6 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F
MINIMUM recoating interval related to later conditions of exposure:				
Interval for recoating with 58030				
Atmospheric, medium	Not relevant	Not relevant	16 hours	8 hours
Atmospheric, severe	Not relevant	Not relevant	16 hours	8 hours
Interval for recoating with HEMPADUR, HEMPADUR FIBRE, HEMPATHANE and HEMPAXANE qualities				
Atmospheric, medium	36 hours	18 hours	8 hours	4 hours
Atmospheric, severe	45 hours	23 hours	10 hours	5 hours
Immersion*	54 hours	27 hours	12 hours	6 hours
MAXIMUM recoating interval related to later conditions of exposure:				
Interval for recoating with 58030				
Atmospheric, medium	Not relevant	Not relevant	6 days	3 days
Atmospheric, severe	Not relevant	Not relevant	3 days	1½ days
Interval for recoating with HEMPADUR and HEMPADUR FIBRE qualities				
Atmospheric, medium	None	None	None	None
Atmospheric, severe	None	None	None	None
Immersion**	(90 days)	90 days	60 days	30 days
Interval for recoating with HEMPATHANE qualities				
Atmospheric. medium	90 days	45 days	20 days	10 days
Atmospheric, severe	30 days	15 days	6 days	3 days
Immersion	Not relevant	Not relevant	Not relevant	Not relevant
Interval for recoating with HEMPAXANE qualities				
Atmospheric. medium	Not relevant	90 days	60 days	30 days
Atmospheric, severe	Not relevant	60 days	42 days	21 days
Immersion	Not relevant	Not relevant	Not relevant	Not relevant

* Not relevant for HEMPATHANE qualities.
** Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

Furthermore, please see page 3.

Workshop application:

For Workshops managing strict consumption control and equipped with proper ventilation, minimum recoat interval may be reduced for HEMPADUR FIBRE 47603:

(125 micron/5 mils dry film thickness of HEMPADUR FIBRE 47603)

Surface temperature	10°C/50°F	20°C/68°F	30°C/86°F
MINIMUM Interval for recoating with HEMPADUR, HEMPADUR FIBRE and HEMPATHANE qualities			
Atmospheric, medium	4 hours	2 hours	1½ hours
Atmospheric, severe	4 hours	2 hours	1½ hours

BALLAST TANKS

For product description refer to product data sheet

HEMPADUR FIBRE 47601/ HEMPADUR FIBRE 47603

47601: BASE 47609 with CURING AGENT 97330
47603: BASE 47609 with CURING AGENT 98420

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR FIBRE 47601/47603 when applied in ballast tanks according to the requirements in IMO Resolution MSC.215(82): Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers (PSPC). The Applications Instructions are applicable also for vessels not covered by PSPC.

Ballast tanks, steel work:

The steel shall preferably be Rust Grade A or B according to ISO 8501-1. The use of steel with Rust Grade C requires more tight inspection of surface profile after blasting as well as of possible salt contamination.

The steel surface shall be prepared so that the coating achieves an even distribution at the specified nominal dry film thickness of 320 micron and has an adequate adhesion by removing sharp edges, grinding weld beads and removing weld spatter and any other surface contamination. PSPC makes reference to ISO 8501-3: “Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness”.

For optimum performance the following is recommended: All welding seams shall be partially dressed to remove irregular profiles.

Surface pores, pits and craters shall be sufficiently open to allow penetration of the paint.

Sharp edges shall be treated to a rounded radius of minimum 2 mm, subjected to a three-pass grinding or treated with an equivalent process that produces an edge profile that results in a dry film thickness retention equivalent to or better than that of three pass grinding. Sharp edge means all edges except natural rounded/rolled edges of sections or profiled steel bars.

Visible roll overs/laminations shall be removed.

The surface shall be free of all loose welding spatter.

Abrasive blasting/ abrasive sweep blasting:

The coating system shall only be applied on steel primed with a pre-qualified zinc containing inhibitor free zinc silicate shopprimer according to PSPC, Table 1.2.1-3. Steel shopprimed with a shopprimer not pre-qualified must be abrasive blast cleaned to Sa 2 removing at least 70% of intact shopprimer, while steel, which has not been shopprimed must be blasted to Sa 2½.

Before blasting any deposits of grease or oil must be removed from the steel surface using a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

The shopprimer must have been checked randomly for excessive film thickness. Areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be blasted to Sa 2 removing at least 70% of the shopprimer.

Welds as well as shopprimed areas with damage, burn marks and rust must be blasted to Sa 2½.

Surfaces with zinc salts, deposits of black iron oxides from plasma cutting, markings and similar foreign matters shall be cleaned by light abrasive sweep blasting.

Welds coated with a temporary (shop)primer after welding must be cleaned by hard abrasive sweeping, preferably abrasive blasting.

Spot-checks for possible salt contamination of the surface must be executed after secondary surface preparation. The upper water soluble salts limit is 50 mg/m² sodium chloride equivalents when measured according to ISO 8502-6:2006 and ISO 8502-9:1998. To limit salt contamination from abrasives it is recommended to use abrasives showing a water-soluble contaminant level equivalent to less than 25 mS/m according to ISO 11127-6:1993.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

In the case of full or partial abrasive blast cleaning, the surface profile must conform to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S or to ISO 8503-1, grade Medium (G).

Dust must be removed just before application of the paint to a dust quantity rating "1" for dust size class "3", "4" or "5". Lower dust size classes shall be removed from the surface if visible without magnification.

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given larger and larger overlaps. Roughening must be carried out when the maximum recoating interval is exceeded (when sand papering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible. Application of a thin zinc epoxy primer coat on these areas after secondary surface preparation at block stage is acceptable if removed before the application of HEMPADUR FIBRE 47601/47603.

Secondary surface preparation of block assembly zones is preferably abrasive spot-blasting or mechanical cleaning to St 3. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Stainless steel: (Ballast tanks of chemical carriers) To be abrasive blast cleaned to a uniform, sharp, dense, profile (Rugotest No. 3, BN9-10, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. shall be removed before abrasive blasting is commenced. Surface preparation and paint application to be carried out concurrently with treatment of surrounding carbon steel.

Application equipment:

HEMPADUR FIBRE 47601/47603, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter max. 30 metres/100 feet, 3/8" internal diameter max. 6 metres/20 feet, 1/4" internal diameter
Filter:	should be removed
Nozzle size:	.023"-.025"
Fan angle:	60-80°.

To spray complicated surfaces a smaller nozzle size should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are used it may be necessary to increase the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by exaggerated thinning.

Airless spray data are indicative and subject to adjustment.

Application:

PSPC requires the application of minimum two spray applied coatings and minimum two stripe coats. The relative humidity shall be 85% or below or the steel temperature shall be 3°/5°F or above the dew point.

Spray application: A continuous, pinhole-free paint film must be obtained at application of each spray applied coat. An application technique which will ensure good film formation on all surfaces must be adopted. It is very important to use nozzles of the correct size, not too large, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. even though these areas also must be stripe coated. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust spray.

The paint layer must be applied homogeneously and as close to the specification as possible. Care shall be taken to avoid exaggerated film thicknesses. Wet film thickness shall be regularly checked during the application.

The finished coating must appear as a homogeneous film with a smooth. Any defective areas, e.g. pin-holes, bubbles, voids, visible abrasive residues, shall be marked up and appropriate repair effected.

Stripe coating: The required two stripe coats must each be applied as a coherent film showing good film formation and no visible defects such as pores or un-wetted areas. The application method must ensure that all areas which require stripe coating are properly stripe coated by alternative application methods which include brush or roller. Application by airless spray requires the use of relatively small, narrow-angled nozzles. PSPC accepts that the second stripe coat, by way of welded seams only, may be reduced in scope where it is proven that the nominal dry film thickness (NDFT) can be met by the coats applied. The first stripe coating should preferably be applied after first full coat to avoid contamination of the steel substrate.

Pot life/mixing/ induction time:

When measured under standard conditions the pot life is 3 hours at 15°C/59°F and 2 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 86 parts by weight of base and 14 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

BALLAST TANKS

HEMPADUR FIBRE 47601/47603

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At steel temperatures below 5°C/41°F the paint may advantageously be prereacted 10-20 minutes before spray application (longer prereaction time at lower steel temperatures).

Two-component spray equipment: Heating may be required to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Dry film thickness:

PSPC requires that the nominal dry film thickness (NDFT) shall be 320 micron and achieved by minimum two spray coats and two stripe coats. The dry film thickness distribution shall be evaluated according to the 90/10 rule.

Dry film thickness (DFT)	DFT micron/mils	Remark
Minimum DFT per coat	90/3.5	Value for undiluted paint at approximately 20°C/68°F. Lower DFT may be achieved by thinning
Maximum DFT (complete coating system)	2,000/80	The maximum DFT is valid for isolated spots less than 1% of the total surface area per tank. No more than 5% of the area must be above 1,500 micron/52 mils. The stated maximum DFT is for guidance and should be kept as close to the specified nominal DFT as possible. Frequent control of wet film thickness during application is recommended

Physical data versus temperature:

(HEMPADUR FIBRE 47601 in a dry film thickness of 160 micron/6.4 mils):

Surface temperature	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time	32 hours	14 hours	7 hours	5 hours	3 hours
Walk-on time	32 hours	14 hours	7 hours	5 hours	3 hours
Curing time	28 days	14 days	7 days	3½ days	2 days
Initial curing*	20 days	10 days	5 days	2½ days	1½ days

(HEMPADUR FIBRE 47603 in a dry film thickness of 160 micron/6.4 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Drying time	45 hours	23 hours	10 hours	5 hours	4 hours
Walk-on time	45 hours	23 hours	10 hours	5 hours	4 hours
Curing time	56 days	28 days	14 days	7 days	3½ days
Initial curing*	40 days	20 days	10 days	5 days	2½ days

* When the state "initial curing" has been reached, the coating may exceptionally be exposed to ballast water provided it has been applied within the specified limits of film thicknesses and that all painted areas have been subject to thorough ventilation.

Recoating:

Recoating intervals (provided proper ventilation)
(HEMPADUR FIBRE 47601 in 160 micron/6.4 mils dry film thickness):

Interval	Minimum				Maximum			
Steel temperature	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Recoating time**	17 hours	9 hours	7 hours	4 hours	60 days*	30 days*	22.5 days*	15 days*

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.
** Stripe coat can be applied when it is possible to walk on the surface without damage to the coating.

(HEMPADUR FIBRE 47603 in 160 micron/6.4 mils dry film thickness):

Interval	Minimum				Maximum			
Steel temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F
Recoating time**	59 hours	29 hours	13 hours	7 hours	(90 days)*	90 days*	60 days*	30 days*

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.
** Stripe coat can be applied when it is possible to walk on the surface without damage to the coating.

Maximum recoating intervals:
Roughening of the surface is necessary to ensure optimum intercoat adhesion if the maximum recoating interval is exceeded.

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts shall be removed by fresh water hosing.
- Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

8.2 Repair process

During construction
Before mechanical surface preparation is started the areas to be repaired shall be cleaned for any salts and other contamination.

Overlap zones shall be suitably prepared and coated.

Small areas: Small areas in this context are areas up to approximately A4 size (20x30 cm) or scratches of up to a few millimetres across. Cracks, in corners or at single runners, may preferably be repaired according to this method, even if they fall outside the area definition.

The surface preparation can be executed by sanding or grinding to a clean rough metal surface, feathering edges of intact coating and slightly roughening the adjacent surface and remove all dust. Touch-up with the coating material specified using stippling for the first brush coat.

Contiguous areas: Contiguous areas over 25 m²/270 sq.ft. or over 2% of the total area of the tank are to be repaired basically according to the original specification. Precautions must be taken against damage from overblasting.

During service
Maintenance and repair during service is subject to the actual condition of the area under consideration. Reference is made to IMO Guidelines for maintenance and repair of protective coatings (MSC.1/Circ.1330).

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 4760112170CR001/4760312170CR001

HEMPADUR QUATTRO FIBRE 47604

BASE 47606 with CURING AGENT 97334

Description:

HEMPADUR QUATTRO FIBRE 47604 is a two-component aluminium pigmented universal epoxy paint with synthetic mineral fibres, which cures to a hard, tough and abrasion resistant coating with superior anticorrosive properties, good resistance to seawater and various oils and significantly improved crack resistance.

Recommended use:

As a universal epoxy and self primed superior performance coating system for atmospheric or in-water service. HEMPADUR QUATTRO FIBRE 47604 is intended for all year application down to -10°C/ 15°F and for in-shop applications where fast recoating and handling is required. Can reduce cracking and break down in high stress areas characterised by harsh in-service conditions such as mechanical flexing/impacts and cycling of wet/dry conditions and high/low service temperatures.
For in-water service, the reddish aluminium shade (19530) can advantageously be used as first coat.

Features:

Improved crack resistance
Superior anticorrosive and mechanical properties
Short drying time
Curing down to -10°C/14°F

Service temperatures:

Dry exposure only:	Maximum 120°C/248°F
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	40°C/104°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Reddish grey/19530*
Finish:	Semi-flat
Volume solids, %:	75 ± 1 *(See REMARKS overleaf)*
Theoretical spreading rate:	6 m²/litre - 125 micron 241 sq.ft./US gallon - 5 mils
Flash point:	27°C/81°F
Specific gravity:	1.38 kg/litre - 11.4 lbs/US gallon
Dry to touch:	4 hours *(app.)* at 20°C/68°F 9 hours (app.) at 5°C/41°F
Fully cured:	7 days at 20°C/68°F 20 days at 5°C/41°F
VOC:	305 g/litre - 2.5 lbs/US gallon *other shades according to assortment list. *(See REMARKS overleaf)*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

	47604
Mixing ratio:	Base 47606 : Curing agent 97334 4 : 1 parts by volume
Application method:	Airless spray Brush/Roller
Thinner (max.vol.):	08450 (5%) 08450 (5%)
Pot life:	Airless spray: 2 hour (20°C/68°F) Brush 2 hours (20°C/68°F)
Induction time:	See REMARKS overleaf
Nozzle orifice:	.021"-.025"
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	125 micron/5 mils (See REMARKS overleaf)
Indicated film thickness, wet:	Approx 175 micron/7 mils
Recoat interval, min:	4 hours (20°C/68°F) 12 hours (5°C/41°F)
Recoat interval, max:	See separate APPLICATION INSTRUCTIONS

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR QUATTRO FIBRE 47604

SURFACE PREPARATION:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to Sa 2½. For temporary protection, if required, use a suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch up, use HEMPADUR QUATTRO FIBRE 47604.
Repair and maintenance: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR QUATTRO FIBRE 47604. As an alternative to dry cleaning, water jetting to sound, well adhering coat and/or to steel. Intact coat must appear with roughened surface after the water jetting. By water jetting to steel, cleanliness shall be Wa 2 - WA 2½ (atmospheric exposure) / minimum Wa 2½ (immersion) (ISO 8501-4:2006). A flash-rust degree of maximum M (atmospheric exposure), preferably L (immersion) (ISO 8501-4:2006) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. Touch up to full film thickness.
On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.
Other substrates: Contact Hempel.

APPLICATION

Use only where application and curing can proceed at temperatures above -10°C/14°F. The temperature of the paint itself should be above 15°C/59°F for proper application. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation.
In confined spaces provide adequate ventilation during application and drying.

SUBSEQUENT COAT:

According to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase II, 2010
VOC in g/l	305	331	500

VOC:

For VOC of other shades, please refer to Safety Data Sheet.

Shades:

Other shades are available according to assortment list. The aluminium pigmented version, shade no. 19530, reddish grey, is designed for primer-coat application and has a volume solids of 72% and a VOC of 305 g/litre - 2.5 lbs/US gallon. Shade 19530 contains approx. 9.5% aluminium on weight in the dry film.

Weathering/ service temperatures:

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product. HEMPADUR QUATTRO FIBRE 47604 has a tendency to yellow after application.This has no influence on the performance nor does the yellowing effect any topcoat applied.

Film thicknesses:

May be specified in other film thicknesses than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 100-200 micron/4-8 mils.

Curing agent:

Curing agent 97334 is hazy. This is intended and has no influence on the performance.

Mixing/ Induction time:

In order to facilitate proper application properties it is recommended to allow the thoroughly mixed mixed BASE and CURING AGENT to pre-react before application at temperatures below 15°C/59°F

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

In case two-component spray-equipment is used consult separate APPLICATION INSTRUCTIONS.

Application equipment:

Filter: Surge tank filter and tip filter should be removed.

Note:

HEMPADUR QUATTRO FIBRE 47604 is for professional use only.

ISSUED BY:

HEMPEL A/S – 4760419530CR001

This Product Data Sheet supersedes those previously issued.
For explanations, definitions and scope, see "Explanatory Notes" in the HEMPEL Book.
Data, specifications, directions and recommendations given in this data sheet represent only test results or experience obtained under controlled or specially defined circumstances. Their accuracy, completeness or appropriateness under the actual conditions of any intended use of the Products herein must be determined exclusively by the Buyer and/or User.
The Products are supplied and all technical assistance is given subject to HEMPEL's GENERAL CONDITIONS OF SALES, DELIVERY AND SERVICE, unless otherwise expressly agreed in writing. The Manufacturer and Seller disclaim, and Buyer and/or User waive all claims involving, any liability, including but not limited to negligence, except as expressed in said GENERAL CONDITIONS for all results, injury or direct or consequential losses or damages arising from the use of the Products as recommended above, on the overleaf or otherwise.

For product description refer to product data sheet

HEMPADUR QUATTRO FIBRE 47604

BASE 47606 with CURING AGENT 97334

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR QUATTRO FIBRE 47604.

Ballast tanks:

HEMPADUR QUATTRO FIBRE 47604 is pending for IMO-PSPC type approval. For ballast tank application at newbuilding stage according to IMO-PSPC HEMPADUR FIBRE 47601/3 is to be used

Abrasive blasting/ abrasive sweep blasting:

Before blasting any deposits of grease or oil must be removed from the steel surface with a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

Repair:
Before blasting, old steel surfaces must be checked for any contamination. Possible blisters must be broken. If thick rust scale has been removed or deep pittings have been encountered, control procedures for contamination must be carried out. If still contaminated, the abrasive blast cleaned steel surface will need a repeated cleaning for salts and/or oil/grease followed by final abrasive blast cleaning.

Newbuilding/new steelwork: To obtain full performance of the ballast tank coating, welds, burns, damaged and rusty shopprimer must be abrasive blast cleaned to Sa 2½. Minor areas mechanically cleaned to St 3.

If welds have previously been coated with a (shop)primer just after welding this (shop)primer must be removed by abrasive blasting (sweeping) in order to obtain optimum performance.

Intact shopprimer:
Zinc salted surfaces, deposits of black iron oxides of plasma cutting and similar foreign matters to be removed by light abrasive sweep blasting. Chalk markings and plate marking of a non-compatible nature to be removed as well.

The shopprimer must have been checked randomly for excessive film thicknesses and areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be sweep blasted in order to remove most of the shopprimer.

Spot-checking for possible salt contamination of the surface to be executed before and after abrasive sweep blasting.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

In the case of abrasive blast cleaning, the surface profile must be equivalent to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S. According to ISO 8503-1 the grade will be MEDIUM (G).

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given greater and greater overlaps - old layers being roughened corresponding to these overlaps (when sand papering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible - or left with a **thin** zinc epoxy primer coat applied on these areas after secondary surface preparation at blockstage.

Secondary surface preparation of block assembly zones are preferably to be abrasive spot-blasted. However, mechanical cleaning to St 3 may be acceptable if zones are narrow and an extra coat of HEMPADUR QUATTRO FIBRE 47604 is applied to these areas. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Repair:
Corroded pits deeper than approx 2 mm, but not repaired by welding, are recommended to be filled with HEMPADUR EPOXY FILLER 35250 after blast priming has been carried out.

Stainless Steel: (Ballast tanks of chemical carriers) to be abrasive blast cleaned to a uniform, sharp, **dense**, profile (Rugotest No. 3, BN9-10, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. to be removed before abrasive blasting is commenced.

Water jetting:

This procedure will primarily be relevant for repair jobs. However, the very good removal of water-soluble salts may also make it useful in other cases.

The resulting standard is to be equal to the Wa 2½ (ISO 8501-4:2006).

Sufficient dehumidification equipment must be used to dry out the tanks as quickly as possible between the water jetting and the coating application.

Local ventilators may be required to distribute the drying air evenly in tanks. All "slurry" is to be removed before it dries. New rust will be acceptable as discoloration only, **not** as powdery, loose rust. Acceptable degree of flash rust is maximum M (ISO 8501-4:2006). Inhibitors are **not** to be used.

All surfaces must be free from contamination at the time of painting and the relative humidity is to be below 85%.

Refurbishment:

It is recommended to carry out rough abrasive blast cleaning - or water jetting - to facilitate visual inspection and any necessary repair of the existing steel work. In the case of pit-corroded tank bottoms this rough blasting will also provide a better basis for a decision between welding of corroded pits or repair by filling.

A main concern is the contamination from sea water (water-soluble, corrosive salts). The preventive method will be to include very thorough cleaning with plenty of fresh water, please see below.
The maximum allowable concentration of chlorides on steel surfaces immediately before application is 7.0 microgrammes/cm² as detected by the "Bresle Method".

In the case of contamination, cleaning procedures must be repeated and/or improved. Especially pit-corroded steel will need special attention and the only possible way to remove contamination from the pits may often be to carry out very thorough cleaning with fresh water after abrasive blast cleaning. After repeated control and drying, the entire surface will need abrasive blast cleaning to obtain the specified degree of cleaning. Alternatively, the pit-corroded areas are cleaned by water jetting, any surplus of water is mopped up or removed by vacuum cleaning. Allow to dry.

Note: Actual type of steel work and surface preparation is dependent on factors such a shipyard technology, contractual specification, required lifetime, etc. Reference is also made to HEMPEL's Technical Standard for Ballast Tank Coating Work.

HEMPADUR QUATTRO FIBRE 47604

Application equipment:

HEMPADUR QUATTRO FIBRE 47604, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter
	max. 30 metres/100 feet, 3/8" internal diameter
	max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh
Nozzle size:	.021"-.025"
Fan angle:	60-80°.

To spray complicated surfaces smallest nozzles should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning.

Airless spray data are indicative and subject to adjustment.

Application:

Film-build/continuity: With this coating it is of special importance that a continuous, pinhole-free paint film is obtained at application of each spray applied coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. The consumption of paint must be controlled to avoid exaggerated film thickness, e.g. by controlling paint consumption and/or measuring wet film thickness.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating: may either be applied by airless spray, (relatively small, narrow-angled nozzles) or by hand-tools. Apply the stripe coat as a uniform, regular film without excessive brush or roller marks in order to avoid cratering by entrapped air.

Application on zinc silicate:

A proper mist-coat technique is necessary in order to avoid/reduce the risk of popping"/"pinholes". Add up to 50% thinner depending on the actual conditions of application.

HEMPADUR QUATTRO FIBRE 47604

Pot life/mixing/ induction time:

When measured under standard conditions the pot life for spraying is 3 hours at 15°C/59°F and 2 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 86 parts by weight of base and 14 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life (spray application)	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At **steel** temperatures below 5°C/41°F the paint may advantageously be pre-reacted e.g. 10-20 minutes (depending on paint temperature) before spray application (longer pre-reaction time at lower temperatures).

When two-component spray equipment is used, heating may be relevant to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Physical data versus temperature:

(HEMPADUR QUATTRO FIBRE 47604 in a dry film thickness of 125-150 micron/5-6 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time	35 hours	14 hours	7 hours	4 hours	3 hours	2 hours
Curing time	56 days	28 days	14 days	7 days	3½ days	40 hours
Initial curing*	40 days	20 days	10 days	5 days	2½ days	30 hours

* When the state "initial curing" has been reached, the coating may exceptionally be exposed to ballast water provided it has been applied within the specified limits of film thicknesses **and** that all painted areas have been subject to thorough ventilation.

Recoating:

Recoating intervals (provided proper ventilation)

HEMPADUR QUATTRO FIBRE 47604 in a dry film thickness of 125 micron/5 mils:

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°	20°C/68°F	30°C/86°F	40°C/104°F
MINIMUM recoating interval related to later conditions of exposure: **Interval for recoating with HEMPADUR**						
Atmospheric, medium	18 hours	9 hours	4 hours	2 hours	1,5 hours	1 hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours	3 hours	2 hours
Immersion	36 hours	18 hours	8 hours	4 hours	3 hours	2 hours
Interval for recoating with HEMPATHANE, HEMPAXANE and HEMPATEX qualities						
Atmospheric, medium	18 hours	9 hours	4 hours	2 hours	1,5 hours	1 hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours	3 hours	2 hours
Interval for recoating with HEMUCRUL qualities						
Atmospheric, medium	N.R.	N.R.	8 hours	4 hours	3 hours	2 hours
Atmospheric, severe	N.R.	N.R.	8 hours	4 hours	3 hours	2 hours
MAXIMUM recoating interval related to later conditions of exposure: **Interval for recoating with HEMPADUR qualities**						
Atmospheric, medium	None	None	None	None	None	None
Atmospheric, severe	90 days	90 days	60 days	30 days	22,5 days	15 days
Immersion*	90 days	90 days	60 days	30 days	22,5 days	15 days
Interval for recoating with HEMPATHANE and, HEMPAXANE qualities						
Atmospheric, medium	90 days	90 days	40 days	20 days	15 days	10 days
Atmospheric, severe	54 days	27 days	12 days	6 days	4,5 days	72 hours
Interval for recoating with HEMPATEX qualities						
Atmospheric, medium	68 hours	34 hours	15 hours	8 hours	6 hours	4 hours
Atmospheric, severe	68 hours	34 hours	15 hours	8 hours	6 hours	4 hours
Interval for recoating with HEMUCRYL qualities						
Atmospheric, medium	N.R.	N.R.	6 days	3 days	54 hours	36 hours
Atmospheric, severe	N.R.	N.R.	3 days	1½ days	27 hours	18 hours

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact Hempel for further advice.

Maximum recoating intervals:
If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR QUATTRO FIBRE 47604 within the following directions for recoating:

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with e.g. suitable detergent followed by high pressure fresh water cleaning. Salts are to be removed by fresh water hosing.

- **Any degraded surface layer, as a result of a long exposure period, must be removed as well**. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant

HEMPADUR QUATTRO FIBRE 47604

Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
ISSUED BY:	HEMPEL A/S – 4760419530CR001

HEMPADUR UNIQ 47741/ HEMPADUR UNIQ 47743

Summertime application: 47741: BASE 47745 with CURING AGENT 98741
Wintertime application: 47743: BASE 47747 with CURING AGENT 98743

Description:

HEMPADUR UNIQ 47741/47743 is a self-priming, two-component, high-build, pure epoxy paint, polyamide/amine cured. Abrasion and corrosion resistant.

Recommended use:

As an universal primer or selfprimed high performance coating system for atmospheric or in-water service.
It provides the possibility of reducing the number of primers for new-building.
HEMPADUR UNIQ 47741 is intended for use in warm climates above 10°C/50°F.
HEMPADUR UNIQ 47743 is intended for use in cold climates down to -10°C/14°F.
Red or grey alu shades (59690 or 19690) can advantageously be used as first coat.

Features:

- High class ballast tank coating.
- Heavy duty, abrasion resistant coating.
- Overcoatable by a wide range of epoxy- and polyurethane coatings.
- VOC Compliant.
- Applicable by standard heavy duty airless spray equipment in a wide range of film thicknesses.

Service temperatures:

Dry exposure only:	Maximum 140°C/284°F *(See REMARKS overleaf)*
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	50°C/122°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

HEMPADUR UNIQ 47741/47743 have been classified B1 by DNV, Norway.
Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

	47741	**47743**
Version; mixed product:		
Colours/Shade nos:	Grey/12170 - Red/50630 *	Grey/12170 - Red/50630 *
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	80 ± 1	80 ± 1
Theoretical spreading rate:	5.3 m^2/litre - 150 micron 214 sq.ft./US gallon - 6 mils	5.3 m^2/litre - 150 micron 214 sq.ft./US gallon - 6 mils
Flash point:	29°C/84°F	26°C/77°F
Specific gravity:	1.6 kg/litre - 13.4 lbs/US gallon	1.6 kg/litre - 13.4 lbs/US gallon
Dry to touch:	6 hours at 20°C/68°F	10-12 hours at 5°C/41°F
Fully cured:	7 days at 20°C/68°F	21 days at 5°C/41°F
V.O.C.:	215 g/litre - 1.8 lbs/US gallon	220 g/litre - 1.8 lbs/US gallon

** See REMARKS overleaf*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

	47741	**47743**
Mixing ratio:	Base 47745 : Curing agent 98741 3 : 1 by volume	Base 47747 : Curing agent 98743 3 : 1 by volume
Application method:	Airless spray	Airless spray
Thinner:	08450	08450
Pot life:	1 hour (20°C/68°F)	$1^1/_4$ hour (5°C/41°F)
Nozzle orifice and pressure:	See overleaf.	See overleaf.
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	150 micron/6 mils	150 micron/6 mils
Indicated film thickness, wet:	200 micron/8 mils	200 micron/8 mils
Recoat interval, min:	6 hours (20°C/68°F)	12 hours (5°C/41°F)
Recoat interval, max:	As per separate painting specification	As per separate painting specification

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR UNIQ 47741/47743

SURFACE PREPARATION:	**New steel:** **Exterior hull, bulk cargo holds and similar areas:** Abrasive blasting to Sa 2½. For temporary protection, if required, use a suitable shopprimer. Damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. . Welds, rusty spots, etc. to be abrasive spot-blasted. Intact shopprimer to be abrasive sweep-blasted (or equivalent roughening). **For areas not later to be subject to aggressive exposure** surface preparation to be as per normal shipyard procedure. **Ballast tanks:** For PSPC type approved coating, consult separate APPLICATION INSTRUCTIONS - BALLAST TANKS for HEMPADUR UNIQ 47741. **Stainless steel:** (Ballast tanks in chemical carriers) to be abrasive blasted to a uniform, sharp, dense profile, ISO Comparator Medium (G), corresponding to Rz minimum 50 micron. Any salts, grease, oil, etc. to be removed before abrasive blasting is commenced. **Repair:** Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR UNIQ 47741/47743. Reference is further made to separate Application Instructions.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above -10°C/14°F for HEMPADUR UNIQ 47743 and above 10°C/50°F for HEMPADUR UNIQ 47741. A temperature of the paint itself above 15°C/59°F facilitates proper application. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Relative humidity max. 85%. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	None or as per specification
SUBSEQUENT COAT:	None, or HEMPADUR or HEMPATHANE paints as per specification, depending on area of use.
REMARKS:	
Weathering/ service temperatures:	The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.
Airless application, nozzle orifice and pressure:	Optimum result with undiluted paint material is obtained with an output pressure of 250 bar/3600 psi and nozzle orifices of 0.021”-0.023”. Bigger nozzle-sizes are possible, but depends on the skill of the painter, sufficient output pressure and material-flow. Furthermore up to 5% thinner may be needed.
Spray equipment:	It is recommended to use heavy duty airless spray equipment with a pump transmission rate of 60:1 (approximately), and a theoretical output of min. 12 litres per minute (at 60 cycles per minute). Longer spray hoses and/or bigger spray nozzles will require higher capacity of the spray equipment to maintain a proper spray fan atomisation.
Colour of curing agent:	The curing agent 98743 has a tendency to become darker at storage. This has no influence on performance, but may influence the shade of the mixed product.
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 125-200 micron/5-8 mils. Undiluted, absolute minimum for closed film formation is 100 micron dry film thickness. For the upper end the paint material has sufficient safety in its “application window” to allow for a 250 micron specification provided a skilled application work.
Shades:	Other shades are available according to assortment list. The aluminium pigmented versions, shade no. 59690, red alu and shade no. 19690, grey alu, are designed for primer-coat applications. They hold a lower volume solids (72%) and a slightly higher VOC (270 g/litre - 2.3 lbs/US gallon) than the other shades. The aluminium pigmented versions, shade no. 59690 and shade no. 19690 contain approximately 9 % aluminium on weight in the dry film.

HEMPADUR UNIQ 47741/47743

Summer-/ winter-version:	When changing between summer- and winter-version, drying time and recoating intervals will change as described separately.
Note:	**HEMPADUR UNIQ 47741/47743 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 4774112170CR003/4774312170CR003

HEMPADUR UNIQ 47741/ HEMPADUR UNIQ 47743

Summertime application: 47741: BASE 47745 with CURING AGENT 98741
Wintertime application: 47743: BASE 47747 with CURING AGENT 98743

Description:

HEMPADUR UNIQ 47741/47743 is a self-priming, two-component, high-build, pure epoxy paint, polyamide/amine cured. Abrasion and corrosion resistant.

Recommended use:

As an universal primer or selfprimed high performance coating system for atmospheric or in-water service.
It provides the possibility of reducing the number of primers for new-building.
HEMPADUR UNIQ 47741 is intended for use in warm climates above 10°C/50°F.
HEMPADUR UNIQ 47743 is intended for use in cold climates down to -10°C/14°F.
Red or grey alu shades (59690 or 19690) can advantageously be used as first coat.

Features:

- High class ballast tank coating.
- Heavy duty, abrasion resistant coating.
- Overcoatable by a wide range of epoxy- and polyurethane coatings.
- VOC Compliant.
- Applicable by standard heavy duty airless spray equipment in a wide range of film thicknesses.

Service temperatures:

Dry exposure only:	Maximum 140°C/284°F *(See REMARKS overleaf)*
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	50°C/122°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

HEMPADUR UNIQ 47741/47743 have been classified B1 by DNV, Norway.
Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

	47741	**47743**
Version; mixed product:		
Colours/Shade nos:	Grey/12170 - Red/50630 *	Grey/12170 - Red/50630 *
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	80 ± 1	80 ± 1
Theoretical spreading rate:	5.3 m^2/litre - 150 micron 214 sq.ft./US gallon - 6 mils	5.3 m^2/litre - 150 micron 214 sq.ft./US gallon - 6 mils
Flash point:	29°C/84°F	26°C/77°F
Specific gravity:	1.6 kg/litre - 13.4 lbs/US gallon	1.6 kg/litre - 13.4 lbs/US gallon
Dry to touch:	6 hours at 20°C/68°F	10-12 hours at 5°C/41°F
Fully cured:	7 days at 20°C/68°F	21 days at 5°C/41°F
V.O.C.:	215 g/litre - 1.8 lbs/US gallon	220 g/litre - 1.8 lbs/US gallon

** See REMARKS overleaf*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

	47741	**47743**
Mixing ratio:	Base 47745 : Curing agent 98741 3 : 1 by volume	Base 47747 : Curing agent 98743 3 : 1 by volume
Application method:	Airless spray	Airless spray
Thinner:	08450	08450
Pot life:	1 hour (20°C/68°F)	$1^1/_4$ hour (5°C/41°F)
Nozzle orifice and pressure:	See overleaf.	See overleaf.
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	150 micron/6 mils	150 micron/6 mils
Indicated film thickness, wet:	200 micron/8 mils	200 micron/8 mils
Recoat interval, min:	6 hours (20°C/68°F)	12 hours (5°C/41°F)
Recoat interval, max:	As per separate painting specification	As per separate painting specification

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR UNIQ 47741/47743

SURFACE PREPARATION:	**New steel:** **Exterior hull, bulk cargo holds and similar areas:** Abrasive blasting to Sa 2½. For temporary protection, if required, use a suitable shopprimer. Damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. . Welds, rusty spots, etc. to be abrasive spot-blasted. Intact shopprimer to be abrasive sweep-blasted (or equivalent roughening). **For areas not later to be subject to aggressive exposure** surface preparation to be as per normal shipyard procedure. **Ballast tanks:** For PSPC type approved coating, consult separate APPLICATION INSTRUCTIONS - BALLAST TANKS for HEMPADUR UNIQ 47741. **Stainless steel:** (Ballast tanks in chemical carriers) to be abrasive blasted to a uniform, sharp, dense profile, ISO Comparator Medium (G), corresponding to Rz minimum 50 micron. Any salts, grease, oil, etc. to be removed before abrasive blasting is commenced. **Repair:** Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably to Sa 2½. Improved surface preparation will improve the performance of HEMPADUR UNIQ 47741/47743. Reference is further made to separate Application Instructions.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above -10°C/14°F for HEMPADUR UNIQ 47743 and above 10°C/50°F for HEMPADUR UNIQ 47741. A temperature of the paint itself above 15°C/59°F facilitates proper application. Apply only on a dry and clean surface with a temperature above the dew point to avoid condensation. Relative humidity max. 85%. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	None or as per specification
SUBSEQUENT COAT:	None, or HEMPADUR or HEMPATHANE paints as per specification, depending on area of use.
REMARKS:	
Weathering/ service temperatures:	The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.
Airless application, nozzle orifice and pressure:	Optimum result with undiluted paint material is obtained with an output pressure of 250 bar/3600 psi and nozzle orifices of 0.021”-0.023”. Bigger nozzle-sizes are possible, but depends on the skill of the painter, sufficient output pressure and material-flow. Furthermore up to 5% thinner may be needed.
Spray equipment:	It is recommended to use heavy duty airless spray equipment with a pump transmission rate of 60:1 (approximately), and a theoretical output of min. 12 litres per minute (at 60 cycles per minute). Longer spray hoses and/or bigger spray nozzles will require higher capacity of the spray equipment to maintain a proper spray fan atomisation.
Colour of curing agent:	The curing agent 98743 has a tendency to become darker at storage. This has no influence on performance, but may influence the shade of the mixed product.
Film thicknesses:	May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 125-200 micron/5-8 mils. Undiluted, absolute minimum for closed film formation is 100 micron dry film thickness. For the upper end the paint material has sufficient safety in its “application window” to allow for a 250 micron specification provided a skilled application work.
Shades:	Other shades are available according to assortment list. The aluminium pigmented versions, shade no. 59690, red alu and shade no. 19690, grey alu, are designed for primer-coat applications. They hold a lower volume solids (72%) and a slightly higher VOC (270 g/litre - 2.3 lbs/US gallon) than the other shades. The aluminium pigmented versions, shade no. 59690 and shade no. 19690 contain approximately 9 % aluminium on weight in the dry film.

HEMPADUR UNIQ 47741/47743

Summer-/ winter-version:	When changing between summer- and winter-version, drying time and recoating intervals will change as described separately.
Note:	**HEMPADUR UNIQ 47741/47743 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 4774112170CR003/4774312170CR003

For product description refer to product data sheet

HEMPADUR UNIQ 47741/ HEMPADUR UNIQ 47743

Summertime application: 47741: BASE 47745 with CURING AGENT 98741
Wintertime application: 47743: BASE 47747 with CURING AGENT 98743

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR UNIQ 47741/47743.

Surface preparation:

The specific type and degree of surface preparation depends on type and condition of the actual substrate and on desired performance. The better the surface preparation the better the performance, but it will not always be economic feasible to go for the highest degree within a given type of surface preparation.

For use as a heavy duty coating:
Bulk cargoholds, fender areas, hulls of ice-going vessels, ramps, splash zones etc.:
New steel:
Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to Sa 2½. For temporary protection, if required, use a suitable shopprimer. Damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. Abrasive grit spot blasting to Sa 2½ of welds, damaged areas etc.
Intact shopprimer to be thoroughly abrasive grit sweep blasted all over.
For repair and touch-up use HEMPADUR UNIQ 47741/47743.
Old steel:
If relevant ask Hempel for specification.

For use as a ballast tank coating:
Reference is made to APPLICATION INSTRUCTIONS – BALLAST TANKS

As a general purpose primer:
For exterior hull including weather decks same surface preparation applies as for ballast tanks. For other areas usually as per normal new-building standard.

Application equipment:

HEMPADUR UNIQ 47741/47743, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	preferably 60:1 or more
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter
	max. 30 metres/100 feet, 3/8" internal diameter
	max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh

Regular surfaces:	Ballast tanks	Exterior hull and similar large regular areas
Nozzle size:	.021"-.023"	.023"-.027"
Fan angle:	60-80°	60°-80°

The above are guidelines and subject to local adjustments.
If bigger nozzles are used it is important that the output capacity and pressure of the spray equipment is sufficient to maintain a proper atomization. A good skill of the spray painter is furthermore a must in order to keep the film thicknesses within limits and maintaining a good film formation in each coat.

Note: Increasing spray hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to above 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning.

Airless spray data are indicative and subject to adjustment.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Application:

Film-build/continuity: It is especially important that a continuous, pinhole-free paint film is obtained at application of each spray applied coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.
The paint layer must be applied homogeneously and as close to the specification as possible. Avoid exaggerated film thickness.
Saggings/"pools" of paint in corners are to be remedied to avoid later crackings and as a general rule highest acceptable dry film thickness will be 3 times the specified film thickness or 1000 micron.
The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating: may either be applied by airless spray, (relatively small, narrow-angled nozzles) or by hand-tools. For stripe coating with brush or roller HEMPADUR UNIQ 47742/47744 is recommended. Apply the stripe coat as a uniform, regular film without excessive brush or roller marks in order to avoid cratering by entrapped air.

First coat on steel substrates:

HEMPADUR UNIQ 47741/3 in shade 59690 (Red alu) is recommended as first coat when the product is applied directly to steel substrates - independent of method of surface preparation.

Pot life/mixing/ induction time: (both curing agents):

When measured under standard conditions the pot life is 2 hours at 15°C/59°F and 1 hour at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must be done properly by volume: 3.0 parts of base and 1.0 part of curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	5°C/41°F	10°C/50°F	20°C/68°F	30°C/86°F[1)]
Pot life, 47741	N.A.	1 ½ hour	1 hour	(½ hour)
Pot life, 47743	1 ¼	1 hour	(½ hour)	N.A.

1) Temperatures above 30°C/86°F should be avoided.

Induction time:
At **Steel** temperatures below 5°C/41°F the paint may advantageously be prereacted 10 minutes before spray application (longer prereaction time at lower steel temperatures).

When twin-feed two-component spray equipment is used, heating may be relevant to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

HEMPADUR UNIQ 47741/47743

Physical data versus temperature:

(HEMPADUR UNIQ 47741 in a dry film thickness of 150 micron/6 mils):

Surface temperature	10°C/50°F	20°C/68°F	30°C/86°F
Drying time	15 hours	6 hours	3 hours
Curing time*	18 days	7 days	3½ days
Initial curing*	13 days	5 days	2½ days

(HEMPADUR UNIQ 47743 in a dry film thickness of 150 micron/6 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F
Drying time	36 hours	18 hours	8 hours
Curing time*	63 days	32 days	14 days
Initial curing*	45 days	23 days	10 days

* Filling of ballast tanks/exposure to water: ask for special instructions.

Recoating:

Recoating intervals related to later conditions of exposure:
(150 micron/6 mils dry film thickness of HEMPADUR UNIQ 47741/47743)

	47741						47743					
	Minimum			Maximum			Minimum			Maximum		
Surface temp.	20°C/68°F						5°C/41°F					
Recoated with	Atmospheric			Atmospheric			Atmospheric			Atmospheric		
	Medium	Severe	Immer-sion *	Medium	Severe	Immer-sion *	Medium	Severe	Immer-sion *	Medium	Severe	Immer-sion *
HEMPADUR	4 hours	5 hours	6 hours	None	None	30 days	12 hours	15 hours	18 hours	None	None	60 days
HEMPATHANE Topcoat	4 hours	5 hours	N/R	10 days	3 days	N/R	12 hours	15 hours	N/R	30 days	9 days	N/R

* and heavy wear - eg bulk cargo holds and fender areas. If such areas are to be topcoated with HEMPATHANE, same max as for atmospheric/severe apply.

The long maximum recoating interval for HEMPADUR will be reduced if the coating is more than just scarcely exposed to direct sunshine before recoating.
If the interval is exceeded, roughening of surface is necessary to ensure intercoat adhesion.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 4774112170CR001/4774312170CR001

BALLAST TANKS

For product description refer to product data sheet

HEMPADUR UNIQ 47741

BASE 47745 with CURING AGENT 98741

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR UNIQ 47741 when applied in ballast tanks according to the requirements in IMO Resolution MSC.215(82): Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers (PSPC). The Applications Instructions are applicable also for vessels not covered by PSPC.

Ballast tanks, steel work:

The steel shall preferably be Rust Grade A or B according to ISO 8501-1. The use of steel with Rust Grade C requires more tight inspection of surface profile after blasting as well as of possible salt contamination.

The steel surface shall be prepared so that the coating achieves an even distribution at the specified nominal dry film thickness of 320 micron and has an adequate adhesion by removing sharp edges, grinding weld beads and removing weld spatter and any other surface contamination. PSPC makes reference to ISO 8501-3: “Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness”.

For optimum performance the following is recommended: All welding seams shall be partially dressed to remove irregular profiles.

Surface pores, pits and craters shall be sufficiently open to allow penetration of the paint.

Sharp edges shall be treated to a rounded radius of minimum 2 mm, subjected to a three-pass grinding or treated with an equivalent process that produces an edge profile that results in a dry film thickness retention equivalent to or better than that of three pass grinding. Sharp edge means all edges except natural rounded/rolled edges of sections or profiled steel bars.

Visible roll overs/laminations shall be removed.

The surface shall be free of all loose welding spatter.

Abrasive blasting/ abrasive sweep blasting:

The coating system shall only be applied on steel primed with a pre-qualified zinc containing inhibitor free zinc silicate shopprimer according to PSPC, Table 1.2.1-3. Steel shopprimed with a shopprimer not pre-qualified must be abrasive blast cleaned to Sa 2 removing at least 70% of intact shopprimer, while steel, which has not been shopprimed must be blasted to Sa 2½.

Before blasting any deposits of grease or oil must be removed from the steel surface using a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

The shopprimer must have been checked randomly for excessive film thickness. Areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be blasted to Sa 2 removing at least 70% of the shopprimer.

Welds as well as shopprimed areas with damage, burn marks and rust must be blasted to Sa 2½.

Surfaces with zinc salts, deposits of black iron oxides from plasma cutting, markings and similar foreign matters shall be cleaned by light abrasive sweep blasting.

Welds coated with a temporary (shop)primer after welding must be cleaned by hard abrasive sweeping, preferably abrasive blasting.

Spot-checks for possible salt contamination of the surface must be executed after secondary surface preparation. The upper water soluble salts limit is 50 mg/m² sodium chloride equivalents when measured according to ISO 8502-6:2006 and ISO 8502-9:1998. To limit salt contamination from abrasives it is recommended to use abrasives showing a water-soluble contaminant level equivalent to less than 25 mS/m according to ISO 11127-6:1993.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

In the case of full or partial abrasive blast cleaning, the surface profile must conform to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S or to ISO 8503-1, grade Medium (G).

Dust must be removed just before application of the paint to a dust quantity rating "1" for dust size class "3", "4" or "5". Lower dust size classes shall be removed from the surface if visible without magnification.

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given larger and larger overlaps. Roughening must be carried out when the maximum recoating interval is exceeded (when sand papering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible. Application of a thin zinc epoxy primer coat on these areas after secondary surface preparation at block stage is acceptable if removed before the application of HEMPADUR UNIQ 47741.

Secondary surface preparation of block assembly zones is preferably abrasive spot-blasting or mechanical cleaning to St 3. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Stainless steel: (Ballast tanks of chemical carriers) To be abrasive blast cleaned to a uniform, sharp, dense, profile (Rugotest No. 3, BN9-10, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. shall be removed before abrasive blasting is commenced. Surface preparation and paint application to be carried out concurrently with treatment of surrounding carbon steel.

Application equipment:

HEMPADUR UNIQ 47741, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter max. 30 metres/100 feet, 3/8" internal diameter max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh
Nozzle size:	.021"-.023"
Fan angle:	60-80°.

To spray complicated surfaces a smaller nozzle size should be used.

The above are guidelines and subject to local adjustments.
If bigger nozzles are used it is important that the output capacity and pressure of the spray equipment is sufficient to maintain a proper atomization. A good skill of the spray painter is furthermore a must in order to keep the film thicknesses within limits and maintaining a good film formation in each coat.

To spray complicated surfaces a smaller nozzle size should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are used it may be necessary to increase the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by exaggerated thinning.

Airless spray data are indicative and subject to adjustment.

Application:

PSPC requires the application of minimum two spray applied coatings and minimum two stripe coats. The relative humidity shall be 85% or below or the steel temperature shall be 3°/5°F or above the dew point.

Spray application: A continuous, pinhole-free paint film must be obtained at application of each spray applied coat. An application technique which will ensure good film formation on all surfaces must be adopted. It is very important to use nozzles of the correct size, not too large, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. even though these areas also must be stripe coated. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust spray.

The paint layer must be applied homogeneously and as close to the specification as possible. Care shall be taken to avoid exaggerated film thicknesses. Wet film thickness shall be regularly checked during the application.

The finished coating must appear as a homogeneous film with a smooth surface. Any defective areas, e.g. pin-holes, bubbles, voids, visible abrasive residues, shall be marked up and appropriate repair effected.

Stripe coating: The required two stripe coats must each be applied as a coherent film showing good film formation and no visible defects such as pores or un-wetted areas. The application method must ensure that all areas which require stripe coating are properly stripe coated by alternative application methods which include brush or roller. Application by airless spray requires the use of relatively small, narrow-angled nozzles. PSPC accepts that the second stripe coat, by way of welded seams only, may be reduced in scope where it is proven that the nominal dry film thickness (NDFT) can be met by the coats applied. The first stripe coating should preferably be applied after first full coat to avoid contamination of the steel substrate. HEMPADUR UNIQ 47742 is recommended for brush and roller application.

Pot life/mixing/ induction time:

When measured under standard conditions the pot life is 3 hours at 15°C/59°F and 2 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 84 parts by weight of base and 16 parts by weight of curing agent or by volume: 3.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	5°C/41°F[1)]	10°C/50°F	20°C/68°F
Pot life	1 1/4 hours	1hours	½ hours

1) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At steel temperatures below 5°C/41°F the paint may advantageously be prereacted 10 minutes before spray application (longer prereaction time at lower steel temperatures).

Two-component spray equipment: Heating may be required to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Dry film thickness:

PSPC requires that the nominal dry film thickness (NDFT) shall be 320 micron and achieved by minimum two spray coats and two stripe coats. The dry film thickness distribution shall be evaluated according to the 90/10 rule.

Dry film thickness (DFT)	DFT micron/mils	Remark
Minimum DFT per coat	90/3.5	Value for undiluted paint at approximately 20°C/68°F. Lower DFT may be achieved by thinning
Maximum DFT (complete coating system)	2,000/80	The maximum DFT is valid for isolated spots less than 1% of the total surface area per tank. No more than 5% of the area must be above 1,300 micron/52 mils. The stated maximum DFT is for guidance and should be kept as close to the specified nominal DFT as possible. Frequent control of wet film thickness during application is recommended

Physical data versus temperature:

(HEMPADUR UNIQ 47743 in a dry film thickness of 160 micron/6.4 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F
Drying time	36 hours	18 hours	8 hours
Walk-on time	36 hours	18 hours	8 hours
Curing time	63 days	32 days	14 days
Initial curing*	45 days	23 days	10 days

* When the state "initial curing" has been reached, the coating may exceptionally be exposed to ballast water provided it has been applied within the specified limits of film thicknesses and that all painted areas have been subject to thorough ventilation.

Recoating:

Recoating intervals (provided proper ventilation)
(160 micron/6.4 mils dry film thickness)

Interval	Minimum				Maximum			
Steel temperature	-10°C/14°F	0°C/32°F	20°C/68°F	30°C/86°F	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F
Recoating time**	20 hours	10 hours	2 hours	1½ hours	60 days*	60 days*	60 days*	30 days*

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.
** Stripe coat can be applied when it is possible to walk on the surface without damage to the coating.

Maximum recoating intervals:
Roughening of the surface is necessary to ensure optimum intercoat adhesion if the maximum recoating interval is exceeded.

remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts shall be removed by fresh water hosing.

- Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

8.2 Repair process

During construction
Before mechanical surface preparation is started the areas to be repaired shall be cleaned for any salts and other contamination.

Overlap zones shall be suitably prepared and coated.

Small areas: Small areas in this context are areas up to approximately A4 size (20x30 cm) or scratches of up to a few millimetres across. Cracks, in corners or at single runners, may preferably be repaired according to this method, even if they fall outside the area definition.

The surface preparation can be executed by sanding or grinding to a clean rough metal surface, feathering edges of intact coating and slightly roughening the adjacent surface and remove all dust. Touch-up with the coating material specified using stippling for the first brush coat.

Contiguous areas: Contiguous areas over 25 m^2/270 sq.ft. or over 2% of the total area of the tank are to be repaired basically according to the original specification. Precautions must be taken against damage from overblasting.

During service
Maintenance and repair during service is subject to the actual condition of the area under consideration. Reference is made to IMO Guidelines for maintenance and repair of protective coatings (MSC.1/Circ.1330).

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 4774112170CR002

BALLAST TANKS

For product description refer to product data sheet

HEMPADUR UNIQ 47743

BASE 47747 with CURING AGENT 98743

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR UNIQ 47743 when applied in ballast tanks according to the requirements in IMO Resolution MSC.215(82): Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers (PSPC). The Applications Instructions are applicable also for vessels not covered by PSPC.

Ballast tanks, steel work:

The steel shall preferably be Rust Grade A or B according to ISO 8501-1. The use of steel with Rust Grade C requires more tight inspection of surface profile after blasting as well as of possible salt contamination.

The steel surface shall be prepared so that the coating achieves an even distribution at the specified nominal dry film thickness of 320 micron and has an adequate adhesion by removing sharp edges, grinding weld beads and removing weld spatter and any other surface contamination. PSPC makes reference to ISO 8501-3: “Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness”.

For optimum performance the following is recommended: All welding seams shall be partially dressed to remove irregular profiles.

Surface pores, pits and craters shall be sufficiently open to allow penetration of the paint.

Sharp edges shall be treated to a rounded radius of minimum 2 mm, subjected to a three-pass grinding or treated with an equivalent process that produces an edge profile that results in a dry film thickness retention equivalent to or better than that of three pass grinding. Sharp edge means all edges except natural rounded/rolled edges of sections or profiled steel bars.

Visible roll overs/laminations shall be removed.

The surface shall be free of all loose welding spatter.

Abrasive blasting/ abrasive sweep blasting:

The coating system shall only be applied on steel primed with a pre-qualified zinc containing inhibitor free zinc silicate shopprimer according to PSPC, Table 1.2.1-3. Steel shopprimed with a shopprimer not pre-qualified must be abrasive blast cleaned to Sa 2 removing at least 70% of intact shopprimer, while steel, which has not been shopprimed must be blasted to Sa 2½.

Before blasting any deposits of grease or oil must be removed from the steel surface using a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

The shopprimer must have been checked randomly for excessive film thickness. Areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be blasted to Sa 2 removing at least 70% of the shopprimer.

Welds as well as shopprimed areas with damage, burn marks and rust must be blasted to Sa 2½.

Surfaces with zinc salts, deposits of black iron oxides from plasma cutting, markings and similar foreign matters shall be cleaned by light abrasive sweep blasting.

Welds coated with a temporary (shop)primer after welding must be cleaned by hard abrasive sweeping, preferably abrasive blasting.

Spot-checks for possible salt contamination of the surface must be executed after secondary surface preparation. The upper water soluble salts limit is 50 mg/m² sodium chloride equivalents when measured according to ISO 8502-6:2006 and ISO 8502-9:1998. To limit salt contamination from abrasives it is recommended to use abrasives showing a water-soluble contaminant level equivalent to less than 25 mS/m according to ISO 11127-6:1993.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

In the case of full or partial abrasive blast cleaning, the surface profile must conform to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S or to ISO 8503-1, grade Medium (G).

Dust must be removed just before application of the paint to a dust quantity rating "1" for dust size class "3", "4" or "5". Lower dust size classes shall be removed from the surface if visible without magnification.

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given larger and larger overlaps. Roughening must be carried out when the maximum recoating interval is exceeded (when sand papering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible. Application of a thin zinc epoxy primer coat on these areas after secondary surface preparation at block stage is acceptable if removed before the application of HEMPADUR UNIQ 47743.

Secondary surface preparation of block assembly zones is preferably abrasive spot-blasting or mechanical cleaning to St 3. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Stainless steel: (Ballast tanks of chemical carriers) To be abrasive blast cleaned to a uniform, sharp, dense, profile (Rugotest No. 3, BN9-10, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. shall be removed before abrasive blasting is commenced. Surface preparation and paint application to be carried out concurrently with treatment of surrounding carbon steel.

Application equipment:

HEMPADUR UNIQ 47743 being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter max. 30 metres/100 feet, 3/8" internal diameter max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh
Nozzle size:	.021"-.025"
Fan angle:	60-80°.

To spray complicated surfaces a smaller nozzle size should be used.

The above are guidelines and subject to local adjustments.
If bigger nozzles are used it is important that the output capacity and pressure of the spray equipment is sufficient to maintain a proper atomization. A good skill of the spray painter is furthermore a must in order to keep the film thicknesses within limits and maintaining a good film formation in each coat.

To spray complicated surfaces a smaller nozzle size should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are used it may be necessary to increase the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by exaggerated thinning.

Airless spray data are indicative and subject to adjustment.

Application:

PSPC requires the application of minimum two spray applied coatings and minimum two stripe coats. The relative humidity shall be 85% or below or the steel temperature shall be 3°/5°F or above the dew point.

Spray application: A continuous, pinhole-free paint film must be obtained at application of each spray applied coat. An application technique which will ensure good film formation on all surfaces must be adopted. It is very important to use nozzles of the correct size, not too large, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. even though these areas also must be stripe coated. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust spray.

The paint layer must be applied homogeneously and as close to the specification as possible. Care shall be taken to avoid exaggerated film thicknesses. Wet film thickness shall be regularly checked during the application.

The finished coating must appear as a homogeneous film with a smooth surface. Any defective areas, e.g. pin-holes, bubbles, voids, visible abrasive residues, shall be marked up and appropriate repair effected.

Stripe coating: The required two stripe coats must each be applied as a coherent film showing good film formation and no visible defects such as pores or un-wetted areas. The application method must ensure that all areas which require stripe coating are properly stripe coated by alternative application methods which include brush or roller. Application by airless spray requires the use of relatively small, narrow-angled nozzles. PSPC accepts that the second stripe coat, by way of welded seams only, may be reduced in scope where it is proven that the nominal dry film thickness (NDFT) can be met by the coats applied. The first stripe coating should preferably be applied after first full coat to avoid contamination of the steel substrate.HEMPADUR UNIQ 47744 is recommended for brush and roller application.

Pot life/mixing/ induction time:

When measured under standard conditions the pot life is 3 hours at 15°C/59°F and 2 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 84 parts by weight of base and 16 parts by weight of curing agent or by volume: 3.0 parts by volume base and 1.0 parts by volume curing agent.

HEMPADUR UNIQ 47743

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	5°C/41°F[1)]	10°C/50°F	20°C/68°F
Pot life	1 1/4 hours	1hours	½ hours

1) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At steel temperatures below 5°C/41°F the paint may advantageously be prereacted 10 minutes before spray application (longer prereaction time at lower steel temperatures).

Two-component spray equipment: Heating may be required to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Dry film thickness:

PSPC requires that the nominal dry film thickness (NDFT) shall be 320 micron and achieved by minimum two spray coats and two stripe coats. The dry film thickness distribution shall be evaluated according to the 90/10 rule.

Dry film thickness (DFT)	DFT micron/mils	Remark
Minimum DFT per coat	90/3.5	Value for undiluted paint at approximately 20°C/68°F. Lower DFT may be achieved by thinning
Maximum DFT (complete coating system)	2,000/80	The maximum DFT is valid for isolated spots less than 1% of the total surface area per tank. No more than 5% of the area must be above 1,300 micron/52 mils. The stated maximum DFT is for guidance and should be kept as close to the specified nominal DFT as possible. Frequent control of wet film thickness during application is recommended

Physical data versus temperature:

(HEMPADUR UNIQ 47741 in a dry film thickness of 160 micron/6.4 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F
Drying time	36 hours	18 hours	8 hours
Walk-on time	36 hours	18 hours	8 hours
Curing time	63 days	32 days	14 days
Initial curing*	45 days	23 days	10 days

* When the state "initial curing" has been reached, the coating may exceptionally be exposed to ballast water provided it has been applied within the specified limits of film thicknesses and that all painted areas have been subject to thorough ventilation.

Recoating:

Recoating intervals (provided proper ventilation)
(160 micron/6.4 mils dry film thickness)

Interval	Minimum				Maximum			
Steel temperature	-10°C/14°F	0°C/32°F	20°C/68°F	30°C/86°F	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F
Recoating time**	20 hours	10 hours	2 hours	1½ hours	60 days*	60 days*	60 days*	30 days*

* Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.
** Stripe coat can be applied when it is possible to walk on the surface without damage to the coating.

Maximum recoating intervals:
Roughening of the surface is necessary to ensure optimum intercoat adhesion if the maximum recoating interval is exceeded.

BALLAST TANKS

HEMPADUR UNIQ 47743

- **Long recoating intervals:**

A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts shall be removed by fresh water hosing

- Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

8.2 Repair process

During construction
Before mechanical surface preparation is started the areas to be repaired shall be cleaned for any salts and other contamination.

Overlap zones shall be suitably prepared and coated.

Small areas: Small areas in this context are areas up to approximately A4 size (20x30 cm) or scratches of up to a few millimetres across. Cracks, in corners or at single runners, may preferably be repaired according to this method, even if they fall outside the area definition.

The surface preparation can be executed by sanding or grinding to a clean rough metal surface, feathering edges of intact coating and slightly roughening the adjacent surface and remove all dust. Touch-up with the coating material specified using stippling for the first brush coat.

Contiguous areas: Contiguous areas over 25 m^2/270 sq.ft. or over 2% of the total area of the tank are to be repaired basically according to the original specification. Precautions must be taken against damage from overblasting.

During service
Maintenance and repair during service is subject to the actual condition of the area under consideration. Reference is made to IMO Guidelines for maintenance and repair of protective coatings (MSC.1/Circ.1330).

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 4774312170CR0023

HEMUCRYL 48130

Description:
HEMUCRYL 48130 is a water-borne paint based on acrylic dispersion with good anticorrosive properties. It dries to a non-yellowing coating with low dirt pick-up and good weathering properties. It has a fairly good resistance to spillage of chemicals and to washing.
Especially suited for application by airless spray.

Recommended use:
As a self-primed coating system for repair and maintenance of steel-work in mildly to moderately corrosive environment.

Service temperatures:
Maximum, dry exposure only: 125°C/248°F.

Certificates/Approvals:
Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/12170 - Red/52251*
Finish:	Semi-flat
Volume solids, %:	47 ± 1
Theoretical spreading rate:	3.9 m²/litre - 120 micron 157 sq.ft/US gallon - 4.8 mils
Flash point:	> 93°C/199°F
Specific gravity:	1.2 kg/litre - 10 lbs/US gallon
Surface dry:	1 (approx.) hr at 20°C/68°F *(ISO 1517)*
Dry to touch:	2 (approx.) hours at 20°C/68°F *(See REMARKS overleaf)*
Shelf life:	1 year at 20°C/68°F
V.O.C.:	30 g/litre - 0.25 lbs/US gallon

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Brush (touch-up)
Thinner (max.vol):	Fresh water (5%)	Fresh water (5%)
Nozzle orifice:	015"-.019" *(see REMARKS overleaf)*	
Nozzle pressure:	130 bar/1900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	Fresh water *(see APPLICATION INSTRUCTIONS)*	
Indicated film thickness, dry:	120 micron/4.8 mils *(see REMARKS overleaf)*	
Indicated film thickness, wet:	250 micron/10 mils	
Recoat interval, min:	3 hours (20°C/68°F)	
Recoat interval, max:	None *(see REMARKS overleaf)*	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMUCRYL 48130

SURFACE PREPARATION: See separate APPLICATION INSTRUCTIONS for HEMPEL'S HEMUCRYL product range.

APPLICATION CONDITIONS: See separate APPLICATION INSTRUCTIONS for HEMPEL'S HEMUCRYL product range.

PRECEDING COAT: See separate APPLICATION INSTRUCTIONS for HEMPEL'S HEMUCRYL product range.
Aged, solvent-borne coatings may be overcoated after a very careful cleaning. However, a test patch is recommended to establish intercoat adhesion.
Aged, chemically cured coatings (alkyd, epoxy, polyurethane etc.) may also precede. Yet, only recommended in case of later mild exposure - besides a very careful cleaning, roughening may be necessary and a test patch is recommended to establish intercoat adhesion.

SUBSEQUENT COAT: None or according to specification.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase II, 2010
VOC in g/l	30	30	140

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Film thicknesses: May be specified in another film thickness than indicated. Normal range is 100-125 micron/4-5 mils dry film thickness. This will alter spreading rate and may influence drying time and recoat interval.

Application: For proper film formation the recommended nozzle sizes should be used.
If application is done by roller/brush, apply liberally. Use brushes with synthetic fibres. Rollers should either be mohair or felt.

Recoating: No maximum recoat interval, but after prolonged exposure to polluted atmosphere remove accumulated contamination by high pressure fresh water cleaning and allow to dry.

Other REMARKS: See separate APPLICATION INSTRUCTIONS for HEMPEL'S HEMUCRYL product range.

HEMUCRYL 48130 is for professional use only.

ISSUED BY: HEMPEL A/S - 4813012170CS005

For product description refer to product data sheet

HEMPEL'S HEMUCRYL product range

Scope:

These Application Instructions cover surface preparation and application conditions of HEMPEL'S HEMUCRYLs.

Surface preparation, primers:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to minimum Sa 2½. For temporary protection, if required, use suitable shopprimer. All damaged shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use the specified HEMUCRYL primer type.

Repair: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose paint by abrasive blasting or power tool cleaning to St 3 before recoating. Touch up bare spots with the specified HEMUCRYL primer type.

Aluminium: Very thorough degreasing, followed by (high pressure) fresh water cleaning to remove all salts and other contamination. Any anodizing must be completely removed. Thorough sand papering or abrasive sweeping with mineral abrasives is recommended. Cast aluminium is recommended to be abrasive swept to a uniform, evenly grey appearance.

Stainless steel: Very thorough degreasing with alkaline degreaser, ie HEMPEL'S LIGHT CLEANER 99350, followed by fresh water hosing to remove all contamination.

Hot-dipped galvanized steel: Wet rubbing/grinding with ammonia water 1:20 followed by fresh water hosing. In the case this method is not feasible, the procedure as described for stainless steel may be used.

Zinc silicate coated surfaces: Remove oil and grease, etc, with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. After exposure to high humidity, zinc salts ("white rust") must be removed carefully by (high pressure) fresh water cleaning - if necessary combined with scrubbing with stiff nylon brushes. Consult the APPLICATION INSTRUCTIONS for the relevant GALVOSIL product.

Note:
Among the HEMUCRYL primer types, HEMUCRYL TI-COAT 18200 is designed to be used as the first coat on aluminium, hot-dipped galvanized steel, stainless steel and on zinc silicate coated surfaces.

Surface preparation, topcoats:

Preceding coats should be sound and tightly adhering. Remove oil and grease with suitable detergent. Remove salts and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up to full system before recoating with specified HEMUCRYL topcoat type.

Concrete: Any oil, grease and other contaminants should be removed by eg volatilizing by flame cleaning or treatment with suitable detergent, the latter in the following way:

1) Saturation of the surface with fresh water
2) Washing with suitable detergent followed by fresh water hosing

Remove loose material eg by stiff brushes or blasting, high pressure jetting or flame cleaning followed by fresh water hosing depending on circumstances. Three last mentioned methods are also able to remove scum layer if necessary. After surface preparation the surface should feel solid and hard. Remove dust. Saturate surface with suitable sealer, eg micro dispersed acrylic type or by the HEMUCRYL topcoat diluted 15-20% with water.

HEMPEL'S HEMUCRYL product range

Application conditions:	Use only where application can proceed at temperatures above 5°C/41°F, preferably above 10°C/50°F. Apply on a clean and dry surface with a temperature above the dew point to avoid condensation. **Relative humidity:** During application above 60%, preferably 75-90%, to avoid dry spray. If RH is below 60%, special thinner may be added in order to reduce dry spray. During drying below 80%, preferably between 40-60%. (Contact HEMPEL for further advice). Good ventilation during application and drying is necessary. Especially during drying it is of utmost importance that sufficient ventilation is covering all parts of the surfaces painted. Ventilation requirements to remove water vapours liberated during application and drying are app. 75 m^3/litre of the paint at 20°C/68°F. (Relative humidity of the air supply 40%).
REMARKS:	
Good painting practice:	The durability/performance of water-borne coatings is to a very high degree depending on the fulfilment of good painting practice. For instance application to riveted and skip-welded constructions will require extra care when coating sharp edges, riveted joints, etc. Avoid too high thicknesses per coat. Preferably apply an extra stripe coat.
"Edge effect":	Furthermore, as water-borne paints have a high tendency to "withdraw" from sharp edges, etc., proper corrosion protection will be highly supported by careful rounding of edges and that any joints are completely closed and tight.
Exposure to low temperatures shortly after application:	If the painted items will be exposed to humidity/water at temperatures below 5-10°C/ 41-50°F shortly after finishing the paint application, it is of utmost importance for later good performance that following rules are complied with: • Excessive film thickness must be avoided. • The (last applied) paint layer must dry for at least 6 hours at 20°C/68°F - 40-60% RH, 12 hours at 10°C/50°F - 40-60% RH before exposure to temperatures below 5°C/41°F and/or condensation/water exposure. Avoid outdoor application in seasons with low night temperatures, frost and frost in combination with condensation or rain.
Shelf life/storage:	Store at temperatures between 5°C-40°C/41°F-104°F. Shelf life is reduced at temperatures above 30°C/86°F. Do not expose to frost during storage and transport, or before the coating is dry.
Cleaning of tools:	Tools must be cleaned immediately with lukewarm soap water and/or fresh water followed by thoroughly rinsing to remove residues of detergent. Dried remains of paint can be removed with HEMPEL'S TOOL CLEANER 99610.
Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
Note:	Any deviations from the above of a particular HEMUCRYL will be stated in the product data sheet for this paint.
ISSUED BY:	HEMPEL A/S

HEMPEL'S SILVIUM 51570

Description:
HEMPEL'S SILVIUM 51570 is an oleoresinous general purpose aluminium paint with good light reflection.

Recommended use:
As a finishing coat on steel and woodwork exterior and interior in mild to moderately corrosive environment where an aluminium surface or light reflection is desired, and/or for moderately hot surface.

Service temperatures:
Maximum, dry exposure only: 200°C/390°F.

Certificates/Approvals:
Complies with Section 175.300 of Food Additive Regulations (in respect of carriage of dry foodstuffs) of the Code of Federal Regulations as found by review of the U.S. Food and Drug Administration.
HEMPEL'S SILVIUM 51570 has been tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
Complies with EU Directive 2004/42/EC, subcategory i.
Please see REMARKS overleaf.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Aluminium/19000
Finish:	Glossy *(See REMARKS overleaf)*
Volume solids, %:	38 ± 1
Theoretical spreading rate:	15.2 m^2/litre - 25 micron 610 sq.ft./US gallon - 1 mil
Flash point:	38°C/100°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon
Dry to touch:	5 (approx.) hours at 20°C/68°F
V.O.C.:	505 g/litre - 4.2 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush/Roller
Thinner (max. vol.):	Do not dilute *(See REMARKS overleaf)*		
Nozzle orifice:	.017"		
Nozzle pressure:	100 bar/1500 psi (Airless spray data are indicative and subject to adjustment)		
Cleaning of tools:	THINNER 08080		
Indicated film thickness. dry:	25 micron/1 mil		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	8 hours (20°C/68°F)		
Recoat interval, max:	None		

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S SILVIUM 51570

SURFACE PREPARATION:
Sound and intact areas primed with eg HEMPALIN or other suitable alkyd primers (temperature range: see PRECEDING COAT below) can be recoated directly after all contamination from storage and fabrication has been thoroughly removed. For other areas remove all rust and loose material by power tool cleaning to St 3 or abrasive blasting to Sa 2.
Maintenance: Remove oil and grease etc. with suitable detergent.
Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by abrasive blasting or power tool cleaning.
Dust off residues. Touch up with recommended primer.

APPLICATION CONDITIONS:
As dictated by normal good painting practice.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT:

Steel surface temperature:	Preceding coat:
Below 120°C/248°F	HEMPALIN PRIMERS
120°-200°C/248°-390°F	Self primed

SUBSEQUENT COAT:
None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	0 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	505	505	600	500

VOC:
For VOC of other shades, please refer to Safety Data Sheet.

Certificates have been issued under the former quality number 5157.

Application:
Spray application is recommended.
For brush application use a flat brush not more than 10 cm/4" wide. Do not dilute. After the paint has been laid on, it should be distributed with light strokes and in one direction only. If the paint is worked too much with brush or roller, it will become streaky and greyish and loose its lustre. The effect is cosmetic only and has no influence on the protective properties.

Finish:
At high temperatures HEMPEL'S SILVIUM 51570 will become greyish and loose its lustre.
This effect is cosmetic only and has no influence on the protective properties.

Colour:
At high temperatures HEMPEL'S SILVIUM 51570 will show a tendency to yellow.
This effect is cosmetic only and has no influence on the protective properties.

Note:
HEMPEL'S SILVIUM 51570 is for professional use only.

ISSUED BY:
HEMPEL A/S - 5157019000CO010

HEMPALIN ENAMEL 52140

Description:

HEMPALIN ENAMEL 52140 is a glossy alkyd enamel which forms a weather resistant coating. It is flexible and resistant to salt water and spillage of mineral oil and other aliphatic hydrocarbons.

Recommended use:

As a general purpose finishing coat in alkyd systems on exterior and interior steel and woodwork in mildly to moderately corrosive environment.
As a finishing coat in engine rooms including tank tops, main engines and auxiliary machinery.

Service temperatures:

Maximum, dry exposure only:
120°C/248°F (these temperatures may cause yellowing/discoloration).

Certificates/Approvals:

Approved as a low flame spread material by Danish, French, Spanish and Singaporean authorities according to IMO resolution MSC 61 (67).
Has a Danish, French, Spanish, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.
Complies with EU Directive 2004/42/EC, subcategory i.
Please see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000*	Black/19990*
Finish:	Glossy	Glossy
Volume solids, %:	46 ± 1	43 ± 1
Theoretical spreading rate:	15.3 m^2/litre - 30 micron 615 sq.ft./US gallon - 1.2 mils	14.3 m^2/litre - 30 micron 575 sq.ft./US gallon - 1.2 mils
Flash point:	38°C/100°F	38°C/100°F
Specific gravity:	1.1 kg/litre - 9.2 lbs/US gallon	0.9 kg/litre - 7.5 lbs/US gallon
Surface dry:	2½ (approx) hrs at 20°C/68°F *(ISO 1517)*	2½ (approx) hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	6-8 hours at 20°C/68°F	6-8 hours at 20°C/68°F
V.O.C.:	430 g/litre - 3.6 lbs/US gallon	455 g/litre - 3.8 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush/Roller	
Thinner (max. vol.):	08230 (5%)	08230 (15%)	08230 (5%)	*(See REMARKS overleaf)*
Nozzle orifice:	.018"			
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*			
Cleaning of tools:	THINNER 08230			
Indicated film thickness, dry:	30 micron/1.2 mils			
Indicated film thickness, wet:	75 micron/3 mils			
Recoat interval, min:	8 hours (20°C/68°F)			
Recoat interval, max:	See REMARKS overleaf			

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPALIN ENAMEL 52140

APPLICATION CONDITIONS: As dictated by normal good painting practice.
In confined spaces provide adequate ventilation during application and drying.

PREDEDING COAT: HEMPALIN PRIMER 12050, HEMPALIN PRIMER HI-BUILD 13200, HEMPALIN UNDERCOAT 42460 according to specification.

SUBSEQUENT COAT: None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	460	500	600	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Certificates have been issued under the former quality number 5214.

Colours: Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere.
Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.
To obtain full opacity, an extra coat may be necessary, especially for certain lead-free colours in eg red, orange, yellow and green.

Film thicknesses: May be specified in other film thicknesses than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoat interval. Normal range 30-40 micron/1.2-1.6 mils.

Thinning: THINNER 08080 may be used for spray application, however, with a certain risk of wrinkling of the preceding **fresh** coat of HEMPALIN.

Recoating: Recoat intervals related to later conditions of exposure:
(30 micron/1.2 mils dry film thickness of HEMPALIN ENAMEL 52140)

	Minimum		Maximum	
Surface temperature	20°C/68°F		20°C/68°F	
Recoated with (quality numbers only)	Atmospheric		Atmospheric	
	Mild	Medium	Mild	Medium
52140	8 hours	8 hours	None	5 days

If the maximum recoat interval is exceeded, roughening of the surface is recommended to ensure intercoat adhesion.
Before recoating after exposure in contaminated environment, clean the surface thoroughly by (high pressure) fresh water hosing and allow drying.

Note: **HEMPALIN ENAMEL 52140 is for professional use only.**

ISSUED BY: HEMPEL A/S - 5214010000C0018

HEMPALIN ENAMEL HI-BUILD 52220

Description:
HEMPALIN ENAMEL HI-BUILD 52220 is an alkyd paint, which can be applied in high film thickness by airless spray.

Recommended use:
As a finishing coat in HEMPALIN Systems on interior and exterior steel in mildly to moderately corrosive environment.
As a finishing coat in engine rooms including tank tops, main engines and auxiliary machinery.

Service temperatures:
Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:
Approved as a low flame spread material by Danish, French, Spanish and Singaporean authorities according to IMO resolution MSC 61 (67).
Has a Danish, French, Spanish, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.
Complies with EU Directive 2004/42/EC, subcategory i.
Please see REMARKS overleaf.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000
Finish:	Glossy
Volume solids, %:	47 ± 1
Theoretical spreading rate:	7.8 m²/litre - 60 micron 314 sq.ft/US gallon - 2.4 mils
Flash point:	38°C/100°F
Specific gravity:	1.1 kg/litre - 9.2 lbs/US gallon
Surface dry:	2½ (approx) hours at 20°C/68°F *(ISO 1517)*
Dry to touch:	6-8 hours at 20°C/68°F
V.O.C.:	435 g/litre - 3.6 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Brush (touch up)
Thinner (max.vol.):	08230 (5%)	08230 (5%)
Nozzle orifice:	.021"-.023"	
Nozzle pressure:	200 bar/2900 psi	
	(Airless spray data are indicative and subject to adjustment)	
Cleaning of tools:	THINNER 08080	
Indicated film thickness, dry:	60 micron/2.4 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	125 micron/5 mils	
Recoat interval, min:	See REMARKS overleaf	
Recoat interval, max:	See REMARKS overleaf	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPALIN ENAMEL HI-BUILD 52220

APPLICATION CONDITIONS: As dictated by normal good painting practice.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: HEMPALIN PRIMER HI-BUILD 13200 or according to specification.

SUBSEQUENT COAT: None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	435	460	600	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Certificate has been issued under the former quality number 5222.

Recoating: Recoat intervals related to later conditions of exposure:
(60 micron/2.4 mils dry film thickness of HEMPALIN ENAMEL HI-BUILD 52220)

	Minimum		Maximum	
Surface temperature	20°C/68°F		20°C/68°F	
Recoated with (quality number only)	Atmospheric		Atmospheric	
	Mild	Medium	Mild	Medium
52220	12 hours	16 hours	None	5 days

If the maximum recoat interval is exceeded, roughening of the surface is recommended to ensure intercoat adhesion.
Before recoating after exposure in contaminated environment, clean surface thoroughly by (high pressure) fresh water hosing and allow drying.
May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoat interval.
Do not expose liquid paint to temperatures above 40°C/104°F neither during storage nor in connection with application.

Note: **HEMPALIN ENAMEL HI-BUILD 52220 is for professional use only.**

ISSUED BY: HEMPEL A/S - 5222010000CO007

HEMPALIN DANREX 52360

Description:

HEMPALIN DANREX 52360 is a versatile, alkyd-based, economy paint with fairly good penetration into rough and porous substrate.
Harmless to grain cargo.

Recommended use:

1. As a self-primed paint system on interior steel and woodwork, e.g. in dry cargo holds and other dry areas such as engine rooms, including tank tops, main engine and auxiliary machinery.
2. As a primer for alkyd-based paint systems in mild environment.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:

Approved as a low flame spread material by Danish, French, Spanish and Singaporean authorities according to IMO resolution MSC 61 (67).
Has a Danish, French, Spanish, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.
Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
Complies with Section 175.300 of Food Additive Regulations (in respect of carriage of dry foodstuffs) of the Code of U.S. Federal Regulations (FDA).
Please see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	Grey/10670 - Red/50610
Finish:	Semi-gloss
Volume solids, %:	56 ± 1
Theoretical spreading rate:	14.0 m^2/litre - 40 micron 561 sq.ft./US gallon - 1.6 mils
Flash point:	38°C/100°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	6-8 hours at 20°C/68°F
V.O.C.:	360 g/litre - 3.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application methods:	Airless spray	Air spray	Brush/Roller	
Thinner (max. vol.):	08230 (5%)	08230 (15%)	08230 (5%)	*(See REMARKS overleaf)*
Nozzle orifice:	.018"-.021"			
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*			
Cleaning of tools:	THINNER 08230			
Indicated film thickness, dry:	40 micron/1.6 mils			
Indicated film thickness, wet:	75 micron/3 mils			
Recoat interval, min:	8 hours (20°C/68°F)			
Recoat interval, max:	None *(See REMARKS overleaf)*			

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPALIN DANREX 52360

SURFACE PREPARATION:	**New steel:** Abrasive blasting to minimum Sa 2. For temporary protection, if required, use suitable shopprimer. All damage of shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use HEMPALIN DANREX 52360. **Maintenance:** Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove all rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up to full film thickness.
APPLICATION CONDITIONS:	As dictated by normal good painting practice. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	None, HEMPALIN PRIMER 12050 or according to specification.
SUBSEQUENT COAT:	HEMPALIN DANREX 52360 is normally used as a self-contained system. May be recoated with oil or alkyd based paints according to specification, e.g.: **Interior:** HEMPEL'S SILVIUM 51570. **Exterior:** (HEMPALIN UNDERCOAT 42460 followed by) alkyd-based finishing coat(s).
REMARKS:	**Certificates** have been issued under the former quality number 5236. Before recoating after exposure in contaminated environment, clean surface thoroughly by (high pressure) fresh water hosing and allow to dry.
Thinning:	THINNER 08080 may be used for spray application, however, with a certain risk of wrinkling of a preceding **fresh** HEMPALIN coat.
Note:	**HEMPALIN DANREX 52360 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 52360106700O0014

HEMPALIN DECKPAINT 53240

Description:

HEMPALIN DECKPAINT 53240 is a quick-drying, styrenated alkyd paint. Hardwearing and resistant to sunlight, salt water, and to oil splashes, but not to aromatic hydrocarbons, such as certain types of petrol (gasoline). For a skid-proof surface, see REMARKS overleaf.

Recommended use:

As a general purpose finishing coat, interior and exterior, on steel decks, stairways, catwalks, etc., in mildly to moderately corrosive environment.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:

Approved as a low flame spread material by Danish, French, Spanish and Singaporean authorities according to IMO resolution MSC 61 (67).
Has a Danish, French, Spanish, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.
Please see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Green/40640	Red/50630
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	42 ± 1	41 ± 1
Theoretical spreading rate:	14.0 m^2/litre - 30 micron	13.7 m^2/litre - 30 micron
	561 sq.ft./US gallon - 1.2 mils	548 sq.ft./US gallon - 1.2 mils
Flash point:	28°C/82°F	28°C/82°F
Specific gravity:	1.1 kg/litre - 9.2 lbs/US gallon	1.1 kg/litre - 9.2 lbs/US gallon
Dry to touch:	1 (approx.) hour at 20°C/68°F	1 (approx.) hour at 20°C/68°F
V.O.C.:	495 g/litre - 4.1 lbs/US gallon	490 g/litre - 4.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush
Thinner (max. vol.):	08080 (5%)	08080 (15%)	08080 (5%)
Nozzle orifice:	.018"-.021"		
Nozzle pressure:	150 bar/2200 psi		
	(Airless spray data are indicative and subject to adjustment)		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	30 micron/1.2 mils		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	2 hours (20°C/68°F) *(See REMARKS overleaf)*		
Recoat interval, max:	4 hours (20°C/68°F) *(See REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPALIN DECKPAINT 53240

APPLICATION CONDITIONS:	As dictated by normal good painting practice. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPALIN PRIMER 12050 or according to specification.
SUBSEQUENT COAT:	None.
REMARKS:	**Certificates** have been issued under the former quality number 5324.
Recoating:	Recoating should take place when the first coat is dry and within 4 hours. If this interval is exceeded, do not recoat until after two weeks. No maximum interval for adhesion. Before recoating after exposure in contaminated environment, clean surface thoroughly by (high pressure) fresh water cleaning and allow to dry. If a skid-proof surface is desired, sprinkle HEMPEL'S ANTI-SLINT 67500 evenly over the first coat of HEMPALIN DECKPAINT 53240 while still wet. (Consumption: approximately 7.5 kg 67500 to 20 litres of paint). When the paint is dry, sweep up surplus grit and apply a second coat of HEMPALIN DECKPAINT 53240. Anti-skid properties can also be attained by mixing 1.0 kg of HEMPEL'S ANTI-SLIP BEADS 67420 into 20 litre of HEMPALIN DECKPAINT 53240.
Note:	**HEMPALIN DECKPAINT 53240 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 5324040640CO017

HEMPAQUICK ENAMEL 53840

Description:
HEMPAQUICK ENAMEL 53840 is a quick drying alkyd enamel with good gloss and colour retention.

Recommended use:
As a topcoat on steel in mild to moderately corrosive environment.
In case of line application of small items to be packed together, HEMPALIN ENAMEL 52140 or HEMPALIN DECK PAINT 53240 is recommended.

Service temperatures:
Maximum, dry exposure only: 140°C/284°F.

Certificates/Approvals:
Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000*
Finish:	Glossy
Volume solids, %:	40 ± 1
Theoretical spreading rate:	10.0 m²/litre - 40 micron 401 sq.ft/US gallon - 1.6 mils
Flash point:	29°C/84°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	30 (approx.) minutes at 20°C/68°F *(ISO 1517)*
Dry to touch:	1 (approx.) hour at 20°C/68°F
V.O.C.:	545 g/litre - 4.5 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Airspray
Thinner (max.vol.):	08080 (5%)	08080 (15%)
Nozzle orifice:	.011"-.015"	
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to confirmation)*	
Cleaning of tools:	HEMPEL'S THINNER 08080	
Indicated film thickness, dry:	40 micron/1.6 mils	
Indicated film thickness, wet:	100 micron/4 mils	
Recoat interval, min.:	2 hours (20°C/68°F)	
Recoat interval, max.:	None	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPAQUICK ENAMEL 53840

APPLICATION CONDITIONS: The surface must be completely clean and dry and its temperature above the dew point to avoid condensation. In confined spaces provide adequate ventilation.

PRECEDING COAT: HEMPAQUICK PRIMER 13624 or according to specification.

SUBSEQUENT COAT: None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	555	600	600	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Colours: Certain lead-free red and yellow colours may discolour when exposed to sulphide and chlorine-containing atmosphere.

Recoating: Before recoating after exposure in contaminated environment, clean the surface thoroughly by high pressure fresh water hosing and allow to dry.

Note: **HEMPAQUICK ENAMEL 53840 is for professional use only.**

ISSUED BY: HEMPEL A/S - 53840100000C0003

HEMPAXANE CLASSIC 55000

BASE 55009 with CURING AGENT 98000

Description:

HEMPAXANE CLASSIC 55000 is a two-component, high-solids, high-gloss, polysiloxane enamel with excellent gloss and colour retention.

Recommended use:

As an isocyanate free glossy decorative and protective, high build finishing coat for new steel structures in severely corrosive atmospheric environment.
Minimum temperature for curing is 0°C/32°F.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/17380*
Finish:	High-gloss
Volume solids, %:	85 ± 1
Theoretical spreading rate:	6.8 m^2/litre - 125 micron 273 sq.ft./US gallon - 5 mils
Flash point:	45°C/95°F
Specific Gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Dry to touch:	6 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	195 g/litre - 1.6 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 55000:	Base 55009 : Curing agent 98000 5.6 : 4.4 by volume	
Application method:	Airless spray	Brush
Thinner (max.vol.):	08080 (10%)	08080 (5%) - See REMARKS overleaf
Pot life:	4 hours (20°C/68°F)	
Nozzle orifice:	.017"-.021"	
Nozzle pressure	100-125 bar /1450 -1800 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	125 micron/5 mils	
Indicated film thickness, wet:	150 micron/6 mils	
Recoat interval, min:	6 hours (20°C/68°F)	
Recoat interval, max:	30 days (20°C/68°F) - See REMARKS overleaf	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas

HEMPAXANE CLASSIC 55000

APPLICATION AND CURING CONDITIONS: The surface must be completely clean and dry at the time of application, and its temperature must be above the dew point to avoid condensation. Minimum temperature for curing is 0°C/32°F, minimum relative humidity 30%. In confined spaces provide adequate ventilation during application and drying.
Reference is made to separate application instructions.

PRECEDING COAT: HEMPADUR-system or GALVOSIL according to specification.

SUBSEQUENT COAT: None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	10 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	225	290	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Colours: Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere.
Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

Service temperatures: At service temperature above 100°C/212°F, slight discoloration may be expected

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 100 - 125 micron/4 -5 mils.
If the product is specified in lower film thickness, more thinning will be needed for proper film formation during spray application - additionally the colour in the preceding coat should be considered to reduce contrast.

Recoating on HEMPADUR: Recoat intervals related to later conditions of exposure:
(150 micron/6 mils dry film thickness of HEMPAXANE CLASSIC 55000):

	Minimum			Maximum		
Surface temperature	20°C/68°F			20°C/68°F		
Recoated with (quality numbers only)	Atmospheric			Atmospheric		
	Mild	Medium	Severe	Mild	Medium	Severe
55000	6 hours	6 hours	7 hours	30 days	30 days	30 days

Thinner: THINNER 08080 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.

Exposure to humidity: HEMPAXANE CLASSIC 55000 will resist condensation and light rain after the dry to touch stage has been reached.

Recoating: If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Application onto zinc silicate: It is recommended to apply HEMPAXANE CLASSIC 55000 by using a "mist-coat" procedure **provided** the paint temperature is approximately above 20°C/68°F: A thin, undiluted coat is applied (the mist coat) and after a few minutes, a second coat is applied in the full specified film thickness. If the paint temperature is below 20°C/68°F, thinning (max 15%) may be required.
HEMPAXANE CLASSIC 55000 is for professional use only.

ISSUED BY: HEMPEL A/S - 5500017380CR005

For product description refer to product data sheet

HEMPAXANE CLASSIC 55000

BASE 55009 with CURING AGENT 98000

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPAXANE CLASSIC 55000.

Surface preparation:

General: HEMPAXANE CLASSIC 55000 is mainly intended as a combined intermediate and topcoat for atmospheric service. For mild environments the product can be used directly to metal as a one-coat system.

NEW STEEL:
When used as intermediate and/or finishing coat, surface preparation according to Product Data Sheet for the preceding primer coat (GALVOSIL and/or HEMPADUR primers).
When used as a self-priming coat, surface preparation should include removal of oil and grease with suitable detergent, salt and other contaminants by (high pressure) fresh water cleaning and finally abrasive blasting to Sa 2½ or according to specification.

GALVANISED STEEL, ALUMINIUM and STAINLESS STEEL:
Remove oil and grease with suitable detergent, salt and other contaminants by (high pressure) fresh water cleaning. Make a light abrasive sweep blasting with a non-metallic (mineral) abrasive that is free of chlorides, to a uniform matt surface with a dense profile.

When applied to HEMPADUR:
The over-coating interval must be observed - consult the APPLICATION INSTRUCTIONS or the Specification for the relevant HEMPADUR.
The epoxy surface must be clean prior to application.

When applied to GALVOSILS:
HEMPAXANE CLASSIC 55000 can be applied when the GALVOSIL is cured. Consult APPLICATION INSTRUCTIONS for the relevant GALVOSIL. Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. After exposure to high humidity, zinc salts, "white rust", must be removed carefully by high pressure fresh water cleaning, if necessary combined with scrubbing with stiff nylon brushes. For application procedure see next pages.

REPAIR AND MAINTENANCE:

Spot-repairs/joints:
Clean damaged areas/welding seams thoroughly by power tool cleaning to minimum St 2 (spot-repairs) or by abrasive blasting to minimum Sa 2, preferably Sa 2½ according to specification. Improved surface preparation will improve the performance. Feather edges to sound and intact coating and roughen adjacent intact HEMPAXANE CLASSIC 55000 coating onto which an overlap will be applied. Touch up bare steel with the specified primer and apply HEMPAXANE CLASSIC 55000 over the primed and roughened area.

HEMPAXANE CLASSIC 55000

Application:

HEMPAXANE CLASSIC 55000 being a high solids and a relatively high viscosity material based on special binder chemistry, may require special measures to be taken at application.

Spray application:

Film-build/continuity: With this paint material applied in one/few coat(s) it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas application of a stripe coat will therefore be good painting practice. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. Avoid exaggerated film thickness due to the risk of sagging, cracks and solvent retention. The paint consumption must be controlled.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Wet/dry film thickness:

Please note that the thixotropic nature of HEMPAXANE CLASSIC 55000 may give a rather "wavy" surface of the paint just after application. This smoothens at drying, but can make it necessary to let the wet film readings be of a higher value than indicated. In many cases the wet film thickness, reading should be 25 micron/1 mil higher than calculated. As the wavy surface becomes smoother during drying these extra wet films thickness readings will not cause a higher paint consumption than otherwise stipulated.

Film thickness/thinning:

HEMPAXANE CLASSIC 55000 is normally specified in 100 - 125 micron/4-5 mils. Depending on ambient conditions, usually maximum 5% thinning with THINNER 08080 is relevant, however, increasing at high temperatures to ensure proper film formation and avoid dust spray. May be specified down to 75 micron/3 mils. To obtain optimum film formation in film thicknesses lower than 100 micron/4 mils dry film thickness additional thinning with 10-15% THINNER 08080 is recommended.

Brush application:

Use a brush with natural bristles - maintain a wet edge. By application with brush, a more uneven paint film is obtained; this can be counteracted by the application of more coats and thinning.

Roller application:

Is in general not recommended due to the formation of stable air bubbles. In exceptional cases a roller can be used, but air bubbles should during the process be levelled out by the use of a brush.

Application onto GALVOSIL:

HEMPAXANE CLASSIC 55000 can be applied directly onto a fully cured zinc-silicate (GALVOSIL) coating. Zinc-silicate coatings are porous and the porosity depends on the actual application of the zinc-silicate, the film thickness and the state of aging. Popping and bubbles may develop when the zinc-silicate is over-coated depending on the porosity and application method. The following methods have been used successfully in order to minimize/eliminate the popping and bubbling:
"Flash coat" procedure: Provided the paint temperature is above approximately 20°C/68°F: A thin, undiluted coat is applied (the flash coat) and after a few minutes, a second coat is applied in the full specified film thickness. If the paint temperature is below 20°C/68°F, thinning (max 15% THINNER 08080) may be required. The flash coat is not intended to form a closed uniform film.
"Sealer coat" procedure: HEMPAXANE CLASSIC 55000 is diluted 100 % with THINNER 08080 and a very thin coat is applied (the sealer coat) - the sealer coat should provide a blotchy non-uniform appearance. One or two passes of the sealer coat should be applied - depending on the actual condition of the GALVOSIL surface. After approx. 1 hour (20°C/68°F) a second coat (undiluted) is applied in the full specified film thickness.

The actual condition of the zinc-silicate may vary from case to case and it may be necessary to try both methods to get the optimal result.

HEMPAXANE CLASSIC 55000

Physical data versus temperature:

Drying time and recoating interval vary with humidity and temperature:

HEMPAXANE CLASSIC 55000 in a dry film thickness of 100-125 micron/4-5 mils:

Surface temperature:	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time (approx)*	12 hours	8 hours	6 hours	3 hours	2 hours
Curing time (approx)**	1 month	14 days	7 days	5 days	3 days

* measured at a relative humidity of 50 %, drying time is increased at lower humidity and decreased at higher relative humidity during drying.

** Curing time is independent of humidity

Surface temperature:	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
MINIMUM recoating interval for recoating with HEMPAXANE:					
	12 hours	8 hours	6hours	3 hours	2 hours
MAXIMUM recoating interval for recoating with HEMPAXANE:					
	3 month	60 days	30 days	15 days	7 days

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion

Recoating intervals:

Recoating intervals between epoxy coatings (HEMPADUR) and polysiloxane coatings (HEMPAXANE) - and between two coats of polysiloxane are narrow and critical for good adhesion and should be observed strictly.
This may require changed coating procedures in relation to larger projects where primers and intermediates are typically applied in one location and the topcoat on the final site. Such changed procedures may include the application of primer only in the shop and intermediate and topcoat on site or by the application of a thin/diluted epoxy bridge coat on site just before application of HEMPAXANE CLASSIC 55000.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S - 5500017380CR005

HEMPAXANE LIGHT 55030

BASE 55039 with CURING AGENT 98000

Description:

HEMPAXANE LIGHT 55030 is a two-component, high-solids, high-gloss, polysiloxane enamel with excellent gloss and colour retention.

Recommended use:

As an isocyanate free glossy decorative and protective finishing coat for structures in severely corrosive atmospheric environment.
Minimum temperature for curing is 0°C/32°F.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/17380*
Finish:	High-gloss
Volume solids, %:	82 ± 1
Theoretical spreading rate:	10.9 m²/litre - 75 micron 438 sq.ft./US gallon - 3 mils
Flash point:	41°C/106°F
Specific Gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	5½ hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	225 g/litre - 1.9 lbs/US gallon

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 55030:	Base 55039 : Curing agent 98000 5.6 : 4.4 by volume	
Application method:	Airless spray	Brush
Thinner (max.vol.):	08080 (10%)	08080 (5%) - See REMARKS overleaf
Pot life:	4 hours (20°C/68°F)	
Nozzle orifice:	.017"-.021"	
Nozzle pressure	100-125 bar /1450 -1800 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610	
Indicated film thickness, dry:	75 micron/3 mils	
Indicated film thickness, wet:	100 micron/4 mils	
Recoat interval, min:	6 hours (20°C/68°F)	
Recoat interval, max:	30 days (20°C/68°F) - See REMARKS overleaf	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas

HEMPAXANE LIGHT 55030

APPLICATION AND CURING CONDITIONS: The surface must be completely clean and dry at the time of application, and its temperature must be above the dew point to avoid condensation. Minimum temperature for curing is 0°C/32°F, minimum relative humidity 30%. In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: HEMPADUR-system according to specification.

SUBSEQUENT COAT: None.

REMARKS:

Colours: To obtain full opacity, an extra coat may be necessary, especially for certain lead-free colours in e.g. red, orange, yellow and green.

	Minimum			Maximum		
Surface temperature	20°C/68°F			20°C/68°F		
Recoated with (quality numbers only)	Atmospheric			Atmospheric		
	Mild	Medium	Severe	Mild	Medium	Severe
55030	6 hours	6 hours	7 hours	30 days	30 days	30 days

Service temperatures: At service temperature above 100°C/212°F, slight discoloration may be expected.

VOC - EU directive 2004/42/EC:

	As supplied	10 vol. % thinning	Limit phase, 2010
VOC in g/l	225	305	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 50 - 80 micron/2 -3 mils.

Thinner: THINNER 08510 may be used alternatively depending on local conditions.

Exposure to humidity: HEMPAXANE LIGHT 55030 will resist condensation and light rain after the dry to touch stage has been reached.

Recoating: If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Notes: **HEMPAXANE LIGHT 55030 is for professional use only.**

ISSUED BY: HEMPEL A/S - 5503017380CR001

HEMPATHANE ENAMEL 55100

BASE 55109 with CURING AGENT 95370

Description:

HEMPATHANE ENAMEL 55100 is a two-component, high-gloss acrylic polyurethane enamel, cured with aliphatic isocyanate, with good gloss and colour retention.

Recommended use:

As a glossy decorative finishing coat on a variety of substrates such as steel, aluminium, glassfibre, reinforced polyester, plywood, hardwood etc. in severely corrosive atmospheric environment.
Minimum temperature for curing is -10°C/14°F.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F (see REMARKS overleaf).

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000*
Finish:	High-gloss
Volume solids, %:	52 ± 1
Theoretical spreading rate:	14.9 m^2/litre - 35 micron 596 sq.ft./US gallon - 1.4 mil
Flash point:	35°C/95°F
Specific Gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Surface dry:	2½ (approx.) hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	4-5 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	440 g/litre - 3.7 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 55100:	Base 55109 : Curing agent 95370 7 : 1 by volume		
Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	See REMARKS overleaf	See REMARKS overleaf	08080 (5%)
Pot life:	2 hours (20°C/68°F)		
Nozzle orifice:	.017"-.019"		
Nozzle pressure	75-100 bar /1100 -1450 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08080 or 08510		
Indicated film thickness, dry:	35 micron/1.4 mil		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	8 hours (20°C/68°F)		
Recoat interval, max:	See REMARKS overleaf		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPATHANE ENAMEL 55100

APPLICATION AND CURING CONDITIONS:
The surface must be completely clean and dry at the time of application, and its temperature must be above the dew point to avoid condensation. Minimum temperature for curing is -10°C/14°F.
At the freezing point and below, be aware of the risk of ice on the surface which will hinder the adhesion. Light rain, high humidity and/or condensation during application and the following 16 hours (20°C/68°F) may adversely affect the film formation. The humidity of plywood/hardwood should not exceed 16% w/w.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: HEMPADUR 45141/45143, HEMPADUR MASTIC 45880/45881 or according to specification.

SUBSEQUENT COAT: None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	20 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	495	550	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Colours: Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere. Leaded colours may become discoloured when exposed to sulphide-containing atmosphere. To obtain full opacity, an extra coat may be necessary, especially for certain lead-free colours in eg red, orange, yellow and green.

Service temperatures: At service temperatures above 100°C/212°F, slight discoloration may be expected.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 20-40 micron/0.8 -1.6 mils.

Thinning: The type and amount of thinner depend on application conditions, application method, temperature, ventilation, and substrate. THINNER 0808 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.
Airless spray: 15-20% thinning is recommended. Under extreme conditions more than 25% may be necessary to obtain satisfactory film formation.
Conventional air spray: Dilute to a viscosity of 17-20 s/DIN 4 (approx 35% by volume). Use lowest possible air pressure and a small nozzle.
For both kinds of spray application the best result is obtained by applying a mist coat of HEMPATHANE ENAMEL 55100 at first, and then 2-15 minutes later apply to full film thickness giving a uniform film formation. Do not exaggerate the film thickness.

Recoating and drying/curing time:

Physical data versus temperatures (35 micron/1.4 mil dry film thickness - sufficient ventilation):

Surface temperature		-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Dry to touch, approx.		45 hours	20 hours	9 hours	5 hours	3 hours
Resist condensing humidity/ light showers after:		(7 days)	3 days	32 hours	16 hours	12 hours
Fully cured, 70% RH		(2 months)	32 days	14 days	7 days	5 days
Recoating interval, recoating 55100 with 55100	Min	3 days	1½ day	16 hours	8 hours	6 hours
	Max*	(6 months)	(6 months)	(6 months)	3 months	2 months

*The maximum recoating intervals apply to surfaces exposed to very severe conditions of periodical immersion, heavy condensation, great variations in temperatures, chemical attack and/or abrasion during service life of the coating system. Under other conditions no maximum recoating interval. **A completely clean surface is anyhow mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, and grease has to be removed. e.g. with suitable detergent. Salts to be removed by fresh water hosing. To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.**

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. In the case of recoating with other paint materials maximum will be 1-3 days (20°C/68°F) depending on type.

Notes: CURING AGENT 95370 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot-life and result in film defects.

HEMPATHANE ENAMEL 55100 is for professional use only.

ISSUED BY: HEMPEL A/S - 5510010000C0006

HEMPATHANE TOPCOAT 55210

BASE 55219 with CURING AGENT 95370

Description:
HEMPATHANE TOPCOAT 55210 is a two-component, glossy acrylic polyurethane coating, cured with aliphatic isocyanate, with good gloss and colour retention.

Recommended use:
As a finishing coat for protection of structural steel in severely corrosive atmospheric environment, where light-fastness and gloss retention are required.
Minimum temperature for curing is -10°C/14°F.

Service temperatures:
Maximum, dry exposure only: 120°C/248°F (see REMARKS overleaf).

Certificates/Approvals:
Approved as a low flame spread material by Danish, French, Spanish and Singaporean authorities according to IMO resolution MSC 61 (67).
Has a Danish, French, Spanish, Singaporean, Malaysian and Indonesian EC-type Examination Certificate.
Complies with EU Directive 2004/42/EC, subcategory j.
Please see REMARKS overleaf.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000 - Blue/30840*
Finish:	Glossy
Volume solids, %:	51 ± 1
Theoretical spreading rate:	10.2 m^2/litre - 50 micron 409 sq.ft./US gallon - 2 mils
Flash point:	33°C/92°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	2½ (approx.) hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	8 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	445 g/litre - 3.7 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 55210:	Base 55219 : Curing agent 95370 7 : 1 by volume	
Application method:	Airless spray	Brush
Thinner (max. vol.):	See REMARKS overleaf	08080 (5%)
Pot life:	4 hours (20°C/68°F)	
Nozzle orifice:	.017"-.019"	
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	THINNER 08080 or 08510	
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	100 micron/4 mils	
Recoat interval, min:	See REMARKS overleaf	
Recoat interval, max:	See REMARKS overleaf	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPATHANE TOPCOAT 55210

APPLICATION AND CURING CONDITIONS: The surface must be completely clean and dry at the time of application, and its temperature must be above the dew point to avoid condensation. Minimum temperature for curing is -10°C/14°F. At the freezing point and below, be aware of the risk of ice on the surface which will hinder the adhesion. High humidity and/or condensation during application and the following 10 hours (20°C/68°F) may adversely affect the film formation.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: HEMPADUR 45141/45143, HEMPADUR MASTIC 45880/45881 or according to specification.

SUBSEQUENT COAT: None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	445	506	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.
Certificate has been issued under the former quality number 5521.

Colours: Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere.
Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.
To obtain full opacity, an extra coat may be necessary, especially for certain lead-free colours in eg red, orange, yellow and green.

Service temperatures: At service temperatures above 100°C/212°F, HEMPATHANE TOPCOAT 55210 will become more soft. Furthermore, discolouration may occur.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 40-75 micron/1.6-3 mils.

Thinning: The type and amount of thinner depend on application conditions, application method, temperature, ventilation, and substrate. THINNER 08080 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.
Airless spray: 5-15% thinning is recommended. Under extreme conditions up to more than 20% may be necessary to obtain satisfactory film formation.
The best result is obtained by applying a mist coat of HEMPATHANE TOPCOAT 55210 at first, and then 2-15 minutes later apply to full film thickness giving a uniform film formation. Do not exaggerate the film thickness.

Electrostatic spray: 10% thinning with specified thinner is recommended. Please contact HEMPEL for further advice.

Recoating and drying/curing time:

Physical data versus temperatures:						
Surface temperature		-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Dry to touch, approx.		3 days	36 hours	16 hours	8 hours	6 hours
Resists condensing humidity/ light showers after*:		(3½ days)	45 hours	20 hours	10 hours	8 hours
Fully cured, 70% RH		(2 months)	32 days	14 days	7 days	5 days
Recoating interval, recoating 55210 with 55210	Min	3½ days	45 hours	20 hours	10 hours	8 hours
	Max	None	None	None	None	None

*Faster drying and curing may be obtained by using an "accelerator" - consult HEMPEL for further advice.

A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, and grease has to be removed, e.g. with suitable detergent. Salts to be removed by fresh water hosing. To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.

Notes: CURING AGENT 95370 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot-life and result in film defects.
HEMPATHANE TOPCOAT 55210 is for professional use only.

ISSUED BY: HEMPEL A/S - 5521010000CO0013

HEMPATHANE TOPCOAT 55213

BASE 55217 with CURING AGENT 95370

Description: HEMPATHANE TOPCOAT 55213 is a two-component, flat to semi-gloss acrylic polyurethane coating with good gloss and colour retention.

Recommended use: As a finishing coat for protection of structural steel in severely corrosive atmospheric environment, where light-fastness and gloss retention are required.
Minimum temperature for curing is -10°C/14°F.

Service temperatures: Maximum, dry exposure only: 120°C/248°F (see REMARKS overleaf).

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000*
Finish:	Flat to semi-gloss, depending on requirements
Volume solids, %:	51 ± 1
Theoretical spreading rate:	10.2 m^2/litre - 50 micron 409 sq.ft./US gallon - 2 mils
Flash point:	31°C/88°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	2½ (approx.) hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	4 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	445 g/litre - 3.7 lbs/US gallon

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 55213:	Base 55217 : Curing agent 95370 7 : 1 by volume	
Application method:	Airless spray	Brush
Thinner (max. vol.):	See REMARKS overleaf	08080 (5%)
Pot life:	2 hours (20°C/68°F)	
Nozzle orifice:	.017"-.019"	
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	THINNER 08080 or 08510	
Indicated film thickness, dry:	50 micron/2 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	100 micron/4 mils	
Recoat interval, min:	See REMARKS overleaf	
Recoat interval, max:	See REMARKS overleaf	

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

APPLICATION AND CURING CONDITIONS: The surface must be completely clean and dry at the time of application, and its temperature must be above the dew point to avoid condensation. Minimum temperature for curing is -10°C/14°F.
55213 should be mixed thoroughly using a clean mixer before application.
At the freezing point and below, be aware of the risk of ice on the surface which will hinder the adhesion. High humidity and/or condensation during application and the following 8 hours (20°C/68°F) may adversely affect the film formation.
In confined spaces provide adequate ventilation during application and drying.

HEMPATHANE TOPCOAT 55213

PRECEDING COAT: HEMPADUR 45141/45143, HEMPADUR HI-BUILD 45200/45201, HEMPADUR MASTIC 45880, HEMPADUR 47140 or according to specification.

SUBSEQUENT COAT: None.

REMARKS:

Service temperatures: At service temperatures above 100°C/212°F, slight discoloration may be expected.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 40-60 micron/1.6-2.4 mils.

Thinning: The type and amount of thinner depend on application conditions, application method, temperature, ventilation, and substrate. THINNER 08080 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.
Airless spray: 5-15% thinning is recommended. Under extreme conditions up to more than 20% may be necessary to obtain satisfactory film formation.
The best result is obtained by applying a mist coat of HEMPATHANE ENAMEL 55213 at first, and then 2-15 minutes later apply to full film thickness giving a uniform film formation. Do not exaggerate the film thickness.

Electrostatic spray: 10% thinning with specified thinner is recommended. Please contact HEMPEL for further advice.

Recoating and drying/curing time:

Physical data versus temperatures:

		-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Surface temperature						
Dry to touch, approx.		36 hours	18 hours	8 hours	4 hours	3 hours
Resist condensing humidity/ light showers after:		(3 days)	36 hours	16 hours	8 hours	6 hours
Fully cured, 70% RH		(2 months)	32 days	14 days	7 days	3 days
Recoating interval, recoating 55213 with 55213	Min	3 days	36 hours	16 hours	8 hours	6 hours
	Max	None	None	None	None	None

A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, and grease has to be removed, e.g. with suitable detergent. Salts to be removed by fresh water hosing. To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.

Notes: CURING AGENT 95370 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot-life and result in film defects.
The products should be applied in the specified film thickness as too high film thickness may increase gloss, just as too low film thickness will reduce gloss.
In case of forced drying contact Hempel as increased temperature during curing may increase gloss.
HEMPATHANE TOPCOAT 55213 is for professional use only.

ISSUED BY: HEMPEL A/S - 5521311150CR004

HEMPEL'S OXIDUR 55850

BASE 55859 with CURING AGENT 97550

Description:
HEMPEL'S OXIDUR 55850 is a two-component oxiraneester based finishing coat. Contains zincphosphate. Resistant to splashes of petrol, mineral oils, and mild acids. VOC-compliant.

Recommended use:
In moderately to severely atmospheric environments, as a finishing coat in two-pack anti-corrosive systems where safety rules preclude the use of isocyanate cured paints. May be specified as a one coat "Direct To Metal" system in mild atmospheric environments.

Service temperatures:
Maximum, dry exposure only: 140°C/282°F (see REMARKS overleaf).

Certificates/Approvals:
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000*
Finish:	Glossy
Volume solids, %:	65 ± 1
Theoretical spreading rate:	10.8 m^2/litre - 60 micron 434 sq.ft./US gallon - 2.4 mils
Flash point:	39°C/102°F
Specific gravity:	1.5 kg/litre 12.5 lbs/US gallon
Surface dry:	3 (approx.) hours at 20°C/68°F (ISO 1517)
Dry to touch:	8-10 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	335 g/litre - 2.8 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1..

APPLICATION DETAILS:

Mixing ratio for 55850:	Base 55859 : Curing agent 97550 2 : 1 by volume		
Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08450 (5%)	08450 (15%)	08450 (5%)
Pot life:	8 hours (20°C/68°F)		
Nozzle orifice:	.018"-.021"		
Nozzle pressure:	175 bar/2500 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08450		
Indicated film thickness, dry:	60 micron/2.4 mils (See REMARKS overleaf)		
Indicated film thickness, wet:	100 micron/4 mils		
Recoat interval, min:	24 hours (20°C/68°F)		
Recoat interval, max:	See REMARKS overleaf		

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPELS'S OXIDUR 55850

SURFACE PREPARATION: For one coat, direct to metal: as per relevant painting specification.

APPLICATION CONDITIONS: Use only where application and curing can proceed at temperatures above 10°C/50°F. The temperature of the surface and that of the paint itself must also be above this limit.
Apply only on a dry and completely clean surface with a temperature above the dew point to avoid condensation.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: None or according to specification.

SUBSEQUENT COAT: None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	15 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	345	410	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Service temperatures: At service temperatures above 90°C/176°F, HEMPEL'S OXIDUR 55850 will become more soft. Furthermore, discoloration may occur.

Colours: Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere.
Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

Stripe coating: When specified as a one coat "Direct to Metal"-system follow "Good Painting Practise" and apply stripe coating before the spray application on areas difficult to cover properly by spray application.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoat interval. Normal range is 50-100 micron/2.0-4.0 mils.

Recoating: Maximum recoat interval related to later conditions of exposure:

Steel temperature	20°C/68°F		
	Atmospheric		
Recoated with (quality number only)	Mild	Medium	Severe
55850	None	None	3 months

A completely clean surface is anyhow mandatory to ensure intercoat adhesion, especially at long recoat intervals. Any dirt, oil and grease has to be removed, e.g. with suitable detergent. Salts to be removed by fresh water hosing. To determine whether the quality of the surface cleaning is adequate, a test patch may be relevant. However, such a test is not the final proof of long-term durability, but if the result is doubtful, repeated cleaning will be relevant

Gloss: A slight tendency to chalk in outdoor exposure does not detract from the protective properties.

Note: **HEMPEL'S OXIDUR 55850 is for professional use only.**

ISSUED BY: HEMPEL A/S - 5585010000CO007

HEMPATHANE TOPCOAT 55910

BASE 55919 with CURING AGENT 97050

Description:
HEMPATHANE TOPCOAT 55910 is a two-component polyurethane topcoat, cured with aliphatic isocyanate.

Recommended use:
As a VOC-compliant, high-build finishing coat for protection of structural steel in corrosive environment, especially for maintenance purposes.
May be specified as a one coat "Direct To Metal" system in mild atmospheric environments.

Service temperatures:
Maximum, dry exposure only: 120°C/248°F *(see REMARKS overleaf)*

Certificates/Approvals:
Complies with EU Directive 2004/42/EC, subcategory j (see REMARKS overleaf).

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000
Finish:	Glossy
Volume solids, %:	65 ± 1
Theoretical spreading rate:	6.5 m^2/litre - 100 micron 261 sq.ft./US gallon - 4 mils
Flash point:	31°C/88°F
Specific gravity:	1.5 kg/litre - 12.5 lbs/US gallon
Surface dry:	3 (approx.) hours at 20°C/68°F *(ISO 1517)*
Dry to touch:	5 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	335 g/litre - 2.8 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 55910:	Base 55919 : Curing agent 97050 7 : 1 by volume	
Application method:	Airless spray *(see REMARKS overleaf)*	Brush *(see REMARKS overleaf)*
Thinner (max.vol.):	08080 (5%)	08080 (5%)
Pot life:	2 hours (20°C/68°F)	
Nozzle orifice:	.017"-.021"	
Nozzle pressure:	175 bar/2540 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	THINNER 08080/08880	
Indicated film thickness, dry:	100 micron/4 mils *(see REMARKS overleaf)*	
Indicated film thickness, wet:	150 micron/6 mils	
Recoat interval, min:	16 hours (20°C/68°F)	
Recoat interval, max:	None *(see REMARKS overleaf)*	

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPATHANE TOPCOAT 55910

SURFACE PREPARATION: For one coat, direct to metal: as per relevant painting specification.

APPLICATION CONDITIONS: The surface must be completely clean and dry at the time of application, and its temperature must be above the dew point to avoid condensation. Minimum temperature for curing is - 10°C/14°F.
At the freezing point and below, be aware of the risk of ice on the surface which will hinder the adhesion. High humidity and/or condensation during application and the following 24 hours (20°C/68°F) may adversely affect the film formation.
In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: According to specification.

SUBSEQUENT COAT: None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	335	360	550	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Service temperatures: At service temperatures above 100°C/212°F, HEMPATHANE TOPCOAT 55910 will become more soft. Furthermore, discolouration may occur.

Colours: Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere.
Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.
To obtain full opacity, an extra coat may be necessary, especially for certain lead-free colours in eg red, orange, yellow and green.

Stripe coating: When specified as a one coat “Direct to Metal”-system 100 micron/4 mils must be applied.
In addition follow “Good Painting Practise” and apply stripe coating before the spray application on areas difficult to cover properly by spray application.

Film thicknesses: May be specified in another film thickness than indicated depending on purpose and area of use. Normal range dry is minimum 50 micron/2 mils (diluted) and minimum 75 micron/3 mils (undiluted), maximum 125 micron/5 mils. This will alter spreading rate and may influence drying time and recoat interval.

Recoat interval: **Maximum recoating interval: A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoat intervals. Any dirt, oil, and grease has to be removed. e.g. with suitable detergent followed by (high pressure) fresh water cleaning. Salts to be removed by fresh water hosing.**
To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.

Notes: CURING AGENT 97050 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot life and result in film defects.

HEMPATHANE TOPCOAT 55910 is for professional use only.

ISSUED BY: HEMPEL A/S - 5591010000CR005

HEMPATEX ENAMEL 56360

Description:

HEMPATEX ENAMEL 56360 is a finishing coat based on acrylic resin and non-chlorinated plasticizer for optimum gloss and colour retention. Physically drying. Resistant to salt water, splashes of aliphatic hydrocarbons and animal and vegetable oils.

Recommended use:

As an interior and exterior finishing coat in HEMPATEX systems in moderately to severely corrosive environment.

Service temperatures:

Maximum, dry exposure only: 80°C/176°F *(see REMARKS overleaf).*

Certificates/Approvals:

Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Black/19990*	Orange/50040*
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	31 ± 1	33 ± 1
Theoretical spreading rate:	8.9 m^2/litre - 35 micron	9.4 m^2/litre - 35 micron
	355 sq.ft./US gallon - 1.4 mils	378 sq.ft./US gallon - 1.4 mils
Flash point:	25°C/77°F	25°C/77°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon	1.0 kg/litre - 8.3 lbs/US gallon
Surface dry:	1 (approx.) hr at 20°C/68°F *(ISO 1517)*	1 (approx.) hr at 20°C/68°F *(ISO 1517)*
Dry to touch:	3-4 hours at 20°C/68°F	3-4 hours at 20°C/68°F
V.O.C.:	615 g/litre - 5.1 lbs/US gallon	595 g/litre - 4.9 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1..

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush/Roller
Thinner (max. vol.):	08080 (5%)	08080 (15%)	08080 (5%)
Nozzle orifice:	.017"		
Nozzle pressure:	150 bar/2200 psi		
	(Airless spray data are indicative and subject to adjustment)		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	35 micron/1.4 mils		
Indicated film thickness, wet:	100 micron/4 mils		
Recoat interval, min:	4 hours (20°C/68°F)		
Recoat interval, max:	None *(See REMARKS overleaf)*		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPATEX ENAMEL 56360

APPLICATION CONDITIONS:	As dictated by normal good painting practice. Dry and clean surface at a temperature above the dew point. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPATEX HI-BUILD qualities, or according to specification.
SUBSEQUENT COAT:	None.
REMARKS:	**Certificate** has been issued under the former quality number 5636.
Colours:	Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere. Leaded colours may become discoloured when exposed to sulphide-containing atmosphere. To obtain full opacity, an extra coat may be necessary, especially for certain lead-free colours in eg red, orange, yellow and green.
Service temperatures:	As HEMPATEX ENAMEL 56360 is a thermoplastic product, prolonged direct contact at temperatures above approx. 40°C/104°F may cause film indentation. When the temperature drops below, the mechanical strength is recovered.
Film thicknesses:	A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended **not** to apply HEMPATEX ENAMEL 56360 in excessive film thickness.
Recoating:	Before recoating after exposure in contaminated environment, clean the surface thoroughly by high pressure fresh water hosing and allow to dry. Overlapping with certain other paints may cause cracking. Refer to Remarks of relevant Painting Specification.
Skid-proof surfaces:	If a skid-proof surface is desired, sprinkle HEMPEL'S ANTI-SLINT 67500 evenly on the first coat of HEMPATEX ENAMEL 56360 while still wet (consumption approx. 2.5 kg/5.5 lbs to 25 m^2/270 sq.ft.). When the paint is dry, sweep up surplus grit and apply a second coat of HEMPATEX ENAMEL 56360. Antiskid properties can also be obtained by mixing 1.0 kg of HEMPEL'S ANTISLIP BEADS 67420 into 20 litres of HEMPATEX ENAMEL 56360.
Note:	**HEMPATEX ENAMEL 56360 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 5636019990CO011

HEMPEL'S HI-VEE 56540

Description:

HEMPEL'S HI-VEE 56540 is a non-hiding, but strongly day-light reflecting acrylic paint with fluorescent pigments which give intense colour impression and high visibility (HI-VEE). It has no effect in darkness, and it needs HEMPEL'S HI-VEE LACQUER 06520 on top in order to improve the light fastness.

Recommended use:

For life-saving equipment and for warning purposes such as protruding or moving objects, etc.

Service temperatures:

Maximum, dry exposure only: 80°C/176°F *(see REMARKS overleaf).*

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shades nos:	Orange/50180*
Finish:	Semi-gloss
Volume solids, %:	44 ± 1
Theoretical spreading rate:	11.0 m^2/litre - 40 micron 441 sq.ft./US gallon - 1.6 mils
Flash point:	38°C/100°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon
Dry to touch:	1-2 hours at 20°C/68°F
V.O.C.:	450 g/litre - 3.7 lbs/US gallon

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush
Thinner (max. vol.):	08230 (5%)	08230 (15%)	08230 (5%)
Nozzle orifice:	.015"-.018"		
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08230		
Indicated film thickness, dry:	40 micron/1.6 mils		
Indicated film thickness, wet:	100 micron/4 mils		
Recoat interval, min:	2 hours (20°C/68°F)		
Recoat interval, max:	None		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S HI-VEE 56540

APPLICATION CONDITIONS:	As dictated by normal good painting practice. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	White, preferably flat HEMPATEX paint or according to specification. HEMPEL'S HI-VEE 56540 is applied on a white surface in order to obtain optimum light reflection.
SUBSEQUENT COAT:	HEMPEL'S HI-VEE LACQUER 06520, which contains ultra-violet radiation absorbing filter.
REMARKS:	As HEMPEL'S HI-VEE 56540 is a thermoplastic product, prolonged mechanical exposure at temperatures above approx. 40°C/104°F may cause film indentation. When temperature drops below, the mechanical strength is recovered. Do not expose liquid paint to temperatures above 40°C/104°F neither during storage nor in connection with application.
Note:	**HEMPEL'S HI-VEE 56540 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 56540501800003

HEMPEL'S SILICONE TOPCOAT 56900

Description:
HEMPEL'S SILICONE TOPCOAT 56900 is a heat resistant polysiloxane paint, pigmented with inert pigments.

Recommended use:
For long-term protection of hot pipelines, exhaust pipes, smoke stacks and other hot surfaces up to 200°C/392°F. In corrosive environment see PRECEDING COAT overleaf.

Service temperatures:
Maximum, dry exposure only: 200°C/392°F.

Certificates/Approvals:
Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000	Black/19990
Finish:	Semi-flat *(See REMARKS overleaf)*	Semi-flat *(See REMARKS overleaf)*
Volume solids, %:	58 ± 1	55 ± 1
Theoretical spreading rate:	23.2 m^2/litre - 25 micron 946 sq.ft./US gallon - 1.0 mil	22.0 m^2/litre - 25 micron 882 sq.ft./US gallon - 1.0 mil
Flash point:	25°C/77°F	25°C/77°F
Specific gravity:	1.5 kg/litre - 12.5 lbs/US gallon	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	1 (approx.) hr at 20°C/68°F *(ISO 1517)*	1 (approx.) hr at 20°C/68°F *(ISO 1517)*
Dry to touch:	2-4 hours at 20°C/68°F	2-4 hours at 20°C/68°F
V.O.C.:	375 g/litre - 3.1 lbs/US gallon	405 g/litre - 3.4 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08080 (25%)	08080 (40%)	08080 (25%) *(See REMARKS overleaf)*
Nozzle orifice:	.017"		
Nozzle pressure:	125 bar/1800 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	25 micron/1 mil *(See REMARKS overleaf)*		
Indicated film thickness, wet:	50 micron/2 mils		
Recoat interval, min.:	24 hours (20°C/68°F) *(See REMARKS overleaf)*		
Recoat interval, max.:	See REMARKS overleaf		

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S SILICONE TOPCOAT 56900

SURFACE PREPARATION: Remove oil and grease etc. thoroughly with suitable detergent. Remove salts and other contaminants by (high pressure) fresh water cleaning.
Abrasive blasting to Sa 2½. If shopprimer is required, only zinc silicate type is recommended.

APPLICATION CONDITIONS: Clean and dry surface with a temperature above the dew point to avoid condensation. In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: Can be used directly on blast-cleaned steel. For maximum corrosion protection, a primer coat of one of the following paints is recommended (40 micron/1.6 mil dry film thicknesses):
HEMPEL'S SILICONE ZINC 16900 or HEMPEL'S GALVOSIL 15700.

SUBSEQUENT COAT: None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	40 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	405	545	600	500

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Gloss: After exposure to heat the gloss is reduced.

Thermoplasticity: The paint film is somewhat thermoplastic also after heating.

Film thicknesses: It is recommended to avoid too high thicknesses of the paint as this will give a risk of blistering at later heating. THINNER 08080 must be added at application to secure the low dry film thickness.

High temperature service: For high temperature service, the total dry film thickness of the paint system should preferably be kept at 75 micron/3 mils as maximum.

First exposure to heat: On first exposure to heat the temperature increase from ambient temperature to the required service temperature must run over a period of 24 hours.

Curing: The coating will be fully cured after:
3 days at 100°C/212°F,
1 day at 150°C/302°F,
or 2 hours at 200°C/392°F

Recoating: May be recoated when through dry (24 hours at 20°C/68°F).
Before recoating after exposure in contaminated environment, clean surface thoroughly by high pressure fresh water hosing and allow to dry.

Zinc silicate primer: If HEMPEL'S SILICONE TOPCOAT 56900 is applied on zinc silicate coatings, such as HEMPEL'S GALVOSIL 15700, popping may occur after application or after first heating up.
The best way to avoid popping is to apply a mist coat in the first pass of HEMPEL'S SILICONE TOPCOAT 56900. Let the air escape and apply the full coat of HEMPEL'S SILICONE TOPCOAT 56900.

Note: **HEMPEL'S SILICONE TOPCOAT 56900 is for professional use only.**

ISSUED BY: HEMPEL A/S - 56900100000C0002

HEMPEL'S SILICONE ALUMINIUM 56910

Description: HEMPEL'S SILICONE ALUMINIUM 56910 is a heat resistant aluminium pigmented polysiloxane paint.

Recommended use: For long-term protection of hot pipelines, exhaust pipes, smoke stacks and other hot surfaces. In corrosive environment see PRECEDING COAT overleaf.

Service temperatures: Maximum, dry exposure only: 600°C/1112°F.

Certificates/Approvals: Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS

Colours/Shade nos:	Aluminium/19000
Finish:	Semi-flat *(See REMARKS overleaf)*
Volume solids, %:	35 ± 1
Theoretical spreading rate:	14.0 m^2/litre - 25 micron 561 sq.ft./US gallon - 1.0 mil
Flash point:	25°C/77°F
Specific gravity:	1.1 kg/litre - 9.2 lbs/US gallon
Surface dry:	1 (approx.) hour at 20°C/68°F *(ISO 1517)*
Dry to touch:	2-4 hours at 20°C/68°F
V.O.C.:	585 g/litre - 4.9 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08080 (5%)	08080 (15%)	08080 (5%) *(See REMARKS overleaf)*
Nozzle orifice:	.017"		
Nozzle pressure:	125 bar/1800 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	25 micron/1 mil *(See REMARKS overleaf)*		
Indicated film thickness, wet:	75 micron/3 mils		
Recoat interval, min:	24 hours (20°C/68°F) *(See REMARKS overleaf)*		
Recoat interval, max:	See REMARKS overleaf		

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S SILICONE ALUMINIUM 56910

SURFACE PREPARATION: Remove oil and grease etc. thoroughly with suitable detergent. Remove salts and other contaminants by (high pressure) fresh water cleaning.
Abrasive blasting to Sa 2½.

APPLICATION CONDITIONS: Clean and dry surface with a temperature above the dew point to avoid condensation. In confined spaces provide adequate ventilation during application and drying.

PRECEDING COAT: Can be used directly on blast-cleaned steel. For maximum corrosion protection, a primer coat of one of the following paints is recommended (40 micron/1.6 mil dry film thicknesses):
HEMPEL'S SILICONE ZINC 16900 or HEMPEL'S GALVOSIL 15700.
This will lower the heat resistance; reference is made to the product data sheets for the mentioned primers.

SUBSEQUENT COAT: None.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	5 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	585	595	600	500

Gloss: After exposure to heat the gloss is reduced.

Thermo plasticity: The paint film is somewhat thermoplastic also after heating.

Film thicknesses: It is recommended to avoid too high thicknesses of the paint as this will give a risk of blistering at later heating. THINNER 08080 must be added at application to secure the low dry film thickness.

High temperature service: For high temperature service, the total dry film thickness of HEMPEL'S SILICONE ALUMINIUM 56910 should preferably be kept at 75 micron/3 mils as maximum.

First exposure to heat: On first exposure to heat the temperature increase from ambient temperature to the required service temperature must run over a period of 24 hours.

Curing: The coating will be fully cured after:
3 days at 100°C/212°F,
1 day at 150°C/302°F,
or 2 hours at 200°C/392°F.

Recoating: May be recoated when through dry (24 hours at 20°C/68°F) or after being heated for one hour to approximately 200°C/392°F.
Before recoating after exposure in contaminated environment, clean surface thoroughly by high pressure fresh water hosing and allow to dry.

Zinc silicate primer: If HEMPEL'S SILICONE ALUMINIUM 56910 is applied on zinc silicate coatings, such as HEMPEL'S GALVOSIL 15700, popping may occur after application or after first heating up.
The best way to avoid popping is to apply a mist coat in the first pass of HEMPEL'S SILICONE ALUMINIUM 56910. Let the air escape and apply the full coat of HEMPEL'S SILICONE ALUMINIUM 56910.

Note: **HEMPEL'S SILICONE ALUMINIUM 56910 is for professional use only.**

ISSUED BY: HEMPEL A/S - 5691019000CO004

HEMPEL'S SILICONE ACRYLIC 56940

Description:

HEMPEL'S SILICONE ACRYLIC 56940 is a heat resistant acrylic modified polysiloxane paint. It is air drying at ambient temperature.

Recommended use:

For long-term protection of hot pipelines, exhaust pipes, smoke stacks and other hot surfaces up to 200°C/390°F, resist short time exposure up to 300°C/572°F. When heated to above 200°C/390°F for longer periods a certain discolouration may occur, which do not affect the protective properties of the product. In corrosive environment see PRECEDING COAT overleaf.

Service temperatures:

Maximum, dry exposure only: Aluminium shade: 400°C/752°F,
Other shades: 200°C/392°F.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	Aluminium/19000*
Finish:	Semi-flat *(see REMARKS overleaf)*
Volume solids, %:	29 ± 1
Theoretical spreading rate:	11.6 m^2/litre - 25 micron 465 sq.ft./US gallon - 1.0 mil
Flash point:	25°C/77°F
Specific gravity:	1.1 kg/litre - 9.2 lbs/US gallon
Surface dry:	½ (approx.) hr at 20°C/68°F *(ISO 1517)*
Dry to touch:	1-2 hours at 20°C/68°F
V.O.C.:	600 g/litre - 5.0 lbs/US gallon

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08080 (15%) *(See REMARKS overleaf)*	08080 (25%)	08080 (15%)
Nozzle orifice:	.017"		
Nozzle pressure:	125 bar/1800 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	THINNER 08080		
Indicated film thickness, dry:	25 micron/1 mil *(see REMARKS overleaf)*		
Indicated film thickness, wet:	50-100 micron/2-4 mils *(depending on colour)*		
Recoat interval, min:	See REMARKS overleaf		
Recoat interval, max:	See REMARKS overleaf		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S SILICONE ACRYLIC 56940

SURFACE PREPARATION:	Remove oil and grease etc. thoroughly with suitable detergent. Remove salts and other contaminants by high pressure fresh water cleaning. Abrasive blasting to Sa 2½, SSPC-SP-10. If shopprimer is required, only zinc silicate type is recommended.
APPLICATION CONDITIONS:	Clean and dry surface with a temperature above dew point to avoid condensation. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	Can be used directly on blast-cleaned steel. For maximum corrosion protection, a primer coat of one of the following paints is recommended (40 micron/1.6 mil dry film thicknesses): HEMPEL'S SILICONE ZINC 16900 or HEMPEL'S GALVOSIL 15700.
SUBSEQUENT COAT:	None.
REMARKS:	
Gloss:	After exposure to heat the gloss is reduced.
Thermo plasticity:	The paint film is somewhat thermoplastic also after heating.
Film thicknesses:	It is recommended to avoid too high thicknesses of the paint as this will give a risk of blistering at later heating. THINNER 0808 must be added at application to secure the low dry film thickness.
High temperature service:	For high temperature service, the total dry film thickness of the paint system should preferably be kept at 75 micron/3 mils as maximum.
First exposure to heat:	On first exposure to heat the temperature increase from ambient temperature to the required service temperature must run over a period of 24 hours.
Curing:	The coating will be fully cured after: 3 days at 100°C/212°F, 1 day at 150°C/302°F, or 2 hours at 200°C/392°F.
Recoating:	May be recoated when through dry (24 hours at 20°C/68°F) or after being heated for one hour to approximately 200°C/392°F. Before overcoating after exposure in contaminated environment, clean surface thoroughly by high pressure fresh water hosing and allow to dry.
Zinc silicate primer:	If HEMPEL'S SILICONE ACRYLIC 56940 is applied on zinc silicate coatings, such as HEMPEL'S GALVOSIL 15700, popping may occur after application or after first heating up. The best way to avoid popping is to apply a mist coat in the first pass of HEMPEL'S SILICONE ACRYLIC 56940. Allow the air to escape and apply the full coat of HEMPEL'S SILICONE ACRYLIC 56940.
Note:	**HEMPEL'S SILICONE ACRYLIC 56940 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 5694019000C0003

HEMUCRYL ENAMEL HI-BUILD 58030

Description:
HEMUCRYL ENAMEL HI-BUILD 58030 is a water-borne, acrylic dispersion based paint. It dries to a non-yellowing and glossy coating with low dirt pick-up, good weathering properties, and high gloss retention.
Especially suited for application by airless spray.

Recommended use:
As a glossy, finishing coat in water-borne paint systems, interior and exterior, in moderately to severe corrosive environments. For use on buildings the relatively high resistance to diffusion of water vapour and carbon dioxide should be taken into account. For handrails and the similar, a chemically curing coating is alternatively recommended.

Service temperatures:
Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:
Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).
Approved as a low flame spread material by the British and Canadian authorities.
Approved as a low flame spread material by the Danish and Spanish authorities according to IMO resolution MSC 61 (67).
Has a Danish and Spanish EC-type Examination Certificate.
Please see REMARKS overleaf.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000*
Finish:	Glossy
Volume solids, %:	44 ± 1
Theoretical spreading rate:	5.9 m^2/litre - 75 micron 235 sq.ft/US gallon - 3 mils
Flash point:	> 93°C/199°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	¾ (approx.) hour at 20°C/68°F *(ISO 1517)*
Dry to touch:	1½ (approx.) hour at 20°C/68°F *(See REMARKS overleaf)*
V.O.C.:	5 g/litre - 0.0 lbs/US gallon

**Wide range of colours available via Hempel's MULTI-TINT system.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Brush (touch-up)
Thinner (max.vol):	Fresh water (5%)	HEMUCRYL BRUSH AGENT 99810 (3-8%)
Nozzle orifice:	015"-.019" *(See APPLICATION INSTRUCTIONS)*	
Nozzle pressure:	130 bar/1900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	Fresh water *(See APPLICATION INSTRUCTIONS)*	
Indicated film thickness, dry:	75 micron/3 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	175 micron/7 mils	
Recoat interval, min:	2 hours (20°C/68°F)	
Recoat interval, max:	None *(See REMARKS overleaf)*	

HEMUCRYL ENAMEL HI-BUILD 58030

SURFACE PREPARATION: See separate HEMUCRYL APPLICATION INSTRUCTIONS.

APPLICATION CONDITIONS: See separate HEMUCRYL APPLICATION INSTRUCTIONS.

PRECEDING COAT: HEMUCRYL PRIMER HI-BUILD 18030, HEMUDUR 18500 or according to specification.
Other paints may precede but consult nearest HEMPEL office. Certain types of aged, solvent-borne coatings can be recoated after a careful cleaning. A test patch is recommended. Aged, chemically cured coatings (alkyd, epoxy, polyurethane etc.) may also precede. Yet, only recommended in case of later mild exposure - roughening may be necessary and a test patch is recommended.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	8 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	5	10	140	140

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Certificates have been issued under the former quality number 5803.

Colours: Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.
Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.
To obtain full opacity, an extra coat may be necessary, especially for certain lead-free colours in eg red, orange, yellow and green.

Film thicknesses: May be specified in another film thickness than indicated. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 50-100 micron/2-4 mils dry film thickness. When used in 50 micron dry film thickness, 3-5% thinning will be necessary to secure proper film formation. Beware of overthinning, which may cause formation of fisheyes.

Application: For proper film formation the recommended nozzle sizes should be used.
If application is done by roller/brush, apply liberally. Use brushes with synthetic fibres. Rollers should either be mohair or felt.
For brush application, add 3-8% by volume of HEMUCRYL BRUSH AGENT 99810.

Recoating: No maximum recoating interval, but after prolonged exposure to polluted atmosphere remove accumulated contamination by high pressure fresh water cleaning and allow to dry.

Other REMARKS: See separate HEMUCRYL APPLICATION INSTRUCTIONS.

HEMUCRYL ENAMEL HI-BUILD 58030 is for professional use only.

ISSUED BY: HEMPEL A/S - 5803010000CO014

For product description refer to product data sheet

HEMPEL'S HEMUCRYL product range

Scope:

These Application Instructions cover surface preparation and application conditions of HEMPEL'S HEMUCRYLs.

Surface preparation, primers:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to minimum Sa 2½. For temporary protection, if required, use suitable shopprimer. All damaged shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use the specified HEMUCRYL primer type.

Repair: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose paint by abrasive blasting or power tool cleaning to St 3 before recoating. Touch up bare spots with the specified HEMUCRYL primer type.

Aluminium: Very thorough degreasing, followed by (high pressure) fresh water cleaning to remove all salts and other contamination. Any anodizing must be completely removed. Thorough sand papering or abrasive sweeping with mineral abrasives is recommended. Cast aluminium is recommended to be abrasive swept to a uniform, evenly grey appearance.

Stainless steel: Very thorough degreasing with alkaline degreaser, ie HEMPEL'S LIGHT CLEANER 99350, followed by fresh water hosing to remove all contamination.

Hot-dipped galvanized steel: Wet rubbing/grinding with ammonia water 1:20 followed by fresh water hosing. In the case this method is not feasible, the procedure as described for stainless steel may be used.

Zinc silicate coated surfaces: Remove oil and grease, etc, with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. After exposure to high humidity, zinc salts ("white rust") must be removed carefully by (high pressure) fresh water cleaning - if necessary combined with scrubbing with stiff nylon brushes. Consult the APPLICATION INSTRUCTIONS for the relevant GALVOSIL product.

Note:
Among the HEMUCRYL primer types, HEMUCRYL TI-COAT 18200 is designed to be used as the first coat on aluminium, hot-dipped galvanized steel, stainless steel and on zinc silicate coated surfaces.

Surface preparation, topcoats:

Preceding coats should be sound and tightly adhering. Remove oil and grease with suitable detergent. Remove salts and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up to full system before recoating with specified HEMUCRYL topcoat type.

Concrete: Any oil, grease and other contaminants should be removed by eg volatilizing by flame cleaning or treatment with suitable detergent, the latter in the following way:

1) Saturation of the surface with fresh water
2) Washing with suitable detergent followed by fresh water hosing

Remove loose material eg by stiff brushes or blasting, high pressure jetting or flame cleaning followed by fresh water hosing depending on circumstances. Three last mentioned methods are also able to remove scum layer if necessary. After surface preparation the surface should feel solid and hard. Remove dust. Saturate surface with suitable sealer, eg micro dispersed acrylic type or by the HEMUCRYL topcoat diluted 15-20% with water.

HEMPEL'S HEMUCRYL product range

Application conditions:	Use only where application can proceed at temperatures above 5°C/41°F, preferably above 10°C/50°F. Apply on a clean and dry surface with a temperature above the dew point to avoid condensation. **Relative humidity:** During application above 60%, preferably 75-90%, to avoid dry spray. If RH is below 60%, special thinner may be added in order to reduce dry spray. During drying below 80%, preferably between 40-60%. (Contact HEMPEL for further advice). Good ventilation during application and drying is necessary. Especially during drying it is of utmost importance that sufficient ventilation is covering all parts of the surfaces painted. Ventilation requirements to remove water vapours liberated during application and drying are app. 75 m^3/litre of the paint at 20°C/68°F. (Relative humidity of the air supply 40%).
REMARKS:	
Good painting practice:	The durability/performance of water-borne coatings is to a very high degree depending on the fulfilment of good painting practice. For instance application to riveted and skip-welded constructions will require extra care when coating sharp edges, riveted joints, etc. Avoid too high thicknesses per coat. Preferably apply an extra stripe coat.
"Edge effect":	Furthermore, as water-borne paints have a high tendency to "withdraw" from sharp edges, etc., proper corrosion protection will be highly supported by careful rounding of edges and that any joints are completely closed and tight.
Exposure to low temperatures shortly after application:	If the painted items will be exposed to humidity/water at temperatures below 5-10°C/ 41-50°F shortly after finishing the paint application, it is of utmost importance for later good performance that following rules are complied with: • Excessive film thickness must be avoided. • The (last applied) paint layer must dry for at least 6 hours at 20°C/68°F - 40-60% RH, 12 hours at 10°C/50°F - 40-60% RH before exposure to temperatures below 5°C/41°F and/or condensation/water exposure. Avoid outdoor application in seasons with low night temperatures, frost and frost in combination with condensation or rain.
Shelf life/storage:	Store at temperatures between 5°C-40°C/41°F-104°F. Shelf life is reduced at temperatures above 30°C/86°F. Do not expose to frost during storage and transport, or before the coating is dry.
Cleaning of tools:	Tools must be cleaned immediately with lukewarm soap water and/or fresh water followed by thoroughly rinsing to remove residues of detergent. Dried remains of paint can be removed with HEMPEL'S TOOL CLEANER 99610.
Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
Note:	Any deviations from the above of a particular HEMUCRYL will be stated in the product data sheet for this paint.
ISSUED BY:	HEMPEL A/S

HEMUCRYL ENAMEL 58040

Description:

HEMUCRYL ENAMEL 58040 is a water-borne, selfcross-linking acrylic dispersion based paint. It dries to a hard, non-yellowing and glossy coating with low dirt pick-up, and very good weathering properties, including a high gloss retention.

Recommended use:

As a glossy and hard topcoat in water-borne paint systems, interior and exterior, in moderately to severely atmospheric corrosive environment.
Suited for workshop application where fast handling is essential.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000
Finish:	Glossy
Volume solids, %:	36 ± 1
Theoretical spreading rate:	6.0 m^2/litre - 60 micron 241 sq.ft/US gallon - 2.4 mils
Flash point:	> 93°C/199°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	¾ (approx.) hour at 20°C/68°F *(ISO 1517)*
Dry to touch:	1½ (approx.) hour at 20°C/68°F *(See REMARKS overleaf)*
V.O.C.:	40 g/litre - 0.3 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Brush (touch-up)
Thinner (max.vol):	Fresh water (5%)	HEMUCRYL BRUSH AGENT 99810 (3-8%)
Nozzle orifice:	015"-.019" *(See REMARKS overleaf)*	
Nozzle pressure:	130 bar/1900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	Fresh water *(See REMARKS overleaf)*	
Indicated film thickness, dry:	60 micron/2.4 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	175 micron/7 mils	
Recoat interval, min:	2 hours (20°C/68°F)	
Recoat interval, max:	None *(See REMARKS overleaf)*	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMUCRYL ENAMEL 58040

SURFACE PREPARATION: See separate APPLICATION INSTRUCTIONS for HEMPEL'S HEMUCRYL product range.

APPLICATION CONDITIONS: See separate APPLICATION INSTRUCTIONS for HEMPEL'S HEMUCRYL product range.
Please note that **minimum application temperature** for HEMUCRYL ENAMEL 58040 is **10°C/50°F**.

PRECEDING COAT: HEMUCRYL PRIMER HI-BUILD 18030, HEMUDUR 18500 or according to specification.
Other paints may precede but consult nearest HEMPEL office. Certain types of aged, solvent-borne coatings can be recoated after a careful cleaning. A test patch is recommended. Aged, chemically cured coatings (alkyd, epoxy, polyurethane etc.) may also precede. Yet, only recommended in case of later mild exposure - roughening may be necessary and a test patch is recommended.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	8 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	40	45	140	140

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Viscosity: HEMUCRYL ENAMEL 58040 has a gelly-like consistency in the can.

Film thicknesses: May be specified in another film thickness than indicated. This will alter spreading rate and may influence drying time and recoating interval. Normal range is 40-60 micron/1.6-2.4 mils dry film thickness.

Application: For proper film formation the recommended nozzle sizes should be used.
If application is done by roller/brush, apply liberally. Use brushes with synthetic fibres. Rollers should either be mohair or felt.
For brush application, add 3-8% by volume of HEMUCRYL BRUSH AGENT 99810.

Recoating: No maximum recoating interval, but after prolonged exposure to polluted atmosphere remove accumulated contamination by high pressure fresh water cleaning and allow to dry.

Other REMARKS: See separate APPLICATION INSTRUCTIONS for HEMPEL'S HEMUCRYL product range.

HEMUCRYL ENAMEL 58040 is for professional use only.

ISSUED BY: HEMPEL A/S - 5804010000CR003

For product description refer to product data sheet

HEMPEL'S HEMUCRYL product range

Scope:

These Application Instructions cover surface preparation and application conditions of HEMPEL'S HEMUCRYLs.

Surface preparation, primers:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to minimum Sa 2½. For temporary protection, if required, use suitable shopprimer. All damaged shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use the specified HEMUCRYL primer type.

Repair: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose paint by abrasive blasting or power tool cleaning to St 3 before recoating. Touch up bare spots with the specified HEMUCRYL primer type.

Aluminium: Very thorough degreasing, followed by (high pressure) fresh water cleaning to remove all salts and other contamination. Any anodizing must be completely removed. Thorough sand papering or abrasive sweeping with mineral abrasives is recommended. Cast aluminium is recommended to be abrasive swept to a uniform, evenly grey appearance.

Stainless steel: Very thorough degreasing with alkaline degreaser, ie HEMPEL'S LIGHT CLEANER 99350, followed by fresh water hosing to remove all contamination.

Hot-dipped galvanized steel: Wet rubbing/grinding with ammonia water 1:20 followed by fresh water hosing. In the case this method is not feasible, the procedure as described for stainless steel may be used.

Zinc silicate coated surfaces: Remove oil and grease, etc, with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. After exposure to high humidity, zinc salts ("white rust") must be removed carefully by (high pressure) fresh water cleaning - if necessary combined with scrubbing with stiff nylon brushes. Consult the APPLICATION INSTRUCTIONS for the relevant GALVOSIL product.

Note:
Among the HEMUCRYL primer types, HEMUCRYL TI-COAT 18200 is designed to be used as the first coat on aluminium, hot-dipped galvanized steel, stainless steel and on zinc silicate coated surfaces.

Surface preparation, topcoats:

Preceding coats should be sound and tightly adhering. Remove oil and grease with suitable detergent. Remove salts and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up to full system before recoating with specified HEMUCRYL topcoat type.

Concrete: Any oil, grease and other contaminants should be removed by eg volatilizing by flame cleaning or treatment with suitable detergent, the latter in the following way:

1) Saturation of the surface with fresh water
2) Washing with suitable detergent followed by fresh water hosing

Remove loose material eg by stiff brushes or blasting, high pressure jetting or flame cleaning followed by fresh water hosing depending on circumstances. Three last mentioned methods are also able to remove scum layer if necessary. After surface preparation the surface should feel solid and hard. Remove dust. Saturate surface with suitable sealer, eg micro dispersed acrylic type or by the HEMUCRYL topcoat diluted 15-20% with water.

HEMPEL'S HEMUCRYL product range

Application conditions:	Use only where application can proceed at temperatures above 5°C/41°F, preferably above 10°C/50°F. Apply on a clean and dry surface with a temperature above the dew point to avoid condensation. **Relative humidity:** During application above 60%, preferably 75-90%, to avoid dry spray. If RH is below 60%, special thinner may be added in order to reduce dry spray. During drying below 80%, preferably between 40-60%. (Contact HEMPEL for further advice). Good ventilation during application and drying is necessary. Especially during drying it is of utmost importance that sufficient ventilation is covering all parts of the surfaces painted. Ventilation requirements to remove water vapours liberated during application and drying are app. 75 m^3/litre of the paint at 20°C/68°F. (Relative humidity of the air supply 40%).
REMARKS:	
Good painting practice:	The durability/performance of water-borne coatings is to a very high degree depending on the fulfilment of good painting practice. For instance application to riveted and skip-welded constructions will require extra care when coating sharp edges, riveted joints, etc. Avoid too high thicknesses per coat. Preferably apply an extra stripe coat.
"Edge effect":	Furthermore, as water-borne paints have a high tendency to "withdraw" from sharp edges, etc., proper corrosion protection will be highly supported by careful rounding of edges and that any joints are completely closed and tight.
Exposure to low temperatures shortly after application:	If the painted items will be exposed to humidity/water at temperatures below 5-10°C/ 41-50°F shortly after finishing the paint application, it is of utmost importance for later good performance that following rules are complied with: • Excessive film thickness must be avoided. • The (last applied) paint layer must dry for at least 6 hours at 20°C/68°F - 40-60% RH, 12 hours at 10°C/50°F - 40-60% RH before exposure to temperatures below 5°C/41°F and/or condensation/water exposure. Avoid outdoor application in seasons with low night temperatures, frost and frost in combination with condensation or rain.
Shelf life/storage:	Store at temperatures between 5°C-40°C/41°F-104°F. Shelf life is reduced at temperatures above 30°C/86°F. Do not expose to frost during storage and transport, or before the coating is dry.
Cleaning of tools:	Tools must be cleaned immediately with lukewarm soap water and/or fresh water followed by thoroughly rinsing to remove residues of detergent. Dried remains of paint can be removed with HEMPEL'S TOOL CLEANER 99610.
Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
Note:	Any deviations from the above of a particular HEMUCRYL will be stated in the product data sheet for this paint.
ISSUED BY:	HEMPEL A/S

Product Data

HEMUCRYL TOPCOAT HI-BUILD 58230

Description:

HEMUCRYL TOPCOAT HI-BUILD 58230 is a water-borne, acrylic dispersion based paint. It dries to a non-yellowing and semi-flat coating with low dirt pick-up and good weathering properties. It has a fairly good resistance to spillage of chemicals and to washing.
Especially suited for application by airless spray.

Recommended use:

As a finishing coat in water-borne paint systems, interior and exterior, in mildly to moderately corrosive environment. For use on buildings the relatively high resistance to diffusion of water vapour and carbon dioxide should be taken into account.

Service temperatures:

Maximum, dry exposure only: 120°C/248°F.

Certificates/Approvals:

Complies with EU Directive 2004/42/EC, subcategory i (see REMARKS overleaf).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000*
Finish:	Semi-flat
Volume solids, %:	42 ± 1
Theoretical spreading rate:	5.6 m²/litre - 75 micron 225 sq.ft/US gallon - 3 mils
Flash point:	> 93°C/199°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Dry to touch:	1½ (approx.) hour at 20°C/68°F *(See REMARKS overleaf)*
V.O.C.	2 g/litre - 0.0 lbs/US gallon

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray	Brush (touch-up)
Thinner (max.vol):	Fresh water (5%)	HEMUCRYL BRUSH AGENT 99810 (3-8%)
Nozzle orifice:	015"-.019" *(See APPLICATION INSTRUCTIONS)*	
Nozzle pressure:	130 bar/1900 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	Fresh water *(See APPLICATION INSTRUCTIONS)*	
Indicated film thickness, dry:	75 micron/3 mils *(See REMARKS overleaf)*	
Indicated film thickness, wet:	175 micron/7 mils	
Recoat interval, min:	2 hours (20°C/68°F)	
Recoat interval, max:	None *(See REMARKS overleaf)*	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMUCRYL TOPCOAT HI-BUILD 58230

SURFACE PREPARATION: See separate HEMUCRYL APPLICATION INSTRUCTIONS.

APPLICATION CONDITIONS: See separate HEMUCRYL APPLICATION INSTRUCTIONS.

PRECEDING COAT: HEMUCRYL PRIMER HI-BUILD 18030 or HEMUDUR 18500.
Other paints may precede but consult nearest HEMPEL office. Certain types of aged, solvent based coatings can be recoated after a careful cleaning. A test patch is recommended.
Aged, chemically cured coatings (alkyd, epoxy, polyurethane etc.) may also precede. Yet, only recommended in case of later mild exposure - roughening may be necessary and a test patch is recommended.

REMARKS:

VOC - EU directive 2004/42/EC:

	As supplied	8 vol. % thinning	Limit phase I, 2007	Limit phase II, 2010
VOC in g/l	5	5	140	140

VOC: For VOC of other shades, please refer to Safety Data Sheet.

Colours: Certain lead-free red and yellow colours may discolour when exposed to chlorine- containing atmosphere.
Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

Film thicknesses: May be specified in another film thickness than indicated. This will alter spreading rate and may influence drying time and recoating interval. Normal range dry is 50-100 micron/2-4 mils dry film thickness. When used in 50 micron dry film thickness, 3-5% thinning will be necessary to secure proper film formation.

Application: For proper film formation the recommended nozzle sizes should be used.
If application is done by brush/roller, apply liberally. Use brushes with synthetic fibres. Rollers should either be mohair or felt.
For brush/roller application, add 3-8% by volume of HEMUCRYL BRUSH AGENT 99810.

Recoating: No maximum recoating interval, but after prolonged exposure to polluted atmosphere remove accumulated contamination by high pressure fresh water cleaning and allow to dry.

Other REMARRKS: See separate HEMUCRYL APPLICATION INSTRUCTIONS.

HEMUCRYL TOPCOAT HI-BUILD 58230 is for professional use only.

ISSUED BY: HEMPEL A/S - 5823010000CO006

For product description refer to product data sheet

HEMPEL'S HEMUCRYL product range

Scope:

These Application Instructions cover surface preparation and application conditions of HEMPEL'S HEMUCRYLs.

Surface preparation, primers:

New steel: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Abrasive blasting to minimum Sa 2½. For temporary protection, if required, use suitable shopprimer. All damaged shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting. For repair and touch-up use the specified HEMUCRYL primer type.

Repair: Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose paint by abrasive blasting or power tool cleaning to St 3 before recoating. Touch up bare spots with the specified HEMUCRYL primer type.

Aluminium: Very thorough degreasing, followed by (high pressure) fresh water cleaning to remove all salts and other contamination. Any anodizing must be completely removed. Thorough sand papering or abrasive sweeping with mineral abrasives is recommended. Cast aluminium is recommended to be abrasive swept to a uniform, evenly grey appearance.

Stainless steel: Very thorough degreasing with alkaline degreaser, ie HEMPEL'S LIGHT CLEANER 99350, followed by fresh water hosing to remove all contamination.

Hot-dipped galvanized steel: Wet rubbing/grinding with ammonia water 1:20 followed by fresh water hosing. In the case this method is not feasible, the procedure as described for stainless steel may be used.

Zinc silicate coated surfaces: Remove oil and grease, etc, with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. After exposure to high humidity, zinc salts ("white rust") must be removed carefully by (high pressure) fresh water cleaning - if necessary combined with scrubbing with stiff nylon brushes. Consult the APPLICATION INSTRUCTIONS for the relevant GALVOSIL product.

Note:
Among the HEMUCRYL primer types, HEMUCRYL TI-COAT 18200 is designed to be used as the first coat on aluminium, hot-dipped galvanized steel, stainless steel and on zinc silicate coated surfaces.

Surface preparation, topcoats:

Preceding coats should be sound and tightly adhering. Remove oil and grease with suitable detergent. Remove salts and other contaminants by (high pressure) fresh water cleaning. Remove rust and loose material by abrasive blasting or power tool cleaning. Dust off residues. Touch up to full system before recoating with specified HEMUCRYL topcoat type.

Concrete: Any oil, grease and other contaminants should be removed by eg volatilizing by flame cleaning or treatment with suitable detergent, the latter in the following way:

1) Saturation of the surface with fresh water
2) Washing with suitable detergent followed by fresh water hosing

Remove loose material eg by stiff brushes or blasting, high pressure jetting or flame cleaning followed by fresh water hosing depending on circumstances. Three last mentioned methods are also able to remove scum layer if necessary. After surface preparation the surface should feel solid and hard. Remove dust. Saturate surface with suitable sealer, eg micro dispersed acrylic type or by the HEMUCRYL topcoat diluted 15-20% with water.

HEMPEL'S HEMUCRYL product range

Application conditions:	Use only where application can proceed at temperatures above 5°C/41°F, preferably above 10°C/50°F. Apply on a clean and dry surface with a temperature above the dew point to avoid condensation. **Relative humidity:** During application above 60%, preferably 75-90%, to avoid dry spray. If RH is below 60%, special thinner may be added in order to reduce dry spray. During drying below 80%, preferably between 40-60%. (Contact HEMPEL for further advice). Good ventilation during application and drying is necessary. Especially during drying it is of utmost importance that sufficient ventilation is covering all parts of the surfaces painted. Ventilation requirements to remove water vapours liberated during application and drying are app. 75 m^3/litre of the paint at 20°C/68°F. (Relative humidity of the air supply 40%).
REMARKS:	
Good painting practice:	The durability/performance of water-borne coatings is to a very high degree depending on the fulfilment of good painting practice. For instance application to riveted and skip-welded constructions will require extra care when coating sharp edges, riveted joints, etc. Avoid too high thicknesses per coat. Preferably apply an extra stripe coat.
"Edge effect":	Furthermore, as water-borne paints have a high tendency to "withdraw" from sharp edges, etc., proper corrosion protection will be highly supported by careful rounding of edges and that any joints are completely closed and tight.
Exposure to low temperatures shortly after application:	If the painted items will be exposed to humidity/water at temperatures below 5-10°C/ 41-50°F shortly after finishing the paint application, it is of utmost importance for later good performance that following rules are complied with: • Excessive film thickness must be avoided. • The (last applied) paint layer must dry for at least 6 hours at 20°C/68°F - 40-60% RH, 12 hours at 10°C/50°F - 40-60% RH before exposure to temperatures below 5°C/41°F and/or condensation/water exposure. Avoid outdoor application in seasons with low night temperatures, frost and frost in combination with condensation or rain.
Shelf life/storage:	Store at temperatures between 5°C-40°C/41°F-104°F. Shelf life is reduced at temperatures above 30°C/86°F. Do not expose to frost during storage and transport, or before the coating is dry.
Cleaning of tools:	Tools must be cleaned immediately with lukewarm soap water and/or fresh water followed by thoroughly rinsing to remove residues of detergent. Dried remains of paint can be removed with HEMPEL'S TOOL CLEANER 99610.
Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
Note:	Any deviations from the above of a particular HEMUCRYL will be stated in the product data sheet for this paint.
ISSUED BY:	HEMPEL A/S

Product Data

HEMPEL'S ANTI-SLIP BEADS 67420

Description:

HEMPEL'S ANTI-SLIP BEADS 67420 are hollow, aluminium silicate spheres ("glass pearls") of diameters between 5 and 300 micron.

Recommended use:

To obtain anti-skid properties on decks and other areas where a skid-proof surface is required. To be mixed with the paint before application.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colour:	Off-white/greyish
Specific gravity:	0.7 kg/litre (approx.)
Particle shape:	Spherical

Remarks:

Store under dry and clean conditions.
Use approximately the following amount in weight of HEMPEL'S ANTI-SLIP BEADS 67420:

Approx. 0.8 kg/1.8 lbs of HEMPEL'S ANTI-SLIP BEADS 67420 into 20 litres or 5 US gallons of HEMPATEX ENAMEL 56360.

Approx. 1.0 kg/2.2 lbs of HEMPEL'S ANTI-SLIP BEADS 67420 into 20 litres or 5 US gallons of HEMPATEX HI-BUILD 46410 or of HEMPALIN DECKPAINT 53240.

Approx. 1.2 kg/2.6 lbs of HEMPEL'S ANTI-SLIP BEADS 67420 into 20 litres or 5 US gallons of HEMPATHANE TOPCOAT 55210.

Approx. 1.3 kg/2.9 lbs of HEMPEL'S ANTI-SLIP BEADS 67420 into 20 litres or 5 US gallons of HEMPADUR HI-BUILD 45200/45201.

HEMPEL'S ANTI-SLIP BEADS 67420 must be stirred thoroughly into the paint until a uniform mixture has been obtained.

Apply the mixture by brush, by roller, or by conventional spray equipment using pressure vessel and large nozzle orifice.

Note:

HEMPEL'S ANTI-SLIP BEADS 67420 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY:

HEMPEL A/S

HEMPEL'S ANTI-SLINT 67500

Description: HEMPEL'S ANTI-SLINT 67500 is flame dried silica sand of which the average particle size is approximately 0.5 millimetres.

Recommended use: To obtain anti-skid properties on decks and other areas where a skid-proof surface is required.

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colour:	Greyish
Specific gravity:	2.7 (approx.) kg/litre
Particle shape:	Grit

Remarks:

Being heavy and rather coarse HEMPEL'S ANTI-SLINT 67500 should not be stirred into the paint before its application. For such purpose use HEMPEL'S ANTI-SLIP BEADS 67420.
HEMPEL'S ANTI-SLINT 67500 should be sprinkled evenly on the surface immediately upon application of the penultimate coat of the paint system while the paint is still wet.
Consumption approximately 2.5 kg/5.5 lbs of HEMPEL'S ANTI-SLINT 67500 to 25 sq.m/ 270 sq.feet.
When the paint is dry, sweep up surplus grit and apply the final coat.
HEMPEL'S ANTI-SLINT 67500 should be kept dry and clean.
Do not mix contaminated sweepings with new supplies.

Note: **HEMPEL'S ANTI-SLINT 67500 is for professional use only.**

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY: HEMPEL A/S

HEMPASIL HELIX 77000

BASE 77009 - HEMPASIL CROSSLINKER 97080
FOULING RELEASE COATING

Description:

HEMPASIL HELIX 77000 is a biocide free, two-component, high solids fouling release coating based on silicone. HEMPASIL HELIX 77000 provides a smooth, low surface energy, hydrophobic surface with special surface release properties whereby fouling settlement is minimised. The coating may foul under static conditions (idle periods). This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

HEMPASIL HELIX 77000 is designed specially for application on propellers and rudders.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colour/Shade nos.:	Grey/15150 - Black/19990
Finish:	Glossy
Volume solids, %:	71 ± 1
Theoretical spreading rate:	4.7 m^2/litre - 150 micron 190 sq.ft./US gallon - 6 mils
Flash point:	28°C/82°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon
Dry to touch:	3 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	270 g/litre - 2.3 lbs/US gallon
Shelf life:	1½ years (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage. If the shelf life is exceeded please contact HEMPEL for further advice.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 77000	Base 77009: CROSSLINKER 97080 7:1 by volume
Application method:	Airless spray Brush *(touch-up) (see REMARKS overleaf)*
Thinner (max. vol.):	No thinning *(see REMARKS overleaf)*
Nozzle orifice:	.019"-.021"
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080
Pot life:	2 hours (20°C/68°F) after addition of HEMPASIL CROSSLINKER 97080
Indicated film thickness, dry:	150 micron/6 mils
Indicated film thickness, wet:	225 micron/9 mils
Recoat interval, min:	6 hours (20°C/68°F)
Recoat interval, max:	None

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPASIL HELIX 77000

APPLICATION CONDITIONS:	Use only where application can proceed at temperatures above 5°C. The temperature of the surface and that of the paint itself must also be above this limit. Apply only on a surface with a temperature above the dew point to avoid condensation. Relative humidity of the air between min. 30% and max. 85%. The surface should be clean and dry. The special application properties do furthermore necessitate extra consideration as to possible windy weather. The on-site representative from Hempel is to be consulted. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPASIL NEXUS 27302.
SUBSEQUENT COAT:	None.
REMARKS:	It is of the utmost importance that thorough protection and cleaning procedures are followed before and after application respectively. It is advisable to apply HEMPASIL SYSTEM after all other exterior painting is complete. This is to avoid silicone contamination of other painted surfaces. **Before** application cover all surfaces surrounding the areas to be applied with plastic sheeting to avoid overspray. **After** application clean all equipment very thoroughly. See below.
Application method:	A well executed spray application is necessary. This paint material has special application properties and it is recommended first to make a small-scale application to get familiar with the properties.
Thinning:	Not recommended. In exceptional cases use THINNER 08080 (max. 5 vol%).
Recommended number of coats:	One coat normally recommended.
Cleaning of tools:	Very thorough cleaning with THINNER 08080 is necessary. DISPOSE OF CLEANING SOLVENTS AFTER USE. DO NOT RE-USE SOLVENTS AFTER CLEANING.
Detailed instructions:	Will be available in connection with separate painting specifications.
Undocking:	Minimum 24 hours (20°C/68°F). At temperatures below 15°C/59°F minimum 48 hours.
Storage of cans:	Must be stored under absolutely dry conditions, protect against seeping humidity.
Note:	**HEMPASIL HELIX 77000 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 7700015150CR001

HEMPASIL 77100

BASE 77109 - HEMPASIL CROSSLINKER 97080
FOULING RELEASE COATING

Description:

HEMPASIL 77100 is a copper free, biocide free, two-component, silicone fouling release coating with a high solids content. The product is based on silicone and cures after addition of HEMPASIL CROSSLINKER 97080.
It provides a smooth, low surface energy, hydrophobic surface with special surface release properties whereby fouling settlement is minimised. The surface properties facilitate self cleaning and provide easy clean characteristics. The coating may accumulate some fouling under static conditions (idle periods).
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As a fouling release coating for High Speed Craft (HSC), powerful commercial and military vessels (such as fast ferries, patrol and coast guard vessels, high speed monohulls, wave piercers, hydrofoils etc.) with service speeds in excess of 25 knots and with medium to high activity.
HEMPASIL 77100 will typically be used in cases where a full new F/R system is to be applied or for recoating of existing F/R system.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colour/Shade nos.:	Grey/15150 - Black/19990 - Blue/32150
Finish:	Glossy
Volume solids, %:	70 ± 1
Theoretical spreading rate:	4.7 m^2/litre - 150 micron 187 sq.ft./US gallon - 6 mils
Flash point:	28°C/82°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon
Dry to touch:	3 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	270 g/litre - 2.3 lbs/US gallon
Shelf life:	1½ years (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage. If the shelf life is exceeded please contact HEMPEL for further advice.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 77100	Base 77109: CROSSLINKER 97080 7:1 by volume
Application method:	Airless spray Brush *(touch-up) (see REMARKS overleaf)*
Thinner (max. vol.):	No thinning *(see REMARKS overleaf)*
Nozzle orifice:	.019"-.021"
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080
Pot life:	2 hours (20°C/68°F) after addition of HEMPASIL CROSSLINKER 97080
Indicated film thickness, dry:	150 micron/6 mils
Indicated film thickness, wet:	225 micron/9 mils
Recoat interval, min:	6 hours (20°C/68°F)
Recoat interval, max:	None

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPASIL 77100

APPLICATION CONDITIONS:	Use only where application can proceed at temperatures above 5°C. The temperature of the surface and that of the paint itself must also be above this limit. Apply only on a surface with a temperature above the dew point to avoid condensation. Relative humidity of the air between min. 30% and max. 85%. The surface should be clean and dry. The special application properties do furthermore necessitate extra consideration as to possible windy weather. The on-site representative from Hempel is to be consulted. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPASIL NEXUS 27302.
SUBSEQUENT COAT:	None.
REMARKS:	It is of the utmost importance that thorough protection and cleaning procedures are followed before and after application respectively. It is advisable to apply HEMPASIL SYSTEM after all other exterior painting is complete. This is to avoid silicone contamination of other painted surfaces. **Before** application cover all surfaces surrounding the areas to be applied with plastic sheeting to avoid overspray. **After** application clean all equipment very thoroughly. See below.
Application method:	A well executed spray application is necessary. This paint material has special application properties and it is recommended first to make a small-scale application to get familiar with the properties.
Thinning:	Not recommended. In exceptional cases use THINNER 08080 (max. 5 vol%).
Recommended number of coats:	One coat normally recommended.
Cleaning of tools:	Very thorough cleaning with THINNER 08080 is necessary. DISPOSE OF CLEANING SOLVENTS AFTER USE. DO NOT RE-USE SOLVENTS AFTER CLEANING.
Detailed instructions:	Will be available in connection with separate painting specifications.
Undocking:	Minimum 24 hours (20°C/68°F). At temperatures below 15°C/59°F minimum 48 hours.
Storage of cans:	Must be stored under absolutely dry conditions, protect against seeping humidity.
Note:	**HEMPASIL 77100 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 7710015150CR002

HEMPASIL 77500

BASE 77509 - HEMPASIL CROSSLINKER 97080
FOULING RELEASE COATING

Description:

HEMPASIL 77500 is a biocide free, two-component, silicone fouling release coating with a high solids content. The product is based on silicone and cures after addition of HEMPASIL CROSSLINKER 97080.
It provides a smooth, low surface energy, hydrophobic surface with special surface release properties whereby fouling settlement is minimised. The coating may foul under static conditions (idle periods).
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As a fouling release coating for deep sea, *high activity* scheduled vessels with service speed in the 15-30-knot range, eg container vessels, ferries, cruise liners, LNG/LPG carriers, vehicle carriers etc.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colour/Shade nos:	Grey/15150 - Black/19990 - Blue/32150
Finish:	Glossy
Volume solids, %:	69 ± 1
Theoretical spreading rate:	4.6 m^2/litre - 150 micron 184 sq.ft./US gallon - 6 mils
Flash point:	28°C/82°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon
Dry to touch:	3 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	275 g/litre - 2.3 lbs/US gallon
Shelf life:	1½ years (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage. If the shelf life is exceeded please contact HEMPEL for further advice.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 77500	Base 77509: CROSSLINKER 97080 7:1 by volume
Application method:	Airless spray Brush *(touch-up) (see REMARKS overleaf)*
Thinner (max.vol.):	No thinning *(see REMARKS overleaf)*
Nozzle orifice:	.019"-.021"
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080
Pot life:	2 hours (20°C/68°F) after addition of HEMPASIL CROSSLINKER 97080
Indicated film thickness, dry:	150 micron/6 mils
Indicated film thickness, wet:	225 micron/9 mils
Recoat interval, min:	6 hours (20°C/68°F)
Recoat interval, max:	None

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPASIL 77500

APPLICATION CONDITIONS:	Use only where application can proceed at temperatures above 5°C. The temperature of the surface and that of the paint itself must also be above this limit. Apply only on a surface with a temperature above the dew point to avoid condensation. Relative humidity of the air between min. 30% and max. 85%. The surface should be clean and dry. The special application properties do furthermore necessitate extra consideration as to possible windy weather. The on-site representative from Hempel is to be consulted. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPASIL NEXUS 27302.
SUBSEQUENT COAT:	None.
REMARKS:	It is of the utmost importance that thorough protection and cleaning procedures are followed before and after application respectively. It is advisable to apply HEMPASIL SYSTEM after all other exterior painting is complete. This is to avoid silicone contamination of other painted surfaces. **Before** application cover all surfaces surrounding the areas to be applied with plastic sheeting to avoid overspray. **After** application clean all equipment very thoroughly. See below.
Application method:	A well executed spray application is necessary. This paint material has special application properties and it is recommended first to make a small-scale application to get familiar with the properties.
Thinning:	Not recommended. In exceptional cases use THINNER 08080 (max 5 vol%).
Recommended number of coats:	One coat normally recommended.
Cleaning of tools:	Very thorough cleaning with THINNER 08080 is necessary. DISPOSE OF CLEANING SOLVENTS AFTER USE. DO NOT RE-USE SOLVENTS AFTER CLEANING.
Detailed instructions:	Will be available in connection with separate painting specifications.
Undocking:	Minimum 24 hours (20°C/68°F). At temperatures below 15°C/59°F minimum 48 hours.
Storage of cans:	Must be stored under absolutely dry conditions, protect against seeping humidity.
Note:	**HEMPASIL 77500 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 7750015150CR002

Product Data

HEMPEL'S ANTIFOULING GLOBIC NCT 8190M

Description:

HEMPEL'S ANTIFOULING GLOBIC NCT 8190M is a high solids, self-smoothening and self-polishing antifouling. It is based on nanocapsule acrylate binder technology. Self-polishing is controlled by sea waters interaction with the core-shell structure of the nanocapsules. An inorganic fibre reinforcement ensures mechanical strength.
A powerful bioactive mixture and its self-renewing effect makes it suitable for protection in the severe fouling conditions of coastal waters.
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an antifouling for bottom and boottop on vessels operating in coastal trade at low to medium speeds and low to medium activity.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	Brown 62900/Red 58000
Finish:	Flat
Volume solids, %:	52 ± 1
Theoretical spreading rate:	5.2 m^2/litre - 100 micron 209 sq.ft./US gallon - 4 mils
Flash point:	27°C/81°F
Specific gravity:	1.8 kg/litre - 15.0 lbs/US gallon
Dry to touch:	4-5 hours at 20°C/68°F
V.O.C.:	480 g/litre - 4.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)
Nozzle orifice:	.027"-.031"
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080
Indicated film thickness, dry:	100 micron/4 mils (see REMARKS overleaf)
Indicated film thickness, wet:	200 micron/8 mils
Recoat interval:	As per painting specification

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING GLOBIC NCT 8190M

SURFACE PREPARATION:	**Existing old self-polishing or ablative antifouling:** Remove possible oil and grease etc. with suitable detergent, followed by high pressure fresh water cleaning for a thorough removal of any possible weak structure of leached antifouling. Allow the surface to dry before coating. **Sealer:** Whether to use a sealer coat/tiecoat or not depends on the type and condition of the existing antifouling.
APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPADUR 45182, HEMPATEX HI-BUILD 46330 or according to specification.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	The GLOBIC's are never tinted and as the high load of cuprous oxide influences the shade a certain variation from batch to batch is allowable. Exposure to humid weather shortly after application is likely to cause discolouration. This is a surface phenomenon only and has no influence on performance nor recoatability.
Aluminium hulls:	**May be specified on aluminium hulls <u>provided</u> an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must <u>stay</u> intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of GLOBIC.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern, and intended service life. No maximum recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat. As for other physically drying paints the final hardness will be obtained a few days after application of the last coat. Precautions must be made taking this into account during e.g. out docking.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING GLOBIC NCT 8190M is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8190M58000CR004

Product Data

HEMPEL'S ANTIFOULING GLOBIC NCT 8190N

Description:

HEMPEL'S ANTIFOULING GLOBIC NCT 8190N is a high solids, self-smoothening and self-polishing antifouling. It is based on nanocapsule acrylate binder technology. Self-polishing is controlled by sea waters interaction with the core-shell structure of the nanocapsules. An inorganic fibre reinforcement ensures mechanical strength.
A powerful bioactive mixture and its self-renewing effect makes it suitable for protection in the severe fouling conditions of coastal waters.
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an antifouling for bottom and boottop on vessels operating in coastal trade at low to medium speeds and low to medium activity.
HEMPEL'S ANTIFOULING GLOBIC NCT 8190N is especially developed for new-buildings.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	Red/58000 - Brown/62900
Finish:	Flat
Volume solids, %:	55 ± 1
Theoretical spreading rate:	5.5 m^2/litre - 100 micron 221 sq.ft./US gallon - 4 mils
Flash point:	27°C/81°F
Specific gravity:	1.9 kg/litre - 15.9 lbs/US gallon
Dry to touch:	4-5 hours at 20°C/68°F
V.O.C.:	410 g/litre - 3.4 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)
Nozzle orifice:	.027"-.031"
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080
Indicated film thickness, dry:	100 micron/4 mils (see REMARKS overleaf)
Indicated film thickness, wet:	175 micron/7 mils
Recoat interval:	As per painting specification

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING GLOBIC NCT 8190N

APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPADUR 45182 or according to specification.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	The GLOBIC's are never tinted and as the high load of cuprous oxide influences the shade a certain variation from batch to batch is allowable. Exposure to humid weather shortly after application is likely to cause discolouration. This is a surface phenomenon only and has no influence on performance nor recoatability.
Aluminium hulls:	**May be specified on aluminium hulls <u>provided</u> an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must <u>stay</u> intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of GLOBIC.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern and intended service life. No maximum recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat. As for other physically drying paints the final hardness will be obtained a few days after application of the last coat. Precautions must be made taking this into account during e.g. out docking.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING GLOBIC NCT 8190N is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8190N58000CR002

Product Data

HEMPEL'S ANTIFOULING GLOBIC NCT 8195M

Description:

HEMPEL'S ANTIFOULING GLOBIC NCT 8195M is a high solids, self-smoothening and self-polishing antifouling. It is based on nanocapsule acrylate binder technology. Self-polishing is controlled by sea waters interaction with the core-shell structure of the nanocapsules. An inorganic fibre reinforcement ensures mechanical strength.
A powerful bioactive mixture and its self-renewing effect makes it suitable for protection on deep-sea vessels.
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an antifouling for bottom and boottop on vessels operating in deep sea trade at medium to high speed and high activity with short idle periods.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Brown/62900 - Red/58000
Finish:	Flat
Volume solids, %:	52 ± 1
Theoretical spreading rate:	5.2 m^2/litre - 100 micron 209 sq.ft./US gallon - 4 mils
Flash point:	27°C/81°F
Specific gravity:	1.8 kg/litre - 15.0 lbs/US gallon
Dry to touch:	4-5 hours at 20°C/68°F
V.O.C.:	450 g/litre - 3.8 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)
Nozzle orifice:	.027"-.031"
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080
Indicated film thickness, dry:	100 micron/4 mils *(See REMARKS overleaf)*
Indicated film thickness, wet:	200 micron/8 mils
Recoat interval:	As per painting specification

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING GLOBIC NCT 8195M

SURFACE PREPARATION:	**Existing old self-polishing or ablative antifouling:** Remove possible oil and grease etc. with suitable detergent, followed by high pressure fresh water cleaning for a thorough removal of any possible weak structure of leached antifouling. Allow the surface to dry before coating. **Sealer:** Whether to use a sealer coat/tie-coat or not depends on the type and condition of the existing antifouling.
APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPADUR 45182, HEMPATEX HI-BUILD 46330 or according to specification.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	The GLOBIC's are never tinted and as the high load of cuprous oxide influences the shade a certain variation from batch to batch is allowable. Exposure to humid weather shortly after application may cause discolouration. This is a surface phenomenon only and has no influence on performance nor recoatability.
Aluminium hulls:	**May be specified on aluminium hulls provided an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must stay intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of GLOBIC.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern, and intended service life. No maximum recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat. As for other physically drying paints the final hardness will be obtained a few days after application of the last coat. Precautions must be made taking this into account during e.g. out docking.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING GLOBIC NCT 8195M is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8195M58000CR002

Product Data

HEMPEL'S ANTIFOULING GLOBIC NCT 8195N

Description:

HEMPEL'S ANTIFOULING GLOBIC NCT 8195N is a high solids, self-smoothening and self-polishing antifouling. It is based on nanocapsule acrylate binder technology. Self-. polishing is controlled by sea waters interaction with the core-shell structure of the nanocapsules. An inorganic fibre reinforcement ensures mechanical strength.
A powerful bioactive mixture and its self-renewing effect makes it suitable for protection on deep-sea vessels.
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an antifouling for bottom and boottop on vessels operating in deep sea trade at medium to high speed and high activity with short idle periods.
HEMPEL'S ANTIFOULING GLOBIC NCT 8195N is especially developed for new-buildings.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Brown/62900 - Red/58000
Finish:	Flat
Volume solids, %:	55 ± 1
Theoretical spreading rate:	5.5 m^2/litre - 100 micron 221 sq.ft./US gallon - 4 mils
Flash point:	27°C/81°F
Specific gravity:	1.9 kg/litre - 15.8 lbs/US gallon
Dry to touch:	4-5 hours at 20°C/68°F
V.O.C.:	410 g/litre - 3.4 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)
Nozzle orifice:	.027"-.031"
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080
Indicated film thickness, dry:	100 micron/4 mils *(See REMARKS overleaf)*
Indicated film thickness, wet:	175 micron/7 mils
Recoat interval:	As per painting specification

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING GLOBIC NCT 8195N

APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPADUR 45182 or according to specification.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	The GLOBIC's are never tinted and as the high load of cuprous oxide influences the shade a certain variation from batch to batch is allowable. Exposure to humid weather shortly after application may cause discolouration. This is a surface phenomenon only and has no influence on performance nor recoatability.
Aluminium hulls:	**May be specified on aluminium hulls provided an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must stay intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of GLOBIC.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern, and intended service life. No maximum recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat. As for other physically drying paints the final hardness will be obtained a few days after application of the last coat. Precautions must be made taking this into account during e.g. out docking.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING GLOBIC NCT 8195N is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8195N58000CR002

HEMPEL'S ANTIFOULING GLOBIC SAP 81970

Description:

HEMPEL'S ANTIFOULING GLOBIC SAP 81970 is a high solid, self-smoothening and self-polishing antifouling. Polishing is based on an ion exchange, resulting in a hydrolysable activated layer. An inorganic fibre reinforcement of the silylated acrylate copolymer ensures effective polishing control and mechanical strength. A powerful bioactive mixture and its self-renewing effect makes it suitable for protection on deep-sea vessels. The system provides a certain control of roughness.
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an antifouling for bottom and boottop especially on vessels operating at medium to high speed and high activity with short idle periods and with long dry-docking intervals, eg container vessels, LNG's and car carriers.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Brown/60600 - Red/51110
Finish:	Flat
Volume solids, %:	57± 1
Theoretical spreading rate:	5.7 m^2/litre - 100 micron 229 sq.ft./US gallon - 4 mils
Flash point:	24°C/75°F
Specific gravity:	1.9 kg/litre - 15.9 lbs/US gallon
Dry to touch:	2 hours at 20°C/68°F
V.O.C.:	415 g/litre - 3.5 lbs/US gallon
Shelf life:	2 years (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*	Brush/Roller *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)	08080 (5%)
Nozzle orifice:	.027"-.031"	
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	THINNER 08080	
Indicated film thickness, dry:	100 micron/4 mils *(see REMARKS overleaf)*	
Indicated film thickness, wet:	175 micron/7 mils	
Recoat interval:	As per painting specification	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING GLOBIC SAP 81970

SURFACE PREPARATION:	**Newbuilding:** as per relevant painting specification. **Maintenance**: **Existing old self-polishing or ablative antifouling:** Remove possible oil and grease etc. with suitable detergent, followed by high pressure fresh water cleaning for a thorough removal of any possible weak structure of leached antifouling. Allow the surface to dry before coating. **Sealer:** Whether to use a sealer coat or not depends on the type and condition of the existing antifouling.
APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPADUR 45182 or according to specification.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	The GLOBIC's are never tinted and as the high load of cuprous oxide influences the shade a certain variation from batch to batch is allowable. Exposure to humid weather shortly after application is likely to cause discolouration. This is a surface phenomenon only and has no influence on performance nor recoatability.
Redocking:	At redocking, HEMPEL'S ANTIFOULING GLOBIC SAP 81970 can be recoated after thorough cleaning and removal of any poorly adhering surface layer on the antifouling. Reference is made to SURFACE PREPARATION above. If recoated with other types of antifouling, other surface preparation methods may be required - contact HEMPEL.
Aluminium hulls:	**May be specified on aluminium hulls <u>provided</u> an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must <u>stay</u> intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of GLOBIC.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern, and intended service life. No maximum recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat. As for other physically drying paints the final hardness will be obtained a few days after application of the last coat. Precautions must be made taking this into account during e.g. out docking.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING GLOBIC SAP 81970 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8197060600CR003

Product Data

HEMPEL'S ANTIFOULING GLOBIC SAP 8197L

Description:

HEMPEL'S ANTIFOULING GLOBIC SAP 8197L is a high solid, self-smoothening and self-polishing antifouling. Polishing is based on an ion exchange, resulting in a hydrolysable activated layer. An inorganic fibre reinforcement of the silylated acrylate copolymer ensures effective polishing control and mechanical strength. A powerful bioactive mixture and its self-renewing effect makes it suitable for protection on deep-sea vessels. The system provides a certain control of roughness.
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an antifouling for bottom and boottop especially on vessels operating at medium to high speed and high activity with short idle periods and with long dry-docking intervals, eg container vessels, LNG's, car carriers and crude oil carriers.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Brown/60600 - Red/51110
Finish:	Flat
Volume solids, %:	57± 1
Theoretical spreading rate:	5.7 m^2/litre - 100 micron 229 sq.ft./US gallon - 4 mils
Flash point:	24°C/75°F
Specific gravity:	1.9 kg/litre - 15.9 lbs/US gallon
Dry to touch:	2 hours at 20°C/68°F
V.O.C.:	415 g/litre - 3.5 lbs/US gallon
Shelf life:	2 years (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*	Brush/Roller *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)	08080 (5%)
Nozzle orifice:	.027"-.031"	
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	THINNER 08080	
Indicated film thickness, dry:	100 micron/4 mils *(see REMARKS overleaf)*	
Indicated film thickness, wet:	175 micron/7 mils	
Recoat interval:	As per painting specification	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING GLOBIC SAP 8197L

SURFACE PREPARATION:	**Newbuilding:** as per relevant painting specification. **Maintenance**: **Existing old self-polishing or ablative antifouling:** Remove possible oil and grease etc. with suitable detergent, followed by high pressure fresh water cleaning for a thorough removal of any possible weak structure of leached antifouling. Allow the surface to dry before coating. **Sealer:** Whether to use a sealer coat or not depends on the type and condition of the existing antifouling.
APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPADUR 45182 or according to specification.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	The GLOBIC's are never tinted and as the high load of cuprous oxide influences the shade a certain variation from batch to batch is allowable. Exposure to humid weather shortly after application is likely to cause discolouration. This is a surface phenomenon only and has no influence on performance nor recoatability.
Redocking:	At redocking, HEMPEL'S ANTIFOULING GLOBIC SAP 8197L can be recoated after thorough cleaning and removal of any poorly adhering surface layer on the antifouling. Reference is made to SURFACE PREPARATION above. If recoated with other types of antifouling, other surface preparation methods may be required - contact HEMPEL.
Aluminium hulls:	**May be specified on aluminium hulls <u>provided</u> an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must <u>stay</u> intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of GLOBIC.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern, and intended service life. No maximum recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat. As for other physically drying paints the final hardness will be obtained a few days after application of the last coat. Precautions must be made taking this into account during e.g. out docking.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING GLOBIC SAP 8197L is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8197L60600CR002

Product Data

HEMPEL'S ANTIFOULING OCEANIC 8490K

Description:

HEMPEL'S ANTIFOULING OCEANIC 8490K is a high solids, self-smoothening and self-polishing antifouling. Polishing is based on an ion exchange, resulting in a hydrolysable activated layer. An inorganic fibre reinforcement of the resin matrix ensures effective polishing control and mechanical strength. A powerful bioactive mixture and its self-renewing effect makes it suitable for protection on vessels trading in coastal waters. The system provides a certain control of roughness.
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an cost effective antifouling for bottom and boottop on vessels operating in coastal trade at low to medium speeds and low to medium activity and with dry-docking interval of up to 60 months.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/51110 - Brown/60700 (see REMARKS overleaf)
Finish:	Flat
Volume solids, %:	52 ± 1
Theoretical spreading rate:	5.2 m^2/litre - 100 micron 209 sq.ft./US gallon - 4 mils
Flash point:	28°C/82°F
Specific gravity:	1.7 kg/litre - 14.2 lbs/US gallon
Dry to touch:	4-5 hours at 20°C/68°F
V.O.C.:	440 g/litre - 3.7 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)
Nozzle orifice:	.027"-.031"
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080
Indicated film thickness, dry:	100 micron/4 mils *(See REMARKS overleaf)*
Indicated film thickness, wet:	200 micron/8 mils
Recoat interval:	As per painting specification

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING OCEANIC 8490K

SURFACE PREPARATION:	**Newbuilding:** as per relevant painting specification. **Maintenance**: **Existing old self-polishing or ablative antifouling:** Remove possible oil and grease etc. with suitable detergent, followed by high pressure fresh water cleaning for a thorough removal of any possible weak structure of leached antifouling. Allow the surface to dry before coating. **Sealer:** Whether to use a sealer coat or not depends on the type and condition of the existing antifouling.
APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPATEX HI-BUILD 46330, HEMPADUR 45182 or according to specification.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	The initial colour may vary within the same shade. The final colour will appear after exposure to saltwater. This has no influence on the antifouling performance. Brown 60700 will change to greyish in direct contact with seawater.
Redocking:	At redocking, HEMPEL'S ANTIFOULING OCEANIC 8490K can be recoated after thorough cleaning and removal of any poorly adhering surface layer on the antifouling. Reference is made to SURFACE PREPARATION above. If recoated with other types of antifouling, other surface preparation methods may be required - contact HEMPEL.
Aluminium hulls:	**May be specified on aluminium hulls <u>provided</u> an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must <u>stay</u> intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of OCEANIC.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern, and intended service life. No maximum, recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING OCEANIC 8490K is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8490K51110CR003

Product Data

HEMPEL'S ANTIFOULING OCEANIC 8495K

Description:

HEMPEL'S ANTIFOULING OCEANIC 8495K is a high solids, tin-free, self-smoothening and self-polishing antifouling. Polishing is based on an ion exchange, resulting in a hydrolysable activated layer. An inorganic fibre reinforcement of the resin matrix ensures effective polishing control and mechanical strength. A powerful bioactive mixture and its self-renewing effect makes it suitable for protection on deep-sea vessels. The system provides a certain control of roughness.
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an cost effective tin-free antifouling for bottom and boottop on deep-sea going vessels operating at medium to high speed and high activity with short idle periods, and with dry-docking interval of up to 60 months.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/51110 - Brown/60700 (see REMARKS overleaf)
Finish:	Flat
Volume solids, %:	52 ± 1
Theoretical spreading rate:	5.2 m^2/litre - 100 micron 209 sq.ft./US gallon - 4 mils
Flash point:	28°C/82°F
Specific gravity:	1.7 kg/litre - 14.2 lbs/US gallon
Dry to touch:	4-5 hours at 20°C/68°F
V.O.C.:	440 g/litre - 3.7 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)
Nozzle orifice:	.027"-.031"
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080
Indicated film thickness, dry:	100 micron/4 mils *(See REMARKS overleaf)*
Indicated film thickness, wet:	200 micron/8 mils
Recoat interval:	As per painting specification

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING OCEANIC 8495K

SURFACE PREPARATION:	**Newbuilding:** as per relevant painting specification. **Maintenance**: **Existing old self-polishing or ablative antifouling:** Remove possible oil and grease etc. with suitable detergent, followed by high pressure fresh water cleaning for a thorough removal of any possible weak structure of leached antifouling. Allow the surface to dry before coating. **Sealer:** Whether to use a sealer coat or not depends on the type and condition of the existing antifouling.
APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPATEX HI-BUILD 46330, HEMPADUR 45182 or according to specification.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	The initial colour may vary within the same shade. The final colour will appear after exposure to saltwater. This has no influence on the antifouling performance. Brown 60700 will change to greyish in direct contact with seawater.
Redocking:	At redocking, HEMPEL'S ANTIFOULING OCEANIC 8495K can be recoated after thorough cleaning and removal of any poor adhering surface layer or leached layer on the antifouling. Reference is made to SURFACE PREPARATION above. If recoated with other types of antifouling, other surface preparation methods may be required - contact HEMPEL.
Aluminium hulls:	**May be specified on aluminium hulls <u>provided</u> an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must <u>stay</u> intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of OCEANIC.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern, and intended service life. No maximum recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING OCEANIC 8495K is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8495K51110CR003

HEMPEL'S GAS PIPE COATING 85442

CURING AGENT 97840

Description:

HEMPEL'S GAS PIPE COATING 85442 is a two-component epoxy polyamide cured coating. It complies with the requirements of AMERICAN PETROLEUM INSTITUTE'S STANDARD RP 5L2.

Recommended use:

As a one-coat system for internal coating of gas pipes designed for carrying of dry, sweet gas. The coating is designed to reduce the drag resistance in the pipeline by making the pipewalls smoother.

Service temperatures:

Maximum, dry exposure only: 140°C/284°F

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Reddish brown/50890
Finish:	Semi-gloss
Volume solids, %:	42 ± 1
Theoretical spreading rate:	7.0 m^2/litre - 60 micron 281 sq.ft./US gallon - 2.4 mils
Flash point:	30°C/86°F
Specific gravity:	1.1 kg/litre 9.2 lbs/US gallon
Surface dry:	3/4 (approx.) hour at 20°C/68°F *(ISO 1517)*
Dry to touch:	5-6 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	530 g/litre - 4.4 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 85442:	Base 85448 : Curing agent 97840 3 : 1 by volume		
Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08080 (5%)	08080 (15%)	08080 (5%)
Pot life:	8 hours (20°C/68°F)		
Nozzle orifice:	.018"-.021"		
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610		
Indicated film thickness, dry:	60 micron/2.4 mils		
Indicated film thickness, wet:	150 micron/6.0 mils		
Recoat interval, min:	See REMARKS overleaf		
Recoat interval, max:	See REMARKS overleaf		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S GAS PIPE COATING 85442

SURFACE PREPARATION:	Remove oil and grease thoroughly with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. Abrasive blasting to Sa 2 ½, SSPC-SP-10 with a surface profile corresponding to Rugotest No. 3, BN9a, Keane-Tator Comparator, 2.0 G/S or ISO Comparator, FINE (G).
APPLICATION CONDITIONS:	The surface must be completely dry and clean with a temperature above the dew point to avoid condensation. The minimum temperature and the temperature of the paint itself should be above 10°C/50°F. The best result is obtained at 15-25°C/59-77°F. Maximum steel temperature approx. 45°C/113°F. Relative humidity max. 85%. In confined spaces provide adequate ventilation.
SUBSEQUENT COAT:	None, or according to specification.

REMARKS:

Recoating:	Recoating will normally not apply. In exceptional cases in connection with touch-up of too low dry film thickness, recoating is acceptable provided sufficient ventilation has been provided during drying. Minimum recoat interval is 8 hours at 20°C/68°F. No maximum recoating interval for the intended use of HEMPEL'S GAS PIPE COATING 85442 but the surface must be completely clean and dry.
Note:	**HEMPEL'S GAS PIPE COATING 85442 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8544250890CS004

HEMPADUR 85531

BASE 85539 with CURING AGENT 97531

Description:

HEMPADUR 85531 is an amine-adduct, cured epoxy coating. It is a hard, impact and abrasion resistant coating eg for exterior pipelines. The material has excellent properties in respect of temperature resistance, mechanical and chemical resistance and cathodic disbondment resistance.

Recommended use:

For new constructions as well as field-applied renovation and repair coating.
As a self-primed, high build coating primarily for protection of interior of steel pipes and of exterior of steel pipes in severely corrosive environment, including permanent immersion.
HEMPADUR 85531 is an excellent material for repair and can be applied to lines while in service temperature up to 90°C/194°F.

Service temperatures:

	Dry exposure only:	In water (no temperature gradient):
Maximum:	120°C/248°F	90°C/194°F

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	Red/50890
Finish:	Glossy
Volume solids, %:	84 ± 1
Theoretical spreading rate:	2.4 m^2/litre - 350 microns 96 sq.ft./US gallon - 14 mils
Flash point:	14°C/57°F
Specific gravity:	1.7 kg/litre - 14.2 lbs/US gallon
Surface dry:	2 hours at 20°C/68°F
Dry to touch:	6 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	170 g/litre - 1.4 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 85531:	Base 85539 : Curing agent 97531 4 : 1 by volume
Application method:	Airless spray
Thinner (max.vol.):	08450 (5%)
Pot life:	1 hour at 20°C/68°F
Nozzle orifice:	.021"-.023"
Nozzle pressure:	250 bar/3600 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	350 micron/14 mils
Indicated film thickness, wet:	425 micron/17 mils
Recoat interval, min:	16 hours (20°C/68°F)
Recoat interval, max:	5 days (20°C/68°F) *(see REMARKS overleaf)*

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 85531

SURFACE PREPARATION:	Abrasive blasting to Sa 2½, (ISO 8501-1:2007), with a surface profile equivalent to Rugotest No. 3 BN 10, Keane-Tator Comparator 3.0 G/S or ISO Comparator, rough Medium (G). Remove any oil, grease and other contaminants by detergent and salts by high fresh water hosing prior to abrasive blasting.
APPLICATION CONDITIONS:	The surface must be completely dry and clean with a temperature above the dew point to avoid condensation. Use only when application and curing can proceed at temperatures above 5°C/41°F. The temperature of the paint itself should be above 15°C/59°F. The best result is obtained at 20-30°C/68-86°F. In confined spaces, provide adequate ventilation. In pipelines blow hot dry air through the pipeline immediately after application to remove solvent fumes and speed up drying process.
PRECEDING COAT:	None.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	
Recoating:	The indicated recoat intervals will normally only apply in connection with touch-up of too low dry film thicknesses. If the maximum recoat interval is exceeded, roughening of the surface is necessary to ensure adhesion.
Note:	**HEMPADUR 85531 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8553150890CR004

HEMPADUR 85671

BASE 85675 with CURING AGENT 97371

Description:

HEMPADUR 85671 is a two-component, amine adduct cured phenolic epoxy (novolac) coating with very good adhesion and high temperature, water and chemical resistance.

Recommended use:

As an interior lining in tanks, pipelines etc. for hot water, brine, crude oil, etc.
For coating of potable water tanks.
As a primer coat in specific painting systems.

Service temperatures:

	Dry exposure only:	In water (maximum gradient 15°C/27°F):
Maximum:	160°C/320°F	90°C/194°F

May be specified for design temperatures up to 260°C/500°F dry.
For higher temperatures see REMARKS overleaf.

Certificates/Approvals:

HEMPADUR 85671 is in accordance with ARAMCO's specification APCS 2A, 2B and 2C (See REMARKS overleaf).
Approved for aviation fuel storage tanks by Exxon Mobil Aviation International Ltd. England.
Approved by Water Research Centre, Great Britain, for potable water up to 23°C/73°F.
Approved by Folkehelseinstituttet, Norway, for potable water - cold water.
Certified to NSF standard 61 by NSF international for use in potable water tanks with volumes of 1000 gallon or greater, valves at 2 inches (5 cm) or greater, pipes at 16 inches (40 cm) or greater.
NSF certification applies to US manufactured product only.
Conforms to Norsok M-501, system no. 3.
Complies with Section 175.300 of the Code of Federal Regulations in respect of carriage of foodstuffs (FDA) for tanks larger than 2006 m^3/530,000 US gallon.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Off-white/11630 - Light red/50900
Finish:	Flat
Volume solids, %:	68 ± 1
Theoretical spreading rate:	6.8 m^2/litre - 100 micron 273 sq.ft./US gallon - 4 mils
Flash point:	24°C/75°F
Specific gravity:	1.7 kg/litre - 14.2 lbs/US gallon
Surface dry:	2-3 hours at 20°C/68°F
Dry to touch:	4-6 hours at 20°C/68°F
Fully cured:	10 days at 20°C/68°F
V.O.C.:	320 g/litre - 2.7 lbs/US gallon
Shelf life:	1 year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage. If the shelf life is exceeded please contact HEMPEL for further advice.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 85671:	Base 85675 : Curing agent 97371 8.8 : 1.2 by volume 13.8 : 1.0 by weight
Application method:	Airless spray. Spinning disc. Brush (touch-up)
Thinner (max.vol.):	08450 *(See APPLICATION INSTRUCTIONS)*
Pot life:	3 hours (20°C/68°F) *(See REMARKS overleaf)*
Induction time:	15 minutes (20°C/68°F) *(see REMARKS overleaf)*
Nozzle orifice:	.018"-.021"
Nozzle pressure:	200 bar/2900 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	100 micron/4 mils *(see REMARKS overleaf)*
Indicated film thickness, wet:	150 micron/6 mils
Recoat interval, min:	See REMARKS overleaf
Recoat interval, max:	See REMARKS overleaf

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 85671

SURFACE PREPARATION:	For optimum performance abrasive blasting to very near white metal Sa 2½-3, with a surface profile corresponding to Rugotest No. 3, BN10, Keane-Tator Comparator 3.0 G/S, or ISO Comparator Rough Medium (G).
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above 10°C/50°F. The temperature of the paint itself must be above 15°C/59°F, best results are obtained at 17-23°C/62-73°F. Relative humidity max. 80%, preferably 40-60%. Apply on a dry and clean surface with a temperature above the dew point to avoid condensation. Furthermore, reference is made to special APPLICATION INSTRUCTIONS. Provide adequate ventilation during application and drying in confined spaces.
PRECEDING COAT:	None.
SUBSEQUENT COAT:	None.
REMARKS:	
High temperature service:	May be used under insulation, pipes and the like in one or two-coat systems. Dry film thicknesses should not exceed 300 micron/12 mils. However, at temperatures above 200°C/392°F, max 260°C/500°F, it is recommended to apply max 125 micron/5 mils. The coating should be cured for at least 7 days at 20°C/68°F before exposure to high temperatures. The coating will discolour at high service temperatures.
Film thicknesses:	The minimum total dry film thickness for the system is normally 300 microns/12 mils. May be specified in other film thicknesses than indicated depending on purpose and area of use. This will alter spreading rate, influence drying time and minimum recoating intervals. The specification may read up to 125 micron/5 mils dry film thickness per coat, exceptionally 150 micron/6 mils.
Pot life:	As per Aramco's requirements, gel time is above 8 hours at a can temperature of 23°C/73°F and above 2 hours at a can temperature of 40°C/164°F. For optimum spray application properties, the mixture should be used within 2 hours at 20°C/68°F.
Recoating intervals:	Minimum: Non-potable water service: 36 hours (20°C/68°F) between the first and second coat, 24 hours (20°C/68°F) between the second and third coat. Potable water service: 3 days (20°C/68°F) between coats. The approval from Folkehelseinstituttet, Norway will apply provided a minimum recoat interval of 6 days (20°C/68°F). Maximum: 21 days (20°C/68°F). If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
Notes to application and recoating:	• The coating is to be applied in a dry film thickness as near as possible to the specified 100 micron/4 mils (or higher if specified). • Film formation of each coat has to be of good quality, free from defects such as pinholes and without any dry spray. • Drying and curing conditions have to be according to APPLICATION CONDITIONS until full curing has been obtained. • No kind of surface contamination must exist except loose dust, abrasives, loose dry-spray, which is possible to remove by vacuum cleaning before overcoating. The surface MUST be completely clean before overcoating. • The coating must only be (exceptionally) exposed to strong, direct sunlight (ultraviolet light) in short periods. • The coating is to be checked carefully and should have no patchy, whitish, and/or greasy formation, which can hinder adhesion of the subsequent coat. **Note:** Exudation of the curing agent causes the mentioned patchy, whitish, and/or greasy formation, which will take place if HEMPADUR 85671 is applied at low temperatures without proper induction time and/or if the coating is exposed to water (rain, condensation) during drying and curing.
Mixing:	The thoroughly mixed BASE and CURING AGENT must be prereacted before application (15 minutes at 20°C/68°F). Keep thinning at an absolute minimum. Do not dilute the components separately - only the mixture.
Disclaimer:	Any reference to a company standard or specification in this Technical Product Data sheet shall not be construed as a recommendation by that company to purchase.
Note:	**HEMPADUR 85671 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8567111630CR003

This Product Data Sheet supersedes those previously issued.
For explanations, definitions and scope, see "Explanatory Notes" in the HEMPEL Book.
Data, specifications, directions and recommendations given in this data sheet represent only test results or experience obtained under controlled or specially defined circumstances. Their accuracy, completeness or appropriateness under the actual conditions of any intended use of the Products herein must be determined exclusively by the Buyer and/or User. The Products are supplied and all technical assistance is given subject to HEMPEL's GENERAL CONDITIONS OF SALES, DELIVERY AND SERVICE, unless otherwise expressly agreed in writing. The Manufacturer and Seller disclaim, and Buyer and/or User waive all claims involving, any liability, including but not limited to negligence, except as expressed in said GENERAL CONDITIONS for all results, injury or direct or consequential losses or damages arising from the use of the Products as recommended above, on the overleaf or otherwise.
Product data are subject to change without notice and become void five years from the date of issue.

For product description refer to product data sheet

HEMPADUR 85671

BASE 85675 with CURING AGENT 97371

Scope:

These application instructions cover surface preparation, application equipment, and application of HEMPADUR 85671.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major new-buildings/new constructions or extensive repair jobs.

Steel work:

For optimum performance, the following is recommended:
All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in welding seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be built up on all surfaces. The radius of the rounding should be minimum 2 mm.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:2007. Any laminations must be removed.

All steel work (including welding, flame cutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed by high pressure fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes.

Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

Old steel: Even after a very thorough cleaning, pits may typically contain contamination in the form of remnants of chemicals/water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary. After the first blasting, a very thorough vacuum cleaning is carried out in order to see if any "chemical bleeding" occurs as well as controls for water soluble salts (reference is made to separate instructions) are made. Special care should be taken in evaluating pitted areas - ask for special guidelines.

For optimum performance, gritblast to very near white metal, Sa 2½-3, ISO 8501-1:2007. In practice this requirement is to be understood as white metal Sa 3 at the moment of abrasive blasting, but allows a slight reduction at the moment of paint application.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10, Keane-Tator Surface Comparator, G/S min. 3.0 or ISO 8503/1 rough MEDIUM (G).

Use steel grit, aluminium silicate, or similar sharp edged abrasives of a good quality free of foreign matters, soft particles, and the like. Control for absence of contamination according to separate guidelines.

In case steel grit is used this must furthermore be controlled so that a proper grain size distribution is maintained.

Steel grit with particle sizes of 0.2-1.2 mm or aluminium silicate of 0.4-1.8 mm will usually create the desired surface profile when the air pressure measured at the nozzle is 6-7 bar/85 -100 psi.

The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

When the abrasive blasting is completed, remove residual grit and dust by vacuum cleaning. Abrasive particles not removed by vacuum cleaning are to be removed by brushing with clean brushes followed by vacuum cleaning.

The importance of systematic working must be stressed when blasting. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

Shopprimed and previously painted surfaces: All shopprimer or existing coating materials to be completely removed. Avoid the use of zinc shopprimer whenever possible.

However, if the steel is shopprimed with zinc, it is very important that **all** zinc is removed by abrasive blast cleaning. Separate check procedures will be necessary to demonstrate the effectiveness of removal. More blast cleaning may be deemed necessary! Use of a red zinc shopprimer will facilitate the visual check of the blast cleaning and is considered necessary in order to obtain an acceptable surface preparation.

Note: Degree of steelwork finish and surface preparation are more detailed described in HEMPEL's Technical Standard for Tank Coating Work.

Application equipment:

HEMPADUR 85671 is to be applied by airless spray equipment. Stripe coating and minor repairs can be carried out by brushing.

Airless spray equipment: A large pump is preferred, with a pump capacity of 8-12 litres/minute.

Pump ratio:	Min. 45:1
Nozzle orifice:	.018"-.021"
Nozzle pressure:	200 bar (2900 psi)
Hoses:	To avoid excessive loss of pressure in long hoses, hoses with an internal diameter of up to 0.5" can be used

(Spray data are indicative and subject to adjustment).

Thinning

If required: max. 10% of THINNER 08450. Additional thinning may be required at higher temperatures to counteract dry-spray. However, never use more thinner than required to avoid possible risk of solvent entrapment. Thinner only to be added to the mixed paint.

Spraying properties are influenced by the induction time (premix time). Too much "thixotropy" will disappear after a certain reaction of the mixed components.

Cleaning of equipment:

The whole equipment to be cleaned thoroughly with HEMPEL'S TOOL CLEANER 99610 after use.

Mixing, pot life:

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must only be done by weighing base and curing agent in the prescribed weight ratio: 158 parts by weight of base and 11.4 parts by weight of curing agent or by volume 8.8 parts by volume base and 1.2 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. **Allow the mixed paint to prereact before application, see table below**.

d. Use all mixed paint before the pot life is exceeded. The pot life depends on the paint's temperature as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	(15°C/59°F[1)])	20°C/68°F	25°C/77°F	(30°C/86°F[2)])
Induction time	(25 minutes)	15 minutes	10 minutes	(5 minutes)
Spray application within	(4 hours)	3 hours	2 hours	(1 hours)

[1)] Below 15°C/59°F the viscosity can be too high for airless spray application.
[2)] Temperatures at 30°C/86°F and above should be avoided due to a risk of dry-spray.

Application procedure:

The first full coat is usually applied immediately after vacuum cleaning.
First stripe coat to follow afterwards.

Film-build/continuity: With this tank coating intended for aggressive service, it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation and no dry-spray on **all** surfaces must be adopted.

It is very important to use nozzles of the correct size, ie not too big. Select small nozzles for spray application of complicated structures, while bigger nozzles may be used for regular surfaces.

A proper, uniform distance of the spray gun to the surface, 30-50 cm, should be aimed at. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dry-spray.

The paint layer must be applied homogenously and as close to the specification as possible. The consumption of paint must be controlled and heavy layers must be avoided because of the risk of sags and cracks and solvent retention.

Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, must be remedied.

Note: In case of old, pit corroded steel; application of a diluted, extra first coat is recommended to obtain better "penetration" in the fine pits. For this purpose, it is relevant to dilute 5-10%. Application by brush is recommended and film thickness so low that the surface is "saturated" only.

Stripe coating:

All places difficult to cover properly by spray application should be stripe coated twice by brushing immediately before the spray application. First stripe coat is applied after the first full coat and second stripe coat after second full coat.

The second stripe coat with brush can be replaced with spray application with a small narrow nozzle, but still air slots and similar and possible undercuts (welds) and the like will require brush application.

Film thicknesses:

The final dry film thickness of the three coat system must be between 300-600 micron (max. 450 micron below 15°C)/12-24 mils (max. 18 mils below 59°F).

Corresponding to 100 micron/4 mils dry film thickness, the wet film thickness must be 150-175 micron/6-7 mils and must be measured regularly.

Normally up to 200 micron/8 mils per coat may be accepted for 100 micron/4 mils specifications, **but at temperatures below 15°C/59°F, it is important not to exceed a dry film thickness of 150 micron/6 mils in any area.**

Microclimate:
The actual climate conditions at the substrate during application:

The minimum surface temperature until full cure is 10°C/50°F.

To ensure an all-over steel temperature of minimum 10°C/50°F, special attention should be paid to possible "cold bridges" eg stiffeners on deck.

In case of steel temperatures lower than 10°C/50°F there is a severe risk of incomplete curing, resulting in a too open film with reduced chemical resistance.

When the outside temperature is lower than 10°C/50°F, it is therefore recommended to use insulation mats on deck and in addition to aim at a general steel temperature of 15°C/59°F to minimise the risk of too low steel temperatures.

Furthermore, the steel temperature should be kept reasonably constant - within the range of ± 3°C/5°F is recommended. Any changes of the outside temperature should therefore be carefully monitored and heating equipment calibrated accordingly.

The maximum surface temperature should preferably be below approximately 30°C/86°F. In a warm climate it is recommended to carry out application during night time. Application at higher temperatures is possible, but extra care must be taken to avoid poor film formation and excessive spray-dust.

The steel temperature must be above the dew point. As a rule of thumb a steel temperature which is 3°C/5°F above the dew point can be considered safe.

The relative humidity should preferably be 40-60%, maximum 80%. In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent.

Drying and curing, ventilation:

In a dry film thickness of 100 micron/4 mils, with a steel temperature of 20°C/68°F, a relative air humidity of maximum 80% and adequate ventilation, HEMPADUR 85671 will be dry to touch after 4-6 hours. Under these drying conditions, the paint film will accept light traffic after approximately 16 hours.

Correct film formation depends on an adequate ventilation during drying.

A good guideline for tank coating work is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPADUR 85671 gives off in total 81 litres solvent **vapour** until it is completely dry.

The lower explosive limit, LEL, is 1.0%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 81 m^3 per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the tank.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.
Actual safety precautions may require stronger ventilation.

Curing time:

Provided that adequate ventilation, recommended relative humidity, specified film thickness, and recommended minimum recoating interval are kept, the following curing times are valid:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	35°C/95°F	40°C/104°F
Curing time	18 days	14 days	10 days	8 days	7 days	6 days	4 days

Post curing:

The chemical resistance of the coating can be extended by **post curing**, which must take place within the first year in service.

Post curing is accomplished by carrying a hot cargo of mineral lube oil, vegetable oil or animal oil at minimum 50°C/122°F. The curing time is 8 days at 50°C/122°F and 4 days at 60°C/140°F.

Post curing of double-hull tankers may also be accomplished by using tank cleaning machines to spray hot, clean fresh water to achieve a minimum steel temperature of 60°C/140°F and maximum 80°C/176°F. The curing time is 16 hours at 60°C/140°F and 3 hours at 80°C/176°F. **All adjacent ballast tanks must be empty and all adjacent cargo tanks must be either empty or carrying a liquid cargo of minimum 40°C/104°F**.

Contact HEMPEL for detailed advice about post curing.

Recoating intervals:

Provided observance of the above stated ventilation and relative humidity for the following recoating intervals in relation to the (steel) temperature are valid:

Steel temperature	10°C/50°F*	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	35°C/95°F
Minimum, non-potable water service						
- between the first and the second coat	90 hours	60 hours	36 hours	24 hours	18 hours	14 hours
- between the second and the third coat	60 hours	40 hours	24 hours	16 hours	12 hours	9 hours
Potable water service, all coats; minimum:**	7½ days	5 days	3 days	2 days	36 hours	30 hours
Maximum	47 days	34 days	21 days	16 days	14 days	11 days

* Absolute minimum temperature recommended.

** The approval from Folkehelseinstituttet, Norway will apply provided a minimum recoat interval of 6 days (20°C/68°F).

The maximum relative humidity before and between the coats should not exceed 80% and the steel temperature should always be above the dew point, in practice minimum 3°C/5°F above the dew point.

Conditions for paint application work:

Dry spray is not acceptable as this will reduce the protective characteristics of the paint and make later tank cleaning difficult. Dry spray can be avoided by using adequate stagings, spraying equipment and methods.

Hold spray gun at a right angle to and about 30 cm/1 foot from surface making even parallel passes at a rate to produce the specified wet film thickness as per specification.

Avoid dry spray (overspray creating excessive paint mist), e.g. by using a smaller fan angle, and the lowest possible pressure. A small fan angle should also be used, if spray application is used, for "stripe coating" of for instance reverse sides of stiffeners. Each layer must be applied homogeneously, must be free from pinholes and other defects and as near above the specification of 100 micron/4 mils dry film thickness, as possible. The consumption of paint must be controlled, and heavy layers must be avoided because of the risk of saggings, cracks and solvent retention.

Surface irregularities such as dry spray, saggings, exaggerated thickness or embedded dust or abrasives will have to be remedied.

If a sandpapering between layers, for instance on the bottom, is needed, great care must be taken to avoid damaging of otherwise intact surfaces. When using mechanical means only lightweight equipment should be used, orbital sander is recommended. Yet, avoid sandpapering on top of welds or irregularities or near to vertical surfaces.

The finished coating must appear as a homogeneous surface without pores, runners or pollution of any kind.

Control of dry film thicknesses:

For the standard specification following applies to the dry film thickness:
The minimum dry film thickness is 300 micron/12 mils, maximum recommended thickness is 600 micron/24 mils (below 15°C/59°F: 450 micron/18 mils). The minimum dry film thickness is evaluated according to the "80-20" rule, ie no more than 20% of the total number of individual measurements must be lower than the minimum dry film thickness, and the lowest individual measurement must be at least 80% of minimum dry film thickness, ie 240 micron/9.6 mils. The maximum dry film thickness can also be evaluated according to the "80-20" rule.
Dry film thickness control must not be carried out within the first 24 hours after application of final coat (20°C, sufficient ventilation). The measurement must be carried out using an electromagnetic dry film thickness gauge calibrated with shims placed on a smooth steel substrate.

Taking into use:

Do not use the tank or pipeline before the coating is properly cured. Reference is made to curing time on page 5.
Being a solvent-borne paint HEMPADUR 85671 does contain traces of solvents after full curing. These solvents will leach out into the surrounding media during service. In order to keep the concentrations below acceptable levels the following conditioning procedure is recommended for HEMPADUR 85671 in contact with **potable water**:
When cured for 1 month (20°C/68°F), but before taking the tank into use for **potable water**, fill twice with water at 60°C/140°F each time for a period of no less than 24 hours and finally flush with fresh water.
For tanks larger the 100.000 litres/26.000 US gallons flush the surface with fresh water (min. 15°C/59°F) for two days. Then wash the tank thoroughly with soap water, followed by brushing with water or steam cleaning.
On vessels adjacent tanks must be empty during the conditioning.

Repairs:

It is of great importance that all damage to the coating is repaired.

Repair shall be started as soon as possible. Repair of mountings for stagings, etc. must take place in connection with the dismantling of the stagings, the tempo of which should be adjusted to the touch-up procedure.

It is important that the repaired areas, as well as the rest of the coated areas, are fully cured before the tank is taken into use or washed by the tank cleaning system.

The extent of damage to the coating can be evaluated by a seawater test: Wash the tanks with clean seawater by means of the tank cleaning machines until profiles and/or heating coils on tank top is covered. Allow the water to stay for minimum 3 days, after which period the tank is emptied and cleaned with clean fresh water to remove salts.

The repair process:

General: Before mechanical treatment is started, surfaces to be repaired have to be cleaned for any salts and other contamination.

Areas less than 5 x 5 cm:
The surface preparation can be executed by grinding to a clean rough metal surface, feathering edges of intact coating and slightly sanding the adjacent surface.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up to full film thickness with minimum 3 coats of HEMPADUR 85671.

Areas up to 1 sq.m:
The surface preparation must be executed by vacuum blasting or open nozzle blasting so that the steel has a proper roughness and cleanness to Sa 3 according to ISO 8501-1:2007. The overlapping zone must be sanded or sweep blasted to ensure a good adhesion of the new paint.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up to full film thickness with minimum 3 coats HEMPADUR 85671.

Areas above 1 sq.m. or areas where several damaged spots are concentrated:
Treatment: Repeat the original specification.

HEMPADUR 85671

Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
ISSUED BY:	HEMPEL A/S - 8567111630CR003

HEMPEL'S ANTIFOULING OLYMPIC 86900

Description:

HEMPEL'S ANTIFOULING OLYMPIC 86900 is a high solids, tin-free, self-polishing antifouling. Polishing is based on an ion exchange, resulting in a hydrolysable activated layer. An inorganic fibre reinforcement of the resin matrix ensures effective polishing control and mechanical strength.
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an economical antifouling for bottom and boottop on vessels operating in coastal trade at low to medium speeds and (down to) low to medium activity with short to medium idle periods.
Dry-docking interval of up to 36 months.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/51110 - Brown/60700 (see *REMARKS* overleaf)
Finish:	Flat
Volume solids, %:	50 ± 1
Theoretical spreading rate:	5.0 m^2/litre - 100 micron 201 sq.ft./US gallon - 4 mils
Flash point:	25°C/77°F
Specific gravity:	1.6 kg/litre - 13.3 lbs/US gallon
Dry to touch:	4-5 hours at 20°C/68°F
V.O.C.:	475 g/litre - 4.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*	Brush/Roller *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)	08080 (5%)
Nozzle orifice:	.027"-.031"	
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S THINNER 08080	
Indicated film thickness, dry:	100 micron/4 mils *(see REMARKS overleaf)*	
Indicated film thickness, wet:	200 micron/8 mils	
Recoat interval, min:	8 hours (20°C/68°F)	
Recoat interval, max:	See REMARKS overleaf	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING OLYMPIC 86900

SURFACE PREPARATION:	**Existing organotin copolymer based self-polishing antifouling:** Remove possible oil and grease etc. with suitable detergent, followed by careful high pressure fresh water cleaning. Ensure that any possible leached surface layer is removed effectively. Allow the surface to dry before recoating. **Sealer:** Whether to use a sealer coat or not depends on the type and condition of the existing antifouling.
APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPATEX HI-BUILD 46330, HEMPADUR 45182 or according to specification.
SUBSEQUENT COAT:	None.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	ANTIFOULING OLYMPIC is never tinted and as the high load of cuprous oxide influences the shade a certain variation from batch to batch is allowable. Exposure to humid weather shortly after application is likely to cause discolouration. This is a surface phenomenon only and has no influence on performance nor recoatability. The final colour will appear after exposure to saltwater. This has no influence on the antifouling performance. Brown 60700 changes to greyish in direct contact with sea water.
Redocking:	At redocking, HEMPEL'S ANTIFOULING OLYMPIC 86900 can be recoated after thorough cleaning and removal of any poorly adhering surface layer on the antifouling. Reference is made to SURFACE PREPARATION above. If recoated with other types of antifouling, other surface preparation methods may be required - contact HEMPEL.
Aluminium hulls:	**May be specified on aluminium hulls <u>provided</u> an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must <u>stay</u> intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of OLYMPIC.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Filmthicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern, and intended service life. No maximum recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING OLYMPIC 86900 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8690051110CR005

Product Data

HEMPEL'S ANTIFOULING OLYMPIC 86950

Description:

HEMPEL'S ANTIFOULING OLYMPIC 86950 is a high solid, tin-free, self-polishing antifouling. Polishing is based on an ion exchange, resulting in a hydrolysable activated layer. An inorganic fibre content ensures polishing control and mechanical strength. This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an economical antifouling for bottom and boottop on deep-sea operating vessels operating at medium to high speed and high activity with short idle periods, and with dry-docking interval of up to 36 months.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/51110 - Brown/60700 (see *REMARKS* overleaf)
Finish:	Flat
Volume solids, %:	50 ± 1
Theoretical spreading rate:	5.0 m^2/litre - 100 micron 201 sq.ft./US gallon - 4 mils
Flash point:	28°C/82°F
Specific gravity:	1.6 kg/litre - 13.4 lbs/US gallon
Dry to touch:	4-5 hours at 20°C/68°F
V.O.C.:	470 g/litre - 3.9 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*	Brush/Roller *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)	08080 (5%)
Nozzle orifice:	.027"-.031"	
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S THINNER 08080	
Indicated film thickness, dry:	100 micron/4 mils *(see REMARKS overleaf)*	
Indicated film thickness, wet:	200 micron/8 mils	
Recoat interval, min:	8 hours (20°C/68°F)	
Recoat interval, max:	See REMARKS overleaf	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING OLYMPIC 86950

SURFACE PREPARATION:	**Existing organotin copolymer based self-polishing antifouling:** Remove possible oil and grease etc. with suitable detergent, followed by careful high pressure fresh water cleaning. Ensure that any possible leached surface layer is removed effectively. Allow the surface to dry before recoating. **Sealer:** Whether to use a sealer coat or not depends on the type and condition of the existing antifouling.
APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPATEX HI-BUILD 46330, HEMPADUR 45182 or according to specification.
SUBSEQUENT COAT:	None.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	ANTIFOULING OLYMPIC is never tinted and as the high load of cuprous oxide influences the shade a certain variation from batch to batch is allowable. Exposure to humid weather shortly after application is likely to cause discolouration. This is a surface phenomenon only and has no influence on performance nor recoatability. The final colour will appear after exposure to saltwater. This has no influence on the antifouling performance. Brown 60700 changes to greyish in direct contact with seawater.
Redocking:	At redocking, HEMPEL'S ANTIFOULING OLYMPIC 86950 can be recoated after thorough cleaning and removal of any poorly adhering surface layer on the antifouling. Reference is made to SURFACE PREPARATION above. If recoated with other types of antifouling, other surface preparation methods may be required - contact HEMPEL.
Aluminium hulls:	**May be specified on aluminium hulls <u>provided</u> an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must <u>stay</u> intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of OLYMPIC.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern, and intended service life. No maximum recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING OLYMPIC 86950 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8695051110CR005

HEMPEL'S ANTIFOULING OLYMPIC FB 8695B

Description:

HEMPEL'S ANTIFOULING OLYMPIC FB 8695B is a tin-free, self-polishing antifouling. Polishing is based on an ion exchange, resulting in a hydrolysable activated layer. An inorganic fibre content ensures polishing control and mechanical strength.
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Antifouling Systems on Ships as adopted by IMO October 2001 (IMO document AFS/CONF/26).

Recommended use:

As an economical antifouling for flat bottom on vessels operating at medium to high speed and high activity with short idle periods, and with dry-docking interval of up to 36 months.
Aluminium hulls: see REMARKS overleaf.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/51110 - (see *REMARKS* overleaf)
Finish:	Flat
Volume solids, %:	50 ± 1
Theoretical spreading rate:	5.0 m^2/litre - 100 micron 201 sq.ft./US gallon - 4 mils
Flash point:	28°C/82°F
Specific gravity:	1.5 kg/litre - 12.5 lbs/US gallon
Dry to touch:	4-5 hours at 20°C/68°F
V.O.C.:	450 g/litre - 3.8 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Application method:	Airless spray *(see REMARKS overleaf)*	Brush/Roller *(see REMARKS overleaf)*
Thinner (max. vol.):	08080 (5%)	08080 (5%)
Nozzle orifice:	.027"-.031"	
Nozzle pressure:	270 bar/4000 psi *(Airless spray data are indicative and subject to adjustment)*	
Cleaning of tools:	HEMPEL'S THINNER 08080	
Indicated film thickness, dry:	100 micron/4 mils *(see REMARKS overleaf)*	
Indicated film thickness, wet:	200 micron/8 mils	
Recoat interval, min:	8 hours (20°C/68°F)	
Recoat interval, max:	See REMARKS overleaf	

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S ANTIFOULING OLYMPIC FB 8695B

SURFACE PREPARATION:	**Existing antifouling:** Will depend on the type and condition of the existing system. For compatible antifouling systems in good condition the following apply: Remove possible oil and grease etc. with suitable detergent, followed by careful high pressure fresh water cleaning. Ensure that any possible leached surface layer is removed effectively. Allow the surface to dry before recoating.
APPLICATION CONDITIONS:	The surface must be completely clean and dry at the time of application and its temperature must be above the dew point to avoid condensation. In confined spaces such as sea chests and stagnant air under large flat bottoms provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPATEX HI-BUILD 46330, HEMPADUR 45182 or according to specification.
SUBSEQUENT COAT:	None.
REMARKS:	This product contains heavy particles. Stir well before use. By providing a constantly active surface during its lifetime, this antifouling is gradually sacrificed in the process.
Colour:	ANTIFOULING OLYMPIC FB is never tinted and as the high load of cuprous oxide influences the shade a certain variation from batch to batch is allowable. Exposure to humid weather shortly after application is likely to cause discolouration. This is a surface phenomenon only and has no influence on performance nor recoatability. The final colour will appear after exposure to saltwater. This has no influence on the antifouling performance.
Redocking:	At redocking, HEMPEL'S ANTIFOULING OLYMPIC FB 8695B can be recoated after thorough cleaning and removal of any poorly adhering surface layer on the antifouling. Reference is made to SURFACE PREPARATION above. If recoated with other types of antifouling, other surface preparation methods may be required - contact HEMPEL.
Aluminium hulls:	**May be specified on aluminium hulls <u>provided</u> an efficient anticorrosive system in minimum 2 coats of 150 micron/6 mils each has been applied. The anticorrosive system must <u>stay</u> intact during service in order to avoid corrosion of the aluminium caused by the cuprous oxide content of OLYMPIC FB.**
Application equipment:	Standard airless heavy-duty spray equipment: Pump ratio: min 45:1 (see Note below) Pump output: min 12 litres/minute (theoretical) Spray hoses: max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter **Note:** If longer spray hoses are necessary, up to 50 metres/150 feet hose (½" internal diameter) can be added. The pump ratio must be raised to 60:1 or more, however, the high output capacity of the pump must be maintained. A **reversible nozzle** is recommended. **Filter:** Surge tank filter and tip filter should be removed.
Film thicknesses:	**Range and control of dry film thickness:** 80 micron/3.2 mils to 150 micron/6 mils. Indicated film thickness will vary according to specification. This will alter spreading rate and may influence drying time. In case of multi-coat application, drying time and minimum recoat interval will be influenced by the number of coats and by the thickness of each coat applied - reference is made to the corresponding painting specification. Keep thinning to a minimum to ensure that correct film thickness is obtained. The proper way of governing the film thickness is to sub-divide the areas to be painted and calculate the amount of paint to be applied on each sub-divided area. The exact amount of paint calculated must be applied evenly on the area. For further information, please consult the corresponding painting specification.
Recommended number of coats:	As per specification depending on existing hull condition, trading pattern, and intended service life. No maximum recoat interval, but after prolonged exposure to polluted atmosphere, remove accumulated contamination by high pressure fresh water cleaning and allow to dry before applying next coat.
Undocking:	Minimum undocking time depends on number of coats applied, film thickness, the prevailing temperature and the subsequent exposure/service conditions. For further information, please consult the corresponding painting specification. Maximum undocking time depends on the atmospheric conditions (UV radiation, temperature, degree of atmospheric pollution, etc.). Exposure to the atmosphere in up to 6 months normally presents no problems but extraordinary contamination may call for a freshwater high pressure hosing - contact Hempel.
Note:	**HEMPEL'S ANTIFOULING OLYMPIC FB 8695B is for professional use only.**
ISSUED BY:	HEMPEL A/S – 8695B51110CR001

HEMPASIL X3 87500

BASE 87509 - HEMPASIL CROSSLINKER 98950
FOULING RELEASE COATING

Description:

HEMPASIL X3 is a third generation fouling release coating with high solids content.
The product is based on silicone, is biocide free and cures after addition of HEMPASIL CROSSLINKER 98950.
It provides as smooth, low surface energy repellent surface with unique fouling release properties. A hydro gel micro layer prevents fouling organisms to adhere firmly while the silicone polymers facilitate self-cleaning. HEMPASIL X3 therefore possess a high fuel saving potential. Under extended static conditions (idle periods) the coating may accumulate some fouling.

Recommended use:

For vessels with service speeds above 8 knots.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colour/Shade nos.:	Red/59151 , Blue/30170, Black/19990
Finish:	Glossy
Volume solids, %:	71±1
Theoretical spreading rate:	4.7 m^2/litre - 150 micron 192 sq.ft./US gallon - 6 mils
Flash point:	28°C/82°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon
Dry to touch:	3 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	265 g/litre - 2.2 lbs/US gallon
Shelf life:	1½ years (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage. If the shelf life is exceeded please contact HEMPEL for further advice.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 87500:	Base 87509 : CROSSLINKER 98950 17.8:2.2 by volume
Application method:	Airless spray Brush *(touch-up) (see REMARKS overleaf)*
Thinner (max. vol.):	No thinning *(see REMARKS overleaf)*
Nozzle orifice:	.019"-.021"
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*
Cleaning of tools:	THINNER 08080
Pot life:	2 hours (20°C/68°F) after addition of HEMPASIL CROSSLINKER 98950, clear 00000
Indicated film thickness, dry:	150 micron/ 6 mils
Indicated film thickness, wet:	225 micron/ 9 mils
Recoat interval, min:	6 hours (20°C/68°F)
Recoat interval, max:	None

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPASIL 87500

APPLICATION CONDITIONS:	Use only where application can proceed at temperatures above 10°C/50°F. The temperature of the surface and that of the paint itself must also be above this limit. Apply only on a surface with a temperature above the dew point to avoid condensation. Relative humidity of the air between min. 30% and max. 85%. The surface should be clean and dry. The special application properties do furthermore necessitate extra consideration as to possible windy weather. The on-site representative from Hempel is to be consulted. In confined spaces provide adequate ventilation during application and drying.
PRECEDING COAT:	HEMPASIL NEXUS 27302 in light red 55001 or according to specification.
SUBSEQUENT COAT:	None.
REMARKS:	It is of the utmost importance that thorough protection and cleaning procedures are followed before and after application respectively. It is advisable to apply HEMPASIL SYSTEM after all other exterior painting is complete. This is to avoid silicone contamination of other painted surfaces. **Before** application cover all surfaces surrounding the areas to be applied with plastic sheeting to avoid overspray. **After** application clean all equipment very thoroughly. See below.
Application method:	A well executed spray application is necessary. This paint material has special application properties and it is recommended first to make a small-scale application to get familiar with the properties.
Thinning:	Not recommended. In exceptional cases use THINNER 08080 (max. 5 vol%).
Recommended number of coats:	One coat normally recommended.
Cleaning of tools:	Very thorough cleaning with THINNER 08080 is necessary. DISPOSE OF CLEANING SOLVENTS AFTER USE. DO NOT RE-USE SOLVENTS AFTER CLEANING.
Detailed instructions:	Will be available in connection with separate painting specifications.
Undocking:	Minimum 24 hours (20°C/68°F). At temperatures below 15°C/59°F minimum 48 hours.
Storage of cans:	Must be stored under absolutely dry conditions, protect against seeping humidity.
Note:	**HEMPASIL X3 87500 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8750059151CR001

HEMPADUR 87540

BASE 87549 with CURING AGENT 97740

Description:

HEMPADUR 87540 is an amine-cured, solvent-free epoxy paint which cures to a very strong and hard coating.

Recommended use:

1. As a self-primed, high-build coating for the protection of the exterior of buried steel pipes, valves, fittings etc. operating at elevated temperatures in severely corrosive environments.
2. As a repair system for pipelines.

The product complies with Aramco Engineering Standard APCS 113. (See REMARKS overleaf).

Service temperature:

Maximum, dry: 150°C/300°F

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red/50700
Finish:	Glossy
Solids content:	100%
Theoretical spreading rate:	1.6 m^2/litre - 625 micron 64 sq.ft./US gallon - 25 mils
Flash point:	> 66°C/151°F
Specific gravity:	1.8 kg/litre - 15.0 lbs/US gallon
Dry to touch:	45 minutes at 25°C/77°F - 15 minutes at 50°C/122°F
Dry to backfilling:	3 hours at 25°C/77°F
V.O.C.:	10 g/litre - 0.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances. Further reference is made to "Explanatory Notes" in the HEMPEL book.

APPLICATION DETAILS:

Mixing ratio 87540:	Base 87549 : Curing agent 97740 2 : 1 by volume
Application method:	Dual-feed, hot airless spray equipment *(See separate APPLICATION INSTRUCTIONS)*
Thinner (max. vol):	Do not dilute *(See separate APPLICATION INSTRUCTIONS)*
Pot life:	3 minutes (60°C/140°F)
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610
Indicated film thickness, dry:	625 micron/25 mils *(see REMARKS overleaf)*
Indicated film thickness, wet:	625 micron/25 mils
Recoat interval, min:	1 hour *(see REMARKS overleaf)*
Recoat interval, max:	2 days

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPADUR 87540

SURFACE PREPARATION:	Abrasive grit blasting to minimum Sa 2½. Recommended surface profile is Rz 75-100 micron/3-4 mils, corresponding to Rugotest No. 3, BN10, Keane-Tator Comparator, minimum 3.0 G/S, or ISO Comparator, Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water cleaning prior to blasting. After blasting clean the surface carefully from abrasives and dust.
APPLICATION CONDITIONS:	Use only where application and curing can proceed at temperatures above 10°C/50°F. Apply only on a clean and dry surface with a temperature above the dew point to avoid condensation. The maximum temperature of the substrate should not be more than approx 100°C/210°F. The paint temperature should not exceed 80°C/176°F. Relative humidity max. 85%.
PRECEDING COAT:	None
SUBSEQUENT COAT:	None.
REMARKS:	
Film thicknesses:	May be specified in another film thickness than indicated. This will alter spreading rate and may influence drying time and overcoating interval.
Substrate temperature, film forming properties:	Irrespective of substrate temperature, make sure that the paint material is applied in a uniform film free of pinholes, dry-spray or other irregularities.
Recoating:	The indicated overcoating interval will normally only apply in connection with touch-up of too low dry film thickness. If the maximum overcoating interval is exceeded, roughening of the surface is necessary to ensure adhesion.
Disclaimer:	Any reference to a company standard or specification in this Technical Product Data sheet shall not be construed as a recommendation by that company to purchase.
Note:	**HEMPADUR 87540 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8754050700CR004

For product description refer to product data sheet

HEMPADUR 87540

BASE 87549 with CURING AGENT 97740

Scope:

These Application Instructions cover surface preparation, application equipment and application details on HEMPADUR 87540.

Surface preparation:

When used as a heavy duty coating for rehabilitation of old buried pipelines:

Abrasive grit blasting to minimum Sa 2½. Recommended surface profile is Rz 75-100 micron/3-4 mils, corresponding to Rugotest No. 3, BN10, Keane-Tator Comparator, minimum 3.0 G/S, or ISO Comparator, Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water cleaning prior to blasting. After blasting clean the surface carefully from abrasives and dust.

Severely pitted areas may call for further water washing at a pressure of min. 300 bar/4350 psi and repeated abrasive blasting.

When used as a heavy duty coating for factory application of pipe fittings and pipe bends:

Oil and grease to be removed by suitable detergent, salts and other contaminants by high pressure fresh water hosing prior to blasting. Abrasive grit blasting to Sa 2½. Recommended surface profile is Rz 75-100 micron/3-4 mils, corresponding to Rugotest No. 3, BN 10 or ISO Comparator, Medium (G).

Application equipment:

HEMPADUR 87540, being a solvent free, high viscosity material, requires special measures to be taken during application. Spray application can only be carried out with **dual feed hot airless equipment** with proportioning pump adjusted to mixing ratio 2:1. Heated storage tanks with agitators, material feed pumps, fluid heaters, solvent flushing pump, one mixer manifold assembly and one mixer tube are required. Other spray systems may be used. Please consult HEMPEL for more details.

Supply hose:	min. 3/8”preferably insulated and heated max. length 25 metres
Spray hose:	1/4” max. length 3 metres
Nozzle size:	.024” - .031”, reversible

Procedure:

Storage: It is recommended to store the paint under heated conditions the last 1-2 days before taken into use, preferably at 40°C/104°F, which will ease emptying the cans into the mixer tanks.
Maximum storage temperature for both base 87549 and curing agent 97740, 40°C/ 104°F.

Start-up: Transfer the two components base 87549 and curing agent 97740 into two storage tanks.

Heating of the base material 87549 and curing agent 97740 is required to reduce the viscosity. The optimum spray temperature is around 55-60°C/131-140°F (at the nozzle).

Circulate the material until the output pressure of the three main pump cylinders is identical - between 160-200 bar/2175-2900 psi and the material temperature is typically 55-60°C/131-140°F maximum 80°C/176°F. This is valid for both base and curing agent. When this has been achieved, the material is ready for spraying. Recirculation should be stopped.

If some or all of the cylinders show too low pressure and no leaks are visible, it may indicate that the viscosity of the material is too high. In this case, further heating of the base is required.

Please note that the output pressure of the two supply pumps should always be lower than that of the proportioning pump cylinders. Maximum recommended output pressure of supply pumps is 10 bar/140 psi.

Before application, the mixing ratio should be checked (on heated product). Close the valve to the re-circulation hoses. Measure the volumetric material flow of the two components separately at the outlets just after the dosing cylinders.

Base : curing agent: 2 : 1 by volume

Please also refer to the user's manual of the spray equipment

Spraying: During the first few seconds of spraying, the spray fan will often "finger" due to the reaction of the mixed material in the hoses and gun.

If any breaks in the spraying have occurred, start again by emptying the spray gun, hose and static mixer by spraying into an empty drum.

Note: Due to the very short pot life of this coating, the following should be observed:

a) Use reversible nozzle for fast cleaning in case of nozzle blockage.

b) In principle, spray continuously with as few stops as possible.

c) Be sure that the flush pump system is on stand-by under full pressure at all times.

d) Have the necessary tools ready for immediate disconnection of spray hose from static mixer if spraying has been discontinued for more than one minute.

The best distance between spray gun and substrate to be coated is approximately 30 cm/1 ft.

It is recommended to do at least three passes (depending on the size of the nozzle) wet-in-wet in order to build up a pinhole-free paint film in the specified film thickness.

Applied wet film thickness should be checked by using a wet film gauge (comb). It is recommended to coat flat steel panels and check the wet film thickness on these, prior to start the coating of the object itself.

When coating long sections of pipelines, the whole section planned for coating, should be coated without making breaks, and if necessary by using replacement teams.

Control:

a) As an extra check of correct mixing ratios, evaluate the "dry to touch" time. If longer than indicated this may indicate insufficient or incorrect mixing.

b) All three main pump cylinders must show same or almost same output pressure. Especially their movements following charging and discharging of the pistons must be synchronous and within the same order of magnitude.

Drying/curing:

Steel temperature	25°C/77°F	50°C/122°F
Dry to touch	45 minutes	15 minutes
Time for pore testing and to backfill	3 hours	30 minutes

Temperature of the mixed paint	60°C/140°F
Pot life	3 minutes

Cleaning of equipment:

Proper equipment cleaning is essential for a successful operation.

Because of the very short pot life of the mixed product, immediately after finishing the application, the pump, hose and gun must be flushed with plenty of **HEMPEL'S TOOL**

	CLEANER 99610 or HEMPEL'S THINNER 08450. Keep flushing until the cleaner looks clear and clean. After all the material has been removed from pump and hoses, the surge valve should be flushed and the suction pipes cleaned.
Topcoating:	HEMPADUR 87540 should be applied to specified thickness in one operation.
Damaged areas:	Coating damaged during testing for continuity of paint film or damaged through handling may be ground down to bare steel and repaired with HEMPADUR 87540 or HEMPEL'S MULTI-MIL 35430.
Safety:	Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.
ISSUED BY:	HEMPEL A/S - 8754050700CR004

HEMPEL'S HS GAS PIPE COATING 87633

BASE 87638 with CURING AGENT 97693

Description:

HEMPEL'S HS GAS PIPE COATING 87633 is a two-component epoxy polyamine cured coating. Formulated according to the requirements in AMERICAN PETROLEUM INSTITUTE'S STANDARD RP 5L2.

Recommended use:

As a one-coat system for internal coating of gas pipes designed for carrying of dry, sweet gas. The coating is designed to reduce the drag resistance in the pipeline by making the pipe walls smoother.

Service temperatures:

Maximum, dry exposure only: 140°C/284°F.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Reddish brown/50890
Finish:	Semi-gloss
Volume solids, %:	69 ± 1
Theoretical spreading rate:	11.5 m^2/litre - 60 micron 461 sq.ft./US gallon - 2.4 mils
Flash point:	25°C/77°F
Specific gravity:	1.3 kg/litre - 10.9 lbs/US gallon
Dry to touch:	8 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	270 g/litre - 2.7 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

APPLICATION DETAILS:

Mixing ratio for 87633:	Base 87638 : Curing agent 97693 4 : 1 by volume		
Application method:	Airless spray	Air spray	Brush
Thinner (max.vol.):	08080 (5%)	08080 (15%)	08080 (5%) *(see REMARKS overleaf)*
Pot life:	90 minutes (20°C/68°F) *(API standard method)*		
Nozzle orifice:	.018"-.021"		
Nozzle pressure:	150 bar/2200 psi *(Airless spray data are indicative and subject to adjustment)*		
Cleaning of tools:	HEMPEL'S TOOL CLEANER 99610		
Indicated film thickness, dry:	60 micron/2.4 mils		
Indicated film thickness, wet:	100 micron/4.0 mils		
Recoat interval, min:	8 hours (20°C/68°F) *(see REMARKS overleaf)*		
Recoat interval, max:	8 days (20°C/68°F)		

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

HEMPEL'S HS GAS PIPE COATING 87633

SURFACE PREPARATION:	Remove oil and grease thoroughly with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. Abrasive blasting to Sa 2½ with a surface profile corresponding to Rugotest No. 3, BN9a, Keane-Tator Comparator, 2.0 G/S, 2S, or ISO Comparator, FINE (G).
APPLICATION CONDITIONS:	The surface must be completely dry and clean with a temperature above the dew point to avoid condensation. The minimum temperature and the temperature of the paint itself should be above 10°C/50°F. The best result is obtained at 15-25°C/59-77°F. Maximum steel temperature approx. 45°C/113°F. Relative humidity max. 85%. In confined spaces provide adequate ventilation.
SUBSEQUENT COAT:	None or according to specification.
REMARKS:	
Recoating:	Recoating will normally only apply in connection with touch-up of too low dry film thickness.
Thinner:	If API RP 5L2 compliance is not required, THINNER 08450 can be used.
Note:	**HEMPEL'S HS GAS PIPE COATING 87633 is for professional use only.**
ISSUED BY:	HEMPEL A/S - 8763350890CS005

HEMPEL'S TOOL CLEANER 99610

Description:
HEMPEL'S TOOL CLEANER 99610 is a blend of strong solvents for cleaning of tools that have been used for mixing or application of two-component epoxy products.
It has better cleaning properties than epoxy thinners.
Does not contain chlorinated solvent.

Recommended use:
For cleaning of brushes, paint rollers, spray equipment, and other tools which have been used for mixing or application of HEMPADUR products.
Do not use as thinner for any paint.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade Nos:	Transparent/00000
Volume solids:	0%
Flash point:	28°C/82°F
Specific gravity:	0.9 kg/litre 7.5 lbs/US gallon
V.O.C.:	715 g/litre - 6.0 lbs/US gallon

Remarks:
Cleaning should take place as soon as possible after use of the tools.
Spray equipment does not require rinsing or flushing after use of HEMPEL'S TOOL CLEANER 99610.
Do not use on cloth, linoleum, plexiglass, plastics, asphalt floors, and similar.
Do not use it for cleaning of equipment before and after application of polyurethanes (HEMPATHANEs).

Note:
HEMPEL'S TOOL CLEANER 99610 is for professional use only.

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY:
HEMPEL A/S - 99610000000C0003

HEMUCRYL THINNER 99800

Description:

HEMUCRYL THINNER 99800 is a water-borne thinner containing a thickener to avoid sagging.

Recommended use:

For dilution of water-borne acrylic paints when low relative humidity is causing an unacceptable level of dry spraying. Can be added up to 50%* by volume to slow down the drying time without reduction of the maximum possible dry film thickness.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Transparent/00000
Volume solids, %:	0,9
Flash point:	> 93°C/199°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon
V.O.C.:	0 g/litre - 0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

Remarks:

Recommended to be used together with HEMUCRYL PRIMER HI-BUILD 18030, HEMUCRYL ENAMEL HI-BUILD 58030 or HEMUCRYL TOPCOAT HI-BUILD 58230.
Add HEMUCRYL THINNER 99800 to the paint and stir well with a mechanical stirrer. The paint will get a gel-like consistency when HEMUCRYL THINNER 99800 has been added.

The table below shows the wet film thickness is going to be increased to obtain the specified dry film thickness and the increase in drying time for different levels of addition. The increase in drying time is calculated on basis of a paint with a volume solid on 44% (58030).

Volume % 99800 added	Increase wet Film thickness %	Minimum recoating interval (75 micron dry)
10	10	2¼ hours
20	20	2½ hours
30	30	2½ hours
40	40	3 hours
50	50	3 hours

* It is recommended to add max. 20% to HEMUCRYL PRIMER HI BUILD 18032.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY:

HEMPEL A/S - 9980000000C0003

HEMUCRYL BRUSH AGENT 99810

Description:

HEMUCRYL BRUSH AGENT 99810 is a water-borne compound containing a flow-improving thickener.

Recommended use:

Addition of HEMUCRYL BRUSH AGENT to a water-borne acrylic paint will increase the high shear viscosity of the paint thereby making it more suitable for application by brush or roller. Eg relevant for touch-up work.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Transparent/00000
Volume solids, %:	8 ± 1
Flash point:	> 93°C/199°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon
V.O.C.:	0 g/litre - 0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

Remarks:

Recommended as an additive to HEMUCRYL PRIMER HI-BUILD 18032, HEMUCRYL ENAMEL HI-BUILD 58030 or HEMUCRYL TOPCOAT HI-BUILD 58230 when a brush applicable paint is required.
Add HEMUCRYL BRUSH AGENT 99810 in 3-8% by volume to the paint and stir well with a mechanical stirrer. The viscosity of the paint will increase proportional to the amount of thickener added.
After addition of HEMUCRYL BRUSH AGENT 99810, the paint is less suitable for airless application as this may cause micro foaming in the paint surface.

Note:

HEMUCRYL BRUSH AGENT 99810 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

ISSUED BY:

HEMPEL A/S - 9981000000C0002

Product Data

HEMPEL'S SILICONE CLEANER 99850

Description:

HEMPEL'S SILICONE CLEANER 99850 is a concentrated alkaline cleaner based on potassium hydroxide, special non-ionic detergents and water.

Recommended use:

As a cleaning fluid for the HEMPASIL range of products. For removal of silicone contamination on all substrates except for aluminium (see REMARK below) to be recoated, e.g. vessels already coated with HEMPASIL or vessels to be coated with a new coat of HEMPASIL.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colour/Shade nos:	Clear/00000
Active matter:	91%
Flash point:	>100°C/212°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon
pH value:	approx. 14
V.O.C.:	0 g/litre - 0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1.

Application method:

Can be applied by brush, roller, or spray at low pressure. To be applied undiluted, left to work for some time (see separate instructions) and then removed by fresh water washing.

Remarks:

Shake HEMPEL'S SILICONE CLEANER 99850 before use to lower the viscosity.
Do not use on aluminium substrates.
Do not expose to frost.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Note:

HEMPEL'S SILICONE CLEANER 99850 is for professional use only.

ISSUED BY:

HEMPEL A/S - 99850