



# Product Data

## 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:

	<b>47741</b>	<b>47743</b>
Version; mixed product:	Grey/12170 - Red/50630 *	Grey/12170 - Red/50630 *
Colours/Shade nos:		
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	80 ± 1	80 ± 1
Theoretical spreading rate:	5.3 m <sup>2</sup> /litre - 150 micron 214 sq.ft./US gallon - 6 mils	5.3 m <sup>2</sup> /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:

	<b>47741</b>	<b>47743</b>
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 <sup>1</sup> / <sub>4</sub> 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 HEMPATANE paints as per specification, depending on area of use.

### REMARKS:

Weathering/  
service

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.

temperatures:  
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 8.8% 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

***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.***

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# Application Instructions

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.
- Ballast tanks, steel work:** **For use as a ballast tank coating:**  
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 REPLICAS NACE RP 0178 minimum Grade E (NACE Standard RP0178-95).
- 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 in order to obtain optimum performance.**

# HEMPEL

## Application Instructions



## HEMPADUR UNIQ 47741/47743

### **Intact shopprimer:**

To be abrasive grit sweep blasted all over.

**Note:** If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be fully re-blasted.

**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 - preferably stripe coating by brush - of HEMPADUR UNIQ 47742/47744 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.

**Galvanised items:** Degreasing and cleaning for surface contamination, if necessary. Yet, normally the most feasible treatment of pipes, supports etc. are not to do further surface preparation, but apply the full ballast tank coating system.

**Note: Actual type of steel work and surface preparation is dependent on factors such as shipyard technology, contractual specification, required lifetime, etc. Reference is also made to Hempel's Technical Standard for Ballast Tank Coating Work.**

### **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, 1/2" 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.



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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.

Sagging/"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.

- 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.
- Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.
- 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 <sup>1)</sup>
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		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	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

***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.***

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***Product data are subject to change without notice and become void five years from the date of issue.***



# Application Instructions

## 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.





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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/m<sup>2</sup> 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 shop priming), 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, 1/2" 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.



# Application Instructions

## BALLAST TANKS

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.

### 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

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- 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	10°C/50°F	20°C/68°F	30°C/86°F <sup>2)</sup>
Pot life	1½ hours	1 hour	(½ hour)

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.

### 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. 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/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time	14 hours	7 hours	5 hours	2 hours
Walk-on time	14 hours	7 hours	5 hours	2 hours
Curing time	18 days	7 days	3½ days	2 days
Initial curing*	13 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)  
(160 micron/6.4 mils dry film thickness)

Interval	Minimum				Maximum			
	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**	16 hours	7 hours	3 hours	2 hours	75 days*	30 days*	15 days*	9 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. 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.

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- **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

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<sup>2</sup>/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.

### 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

*This Product Data Sheet supersedes those previously issued.*

*For explanations, definitions and scope, see "Explanatory Notes" in the HEMPEL Book.*

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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 8501-1:2007. The use of steel with Rust Grade C requires more tight inspection of surface profile after blasting as well as of possible salt contamination. Rust grade D should not be used for ballast tanks.

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 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.

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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/m<sup>2</sup> 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 be 40-75 micron/1.6-3.0 mils approximately equivalent 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. However, mechanical cleaning to St 3 may be acceptable if zones are narrow and an extra coat of HEMPADUR UNIQ 47743 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.

**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"-.023"
Fan angle:	60-80°.

To spray complicated surfaces a smaller nozzle size should be used.



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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.

**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 and irregularities such as dust, dry spray, abrasives, should be remedied.

**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

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- 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 <sup>2)</sup>
Pot life	11/4hours	1 hour	(½ hour)

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.

### 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. 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/140°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			
	-10°C/50°F	0°C/68°F	20°C/86°F	30°C/104°F	-10°C/50°F	0°C/68°F	10°C/86°F	20°C/104°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. 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.

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- **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

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<sup>2</sup>/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.

### 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 - 4774312170CR003

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***For explanations, definitions and scope, see "Explanatory Notes" in the HEMPEL Book.***

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