Application Instructions

BALLAST TANKS
HEMPADUR 15570
HEMPADUR QUATTRO XO 17870

For product description refer to product data sheets

HEMPADUR 15570/ HEMPADUR XO 17870

15570: BASE 15579 with CURING AGENT 95570
17870: BASE 17879 with CURING AGENT 95870

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR 15570/HEMPADUR QUATTRO XO 17870 coating system where HEMPADUR 15570 is applied as primer for a 2 coat system of HEMPADUR QUATTRO XO 17870 as a ballast tank coating system 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 system achieves an even distribution at the specified nominal dry film thickness of minimum 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 Sa2½.

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 given larger and larger overlaps. Roughening must be carried out when the maximum overcoating interval is exceeded (when sand papering, use free-cut paper, grain size 80).
Furthermore, these areas may also be masked off with tape to keep them as narrow as possible.

Secondary surface preparation of block assembly zones is preferably abrasive spot-blasting or mechanical cleaning to St 3.

Stainless steel: (E.g. 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 15570 and HEMPADUR QUATTRO XO 17870, being high viscosity materials, may require special measures to be taken at application.

Recommended airless spray equipment for HEMPADUR 15570 and HEMPADUR QUATTRO XO 17870:

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°.

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.

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.

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 stripe coats must each be applied as coherent films 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 of HEMPADUR 15570 and HEMPADUR QUATTRO XO 17870 for spraying are 2 hours and 1 hour respectively 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 will shorten the corresponding practical pot life considerably.

a. Mix the entire contents of corresponding base and curing agent packing. If it is necessary to mix smaller portions, this must be done properly according to the pre scribed mixing ratios for the respective product.

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 of 15570 (spray application)	3 hours	2 hours	1½ hours	1 hour
Pot life of QUATTRO XO 17870 (spray application)	1½ hours	1 hours	¾ hours	½ 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 substrate temperatures below 5°C/41°F the paint may advantageously be pre-reacted 10-20 minutes before spray application (longer pre-reaction time at lower temperatures).

Application conditions:
HEMPADUR 15570 and HEMPADUR QUATTRO XO 17870 shall only be used where application and curing can proceed at temperatures above -10°C. At the freezing point and below be aware of the risk of ice on the surface, which will hinder adhesion. The temperature of the paint itself should be 15°C or above.

Both products shall only be applied onto dry and clean surfaces with a temperature above the dew point in order to avoid condensation.

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:

To achieve a nominal dry film thickness (NDFT) of 320 micron of the coating system by minimum two spray coats and two stripe coats as required by PSPC.
HEMPADUR 15570 is to be specified in a dry film thickness of approx. 50 micron/2 mils, and HEMPADUR QUATTRO XO 17870 in two coats of a total dry film thickness of approx. 270-300 micron/11-12 mils. The dry film thickness distribution shall be evaluated according to the 90/10 rule.

Dry film thickness (DFT)	DFT micron/mil	Remark
Minimum DFT per coat of 15570	50/2	Value for undiluted paint at approximately 20°C/68°F. See more info in Product data sheet
Minimum DFT per coat of QUATTRO XO 17870	100/4	Value for undiluted paint at approximately 20°C/68°F. See more info in Product data sheet
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 15570 in a dry film thickness of 50 micron/2 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	36 hours	16 hours	8 hours	4 hours	3 hours
Walk-on time	40 hours	20 hours	9 hours	4½ hours	3½ hours
Curing time	60 days	30 days	14 days	7 days	5 days
Initial curing*	40 days	20 days	10 days	5 days	3 days

HEMPADUR QUATTRO XO 17870 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	32 hours	12 hours	6 hours	3½ hours	3 hours
Walk-on time	41 hours	20 hours	8½ hours	4 hours	3½ hours
Curing time	40 days	20 days	10 days	5 days	2½ days
Initial curing*	20 days	10 days	6 days	4 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.

Overcoating:

Overcoating intervals (provided proper ventilation)
HEMPADUR 15570 in a dry film thickness of 50-75 micron/2-3 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
Overcoating time**	51 hours	25 hours	11 hours	6 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
Overcoating time**	Extended*	Extended*	Extended*	Extended*	Extended*	Extended*

HEMPADUR QUATTRO XO 17870 in a dry film thickness of 150 micron/6 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
Overcoating time**	36 hours	18 hours	8 hours	4 hours	3 hours	2 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
Overcoating time**	90 days	90 days	60 days	30 days	22 ½ days	15 days

* Where the maximum overcoating interval is denoted "extended" the coated structure can possibly be overcoated even after longer periods depending on the actual exposure conditions such as limited UV exposure and depending on the condition and cleanliness of the paint surface. The evaluation of the specific situation is based on local experience, HEMPEL's Technical Service Department should be contacted for advice in writing.
Extended overcoating 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 HEMPADUR QUATTRO XO 17870 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.
** Stripe coat can be applied when it is possible to walk on the surface without damage to the coating.

Maximum overcoating intervals:
Roughening of the surface is necessary to ensure optimum inter-coat adhesion if the maximum overcoating interval is exceeded.

- **Long overcoating intervals:**
  A completely clean surface is mandatory to ensure inter-coat adhesion, especially in the case of long overcoating 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.

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 done 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 over-blasting.

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 – QUATTRO XO 1787050630/1557012430

These Application Instructions supersede those previously issued.
For explanations, definitions and scope see "Explanatory Notes" available on www.hempel.com. 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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