

Application Guide



Balloxy HB Light

Product description

This is a two component polyamine cured epoxy mastic coating. It is a surface tolerant, high solids, high build product. Specially designed for areas where optimum surface preparation is not possible or desired. Provides long lasting protection in environments with high corrosivity. Can be used as primer, mid coat or finish coat in atmospheric and immersed environments. Suitable for properly prepared carbon steel, galvanised steel, stainless steel, aluminium and a range of aged coating surfaces. It can be applied at sub zero surface temperatures.

Scope

The Application Guide offers product details and recommended practices for the use of the product.

The data and information provided are not definite requirements. They are guidelines to assist with efficient and safe use, and optimum service of the product. Adherence to the guidelines does not relieve the applicator of responsibility for ensuring that the work meets specification requirements. Jotuns liability is in accordance with general product liability rules.

The Application Guide (AG) must be read in conjunction with the relevant specification, Technical Data Sheet (TDS) and Safety Data Sheet (SDS) for all the products used as part of the coating system.

Projects specified to the requirements in Performance Standard for Protective Coatings (PSPC)

For application and repair / maintenance requirements according to IMO MSC.215 (82) for dedicated Sea Water Ballast Tanks (WBT), and/or to IMO MSC.288 (87) for Cargo Oil Tanks of Crude Oil Tankers (COT) reference is made to the PSPC Appendix in this document.

Referred standards

Reference is generally made to ISO Standards. When using standards from other regions it is recommended to reference only one corresponding standard for the substrate being treated.

Surface preparation

The required quality of surface preparation can vary depending on the area of use, expected durability and if applicable, project specification.

When preparing new surfaces, maintaining already coated surfaces or aged coatings it is necessary to remove all contamination that can interfere with coating adhesion, and prepare a sound substrate for the subsequent product.

Inspect the surface for hydrocarbon and other contamination and if present, remove with an alkaline detergent. Agitate the surface to activate the cleaner and before it dries, wash the treated area using fresh water. Paint solvents (thinners) shall not be used for general degreasing or preparation of the surface for painting due to the risk of spreading dissolved hydrocarbon contamination. Paint thinners can be used to treat small localized areas of contamination such as marks from marker pens. Use clean, white cotton cloths that are turned and replaced often. Do not bundle used solvent saturated cloths. Place used cloths into water.

Process sequence

Surface preparation and coating should normally be commenced only after all welding, degreasing, removal of sharp edges, weld spatter and treatment of welds is complete. It is important that all hot work is completed before coating commences.

Soluble salts removal

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Soluble salts have a negative impact on the coating systems performance, especially when immersed. Jotun's general recommendations for maximum soluble salts (sampled and measured as per ISO 8502-6 and -9) content on a surface are:

Water ballast tanks (PSPC): 50 mg/m²

For areas exposed to (ISO 12944-2):

C1-C4: 200 mg/m²

Carbon steel

Initial rust grade

The steel shall preferably be Rust Grade A or B (ISO 8501-1). It is technically possible to apply the coating to rust grades C and D, but it is practically challenging to ensure specified film thickness on such a rough surface, hence risk of reduced lifetime of the coating system. When steel of Rust Grade C or D is coated, the frequency of inspection and testing should be increased.

For steel with Rust Grades C or D, contact your nearest Jotun office for advice.

Metal finishing

For areas in corrosivity category C1 to C4 (ISO 12944-2) all irregularities, burrs, slivers, slag and spatter on welds, sharp edges and corners shall conform to minimum grade P2 (ISO 8501-3) Table 1, or as specified. All edges shall have a rounded radius of minimum 2 mm subjected to three pass grinding or equally effective method.

For areas in corrosivity category C5 the requirement is conformance to grade P3 (ISO 8501-3) Table 1.

Defective welds shall be replaced and treated to an acceptable finish before painting. Temporary welds and brackets shall be ground to a flat finish after removal from the parent metal.

Pitting repair

Pittings in steel can be difficult to cover fully with most coatings. In some areas it is practically feasible to use filler to fill pittings. This should then be done either after the initial surface preparation or after application of first coat.

Abrasive blast cleaning

Cleanliness

After pre-treatment is complete, the surface shall be dry abrasive blast cleaned to minimum Sa 1 (ISO 8501-1) using abrasive media suitable to achieve a sharp and angular surface profile.

Surface profile

Recommended surface profile 30-85 µm, grade Fine to Medium G (ISO 8503-2).

Abrasive media quality

The selected abrasive must be compatible with both the surface to be blast cleaned and the specified coating system. The abrasive shall meet specifications as per relevant parts of ISO 11124 (Specification for metallic blast-cleaning abrasives), or ISO 11126 (Specification for non-metallic blast-cleaning abrasives). It should be sampled and tested as per relevant parts of ISO 11125 (metallic abrasives) or ISO 11127 (non-metallic abrasives). Dry storage of abrasive and shelter for blasting pots is necessary to prevent equipment becoming clogged with damp abrasive.

All abrasive blast media used should be new and not recirculated, with the exception of Steel Grit. If this is utilized the circulation process must include a cleaning process.

Compressed air quality

The supply of clean air to blasting pots must be secured to avoid contamination of abrasive and thereby of blast cleaned surfaces. Compressors must be fitted with sufficient traps for oil and water. It is also recommended to fit two water separators at the blasting machine to ensure a supply of moisture-free air to the abrasive chamber.

Dust contamination

At the completion of abrasive blasting the prepared surface shall be cleaned to remove residues of corrosion products and abrasive media, and inspected for surface particulate contamination. Maximum contamination level is rating 2 (ISO 8502-3) as per Figure 1. Dust size no greater than class 2.

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Hand and Power Tool Cleaning

Power tool cleaning

Surfaces to be coated shall be prepared by mechanical preparation methods to minimum St 2 (ISO 8501-1). Suitable methods are disc grinding, hand sanding or hand wire brushing. Ensure the surface is free from mill scale, residual corrosion, failed coating and is suitable for painting. If power wire brushing is used, care should be taken not to polish the metal surface, as this can reduce adhesion of the coating. The surface should appear rough and mat.

Overlapping zones to intact coating shall have all leading edges feathered back by sanding methods to remove all sharp leading edges and establish a smooth transition from the exposed substrate to the surrounding coating. Consecutive layers of coating shall be feathered to expose each layer and new coating shall always overlap to an abraded existing layer. Abrade intact coatings around the damaged areas for a minimum 100 mm to ensure a mat, rough surface profile, suitable for over coating.

Water jetting

High pressure water jetting surface preparation refers to ISO 8501-4, for substrates previously coated either with a full coating system (surface DC A, DC B, DC C) or shop primer (surface DP I and DP Z). The surface definition for existing coating (DC) refers to the degree of coating breakdown according to ISO 4628.

It is important before considering hydro jetting, to ensure that the specified coating system is compatible with the existing coating system. High pressure water jetting does not remove mill scale or create surface roughness, and is only useful for surfaces with an initial roughness suitable for the subsequent coat.

Optimum performance is achieved with preparation grade Wa 2½ (ISO 8501-4). Minimum preparation grade is Wa 2. For DP I and DP Z surface Wa 1 is accepted.

Maximum accepted grade of flash rust for any preparation is FR L (ISO 8501-4).

Alternatively minimum approved preparation grade is SSPC-SP WJ-2/ NACE WJ-2, Very thorough cleaning.

Maximum accepted flash rust grade is Light (L).

Galvanised steel

Abrasive blast cleaning

The galvanised finish shall be smooth as is consistent for a protective coating and shall have no sharp fins, sharp edges, dross or zinc ash on the surface. If present, remove by mechanical cleaning methods.

After removal of excess zinc and surface defects the area to be coated shall be degreased to ISO 12944-4, Part 6.1.4 Alkaline Cleaning. The galvanised surface shall be dry abrasive brush off blast cleaned with the nozzle angle at 45-60° from perpendicular at reduced nozzle pressure to create a sharp and angular surface profile using approved non-metallic abrasive media. As a guide, a surface profile 25-55 µm, grade Fine G; Ry5 (ISO 8503-2) should be achieved.

Hand and Power Tool Cleaning

After removal of excess zinc and surface defects the area to be coated shall be degreased with an alkaline detergent, washed by Low-Pressure Water Cleaning (LPWC) to a grade corresponding to the description of Wa 1 (ISO 8501-4) or higher standard and the surface abraded using mechanical or hand sanding methods using non-metallic abrasives or bonded fibre abrasive pads to remove all polish and to impart a scratch pattern to the surface. Do not use high speed rotational sanders.

Water jetting

Inspect the surface for process residues, hydrocarbon contamination and zinc corrosion by-products. If present, remove with an alkaline detergent. Agitate the surface to activate the detergent and before it dries, wash the treated area by Low-Pressure Water Cleaning (LPWC) to a grade corresponding to the description of Wa 1 (ISO 8501-4) or higher standard using fresh water.

Optimum performance is achieved with preparation to a grade corresponding to the description of Wa 2½.

Minimum preparation grade is Wa 1.

Aluminium

Abrasive blast cleaning

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After pre-treatment of welds, sharp edges, removal of weld spatter and other surface contamination the surface shall be degreased using an alkaline detergent which is agitated with non-metallic brushes and removed by Low-pressure Water Cleaning (LPWC) to a grade corresponding to the description of Wa 1 (ISO 8501-4) or higher standard with fresh water. The surface shall be then dry abrasive blast cleaned with an approved non-metallic abrasive media to create a sharp and angular surface profile. As a guide, a surface profile between 25-55 µm, grade Fine G; Ry5 (ISO 8503-2) should be achieved.

Hand and Power Tool Cleaning

After pre-treatment of welds, sharp edges, removal of weld spatter and other surface contamination the surface shall be degreased using an alkaline detergent which is agitated with non-metallic brushes and then fresh water rinsed. The cleaned surface shall be then hand or machine abraded with non-metallic abrasives or bonded fibre machine or hand abrasive pads to remove all surface polish and to impart a scratch pattern to the surface. Do not use high speed rotational sanders.

Water jetting

Surfaces not contaminated with hydrocarbon deposits shall be cleaned by Low-pressure Water Cleaning (LPWC) to a grade corresponding to the description of Wa 1 (ISO 8501-4) or higher standard using fresh water to remove all dusts, chloride and non-visible contamination. Optimum performance is achieved with preparation to a grade corresponding to the description of Wa 2½. Minimum preparation grade is Wa 1.

Stainless steel

Abrasive blast cleaning

After pre-treatment of welds, sharp edges, removal of weld spatter and other surface contamination the surface shall be degreased with an alkaline detergent, washed by low-pressure Water Cleaning (LPWC) to a grade corresponding to the description of Wa 1 (ISO 8501-4) or higher standard and dry abrasive blast cleaned to create a sharp and angular surface profile using approved non-metallic abrasive media. As a guide, a surface profile between 45-75 µm, grade Fine, Ry5 (ISO 8503-2) should be achieved.

Hand and Power Tool Cleaning

After pre-treatment of welds, sharp edges, removal of weld spatter and other surface contamination the surface shall be degreased with an alkaline detergent, washed by low-pressure Water Cleaning (LPWC) to a grade corresponding to the description of Wa 1 (ISO 8501-4) or higher standard and hand or machine abraded with non-metallic abrasives or bonded fibre machine or hand abrasive pads to remove all polish and to impart a scratch pattern to the surface. Do not use high speed rotational sanders.

Water jetting

Inspect the surface for oil and hydrocarbon contamination and if present, remove with an alkaline detergent. Agitate the surface with non-metallic brushes to activate the detergent and before it dries, wash the treated area by low-pressure Water Cleaning (LPWC) to a grade corresponding to the description of Wa 1 (ISO 8501-4) or higher standard using fresh water to remove contamination and reduce salt concentration. Optimum performance is achieved with preparation to a grade corresponding to the description of Wa 2½. Minimum preparation grade is Wa 1.

Chlorinated or chlorine containing solvents or detergents must not be used on stainless steel.

Concrete

Water cleaning

Low pressure water washing to a rough, clean, dry and laitance free surface.

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Coated surfaces

Verification of existing coatings including primers

When the surface is an existing coating, verify with technical data sheet and application guide of the involved products, both over coatability and the given maximum over coating interval.

Over coating

High pressure water jetting surface preparation refers to ISO 8501-4, for substrates previously coated either with a full coating system (surface DC A, DC B, DC C) or shop primer (surface DP I and DP Z). The surface definition for existing coating (DC) refers to the degree of coating breakdown according to ISO 4628. It is important before considering hydro jetting, to ensure that the specified coating system is compatible with the existing coating system. High pressure water jetting does not remove mill scale or create surface roughness, and is only useful for surfaces with an initial roughness suitable for the subsequent coat.

Shop primers

Shop primers are accepted as temporary protection of steel plates and profiles. Refer to the technical data sheet for the generic types accepted. Certain standards require pre-approval of the shop primer as part of a complete system. Contact your nearest Jotun office for specific system compatibility. Before being overcoated the shop primer must be fully cured, clean, dust free, dry and undamaged. Inorganic zinc shop primers must be free of zinc salts (white rust). Corroded and damaged areas must be blast cleaned to minimum Sa 1 (ISO 8501-1).

Application

Acceptable environmental conditions - before and during application

Before application, test the atmospheric conditions in the vicinity of the substrate for the dew formation according to ISO 8502-4.

Standard grade

Air temperature	10 - 60	°C
Substrate temperature	10 - 50	°C
Relative Humidity (RH)	10 - 85	%

Winter grade

Air temperature	-5 - 50	°C
Substrate temperature	-5 - 20	°C
Relative Humidity (RH)	10 - 85	%

The following restrictions must be observed:

- Only apply the coating when the substrate temperature is at least 3 °C (5 °F) above the dew point
- Do not apply the coating if the substrate is wet or likely to become wet
- Do not apply the coating if the weather is clearly deteriorating or unfavourable for application or curing
- Do not apply the coating in high wind conditions

Product mixing

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Product mixing ratio (by volume)

STANDARD GRADE

Balloxy HB Light Comp A	5 part(s)
Balloxy HB Light Comp B	1 part(s)

WINTER GRADE

Balloxy HB Light Comp A	3 part(s)
Balloxy HB Light Wintergrade Comp B	1 part(s)

Paint temperature

Ambient temperature will affect the viscosity of the coating. Low temperature will increase the viscosity and high temperatures reduce the viscosity. Careful use of thinning may be needed at lower temperatures. At low temperatures, very high volume solids and solvent free coatings can be warmed by placing the cans into a heated room prior to use or, with care, can be heated using appropriate equipment to reduce the viscosity so that thinning is not required.

When working in warmer temperatures the paint should be kept in a shaded and ventilated area, and not in direct sunlight.

Induction time and Pot life

Paint temperature	23 °C
Standard grade	
Induction time	10 min
Pot life	2 h
Winter grade	
Induction time	10 min
Pot life	1.5 h

The temperature of base and curing agent is recommended to be 18 °C or higher when the product is mixed.

Thinner/Cleaning solvent

Thinner: Jotun Thinner No. 17

Thinning of a coating can in some cases improve the spray ability and will affect volume solids and sagging resistance of a coating. Thinning should be kept at a minimum except if the coating is to be used as a tie coat on top of zinc containing coatings.

Thinning may be required to adjust the spray pattern and for rolling and brushing. Thinning will reduce the viscosity, which can reduce sag resistance. Thinning must be done with care as this will result in lower maximum thickness. Excessive thinning can also lead to solvent entrapment, particularly in hot weather.

Application data

Always have sufficient tools available in order to be able to dismantle and clean out the application equipment should blockages or an unscheduled stop to the work occur.

When using single leg airless spray and conventional air spray equipment ensure the pump, pressure pot, lines and gun are fully flushed with thinner after spraying stops for a prolonged period.

When using two component airless spray ensure the mixing chamber, material hose and gun are flushed with thinner when spraying stops for a prolonged period.

Spray application

Airless Spray Equipment

Pump ratio (minimum) : 42:1

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Pump output (litres/minute) :	1.5-2.2
Pressure at nozzle (minimum) :	150 bar/2100 psi
Nozzle tip (inch/1000) :	19-23
Filters (mesh) :	70

Several factors influence, and need to be observed to maintain the recommended pressure at the nozzle. Among factors causing pressure drop are:

- extended hoses or hose bundles
- extended hose whip-end line
- small internal diameter hoses
- high paint viscosity
- large spray nozzle size
- inadequate air capacity from compressor
- incorrect or clogged filters

The following equipment is suitable to apply this product. However, other equipment may also be suitable. Contact your equipment supplier for additional information.

Plural component (Twin Pump) airless spray equipment

When using Plural Airless Spray the Component A and B should be mixed separately until homogenous and then placed into the separate A & B Containers of the airless pump.

Jotun recommends that the paint containers of single and twin pump airless units are fitted with slow rotation air powered impellers.

When using two component spray equipment, Jotun recommends the use of either a pump with electronic controlled pump ratio settings or fixed ratio settings in combination with a flow meter for each pump to monitor the proper delivery ratio of the pack A and Pack B is maintained during use.

Recommended data for pump output, pressure at nozzle, nozzle tip and filters are the same as for airless spray equipment.

Spray application technique

Pay close attention to both spraying technique and the correct setting of equipment during application in order to achieve an even, pinhole free film. A combination of the correct inbound air / outbound material pressure, correct airless tip or spray set up and a recommend gun to substrate distance of 30-50 cm is recommended.

Apply the coating in even and uniform parallel passes and overlap each pass 50% to achieve an even film. Use a painter's wet film comb during application to control the wet to dry film thickness of the coating.

When applying the product may appear transparent until a minimum wet film thickness is achieved. It is recommended to use this as an indicator for correct WFT.

Film thickness per coat

Typical recommended specification range

STANDARD GRADE

Dry film thickness	125 - 300	µm
Wet film thickness	150 - 365	µm
Theoretical spreading rate	6.6 - 2.7	m ² /l

WINTER GRADE

Dry film thickness	125 - 300	µm
Wet film thickness	175 - 420	µm
Theoretical spreading rate	5.7 - 2.4	m ² /l

This product can be applied up to 50 % higher than maximum specified film thickness without loss of technical properties.

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Film thickness measurement

Wet film thickness (WFT) measurement and calculation

To ensure correct film thickness, it is recommended to measure the wet film thickness continuously during application using a painter's wet film comb (ISO 2808 Method 1A). The measurements should be done as soon as possible after application.

Fast drying paints may give incorrect (too low) readings resulting in excessive dry film thickness. For multi layer physically drying (resoluble) coating systems the wet film thickness comb may give too high readings resulting in too low dry film thickness of the intermediate and top coats.

Use a wet-to-dry film calculation table (available on the Jotun Web site) to calculate the required wet film thickness per coat.

Dry film thickness (DFT) measurement

When the coating has cured to hard dry state the dry film thickness can be checked to SSPC PA 2 or equivalent standard using statistical sampling to verify the actual dry film thickness. Measurement and control of the WFT and DFT on welds is done by measuring adjacent to and no further than 15 cm from the weld.

Minimum thickness

The minimum dry film thickness of all Jotun's products are stated on the technical data sheet. It is in most cases possible to apply a thinner film if the product is thinned. This may be valid for minor touch up areas or if the applicator wishes to build the coating system up in more coats, but care should be taken to achieve a proper film and sufficient hiding of the surface or previous coat.

Maximum thickness

Excessive dry film thickness could result in slower turnaround for the work being painted as well as an increase in the dry and cure times and an increased risk of solvent entrapment. Care should be taken to ensure that the dry film thickness of the coating does not exceed our recommendations. In general the dry film thickness of any ballast tank coating system should be kept as close to the specified as possible. The general guideline for the overall surface, unless otherwise specified is that the dry final film thickness of the coating system should not exceed 3 times the specified dry film thickness. For minor spots, not exceeding 1% of the surface a total DFT of up to 1200 microns can be accepted.

Ventilation

Sufficient ventilation is very important to ensure proper drying/curing of the film. When applied in confined spaces continuous ventilation is important during application and until "walk-on-dry" is achieved.

Stripe coating

The stripe coat sequence can be either of the following:

1. Surface preparation, stripe coat, full coat.
2. Surface preparation, full coat, stripe coat. This sequence can be used when a large substrate area has been prepared and leaving the substrate exposed for a long time while doing stripe coating could lead to surface deterioration.

It is important to pay special attention to edges, openings, rear sides of stiffeners, scallops etc. and to apply a stripe coat to these areas where the spray fan may not reach or deposit an even film.

When applying a stripe coat to bare metal use only a stiff, round stripe coating brush to ensure surface wetting and filling of pits in the surface.

Stripe coating shall be of a different colour to the main primer coat and the topcoat colour and should be applied in an even film thickness, avoiding excessive brush marks in order to avoid entrapped air. Care should be taken to avoid excessive film thickness. Pay additional attention to pot life during application of stripe coats.

Jotun recommends a minimum of one stripe coat. However, in extremely aggressive exposure conditions there may be good reason to specify two stripe coats.

Coating loss

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The consumption of paint should be controlled carefully, with thorough planning and a practical approach to reducing loss. Application of liquid coatings will result in some material loss. Understanding the ways that coating can be lost during the application process, and making appropriate changes, can help reducing material loss.

Some of the factors that can influence the loss of coating material are:

- type of spray gun/unit used
- air pressure used for airless pump or for atomization
- orifice size of the spray tip or nozzle
- fan width of the spray tip or nozzle
- the amount of thinner added
- the distance between spray gun and substrate
- the profile or surface roughness of the substrate. Higher profiles will lead to a higher "dead volume"
- the shape of the substrate target
- environmental conditions such as wind and air temperature

Drying and Curing time

Substrate temperature	-5 °C	0 °C	5 °C	10 °C	23 °C	40 °C
STANDARD GRADE						
Surface (touch) dry				8 h	4 h	2 h
Walk-on-dry				24 h	10 h	4 h
Dry to over coat, minimum				24 h	10 h	4 h
Dried/cured for service				14 d	7 d	2 d
Dried/cured for immersion				7 d	2 d	1 d
WINTER GRADE						
Surface (touch) dry	24 h	18 h	12 h	6 h	2.5 h	
Walk-on-dry	48 h	26 h	18 h	12 h	5 h	
Dry to over coat, minimum	48 h	26 h	18 h	12 h	5 h	
Dried/cured for service	21 d	14 d	7 d	3 d	2 d	
Dried/cured for immersion	10 d	9 d	7 d	3 d	1 d	

Drying and curing times are determined under controlled temperatures and relative humidity below 85 %, and at average of the DFT range for the product.

Surface (touch) dry: The state of drying when slight pressure with a finger does not leave an imprint or reveal tackiness.

Walk-on-dry: Minimum time before the coating can tolerate normal foot traffic without permanent marks, imprints or other physical damage.

Dry to over coat, minimum: The shortest time allowed before the next coat can be applied.

Dried/cured for service: Minimum time before the coating can be permanently exposed to the intended environment/medium.

Dried/cured for immersion: Minimum time before the coating can be permanently immersed in sea water.

Maximum over coating intervals

Maximum time before thorough surface preparation is required. The surface must be clean and dry and suitable for over coating. Inspect the surface for chalking and other contamination and if present, remove with an alkaline detergent. Agitate the surface to activate the cleaner and before it dries, wash the treated area by low-pressure water jetting to Wa 1 (ISO 8501-4) using fresh water.

If maximum over coating interval is exceeded the surface should in addition be carefully roughened to ensure good inter coat adhesion.

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Areas for atmospheric exposure

Average temperature during drying/curing	-5 °C	0 °C	5 °C	10 °C	23 °C	40 °C
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Standard grade

Itself				3 mth	3 mth	2 mth
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Winter grade

Itself	1 mth	21 d	21 d	18 d	14 d	
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Areas for immersed exposure

Average temperature during drying/curing	-5 °C	0 °C	5 °C	10 °C	23 °C	40 °C
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Standard grade

Itself				3 mth	3 mth	2 mth
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Winter grade

Itself	1 mth	21 d	21 d	18 d	14 d	14 d
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Other conditions that can affect drying / curing / over coating

Repair of coating system

Damages to the coating layers:

Prepare the area through sandpapering or grinding, followed by thorough cleaning/vacuuming. When the surface is clean and dry the coating may be over coated by itself or by another product, ref. original specification.

Always observe the maximum over coating intervals. If the maximum over coating interval is exceeded the surface should be carefully roughened in order to ensure good intercoat adhesion.

Damages exposing bare substrate:

Remove all rust, loose paint, grease or other contaminants by spot blasting, mechanical grinding, water and/or solvent washing. Feather edges and roughen the overlap zone of surrounding intact coating. Apply the coating system specified for repair.

Areas with too low DFT:

Roughen the surface, vacuum and apply new coating according to specification.

Areas with too high DFT:

Areas with with DFT above maximum specified for isolated areas shall be ground down to acceptable thickness, or down to bare steel and recoated.

Repair of damaged areas

Sags and runs can be caused by too high wet film thickness, too much thinner added or the spray gun used too close to the surface.

Repair by using a paint brush to smooth the film when still wet.

Sand down to a rough, even surface and re-coat if the coating is cured.

Orange peel can be caused by poor flow/levelling properties of the paint, poor atomization of the paint, thinner evaporating too fast or the spray gun held too close to the surface.

This can be rectified by abrading the surface and applying an additional coat after having adjusted the application properties or the application technique.

Dry spray can be caused by poor atomization of the paint, spray gun held too far from the surface, high air temperature, thinner evaporating too fast or coating applied in windy conditions.

Sand down to a rough even surface and re-coat.

Pinholes can be caused by entrapped solvents in the film or by incorrect application technique. Pinholes can be repaired as per procedure for damages to the coating layer or to the substrate, ref. above.

Coating film continuity

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Jotun recommends that all tank coating systems are pinhole/defect tested either by ASTM D 5162, test methods A or B as appropriate for the actual dry film thickness after cured for service. In general test method A (Low voltage wet sponge) is recommended for dry film thickness up to 500 µm using 90 Volts. For higher film thickness test method B (High voltage spark test) is recommended using 400 Volts per 100 µm.

Alternatively by visual observation of pin hole rusting after water immersion. For water immersion test use of seawater is recommended. Immersion time should be at least 24 hours. If fresh water is used the immersion time should be at least 48 hours.

All noted defects shall be repaired using best practical means and methods.

Performance Standard for Protective Coatings (PSPC)

PSPC Appendix (WBT)

Application requirements particular for coating according to Performance Standard for Protective Coatings (PSPC) of dedicated seawater ballast tanks to IMO Resolution MSC.215 (82)

Job specification

There shall be a minimum of two stripe coats and two spray coats, except that the second stripe coat, by way of welded seams only, may be reduced in scope where it is proven that the NDFT (nominal total dry film thickness) can be met by the coats applied in order to avoid unnecessary over thickness. Any reduction in scope of the second stripe coat shall be fully detailed in the CTF.

NDFT (nominal total dry film thickness)

NDFT 320 µm with 90/10 rule. (Minimum 90 % of all DFT measurements shall be greater than or equal to the NDFT and none of the remaining 10 % measurements shall be below 0.9 x NDFT).

Maximum DFT 2000 µm is acceptable for isolated spots only, and should not extend to more than 1 % of the total tank area.

PRIMARY SURFACE PREPARATION

Blasting and surface profile:

Cleanliness minimum Sa 2½ (ISO 8501-1)
Surface profile 30-75 µm (ISO 8503-2)

Blasting shall not be carried out when:

- the relative humidity is above 85 %
- the surface temperature of steel is less than 3 °C above the dew point

Water soluble salts limit equivalent to NaCl

Maximum 50 mg/m² of sodium chloride (ISO 8502-6/9)

SECONDARY SURFACE PREPARATION

Steel condition

For steel preparation, PSPC makes reference to grade P2 (ISO 8501-3). All sharp edges are to be rounded to a radius of minimum 2 mm, subject to a three-pass grinding, or treated with an alternative process giving an edge profile that results in a dry film thickness retention corresponding to or better than a three pass grinding. Sharp edges mean all edges except natural rounded/rolled edges of sections.

Surface treatment

Cleanliness minimum Sa 2½ (ISO 8501-1) on damaged shop primer and welds.

Surface treatment after erection

Water ballast tanks (WBT), IMO Resolution MSC.215 (82)

Erection joints minimum St 3 or Sa 2½ (ISO 8501-1) where practicable.

- Damages up to 2 % of the area to be coated to be treated to minimum St 3
- Contiguous damages over 25 m² or over 2 % of the area to be coated, Sa 2½ shall be applied

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- Coating in overlap shall be feathered

Profile requirements

In case of full or partial blasting surface profile 30-75 µm (ISO 8503-2).

Dust

Dust quantity rating 1 for dust size class 3 or larger (ISO 8202-3).

Lower dust size classes to be removed if visible without magnification on the surface to be coated.

Water soluble salts limit equivalent to NaCl after blasting/ grinding

Maximum 50 mg/m² of sodium chloride (ISO 8502-6/9).

Contamination

No oil contamination.

Inspect the surface for contaminations and if present, remove with an alkaline detergent. Agitate the surface to activate the cleaner and before it dries, wash the treated area by Low-Pressure Water Cleaning (LPWC) to Wa 1 (ISO 8501-4) using fresh water.

Ventilation

Sufficient ventilation must be provided to remove the solvent evaporating from the coating. When mixed, this product requires exchange of 56 m³ air per litre paint in order to dilute the evaporating solvent to a safe concentration in the tank (i.e. less than 10 % of the Lower Explosion Limit, LEL). The solvent gas concentration in the tank must at all times be kept below this level, hence sufficient ventilation must be maintained during the whole application and drying periods.

Environmental conditions

Coating shall be applied under controlled humidity and surface conditions, in accordance with the manufacturer's specifications. In addition, coating shall not be applied when:

- the relative humidity is above 85 %
- the surface temperature is less than 3 °C above the dew point
- the surface is wet or is likely to become wet

Testing of coating

Destructive testing should be avoided.

Dry film thickness shall be measured after each coat for quality control purposes. The total dry film thickness shall be documented after completion of the final coat, using appropriate thickness gauges.

Repair and maintenance procedures relevant to coating according to Performance Standard for Protective Coatings (PSPC) of dedicated seawater ballast tanks to IMO Resolution MSC.215(82)

Superficial damages not exposing bare substrate:

Prepare the area through sandpapering or grinding, followed by thorough cleaning/vacuuming. When the surface is dry and clean the coating may be over coated by itself or by another product, ref. original specification. Always observe the minimum and maximum over coating intervals. If the maximum over coating interval is exceeded the surface should be carefully roughened in order to ensure good intercoat adhesion.

Damages exposing bare substrate:

Choice of surface preparation and application methods shall be made in conjunction with Jotun and the actual Classification Society, following the guidelines in:

MSC.1/Circ. 1330 (WBT)

- Chapter 4.1 for coating condition assessment
- Chapter 5 for coating maintenance
- Chapter 6 for coating repair

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Quality assurance

The following information is the minimum required. The specification may have additional requirements.

- Confirm that all welding and other metal work has been completed before commencing pre-treatment and surface preparation
- Confirm that installed ventilation is balanced and has the capacity to deliver and maintain the RAQ
- Confirm that the required surface preparation standard has been achieved and is held prior to coating application
- Confirm that the climatic conditions are within recommendations in the AG, and are held during the application
- Confirm that the required number of stripe coats have been applied
- Confirm that each coat meets the DFT requirements in the specification
- Confirm that the coating has not been adversely affected by rain or other factors during curing
- Observe that adequate coverage has been achieved on corners, crevices, edges and surfaces where the spray gun cannot be positioned so that its spray impinges on the surface at 90° angle
- Observe that the coating is free from defects, discontinuities, insects, abrasive media and other contamination
- Observe that the coating is free from misses, sags, runs, wrinkles, fat edges, mud cracking, blistering, obvious pinholes, excessive dry spray, heavy brush marks and excessive film build
- Observe that the uniformity and colour are satisfactory

All noted defects shall be fully repaired to conform to the coating specification.

Caution

This product is for professional use only. The applicators and operators shall be trained, experienced and have the capability and equipment to mix/stir and apply the coatings correctly and according to Jotun's technical documentation. Applicators and operators shall use appropriate personal protection equipment when using this product. This guideline is given based on the current knowledge of the product. Any suggested deviation to suit the site conditions shall be forwarded to the responsible Jotun representative for approval before commencing the work.

For further advice please contact your local Jotun office.

Health and safety

Please observe the precautionary notices displayed on the container. Use under well ventilated conditions. Do not inhale spray mist. Avoid skin contact. Spillage on the skin should immediately be removed with suitable cleanser, soap and water. Eyes should be well flushed with water and medical attention sought immediately.

Accuracy of information

Always refer to and use the current (last issued) version of the TDS, SDS and if available, the AG for this product. Always refer to and use the current (last issued) version of all International and Local Authority Standards referred to in the TDS, AG & SDS for this product.

Colour variation

Some coatings used as the final coat may fade and chalk in time when exposed to sunlight and weathering effects. Coatings designed for high temperature service can undergo colour changes without affecting performance. Some slight colour variation can occur from batch to batch. When long term colour and gloss retention is required, please seek advice from your local Jotun office for assistance in selection of the most suitable top coat for the exposure conditions and durability requirements.

Reference to related documents

The Application Guide (AG) must be read in conjunction with the relevant specification, Technical Data Sheet (TDS) and Safety Data Sheet (SDS) for all the products used as part of the coating system.

When applicable, refer to the separate application procedure for Jotun products that are approved to classification societies such as PSPC, IMO etc.

Symbols and abbreviations

min = minutes

h = hours

TDS = Technical Data Sheet

AG = Application Guide

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d = days
°C = degree Celsius
° = unit of angle
µm = microns = micrometres
g/l = grams per litre
g/kg = grams per kilogram
m²/l = square metres per litre
mg/m² = milligrams per square metre
psi = unit of pressure, pounds/inch²
Bar = unit of pressure
RH = Relative humidity (% RH)
UV = Ultraviolet
DFT = dry film thickness
WFT = wet film thickness

SDS = Safety Data Sheet
VOC = Volatile Organic Compound
MCI = Jotun Multi Colour Industry (tinted colour)
RAQ = Required air quantity
PPE = Personal Protective Equipment
EU = European Union
UK = United Kingdom
EPA = Environmental Protection Agency
ISO = International Standards Organisation
ASTM = American Society of Testing and Materials
AS/NZS = Australian/New Zealand Standards
NACE = National Association of Corrosion Engineers
SSPC = The Society for Protective Coatings
PSPC = Performance Standard for Protective Coatings
IMO = International Maritime Organization

Disclaimer

The information in this document is given to the best of Jotun's knowledge, based on laboratory testing and practical experience. Jotun's products are considered as semi-finished goods and as such, products are often used under conditions beyond Jotun's control. Jotun cannot guarantee anything but the quality of the product itself. Minor product variations may be implemented in order to comply with local requirements. Jotun reserves the right to change the given data without further notice.

Users should always consult Jotun for specific guidance on the general suitability of this product for their needs and specific application practices.

If there is any inconsistency between different language issues of this document, the English (United Kingdom) version will prevail.

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