Jotacote Universal N10

Product description

This is a two component polyamine cured pure epoxy coating. It is a high solids, high build, abrasion resistant product. Available with curing agents for standard, and for quick drying (QD) properties. Specially designed as a universal, all round, all year, new building coating where fast dry to handle is required. Can be used as primer, mid coat, finish coat or as single coat system in atmospheric and immersed environments. Suitable for properly prepared aluminium, carbon steel, galvanised steel, shop primed steel and stainless steel substrate. 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

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

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
C5: 100 mg/m²
CX: 50 mg/m²
Im1: 20 mg/m²
Im2-Im4: 80 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.

Initial inspection and pretreatment

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.
Non-contaminated areas shall be washed down by Low-Pressure Water Cleaning (LPWC) to Wa 1 (ISO 8501-4) using fresh water to reduce the concentration of surface chlorides.

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.
For areas in corrosivity category C5, Im1-3 the requirement are for the steel to conform to grade P2 (ISO 8501-3) Table 1. All edges shall have a rounded radius of minimum 2 mm subjected to three pass grinding or equally effective method. One may use a mechanical grinder fitted with a suitable abrasive disc. All sharp irregularities, burrs, slivers, slag and spatter on welds, whether apparent before or after blast cleaning, shall be removed before coating application. It is recommended that welding smoke should be removed by low-pressure Water Cleaning LP WC method (ISO 8501-4) Wa 1 using fresh water. Welding smoke residues are water soluble and could cause blistering if not removed by washing before blasting.
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 Sa 2½ (ISO 8501-1) using abrasive media suitable to achieve a sharp and angular surface profile. Minimum acceptable blast cleaning standard is Sa 1 (ISO 8501-1).

Surface profile

The surface shall have a sharp and angular surface profile 30-85 µm, grade Fine to Medium G (ISO 8503-2). Measure the achieved profile with surface replication tape (Testex) (ISO 8503-5) or by surface roughness stylus instrument (ISO 8503-4).

Abrasive media quality

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

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). Dust size no greater than class 2.
As per PSPC requirements dust must be removed just before application of the paint to a dust quantity rating 1 for dust size class 3, 4 or 5 (ISO 8502-3). Lower dust size classes shall be removed from the surface if visible without magnification.

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. 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.
PSPC requires power tool cleaning to cleanliness minimum St 3 (ISO 8501-1:2007).

Galvanised steel

Abrasive blast cleaning

After removal of excess zinc and surface defects the area to be coated shall be degreased to ISO 12944-4, Part 6.2.4 Alkaline Cleaning. The galvanised surface shall be sweep 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. Care must be exercised when sweep blasting. The zinc coating thickness should be reduced as little as possible, preferably not more than 10 µm.
Smaller areas can be lightly treated with abrasive paper.
Finished surfaces shall be dull, profiled and show no areas of shiny metal.
Do not handle the prepared surface with bare hands.

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

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

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

After removal of surface defects, the area to be coated shall be degreased according to ISO 12944-4, section 6.2.1 Water cleaning or 6.2.4 Alkaline Cleaning. The surface shall be sweep 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 to Medium G; Ry5 (ISO 8503-2) should be achieved. Smaller areas can be lightly treated with abrasive paper.
Finished surfaces shall be dull, profiled and show no areas of shiny metal.
Do not handle the prepared surface with bare hands.

Hand and Power Tool Cleaning

After removal of surface defects the area to be coated shall be degreased to ISO 12944-4, Part 6.2.4 Alkaline Cleaning, 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 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.

Stainless steel

Abrasive blast cleaning

After removal of surface defects, the area to be coated shall be degreased according to ISO 12944-4, section 6.2.1 Water cleaning or 6.2.4 Alkaline Cleaning. The surface shall be sweep 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 to Medium G; Ry5 (ISO 8503-2) should be achieved.

Hand and Power Tool Cleaning

After removal of surface defects the area to be coated shall be degreased to ISO 12944-4, Part 6.2.4 Alkaline Cleaning, 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 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.

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

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

Coated surfaces

Over coating

Suitable for initial surface conditions DC A, DC B and DC C prepared to surface appearance Wa 2½ (ISO8501-4). For DP I and DP Z surface appearance Wa 2 is accepted.
The maximum accepted grade of flash rust is FR L. When applied on coatings past maximum intercoating interval light abrading may be required to achieve proper intercoat adhesion.

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 2½ (ISO 8501-1).

Inorganic zinc silicates

This product can be applied on top of an inorganic zinc ethyl silicate, provided the primer is cured and the product is applied using a mist-coat technique.

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.

Air temperature	-10 - 60	°C
Substrate temperature	-10 - 60	°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

For the QD version, brush and roller application temperatures above 15 °C are not recommended.

Product mixing

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

Product mixing ratio (by volume)

Jotacote Universal N10 Comp A	3 part(s)
Jotacote Universal N10 Comp B	1 part(s)
Jotacote Universal N10 Comp A	3 part(s)
Jotacote Universal N10 QD Comp B	1 part(s)

Induction time and Pot life

Paint temperature	**23 °C**
Standard grade	
Induction time	10 min
Pot life	1.5 h
QD grade	
Induction time	10 min
Pot life	1 h

The temperature of base and curing agent is recommend to be 18 °C or higher when the product is applied.
Low temperature of paint at the point of application, may not achieve the desired drying time in TDS.

Thinner/Cleaning solvent

Thinner: Jotun Thinner No. 17

Application data

Spray application

Airless Spray Equipment

Pump ratio (minimum) :	42:1
Pressure at nozzle (minimum) :	150 bar/2100 psi
Nozzle tip (inch/1000) :	17-27
Nozzle output (litres/minute) :	1.3-2.2
Filters (mesh) :	70

Check to ensure that filters are clean.

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

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

Film thickness per coat

Typical recommended specification range

Standard grade

Dry film thickness	75	-	300	µm
Wet film thickness	105	-	415	µm
Theoretical spreading rate	9.6	-	2.4	m²/l

QD grade

Dry film thickness	75	-	300	µm
Wet film thickness	105	-	415	µm
Theoretical spreading rate	9.6	-	2.4	m²/l

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

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 mm from the weld.

Application / Drying / Curing considerations

The surface should be free from chalking and any contamination before application, If the coating has been exposed to direct sunlight for some time, special attention must be paid to surface cleaning and mattening/ removal of the surface layer in order to obtain good adhesion. The given data must be considered as guidelines only. The actual drying time and time before recoating may be shorter or longer, depending on the ambient temperature, film thickness, ventilation, humidity, underlying paint system, requirement for early handling and mechanical strength etc. A complete system can be described on a system sheet, where all parameters and special conditions could be included.

Ventilation

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

When coatings are applied in a confined space, its solvent will evaporate and produce an explosive atmosphere unless solvent concentration is immediately reduced to a non-explosive level, therefore artificial ventilation is required. During application it is recommended to provide enough ventilation to have a safe work environment and to ensure that solvent concentration in the tank at no time exceeds the maximum permitted according to local health and safety regulations.
After application it is recommended to increase the ventilation (see later in this document) as long as solvent is released from the uncured film. This is usually 10% of the product's Lower Explosive Limit.
As a guideline for good ventilation, after application the confined space should be ventilated with 3-5 cycles per hour for 48 hours and can be reduced to 1-2 cycles per hour until coating is fully cured.

As solvent is heavier than air and will tend to accumulate in the lower areas of tanks, ventilation system and trunking must be arranged to efficiently remove solvent vapour from these areas.
The extraction hose should be close to the bottom of the tank (approximately 50~100 cm above the tank top).
Ventilation air (input) should be organised in a way so all parts of the tank are well circulated.
For application on block stage, 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. For complex structures, solvents can be entrapped in some area and may be delayed the drying/ curing time, hence for large or complicated blocks or structures one may consider to keep the ventilation on until the surface is confirmed walk-on-dry.

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.

Drying process

Do not attempt to speed up the curing process by blowing hot air on to the wet coating film as this may lead to skin drying/curing, entrapped solvents and consequently solvent blistering and inferior corrosion protection.

Coating loss

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

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

Drying and Curing time

Substrate temperature	-10 °C	-5 °C	0 °C	5 °C	10 °C	23 °C	40 °C
Standard grade							
Surface (touch) dry	26 h	14 h	10 h	6 h	5 h	2 h	1 h
Walk-on-dry	72 h	34 h	24 h	14 h	10 h	5 h	2 h
Dry to over coat, minimum	36 h	22 h	15 h	9 h	7 h	4 h	2 h
Dried/cured for immersion	14 d	7 d	4 d	3 d	2 d	1 d	12 h
Dried/cured for service			21 d	14 d	10 d	7 d	3 d
QD grade							
Surface (touch) dry	17 h	10 h	7 h	4 h	3 h	1 h	
Walk-on-dry	40 h	25 h	20 h	10 h	7.5 h	3 h	
Dry to over coat, minimum	26 h	17 h	10 h	7 h	5 h	2 h	
Dried/cured for immersion	12 d	6 d	4 d	3 d	2 d	1 d	
Dried/cured for service			21 d	14 d	10 d	7 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 recommended shortest time before the next coat can be applied.

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

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

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 cleaning using fresh water.

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

The referred intervals relate specifically to over coating with Jotun Performance Coating products.

Areas for atmospheric exposure

Average temperature during drying/curing	-10 °C	-5 °C	0 °C	5 °C	10 °C	23 °C	40 °C
Standard grade							
Itself	6 mth	6 mth	6 mth	5 mth	5 mth	5 mth	3 mth
acrylic	5 d	4 d	3 d	3 d	2 d	1 d	12 h
alkyd	3 d	2 d	1 d	1 d	1 d	1 d	12 h

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

epoxy	3 mth	3 mth	3 mth	3 mth	3 mth	3 mth	2 mth
epoxy Passive Fire Protection				14 d	14 d	14 d	14 d
polysiloxane	5 d	5 d	4 d	4 d	4 d	3 d	3 d
polyurethane	5 d	5 d	4 d	4 d	4 d	3 d	3 d

QD grade

Itself	6 mth	6 mth	6 mth	5 mth	5 mth	5 mth
acrylic	5 d	4 d	3 d	3 d	2 d	1 d
alkyd	3 d	2 d	1 d	1 d	1 d	1 d
epoxy	3 mth	3 mth	3 mth	3 mth	3 mth	3 mth
epoxy Passive Fire Protection				14 d	14 d	14 d
polysiloxane	5 d	5 d	4 d	4 d	4 d	3 d
polyurethane	5 d	5 d	4 d	4 d	4 d	3 d

For surface preparation reference is made to the recommendations for coated surfaces.

Areas for immersed exposure

Average temperature during drying/curing	-10 °C	-5 °C	0 °C	5 °C	10 °C	23 °C	40 °C
Standard grade							
Itself	15 d	15 d	15 d	14 d	14 d	14 d	12 d
epoxy	15 d	15 d	15 d	14 d	14 d	14 d	12 d
vinyl epoxy		15 d	15 d	14 d	14 d	14 d	12 d
QD grade							
Itself	15 d	15 d	15 d	14 d	14 d	14 d	
epoxy	15 d	15 d	15 d	14 d	14 d	14 d	
vinyl epoxy		15 d	15 d	14 d	14 d	14 d	

For surface preparation reference is made to the recommendations for coated surfaces.

Other conditions that can affect drying / curing / over coating

Adding anti-skid to the coating system

Anti skid aggregate should only be added in the final coat, and should not be used in single coat systems. Spread the aggregate evenly on the surface before half of time to Surface dry. Use Jotun Anti-skid, medium particle size (400 - 600 µm) for coatings applied in 150 to 400 µm DFT. The recommended usage is 2.5 - 3.3 kg per 10 litres of paint.

Repair of coating system

General comment for Water ballast tank coatings:
Minor coating damage may be prepared to St 3 (ISO 8501-1:2007) with minimum 25 microns surface profile equivalent to SSPC SP11. This method of preparation is only recommended for small damages where abrasive blasting would make excessive damage to surrounding coatings. Edges of intact surrounding coating should be feathered so the consecutive layers of coating are exposed; a thorough vacuum cleaning of the area should be carried out before paint application take place.

Detailed background information about ventilation arrangements and calculations is given in the Code of Practice for Tank Coating, available at **jotun.com**. A "Ventilation calculator" that can be used for different coatings and thinners is also available at **jotun.com**.

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

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. Damage in the surface of the coating or of size less than 5 cm² can be repaired by roughening of the surface by abrasive sanding or equal.

Damage to the coating that exposes bare steel where the damaged area is less than 5 cm² should be mechanically cleaned by abrasive sanding to a minimum standard of St 3 with a rough surface profile. Damage to the coating that exposes bare steel where the damaged area is greater than 5 cm² shall be dry abrasive blast cleaned to Sa 2½ (ISO 8501-1), preferably by the use of vacuum blasting equipment. Coating damage that exceeds 0.5% of the total area should be removed and replaced. All noted defects should be repainted to conform to the coating specification.
Overlapping zones to intact coating shall be masked off with a minimum 200 mm distance to the damage and should cover the surrounding area so that overspray to sound coating does not occur during repair application. Edges of intact coating around damage shall be feathered to ensure a smooth transition from the coating to the prepared steel. Consecutive layers of coating shall be feathered to expose each layer and new coating shall always overlap to an abraded existing layer.

Areas with too low DFT:
Roughen the surface, vacuum and apply new coating according to specification.

Areas with too high DFT:
Areas 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

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)

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

PSPC Appendix (WBT / COT)

Application requirements particular for coating according to Performance Standard for Protective Coatings (PSPC) of cargo oil tanks of crude oil tankers to IMO Resolution MSC.288(87) and 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

Pre-qualified shop primer
Retained, intact shop primer shall be cleaned by sweep blasting, high-pressure water washing or equivalent method. Damaged and corroded shop primer and welds shall be abrasive blast cleaned to minimum Sa 2½ (ISO 8501-1). Complete removal of shop primer is required.

Not pre-qualified shop primer
Intact shop primer shall be abrasive blast cleaned to minimum Sa 2 (ISO 8501-1). At least 70% of the intact shop primer shall be removed. Damaged and corroded shop primer and welds shall be abrasive blast cleaned to minimum Sa 2½ (ISO 8501-1). Complete removal of shop primer is required.

SURFACE TREATMENT AFTER ERECTION

Cargo oil tanks (COT), IMO Resolution MSC.288 (87)
Erection joints minimum St 3 or Sa 2½ (ISO 8501-1) where practicable.

For inner bottom:
- Damages up to 20 % of the area to be coated to be treated to minimum St 3
- Contiguous damages over 25 m² or over 20 % of the area to be coated, Sa 2½ shall be applied

For underdeck:
- Damages up to 3 % of area to be coated to be treated to minimum St 3
- Contiguous damages over 25 m² or over 3 % of the area to be coated, Sa 2½ shall be applied
- Coating in overlap shall be feathered

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

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
Adequate ventilation is necessary for the proper drying and curing of coating. Ventilation should be maintained throughout the application process and for a period after application is completed. Required duration after the last full coat is indicated in Technical Data Sheet as "Dried/cured for service" under Drying and Curing time.

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.

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 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
- 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
Adequate ventilation is necessary for the proper drying and curing of coating. Ventilation should be maintained throughout the application process and for a period after application is completed. Required duration after the last full coat is indicated in Technical Data Sheet as "Dried/cured for service" under Drying and Curing time

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

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

- 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 MAINTENACE

Repair and maintenance procedures relevant to coating according to Performance Standard for Protective Coatings (PSPC) of cargo oil tanks of crude oil tankers to IMO Resolution MSC.288(87) and dedicated seawater ballast tanks to IMO Resolution MSC.215(82)

Scope:
The purpose with this chapter is to clarify the below repair procedure, and to implement a unified interpretation for each area to be repaired:
Block painting and pre-erection: these areas are not to be regarded as "after erection", and as such damaged calculation shall be carried out at this stage.

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:
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.
Damages smaller than 5 cm²:
Mechanical cleaning by abrasive sanding to a minimum St 3 (ISO 8504-3) with a rough surface profile.
Damages larger than 5 cm²:
Dry abrasive blast cleaning to Sa 2½ (ISO 8501-1), preferably by the use of vacuum blasting equipment.

Reference is made to MSC.1/Circ. 1330 (WBT) and MSC.1/Circ. 1399 (COT)
- Chapter 4.1 for coating condition assessment
- Chapter 5 for coating maintenance
- Chapter 6 for coating repair

Overlapping zones to intact coating shall be masked off with a minimum 200 mm distance to the damage and should cover the surrounding area so that overspray to sound coating does not occur during repair application. Edges of intact coating around damage shall be feathered to ensure a smooth transition from the coating to the prepared steel. Consecutive layers of coating shall be feathered to expose each layer and new coating shall always overlap to an abraded existing layer.

In cases where there are minor mechanical or stress related damages in a tank after sea-trial or water immersion testing, one has to consider the amount of damages compared to how many potential new damages will be made when re-installing scaffolding. For minor areas mechanical grinding and touch up is considered common practice. Hard to reach spots shall be repaired using best practical means and methods.

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.

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

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

When applicable, products primarily meant for use as primers or antifoulings may have slight colour variations from batch to batch. Such products and epoxy based products used as a finish coat may chalk when exposed to sunlight and weathering.

Colour and gloss retention on topcoats/finish coats may vary depending on type of colour, exposure environment such as temperature, UV intensity etc., application quality and generic type of paint. Contact your local Jotun office for further information.

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
d = days
°C = degree Celsius
° = unit of angle

TDS = Technical Data Sheet
AG = Application Guide
SDS = Safety Data Sheet
VOC = Volatile Organic Compound
MCI = Jotun Multi Colour Industry (tinted colour)

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.

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

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
ASFP = Association for Specialist Fire Protection

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.

This Application Guide supersedes those previously issued.
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.
For your nearest local Jotun office, please visit our website at www.jotun.com.