Tankguard Special Ultra

Product description

This is a two component polyamine cured phenolic/novolac epoxy coating. Specially designed tank coating with excellent chemical resistance. Developed as a 3-coat system for optimum chemical resistance in atmospheric and immersed environments. Suitable for properly prepared carbon steel, galvanised steel and stainless steel substrates. It can be applied down to +5 °C surface temperature.

Scope

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

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.

A successful tankcoating job is dependent on the quality of planning and performance of the following activities and are covered in this document:
- Staging
- Lighting
- Steel preparation
- Surface preparation
- Coating application
- Health and safety control

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. 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.

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

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:
Chemical tanks: 50 mg/m²

Carbon steel

Initial rust grade

The steel shall preferably be Rust Grade A or B (ISO 8501-1). The use of C grade steel requires more thorough surface preparation and possibly more paint to achieve the specified DFT. The chloride contamination risk with Rust Grade C steel is significantly higher, so if this steel is used the frequency of inspection and testing for surface salt content should be increased and emphasized.

Metal finishing

All welds, sharp edges and corners shall be prepared to conform to ISO 8501-3 Table 1, minimum grade P2 or NACE RP0178 grade D comparator.

Defective welds shall be replaced and treated to an acceptable finish before painting.

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 is 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.
Before blasting it is necessary to carry out high pressure fresh water washing if the salt level is high, in order to avoid high salt level after blasting. All debris should be removed and the tank allowed to dry.

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. For tank coating and lining used for chemical exposure the recommendation is to fill pitts through welding, since using fillers may negatively affect the coating systems' chemical resistance and flexibility.

Abrasive blast cleaning

Application of protective coating shall commence before degradation of the surface standard occurs.

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.

Surface profile

Recommended surface profile 50-100 µm, grade Medium to G; Ry5 (ISO 8503-2). Measure the achieved profile with surface replication tape (Testex) to ISO 8503-5 or by a surface roughness stylus instrument (ISO 8503-4).

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 product and abrasive media and inspected for surface particulate contamination. Maximum contamination level is rating 1 (ISO 8502-3) as per Figure 1. Dust size no greater than class 2.

Hand and Power Tool Cleaning

Power tool cleaning

Minor damage of the coating may be prepared to St 3 (ISO 8501-1). Suitable method is disc grinding with rough discs only. Ensure the surface is free from mill scale, residual corrosion, failed coating and is suitable for painting. 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.

Stainless steel

Tank interior details of stainless steel may be coated with this product provided it is treated to the same standard as the tank surface. However, it is not necessary to treat and paint stainless steel material. In general only a minor overlap of 5 cm is recommended on items such as handrails, ladders, support and similar.

Abrasive blast cleaning

The surface to be coated shall be dry abrasive blast cleaned as required for the specified surface profile using non-metallic abrasive media which is suitable to achieve a sharp and angular surface profile. As a guide, a surface profile corresponding to 25-55 µm, grade Fine G; Ry5 (ISO 8503-2) should be achieved. Examples of recommended abrasives are:
• Ferrite free almandite garnet grade 30/60 and 80 grade (US Mesh size)
• Aluminium oxide grade G24.

Passivation of material:
Passivation of stainless steel should preferably be done before installation in the tank. If done in the tank, care should be taken on protection of coated surface and the coating system during passivation.

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

Coated surfaces

Shop primers

Shop primers are accepted as temporary protection of steel plates and profiles. However the shopprimer should be completely removed through blast cleaning to minimum Sa 2½ (ISO 8501-1) using abrasive media suitable to achieve a sharp and angular surface profile 50-100 µm, grade Medium G; Ry5 (ISO 8503- 2).

Application

Environmental conditions

Normally dehumidifier should be used during blasting, cleaning and painting. In addition, if low temperatures and heating is required, the steel temperature should achieve a stable temperature throughout blasting, cleaning and painting till curing is complete. It is wise to ensure that adjacent spaces are kept heated as well. This to reduce any risk of "Cold Wall" effect or "Skin Dry" effect upon the coating.

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	5 - 50	°C

Substrate temperature	5 - 50	°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

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Material storage conditions

In hot climates the coating should be kept in a shaded and ventilated area, not in direct sunlight. In cold climates, pre-heating of coating in the can shall be maintained above 15 °C, as this will provide more optimal curing condition.

Product mixing

Product mixing ratio (by volume)

Tankguard Special Ultra Comp A	4	part(s)
Tankguard Special Ultra Comp B	1	part(s)

Product mixing

The temperature of the wet coating will affect its viscosity. Low temperature will increase viscosity, high temperatures will reduce it.

Mechanically stir component A. Add component B slowly to component A, while continuously stirring. Make sure that all of component B is added into component A. Continue stirring until the mixture is homogenous. Do not combine the components until you are ready to start application, and take note of the recommended induction time for the product, especially in colder weather.

The temperature of base and curing agent should preferably be 15°C or higher when the paint is applied. As with lower temperatures, there is an increased risk of amine sweating after application. The viscosity will increase at lower temperatures and longer induction time is needed. Induction time is the time where the mixed product is left in the can in order to get curing of the product initiated.
The induction time is important to make the curing process start. In hot weather only one set of pre-mixed components should be combined in order to avoid inconvenient pot life expiry.
Monitor the volume of mixed product. When the previous set is low in volume, mix the next set and add it to the paint container.

Induction time and Pot life

Paint temperature	**5 °C**	**10 °C**	**15 °C**	**23 °C**	**40 °C**
Induction time	30 min	25 min	20 min	15 min	7 min
Pot life	4 h	3 h	3 h	2 h	1 h

Thinner/Cleaning solvent

Thinner: Jotun Thinner No. 23

Thinning may be required to adjust the spray pattern and for rolling and brushing. Thinning will lower the viscosity, which can reduce sag resistance. Thinning must be done with care as this will result in a lower maximum thickness attainable. Excessive thinning can also lead to solvent entrapment, particularly in hot weather. 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 or when applied with air spray. Measure the thinner volume accurately with a measuring container. Do not add thinner by eye measurement. 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 feed 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 that the mixing chamber, material hose and gun are flushed with thinner when spraying stops for a prolonged period.
For the main coat, maximum 5% thinning. For touch-up / stripe coat, up to 15% thinning is acceptable. Jotun Thinner No. 23 is recommended.

It is of vital importance that the nozzle and other parts of the spray equipment are cleaned properly directly after spraying, in order to prevent cured paint inside the equipment.

Hoses should be of good quality and not longer than necessary. If longer hoses are used it may be necessary to increase the pump capacity/pressure. Lower temperature paint will also have an impact on the pressure due to the increase of viscosity.

Ideally the pump stations should be situated close to the tank and sheltered. In cold climate condition this should be a heated area.
Increasing hose diameter may ease paint flow thereby improving the spray fan with good atomization.

Application data

Airless Spray Equipment

Pump ratio (minimum) :	42:1
Pump output (litres/minute) :	1.3- 2.2
Pressure at nozzle (minimum) :	150 bar/2100 psi
Nozzle tip (inch/1000) :	17-23
Spray angle :	30 - 60
Filters (mesh) :	70

Material hose length :

Several factors influence, and need to be observed to maintain the recommended pressure at nozzle. Among factors causing pressure drop are:
- long paint- and whip hoses
- low inner diameter hoses
- high paint viscosity
- large spray nozzle size
- inadequate air capacity from compressor
- wrong or clogged filters

It is of vital importance that the nozzle and other parts of the spray equipment are cleaned properly directly after the work is done due to the on-going curing process. If a pail is used under the spray pump and new paint poured into it, this pail must be changed regularly so that paint material with expired pot life is not sucked into the spray gun. The hoses should be of good quality and not longer than necessary. Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are used it may be necessary to increase the pump capacity. The hose length and diameter selection is also temperature dependent. Hose selection is also influenced by the elevation of the spray gun above the pump.

Plural component (Twin Pump) airless spray equipment

When using plural spray equipment, Jotun recommends the use of either a pump with computerised pump ratio settings or fixed ratio settings in combination with a flow meter for each pump to monitor the proper delivery ratio of the coating components is maintained during use.

Application Guide
Tankguard Special Ultra

Ventilation

When a tank coating is applied the solvent will evaporate and produce an explosive atmosphere unless the solvent concentration is kept at a non-explosive level. Forced artificial ventilation will be 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. This is usually 10% of the product's Lower Explosive Limit.
As a guideline for good ventilation, after application of each coat the confined space should be ventilated with 3-5 cycles per hour. After final coat maintain 3-5 cycles per hour for minimum 48 hours. Thereafter the number of cycles can be reduced to 1- 2 cycles per hour until coating is fully cured.

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.

In general Jotun recommends alternative 2 because it reduces the risk that "new" contamination will be introduced to the uncoated substrate.
Walking on the blast cleaned substrate in order to do the stripe coating presents a risk for such contamination. 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.
If applying the stripe coat after a full primer coat has been applied, the stripe coat can be applied by either brush or by airless spray using a tip with a narrow spray fan. 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. A second stripe coat, with the same colour as the first full coat, will be beneficial in order to ensure that sufficient paint material is applied to the critical parts of the object.
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After each full coat and before stripe coat and dry spray, runs or excessive thickness to be removed by glass, fibrepad, scouring pad, fine sandpaper and subsequently vacuum cleaned prior to stripe coating.

Each coat of the system must be a closed film and free from over spray, curtaining, sags, holidays, grit and dirt inclusion. Any such defects are to be repaired prior to the application of the next coat of the system, and within the overcoating limits of the paints. Any dust caused by the repair of defects is to be removed from the tank by vacuum cleaning.

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

Drying and Curing time

Substrate temperature	5 °C	10 °C	15 °C	23 °C	40 °C
Surface (touch) dry	24 h	16 h	6 h	4 h	2 h
Walk-on-dry	36 h	24 h	10 h	7 h	3 h
Dry to over coat, minimum	36 h	24 h	20 h	16 h	10 h
Dry to over coat, maximum, atmospheric	30 d	30 d	25 d	21 d	7 d
Dried/cured for service	30 d	18 d	13 d	7 d	3 d
Dried/cured for immersion	15 d	9 d	7 d	4 d	2 d

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

Surface (touch) dry: The state of drying when slight pressure with a finger does not leave an imprint or reveal tackiness. Dry sand sprinkled on the surface can be brushed off without sticking to or causing damage to the surface.

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.

Dry to over coat, maximum, atmospheric: The longest time allowed before the next coat can be applied without any surface preparation.

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 for atmospheric exposure

Substrate temperature	5 °C	10 °C	15 °C	23 °C	40 °C
Itself	30 d	30 d	25 d	21 d	7 d

Maximum over coating intervals for immersed exposure

Substrate temperature	5 °C	10 °C	15 °C	23 °C	40 °C
Itself	30 d	30 d	25 d	21 d	7 d

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 washing. When the surface is 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 abrasive 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 to the coating that exposes bare steel where the damage is greater than 5 cm² shall be dry abrasive blast cleaned to ISO 8501-1 Sa 2 ½, preferably by the use of vacuum blasting equipment.
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 damage area is less than 5 cm² should be mechanically cleaned by abrasive sanding to a minimum standard of ISO 8504-3 St 3 with a rough surface profile.
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.
Coating damage that exceeds 0.5% per 100 m² should be removed and replaced.
In cases where there are minor mechanical or stress related damages in a tank after sea-trial or water immersion testing, Jotun's opinion is that one has to consider the amount of damages compared to how many potential new damages one will make when re-installation of scaffolding. For minor reachable areas mechanical grinding and touch up is considered common procedure. Unreachable spots should be repaired in the safest possible manner, e.g. paint touch up by reaching with a pole or similar.

Repair of damaged areas

Areas with too low DFT: Roughen the surface to be roughened, vacuum and apply new coating as soon as possible afterwards.

Overlapping zones to intact coating should be masked off with a minimum 200mm 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.

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Coating film continuity

Jotun recommends that all coating systems for immersion shall be inspected for film continuity/defects by visual observation of pin hole rusting through the coating after tank hydro-testing or sea water immersion during sea trials. Alternatively, full immersion of tanks in combination with tanks fully saturated by tank cleaning machine(s), soaking all surfaces with sea water and creating a high condensation environment during sea trials.

All noted defects shall be repaired or reported as outstanding issues.

For onshore storage tanks or for tanks where sea water immersion may not be permitted or practical, coating shall be tested for film continuity/defects as described in ASTM D 5162, method A or B as appropriate for the coating thickness

The recommended voltage is 500 volts per 100 µm DFT. The acceptance criterion is no defects.

Quality assurance

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 product☐ mlhu☐ z

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.