

Application Guide



Hardtop AS

Product description

This is a two component chemically curing aliphatic acrylic polyurethane coating. It has a high gloss finish with excellent gloss retention. It has good chemical resistance. To be used as topcoat in atmospheric environments.

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 in smooth 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.

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.

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.

Organic primers/intermediates

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The surface of previous coats shall be free from contamination by water, hydrocarbon based products, wax, mud, mortar droppings and loose, chalked and flaking coating. Inspect the surface for hydrocarbon and other contamination and if present, remove with an alkaline emulsifying detergent. Agitate the surface to activate the cleaner and before it dries, wash the treated area by low-pressure waterjetting method to Wa 1 (ISO 8501-4) using fresh water. Surfaces not contaminated with hydrocarbon deposits shall be washed to Wa 1 (ISO 8501-4) using fresh water to reduce surface chlorides. When applied on coatings past maximum over coating interval light abrading may be required to achieve proper intercoat adhesion.

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 | 0 - 50 | °C |
| Substrate temperature | 0 - 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

Product mixing

Product mixing ratio (by volume)

The coating shall be mixed with an air powered mechanical paint mixing tool that is clean and fit for purpose. Mix complete units only.

| | |
|----------------------|-----------|
| Hardtop AS Comp A | 4 part(s) |
| Hardtop AS/HB Comp B | 1 part(s) |

Induction time and Pot life

Paint temperature **23 °C**

Pot life 4 h

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

Thinner/Cleaning solvent

Thinner: Jotun Thinner No. 10 / Jotun Thinner No. 25

Jotun Thinner No. 10 for fast evaporation.

Jotun Thinner No. 25 for slow evaporation.

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Application data

Airless Spray Equipment

| | |
|--------------------------------|------------------|
| Pump ratio (minimum) : | 32:1 |
| Pump output (litres/minute) : | 0.7-1.5 |
| Pressure at nozzle (minimum) : | 150 bar/2100 psi |
| Nozzle tip (inch/1000) : | 13-19 |
| Filters (mesh) : | 70-100 |

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

Air Spray Equipment

| | |
|--------------------------------|---|
| Pressure at nozzle (minimum) : | 2.1 bar/30 psi (HVLP) / 2.1 bar/30 psi (pressure pot) |
| Nozzle tip (inch/1000) : | 11-19 (HVLP) / 1.1-1.9 mm (pressure pot) |

Film thickness per coat

Typical recommended specification range

| | | |
|----------------------------|------------|-------------------|
| Dry film thickness | 40 - 60 | µm |
| Wet film thickness | 80 - 120 | µm |
| Theoretical spreading rate | 12,5 - 8,3 | m ² /l |

Bright colours may need film thickness in the high end of the recommended specification range to achieve opacity.

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). Use a wet-to-dry film calculation table to calculate the required wet film thickness per coat.

A wet to dry film thickness chart is available on the Jotun Web site.

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.

Ventilation

Sufficient ventilation is very important to ensure proper drying/curing of the film.

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 | 0 °C | 5 °C | 10 °C | 23 °C | 40 °C |
|---------------------------|------|------|-------|-------|--------|
| Surface (touch) dry | 8 h | 4 h | 2 h | 1 h | 30 min |
| Walk-on-dry | 40 h | 30 h | 16 h | 8 h | 4 h |
| Dry to over coat, minimum | 24 h | 18 h | 10 h | 5 h | 2.5 h |
| Dried/cured for service | 20 d | 15 d | 10 d | 5 d | 2 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.

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.

Areas for atmospheric exposure

| Average temperature during drying/curing | 0 °C | 5 °C | 10 °C | 23 °C | 40 °C |
|--|----------|----------|----------|----------|----------|
| Itself | extended | extended | extended | extended | extended |

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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, fine particle size (180 - 250 µm), for coatings applied in 50 to 150 µm DFT. The recommended usage is 1.5 - 2.0 kg per 10 litres of paint.

Water contamination

If the wet coating is exposed to relative humidity above 85% or to moisture before the coating is at least Walk-on-dry, then blushing may occur. Blushing will cause fading of bright colours, and will affect the gloss. Provided the coating is fully dried/cured the protective properties will not be affected. All affected areas should be lightly sanded, cleaned and recoated.

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.

Surface finish

Application of polyurethane topcoats in hot weather or on hot substrates can result in loss of gloss. Affected areas should be lightly sanded and the coating reapplied.

Slower evaporating thinners could assist in solving the problem. To be discussed with your Jotun technical representative.

Coating film continuity

When required by the specification, the coating shall be tested for film discontinuity according to ASTM D 5162, test method A or B as appropriate for the actual dry film thickness.

All recorded defects shall be repaired by best practical means.

Quality assurance

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

- Confirm all welding and other metal work, whether internal or external to the tank, has been completed before commencing pre-treatment and surface preparation of the substrate
- Confirm installed ventilation is balanced and has the capacity to deliver and maintain the RAQ
- Confirm the required surface preparation standard has been achieved and is held prior to coating application
- Confirm that the climatic conditions are within recommendation in the AG and held during the application
- Confirm the required number of stripe coats have been applied
- Confirm each coat meets the DFT requirements of the specification
- Confirm the coating has not been adversely affected by rain or any other agency during curing
- Observe 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°
- Observe the coating is free from defects, discontinuities, insects, spent abrasive media and other contamination
- Observe 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 the uniformity and colour are satisfactory

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

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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

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

TDS = Technical Data Sheet

AG = Application Guide

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

Date of issue: 16 September 2015

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For your nearest local Jotun office, please visit our website at www.jotun.com.

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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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