Hardtop XP

Product description

This is a two component chemically curing aliphatic acrylic polyurethane coating. It has a glossy finish with very good gloss retention. It is a high solids product. The product has good application properties with low dry spray. 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 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.

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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.

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Coated surfaces

Verification of existing coatings including primers

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

Organic primers/intermediates

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 water cleaning (ISO 8501-4) using fresh water. Surfaces not contaminated with hydrocarbon deposits shall be washed according to ISO 12944-4, section 6.2.1 Water cleaning 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.

Air temperature	5 - 50	°C
Substrate temperature	5 - 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)

Hardtop XP Comp A	10 part(s)
Hardtop XP Comp B	1 part(s)

Product mixing

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

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Induction time and Pot life

Paint temperature	23 °C	40 °C
Pot life	1.5 h	50 min

The temperature of base and curing agent is recommended to be 18 °C or higher when the product is mixed. Ensure that pot life is not exceeded during application. Special care must be taken at temperatures above 40°C. The viscosity will increase very fast at such temperatures.

Thinner/Cleaning solvent

Thinner: Jotun Thinner No. 10 / Jotun Thinner No. 26

Jotun Thinner No. 26 is supplied and used in USA due to legislation.

Jotun Thinner No 63 can be used for faster curing. Max addition; 5%. Please note that addition of Thinner No 63 will give reduced potlife depending on ambient temperature.

Application data

Spray application

Airless Spray Equipment

Pump ratio (minimum) : 42:1
Pressure at nozzle (minimum) : 150 bar/2100 psi
Nozzle tip (inch/1000) : 13-19
Nozzle output (litres/minute) : 0.9-1.9
Filters (mesh) : 70

Note*
Several factors influence and need to be observed to maintain the recommended fluid flow/product atomization pattern. Among factors causing pressure drop are:
- Pump size
- Extended hoses or hose bundles
- Extended hose whip-end line
- Small internal diameter hoses
- Narrow tip angle
- High paint viscosity
- Large spray nozzle size
- Inadequate air capacity from compressor
- Incorrect or clogged filters
- Product temperatures

Air Spray Equipment

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

Other application tools

Roller application

Can be applied by roller. The addition of a small volume of thinner is recommended to achieve better flow. As with brush, it will be necessary to apply additional coats to achieve a similar dry film thickness when the coating is applied by airless or air spray. Roller is not recommended for application direct to prepared metal, and for stripe coating.

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Film thickness per coat

Typical recommended specification range

Dry film thickness	50	-	100	µm
Wet film thickness	80	-	160	µm
Theoretical spreading rate	12.6	-	6.3	m²/l

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

Special effect colours may have diverging specification range. Refer to the Application Guide (AG) for additional information or contact your nearest Jotun office.

RAL 1026, Luminous yellow, has recommended dry film specification range 90 - 120 µm. To maintain the gloss and the special effect colour over coating with Hardtop Clear is recommended.

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.

Ventilation

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

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

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Drying and Curing time

Substrate temperature	5 °C	10 °C	23 °C	40 °C
Surface (touch) dry	16 h	6 h	3.5 h	2 h
Walk-on-dry	24 h	14 h	7 h	4 h
Dry to over coat, minimum	24 h	14 h	7 h	4 h
Dried/cured for service	21 d	14 d	7 d	3 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 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.

Where an extended overcoating time is stated, the product can be overcoated after an extended time period, however the anticipated level of inter-coat adhesion can only be achieved through good painting practices.

The max overcoating time the product is able to achieve without any surface preparation depends on environmental exposure conditions (such as UV, temperature, humidity etc.), system composition and other factors.

If the surface has signs of chalking or any contamination, surface treatment, such as methodical abrading followed by freshwater washing should be employed. Alkaline detergent should be used to remove heavy contamination. If you are unsure a test patch should be used to consider sufficient cohesion.

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	5 °C	10 °C	23 °C	40 °C
Itself	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/Moisture 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.

Application at higher temperatures (>40°C)

Application of polyurethane topcoats in hot weather or on hot substrates can result in loss of gloss due to rapid curing. Affected areas should be lightly sanded and the coating reapplied. Slower evaporating thinners could assist in improving adhesion. To be discussed with your Jotun technical representative.

Self on self-application can give poorer adhesive properties for the second layer at elevated temperatures. To achieve an optimum result, the surface should be lightly abraded with a scouring pad before application of a second layer.

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.

Finish

The application process of a top-coat product significantly influences its final finish and gloss. Techniques like brushing, rolling, and spraying each have unique impacts, with spraying generally providing the smoothest and most uniform finish. Environmental factors such as temperature, humidity, and air flow also will also effect the appearance of the coating. Additionally, the quality and maintenance of tools, including brushes, rollers, and spray guns, is important. Properly calibrated and clean tools ensure a smooth application, free of imperfections.

IMO FTP - Low Flame Spread

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When used as part of an approved scheme, this material has the following certification: Low Flame Spread in accordance with EU Directive for Marine Equipment (MED). Low Flame Spread in accordance with UK MCA Merchant Shipping Regulation 2025 (MER) and valid amendment of UK MCA Merchant Shipping Notice 1874 (M+F). Approved in accordance with parts 5 and 2 of Annex 1 of IMO 2010 FTP Code, or Parts 5 and 2 of Annex 1 of IMO FTPC when in compliance with IMO 2010 FTP Code Ch. 8.
In accordance with Approved Recommendation MarED-01-0025 FIRE-001 (EU) and UK21/F001 (UK) then it is not required by the MED/MER that the conformity mark is permanently visible on all constructions. It is considered intended that the documentation supplied with the product provides evidence of the Certification at the time of delivery.

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 applicator and operator 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 should 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 in 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 sought medical attention 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.

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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
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 data given 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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