Base Load Power Hub (BLPH)

DAVIT CRANE

PAINTING PROCEDURE

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Document Class: 2

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REMAZEL ENGINEERING

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Revision / Change Log

Rev.	Description
00	Issue for Review (IFR)
01	Issue for Review (IFR)
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03	Accepted for construction (AFC) / added Paint system for safety equipment
04	Accepted for construction (AFC)

HOLDS LIST

No.	Description
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Table of contents

1 INTRODUCTION 5

1.1 PROJECT OVERVIEW 5

1.1.1 Project Location 5

1.1.2 Project Concept 6

2 DOCUMENT SCOPE 8

2.1 DEFINITIONS AND ABBREVIATIONS 8

3 PAINTING PROCEDURE 9

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List of Figures

Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map 5
Figure 2 - Wind Park Details 6
Figure 3 – BLPH Concept 6

List of tables

Table 2 - Definitions and Abbreviations 8

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

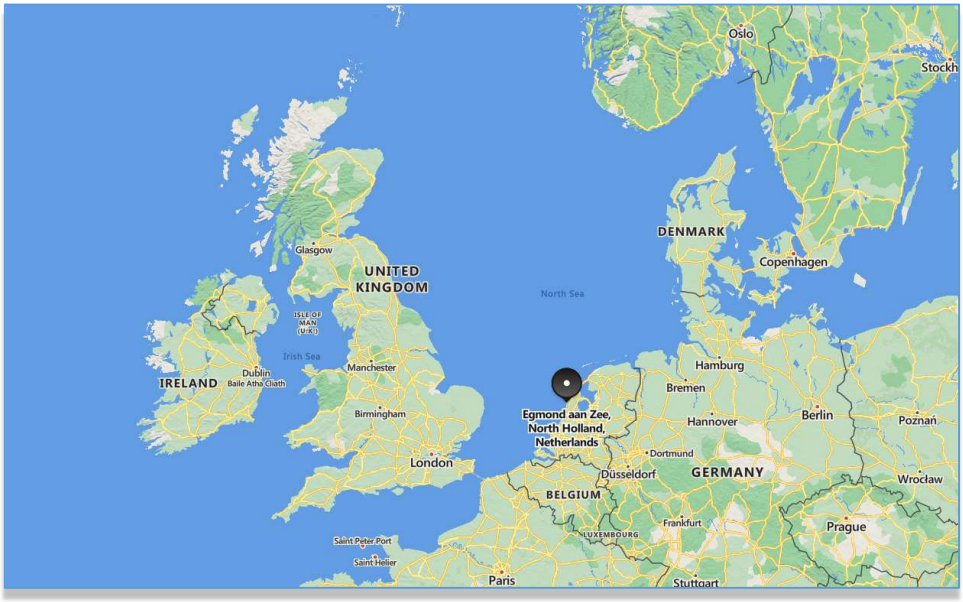


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

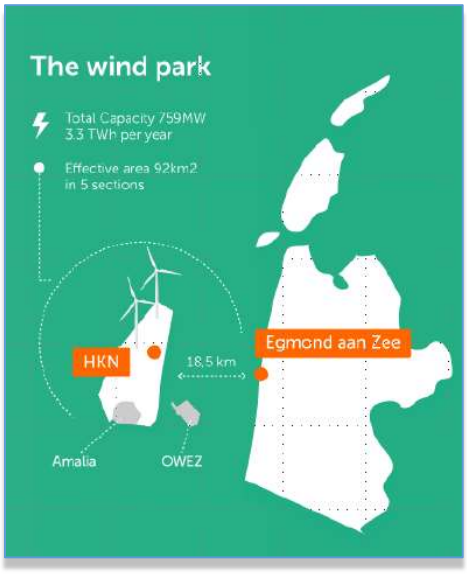


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

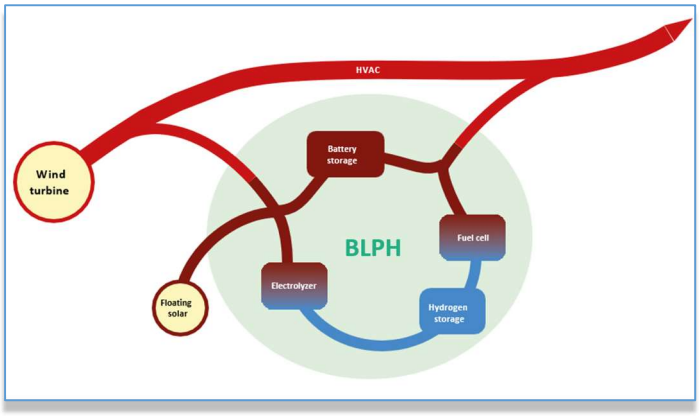


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT SCOPE

This document explains in detail the "working procedure" for surface preparation, paint application, inspection, testing and repair of Davit Crane

2.1 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project

Table 1 - Definitions and Abbreviations

3 PAINTING PROCEDURE

Davit Crane

PAINTING PROCEDURE
24-27012-PP-001

Rev	Date	Revision Description	Prepared	Checked	Approved
04	26/11/2024	Accepted for construction (AFC)	CZB	MPU	ATR
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SUMMARY OF REVISION

Rev.	Revised chapters	Revision description	Reason for revision
00	///	///	IFR
01	Document Scope;Standard Reference; Surface preparation	Added year revision of normative; change salt concentration	IFR
02	/	Accepted for construction	AFC
03	/	Added paint System safety equipment RAL 1023	AFC
04	/	Accepted for construction	AFC

INDEX

1. Scope 4
2. Reference Documents 4
3. Definitions 4
4. Standard 4
5. Responsabilities 5
5.1. VENDOR 5
5.2. Paint Manufacturer 5
5.3. Paint Applicator 5
6. Qualification of Paint Operators 6
7. Safety 6
8. Ambient Conditions 6
9. Unpainted Surfaces 7
10. Pre-Blasting Preparation 7
11. Surface Preparation 7
12. Paint Application 8
13. Paint Systems 9
14. Inspection and Testing 10
15. Coating Repairs 13
16. Handling and Storage 13
17. Technical datasheet 13

1. Scope

This document explains in detail the “working procedure” for surface preparation, paint application, inspection, testing and repair of Davit Crane.
This document is applicable to structural steel; the commercial items such as gearboxes, motors, brake, filters, slewing ring and other minor commercial items will be purchased painted according to international recognized painting cycle C5 or CX suitable for offshore environmental.

2. Reference Documents

- 1724001010-QC-ITP-00002 Inspection test plan

3. Definitions

- CONTRACTOR: Rosetti Marino
- SUPPLIER: Remazel Engineering SpA.
- PAINT MANUFACTURER: Jotun
- PAINT APPLICATOR: a company awarded by REMAZEL

4. Standard

- ASTM D 4285_2018: Standard Test Method for Indicating Oil or Water in Compressed Air.
- ISO 4624_2023: Standard Test Method for Pull-Off.
- ISO 2808_2019: Paints and Varnishes - Determination of film thickness.
- ISO 8501-1_2007: Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.
- ISO 8501-3_2006: Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 3: Preparation grades of welds, edges and other areas with surface imperfections.
- ISO 8502-3_2017: Preparation of steel substrates before application of paints and related products - Test for the assessment of surface cleanliness - Part 3: Assessment of dust on steel surfaces prepared for painting (pressure sensitive tape method).
- ISO 8502-4_2017: Preparation of steel substrates before application of paint and related products - Test for the assessment of surface cleanliness - Part 4: Guidance on the estimation of the probability of condensation prior to paint application.
- ISO 8502-6_2020: Preparation of steel substrates before application of paint and related products - Test for the assessment of surface cleanliness - Part 6: Extraction of soluble contaminants for analysis - The Bresle method.
- ISO 8502-9_2020: Preparation of steel substrates before application of paint and related products - Test for the assessment of surface cleanliness - Part 9: Field method for the conduct metric determination of water-soluble salts.
- ISO 8503-1_2012: Preparation of steel substrates before application of paint and related products - Surface roughness characteristics of blast-cleaned steel substrates - Part 1: Specification and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces.
- ISO 8504-2_2019: Preparation of steel substrates before application of paint and related products - Surface preparation methods – Part 2: Abrasive blast-cleaning.

- ISO 11124-1_2018: Preparation of steel substrates before application of paints and related products – Specifications for metallic blast-cleaning abrasives – Part 1: General introduction and classification.
- ISO 11124-3_2018: Preparation of steel substrates before application of paints and related products – Specifications for metallic blast-cleaning abrasives – Part 3: High-carbon cast steel shot and grit.
- ISO 11126-1_2018: Preparation of steel substrates before application of paints and related products – Specifications for non-metallic blast-cleaning abrasives – Part 1: General introduction and classification.
- ISO 11126-10_2017: Preparation of steel substrates before application of paints and related products - Specifications for non-metallic blast-cleaning abrasives – Part 10: Almandite garnet.
- ISO 19840_2012: Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Measurement of, and acceptance criteria for, the thickness of dry films on rough surfaces.
- NACE SP0188: Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
- SSPC-SP 1: Solvent cleaning.

5. Responsabilities

5.1. VENDOR

- Quality control (Q.C.) – Quality Assurance (Q.A.).
- Make sure that all the CONTRACTOR 'S prescriptions shall be fully understood and respected.
- Perform intermediate and final checks to verify works acceptability.
- Perform (in the fabrication shop prior to release to Paint Applicator) accurate checks to assure that
    - The preparation grades of welds, edges and other areas with surface imperfections shall be according to grade P3 of ISO 8501-3 except for weld profile smoothing that shall follow grade P2.
- Collaborate with the Certified Coating Inspector for the checking and recording of all work stages.
- Handle and store the coated material, after its release from the Paint Applicator, with proper care in order to avoid mechanical damage.

5.2. Paint Manufacturer

- Supply all the paint required in unopened containers clearly marked with the following details: name of manufacturer, material identification, color reference number and batch number. Other details to be supplied shall include: date of manufacture, quantity, shelf life, safety and technical data sheet.

5.3. Paint Applicator

- Paint application and Quality Control.
- Verify the integrity of the items received by the Vendor and make sure they shall be conformed to what is requested and specified.
- Verify the integrity of all the incoming abrasive, paint, equipment, etc., rejecting material without documentation, label, batch number, expiration and manufacturing dates or proper packaging.
- Record the batch number of all materials received on suitable forms.

- Availability of suitable equipment to blast-clean and to apply the paint along with sets of spare parts.
- Availability of suitable instruments to perform the specified inspection and testing, knowledge of their use and reference standards. All instruments shall have valid calibration certificate issued by their manufacturers or by an acknowledged body.
- Guarantee tradesman level workmanship as regards surface preparation and paint application.
- Provide an environment that protects the painting / curing process and the operators from dust, wind, rain and fumes.
- Grant CLIENT, CONTRACTOR and SUPPLIER Coating Inspector free access and assistance to inspect all work performed.
- Grant CLIENT, CONTRACTOR and VENDOR Coating Inspector availability of testing and inspection instrument, properly calibrated and maintained, while conducting surveillance of the work.
- Carry out all work stages in strict accordance whit this working procedure.
- Fill in daily report detailing the work carried out in collaboration with Q.C.
- Arrange the storage of painted items in suitable areas well protected against damage.
- As regard the storage of the coating material and solvents, the Paint Manufacturer's instruction shall be followed.
- Supply the Paint Applicator one test panel, for each production batch, which shall be used to perform the Adhesion test. Minimum dimensions of the test panels are 300 x 300 x 4 mm.

6. Qualification of Paint Operators

Paint Applicator Company selected to carry out the coating works described in this Procedure may be required to comply with the provisions SSPC QP 1 for Field Coating Application and SSPC QP 3 for Shop Coating Application. Operators employed in abrasive blast cleaning and coating operations shall be qualified according to tradesman level as Blaster or Painter. Personnel performing controls, inspections and tests shall be individually certified by a recognized association or organization NACE Coating Inspector level II or NS 476 FROSIO Inspector level III.

7. Safety

Any blast-cleaning and coating phase shall be carried out and any paint, thinner, abrasive, material or equipment shall be used in accordance to all applicable local, national and international safety regulations. Product Safety Data Sheets (PSDS) shall be available for review at shops where coating is applied.
All operators shall be provided with suitable safety personal equipment. Used solvents, paint, waste materials and cleaning materials shall be handled in strict accordance with PSDS requirements and applicable local and national disposal procedures.

8. Ambient Conditions

Blast cleaning, coating application and paint curing shall not be allowed to take place:

- When the ambient and steel temperature is below 5°C and above 52°C.
- When the relative humidity is greater than 85%.
- When steel temperature is less than 3°C above dew-point temperature.

The Paint Manufacturer shall specify the maximum and minimum application and curing temperature and other relevant limitations regarding application and curing conditions for each product.

9. Unpainted Surfaces

The following surfaces shall not be blast-cleaned and painted:

- RF Flanges, unless otherwise specified.
- Machined surfaces.
- Name Plate

All these surfaces shall be properly protected with tape, rubber, plastic caps, etc. before blast-cleaning and painting.

10. Pre-Blasting Preparation

All the incoming items shall be thoroughly inspected to assure that sharp, edges, fillets and corners have been dressed to achieve a grade P3 of ISO 8501-3 except for weld profile smoothing that shall follow grade P2.
Special attention shall be given to all weld's areas for removal of weld flux, fumes, slivers, welding spatter and other foreign objects. Any surfaces defects, particularly surface laminations or scrubs, likely to be detrimental to protective coating system, shall be smoothened. Spot and discontinue welds shall not be allowed.
Surface contaminants such as oil and grease shall be solvent cleaned as per SSPC-SP 1. Soluble salt deposits, soil and any exogenous compounds shall be removed by steam cleaning and brushing in combination with detergent. The degreased surfaces shall be further washed with fresh water to remove all traces of the degreaser chemicals.

11. Surface Preparation

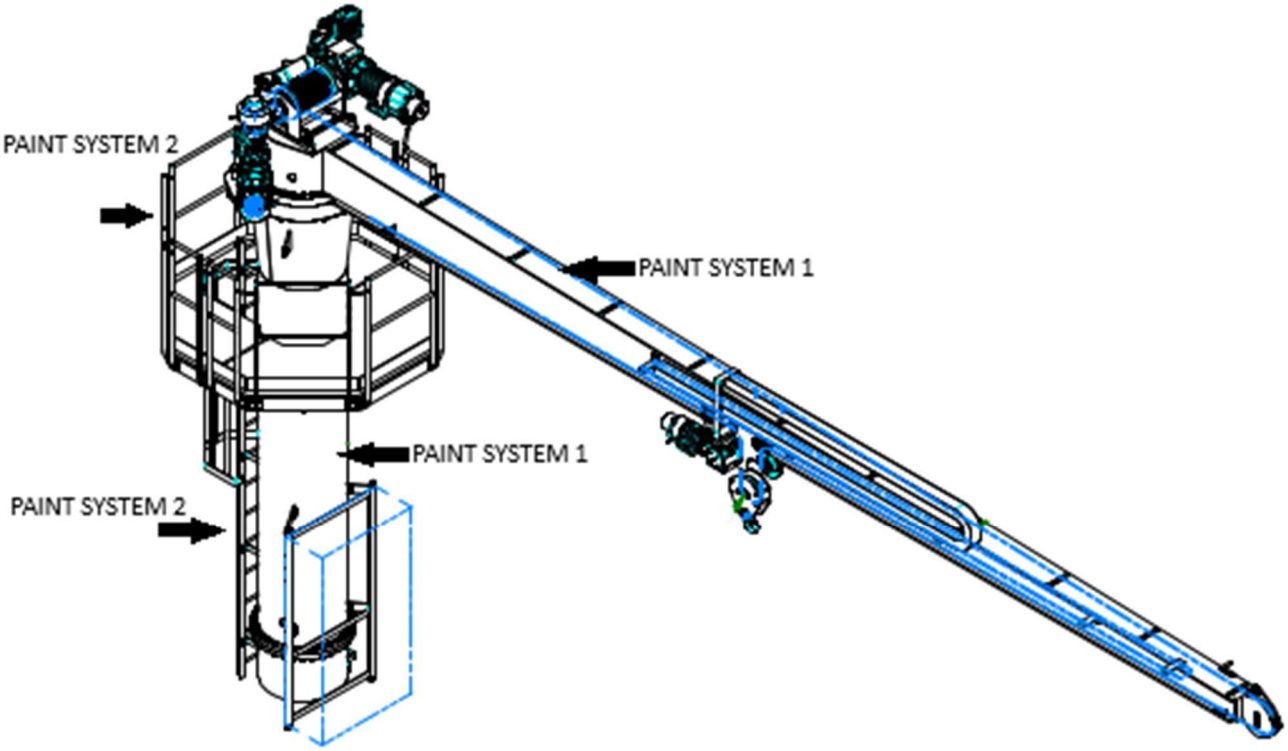
All abrasive material selected (STEEL GRIT or GARNET) shall be dry, clean and free from oil, grease and other contaminants that could be detrimental to long term coating performance.
Conductivity of abrasive shall not exceed 250 µS/cm at 20°C as per ISO 11127-6.
The compressed air used for blast-cleaning shall be free from water and oil. Adequate separators and traps shall be provided and these shall be kept emptied of water and oil. Control of the compressed air cleanliness shall be done according to Standard ASTM D 4285.

- Carbon Steel blasted surfaces, cleaned to ISO 8501-1 SA 2 1/2 shall have a roughness between 50÷85 µm and Medium G.
- Stainless Steel blasted surfaces, cleaned to SSPC-SP17 shall have a roughness between 30÷50 µm.

Blast profile measurement shall be carried out in accordance with ISO 8503-5 Replica tape method and with ISO 8503-2 Comparator Procedure.
Welding spatter, slivers, laminations and underlying mill scale removed during fabrication but still visible after blast cleaning operations shall be dressed and the edges smoothed or rendered flush.
After preparation of the surface any grit, dust, etc. shall be removed. The residual particle quantity and particle size shall not exceed dust quantity rating 2 and dust size class 2 of ISO 8502-3.
The salt concentration (chlorides) tested on the blast cleaned surfaces shall not exceed 20 mg/m² NaCl when measured per ISO 8502-6 and ISO 8502-9.
The test panels, supplied by the VENDOR for each production batch and for each PAINT SYSTEM, shall receive the same surface preparation of the items. Minimum dimensions of the test panels are 300 x 300 x 5 mm.
Final blast-cleaning shall not be done on any surface that are moist, or that may become moist, before the application of primer.

12. Paint Application

All paint furnished shall be in unopened, clearly identifiable containers. No paint shall be used whose shelf life has expired. Containers shall remain unopened until required for use.
Coating application shall be carried out after completion of blast cleaning and before any rusting occurs. The blast-cleaned surface shall be vacuum cleaned or blown free of dust and other loose contaminants.
All application data shall be in accordance with the PTDS of the Paint Manufacturer. The type of thinner used shall comply with the Manufacturer's recommendation. Airless or conventional spray pumps shall be used. Stripe-coating with brush of edges, welds, corners and all irregular surfaces shall be performed to obtain the specified film thickness and to avoid holidays.
All blast cleaned surfaces shall be painted with primed before rust bloom occurs, usually within 4 hours and depending upon the ambient conditions.
The blast-cleaned test panels shall be painted contemporaneously with the same paint system as per the items. In the period between coating and curing, the freshly applied coating shall not come into contact with handling equipment or any other items that may impact coating quality and shall be held in a covered facility protected from dust, wind and rain. Over-coating time shall be recommended by the Paint Manufacturer in the PTDS.



13. Paint Systems

PAINT SYSTEM 1- SANDBLASTED CARPENTRY-STRUCTURAL STEEL

SURFACE PREPARATION	ISO 8501-1 SA 2 1/2 Profile between 50 µm and 85 µm
1st Coat	JOTAMASTIC 90 Alu D.F.T. 150 µm
2nd Coat	JOTAMASTIC 90 D.F.T. 150 µm
3rd Coat	HARDTOP XP Color Gray RAL 7038 D.F.T. 60 µm
T.D.F.T.	360 µm

PAINT SYSTEM 2- SANDBLASTED HANDRAILS AND STAIRS

SURFACE PREPARATION	ISO 8501-1 SA 2 1/2 Profile between 50 µm and 85 µm
1st Coat	JOTAMASTIC 90 Alu D.F.T. 150 µm
2nd Coat	JOTAMASTIC 90 D.F.T. 150 µm
3rd Coat	HARDTOP XP Color Yellow RAL 1023 D.F.T. 60 µm
T.D.F.T.	360 µm

14. Inspection and Testing

Test Type	Method	Frequency	Acceptance Criteria	Corrective Action In Case Of N.C.
Blotter Test	White adsorbent paper ASTM D 4285	Before start and end of each shift.	A piece of clean white absorbent paper shall be positioned at the air-outlet. After about 1 min. of air discharge there shall be no trace of water and oil on the paper.	Any accumulated moisture and oil in the traps, separators and filters shall be emptied. The air supply shall then be checked once again until conformity is achieved.
Temperature	Thermo hygrometer ISO 8502-4	Before start and end of each shift.	Ambient and Steel Temperature min. 5°C and max. 52°C. The paint manufacturer shall specify the maximum and minimum application and curing temperature and other relevant limitations regarding application and curing conditions for each product.	Unless these parameters are met the operations shall not proceed.
Relative Humidity			85% max.	
Dew point			Steel Temperature min. 5°C, and 3°C or more above Dew Point Temperature.	

Test Type	Method	Frequency	Acceptance Criteria	Corrective Action In Case Of N.C.
Visual Examination	Visual	All surfaces.	Sharp, edges, fillets, corners and welds are properly dressed to achieve a minimum preparation grade P3 of ISO 8501-3 except for weld profile smoothing that shall follow grade P2.	Out of conformity items shall be kept aside. Vendor shall be notified.
Pre-cleaning of surfaces	Steam jet cleaner SSPC-SP 1	All surfaces.	Surface contaminants such as oil and grease shall be solvent cleaned as per SSPC-SP 1. Soluble salt deposits, soil and any exogenous compounds shall be removed by steam cleaning and brushing in combination with detergent. The degreased surfaces shall be further washed with fresh water to remove all traces of the degreaser chemicals.	If oil, grease and any exogenous compound is still visible on the surface the operations shall be repeated until conformity is achieved.
Conductivity of abrasive	ASTM D 4940	Before start of each shift.	Conductivity of abrasive soaked in reagent water shall not exceed 250 µS/cm at 20°C.	Replace the abrasive with a new lot and re-testing until acceptable.
Surface Preparation Cleanliness	Blasting booth ISO 8501-1 and SSPC-VIS	All surfaces.	For Carbon Steel surfaces the required visual standard of blast cleaning shall correspond to ISO 8501-1 SA 2 1/2 Very Thorough Blast Cleaning.	Re-blasting and retesting until acceptable.
Blasted Surface Roughness	Replica tape NACE SP0287	Once per production batch.	For Carbon steel surfaces the required surface profile shall between 50 µm and 75 µm.	Re-blasting.
Water Soluble Salts	Bresle-kit ISO 8502-6 ISO 8502-9	Once per production batch.	The salt concentration (chlorides) tested on the blast cleaned surface shall not exceed 20 mg/m² NaCl like single point	Washing with potable water and retesting until acceptable.

Test Type	Method	Frequency	Acceptance Criteria	Corrective Action In Case Of N.C.
Surface Dust Cleanliness	Transparent adhesive tape ISO 8502-3	Once per production batch.	After surface preparation any grit, dust, etc. shall be removed. The residual particle quantity and particle size shall be class 2, rating 2.	Re-cleaning and retesting until acceptable.
Wet Film Thickness	Comb type ISO 2808 Method 1A	Spot checks.	As indicate in PTDS.	Additional coat
Visual Inspection	Visual	During all phases of coating application.	The coating shall be smooth, of uniform color, free of runs, sags, visible holidays, blisters, orange peel, scratches, dust inclusions, solvent retention or any other irregularities.	Repair and retesting.
Dry Film Thickness	Electromagnetic thickness gauge ISO 19840	ISO 19840 After each coat and before application of next coat.	The arithmetic mean of all the individual DFT shall be equal to or greater than the NDFT. All individual dry film thicknesses shall be equal to or above 90% of the NDFT. Individual DFT between 80% of the NDFT and the NDFT are acceptable provided that the number of these measurements is less than 20% of the total number of individual measurements taken. Max of 150% of NDFT or as per manufacturers maximum recommended DFT	Repair, additional coats or recoating as appropriate.
Adhesion Test	Automatic centered pulling force equipment ISO 4624	One test panel for each batch production.	Performed on the coated test panels when the coating system is fully cured. Minimum acceptable adhesion value: 5 MPa.	In case of poor adhesion, the test is repeated on the coated surfaces of the items. It fails again the items shall be blast-cleaned and re-coated.

15. Coating Repairs

TOTAL DAMAGED COATING WITH EXPOSED METAL SUPPORT	DAMAGED COATING WITHOUT EXPOSED METAL SUPPORT
SURFACE PREPARATION The damaged area shall be re-cleaned as originally specified for the item and the complete coating system reapplied. The re-cleaning shall carry over on to the secure surroundings coating for not less than 30 mm all around and the edges feathered using a method approved by the Contractor.	**SURFACE PREPARATION** The coating around the damaged area shall be feathered using an approved method to ensure continuity of the patch coating. The full coating system shall then be reapplied strictly in accordance with this Painting Procedure.
COATING APPLICATION See Original Paint System	**COATING APPLICATION** See Original Paint System
The D.F.T. of each single layer and the final D.F.T. shall be as per original application.	

Areas with inadequate coating thickness shall be thoroughly cleaned and, if necessary abraded and additional compatible coats applied until they meet this specification. These additional coats shall blend in with the final coating on adjoining areas.

16. Handling and Storage

Finished painted items shall be handled and/or stored in a manner to protect the coating from damage. They shall not be dropped or impacted against other objects. Use of ropes, hooks, chains or cables are not permitted. Only rubber or nylon belts shall be allowed for lifting, lowering or suspending the items. Coated items shall be stored off the ground on sufficiently padded skids, properly leveled and spaced.
Once loaded for transport, they are arranged to avoid scratches and to prevent hitting. Non-abrasive and non-metallic supports, wooden board, pallets, mats or rubber strips shall be used.

17. Technical datasheet

Jotamastic 90

Product description

This is a two component polyamine cured epoxy mastic coating. It is a surface tolerant, abrasion resistant, high solids, high build product. This product is tintable in a wide range of colours in Jotun's Multicolor Industry (MCI) system. Specially designed for areas where optimum surface preparation is not possible or required. Provides long lasting protection in environments with high corrosivity. Can be used as primer, mid coat, finish coat or as single coat system in atmospheric and immersed environments. Suitable for properly prepared carbon steel, galvanised steel, stainless steel, aluminium, concrete and a range of aged coating surfaces. It can be applied at sub zero surface temperatures.

Typical use

General:
Primarily designed for maintenance and repair.

Marine:
Outside hulls, exterior and interior areas.

Protective:
Recommended for offshore environments, including splash zones, refineries, power plants, bridges, buildings, mining equipment and general structural steel.

Approvals and certificates

This product contributes to the Green Buildings Standard credits. Please see section Green Building Standards.

Certified in accordance with IMO Res.288(87) – PSPC Crude Oil Tanks **(Valid for Standard Grade only)**
Pre-qualified in accordance with NORSOK M-501 in selected systems
Grain, Newcastle Occupational Health

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. 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

Consult your Jotun representative for details.

Additional certificates and approvals may be available on request.

Other variants available

Jotamastic 90 Aluminium
Jotamastic 90 GF

Refer to separate TDS for each variant.

Colours

black, white and according to Multicolor Industry tinting system (MCI)

This Technical Data Sheet supersedes those previously issued.
The Technical Data Sheet (TDS) is recommended to be read in conjunction with the Safety Data Sheet (SDS) and the Application Guide (AG) for this product. For your nearest local Jotun office, please visit our website at www.jotun.com

Product data

Property	Test/Standard	Description
STANDARD GRADE		
Solids by volume	ISO 3233	80 ± 2 %
Gloss level (GU 60 °)	ISO 2813	semi gloss (35-70)
Flash point	ISO 3679 Method 1	35 °C
Density	calculated	1.4 kg/l

Region	Regulation	Test Standard	VOC Value
US	CARB(SCM)2020 / SCAQMD rule 1113	Calculated	234 g/l
Hong Kong	Air Pollution Control (VOC) Regulation	Calculated	234 g/l
EU	European Paint Directive 2004/42/CE	Calculated	234 g/l
EU IED	Industrial Emission Directive 2010/75/EU	Calculated	234 g/l
Korea	Korea Clean Air Conservation Act	KS M ISO 11890-1	224 g/l
China	GB 30981-2020 Limit of harmful substances of industrial protective coatings	GB/T 23985-2009 8.3	243 g/l

WINTER GRADE		
Solids by volume	ISO 3233	80 ± 2 %
Flash point	ISO 3679 Method 1	36 °C
Density	calculated	1.4 kg/l

Region	Regulation	Test Standard	VOC Value
US	CARB(SCM)2020 / SCAQMD rule 1113	Calculated	213 g/l
Hong Kong	Air Pollution Control (VOC) Regulation	Calculated	213 g/l
EU	European Paint Directive 2004/42/CE	Calculated	213 g/l
EU IED	Industrial Emission Directive 2010/75/EU	Calculated	213 g/l
Korea	Korea Clean Air Conservation Act	KS M ISO 11890-1	232 g/l
China	GB 30981-2020 Limit of harmful substances of industrial protective coatings	GB/T 23985-2009 8.3	208 g/l

The provided data is typical for factory produced products, subject to slight variation depending on colour.

Gloss description: According to Jotun Performance Coatings' definition.

Small colour variations may occur when changing between the two curing agents. If exposed to weathering without topcoat, the Wintergrade (WG) version will yellow at a faster rate than the same colour in Standard grade.

The VOC values refer to grey colour.

This Technical Data Sheet supersedes those previously issued.
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Film thickness per coat

Typical recommended specification range

STANDARD GRADE

Dry film thickness	100	-	300	µm
Wet film thickness	125	-	375	µm
Theoretical spreading rate	8	-	2.7	m²/l

WINTER GRADE

Dry film thickness	100	-	300	µm
Wet film thickness	125	-	375	µm
Theoretical spreading rate	8	-	2.7	m²/l

Surface preparation

Surface preparation summary table

Substrate	Surface preparation	
	Minimum	Recommended
Carbon steel	St 2 (ISO 8501-1)	Sa 2 (ISO 8501-1)
Stainless steel	The surface shall be hand or machine abraded with non-metallic abrasives or bonded fibre machine or hand abrasive pads to impart a scratch pattern to the surface.	Abrasive blast cleaning to achieve a surface profile using non-metallic abrasive media which is suitable to achieve a sharp and angular surface profile.
Aluminium	The surface shall be hand or machine abraded with non-metallic abrasives or bonded fibre machine or hand abrasive pads to impart a scratch pattern to the surface.	Abrasive blast cleaning to achieve a surface profile using non-metallic abrasive media which is suitable to achieve a sharp and angular surface profile.
Galvanised steel	The surface shall be clean, dry and appear with a rough and dull profile.	Sweep blast-cleaning using non-metallic abrasive leaving a clean, rough and even pattern.
Shop primed steel	Clean, dry and undamaged shop primer (ISO 12944-4 5.4)	Sa 2 (ISO 8501-1)
Coated surfaces	Clean, dry and undamaged compatible coating	Clean, dry and undamaged compatible coating
Concrete	Low pressure water washing to a rough, clean, dry and laitance free surface.	Minimum 4 weeks curing. Moisture content maximum 5 %. Prepare the surface by means of enclosed blast shot or diamond grinding and other appropriate means to abrade the surrounding concrete and to remove laitance.

Optimum performance, including adhesion, corrosion protection, heat resistance and chemical resistance is achieved with recommended surface preparation.

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Application

Application methods

The product can be applied by

Spray:	Use airless spray.
Brush:	Recommended for stripe coating and small areas. Care must be taken to achieve the specified dry film thickness.
Roller:	May be used for small areas. Not recommended for first primer coat. Care must be taken to achieve the specified dry film thickness.

Product mixing ratio (by volume)

STANDARD GRADE

Jotamastic 90 Comp A	3.5 part(s)
Jotamastic 90 Standard Comp B	1 part(s)

WINTER GRADE

Jotamastic 90 Comp A	3.5 part(s)
Jotamastic 90 Wintergrade Comp B	1 part(s)

Independent on substrate temperature the minimum temperature of the mixed base and curing agent is 10 °C. Lower temperature may require additional thinner to reach correct application viscosity. Additional thinner gives lower sag resistance and slower curing. If addition of thinner is required, this shall be done after mixing of the two components.

Thinner/Cleaning solvent

Thinner: Jotun Thinner No. 17

Thinning is not normally required. Consult the local representative for advice during application in extreme conditions. Do not thin more than allowed by local environmental legislation.

Guiding data for airless spray

Nozzle tip (inch/1000):	19-25
Pressure at nozzle (minimum):	150 bar/2100 psi

Drying and Curing time

Substrate temperature	-5 °C	0 °C	5 °C	10 °C	23 °C	40 °C
STANDARD GRADE						
Surface (touch) dry			20 h	12 h	4 h	1.5 h
Walk-on-dry			40 h	20 h	6 h	3 h
Dry to over coat, minimum			30 h	10 h	3 h	1.5 h
Dried/cured for service			28 d	14 d	7 d	2 d

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WINTER GRADE

Surface (touch) dry	24 h	18 h	12 h	8 h	3.5 h
Walk-on-dry	72 h	30 h	20 h	12 h	4 h
Dry to over coat, minimum	54 h	20 h	10 h	6 h	2 h
Dried/cured for service	21 d	14 d	10 d	5 d	3 d

For maximum overcoating intervals, refer to the Application Guide (AG) for this product.

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.

Induction time and Pot life

Paint temperature	**23 °C**
STANDARD GRADE	
Pot life	2 h
WINTER GRADE	
Pot life	45 min

Heat resistance

	Temperature	
	Continuous	**Peak**
Dry, atmospheric	90 °C	-
Immersed, sea water	50 °C	60 °C
Immersed, crude oil	80 °C	90 °C

WINTER GRADE
Dry, atmospheric, continuous: 120 °C
Dry, atmospheric, Peak: -

Peak temperature duration max. 1 hour.

The temperatures listed relate to retention of protective properties. Aesthetic properties may suffer at these temperatures.

Note that the coating will be resistant to various immersion temperatures depending on the specific chemical and whether immersion is constant or intermittent. Heat resistance is influenced by the total coating system. If used as part of a system, ensure all coatings in the system have similar heat resistance.

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Product compatibility

Depending on the actual exposure of the coating system, various primers and topcoats can be used in combination with this product. Some examples are shown below. Contact Jotun for specific system recommendation.

Previous coat:	epoxy shop primer, inorganic zinc silicate shop primer, zinc epoxy, epoxy, epoxy mastic, inorganic zinc silicate
Subsequent coat:	polyurethane, polysiloxane, epoxy, acrylic, vinyl epoxy

Packaging (typical)

	Volume (litres)	Size of containers (litres)
Jotamastic 90 Comp A	3.55/15.6	5/20
Jotamastic 90 Standard Comp B	1/4.4	1/5
Jotamastic 90 Wintergrade Comp B	1/4.4	1/5

The volume stated is for factory made colours. Note that local variants in pack size and filled volumes can vary due to local regulations.

Storage

The product must be stored in accordance with national regulations. Keep the containers in a dry, shaded, cool, well-ventilated space and away from sources of heat and ignition. Containers must be kept tightly closed. Handle with care.

Shelf life at 23 °C

Jotamastic 90 Comp A	48 month(s)
Jotamastic 90 Standard Comp B	24 month(s)
Jotamastic 90 Wintergrade Comp B	24 month(s)

In some markets commercial shelf life can be dictated shorter by local legislation. The above is minimum shelf life, thereafter the paint quality is subject to re-inspection.

Green Building Standards

This product contributes to Green Building Standard credits by meeting the following specific requirements:

LEED®v4 (2013)
EQ credit: Low emitting materials
- Healthcare and schools, Exterior applied products: VOC content for Industrial Maintenance Coatings (250 g/l) (CARB(SCM)2007).
MR credit: Building product disclosure and optimization
- Material Ingredients, Option 2: Material Ingredient Optimization, International Alternative Compliance Path - REACH optimization: Fully inventoried chemical ingredients to 100 ppm and not containing substances on the REACH Authorization list – Annex XIV, the Restriction list – Annex XVII and the SVHC candidate list.
- Environmental Product Declarations. Product-specific Type III EPD (ISO 14025;21930, EN 15804).

BREEAM® International (2016)
- Mat 01: Product-specific Type III EPD (ISO 14025;21930, EN 15804).

BREEAM® International (2013)

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- Hea 02: VOC content for Binding Primers SB (750 g/l) (EU Directive 2004/42/CE).

The EPDs are available at www.epd-norge.no

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.

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.

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.

Disclaimer

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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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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.

Typical use

Marine:
Recommended for topside, deck and superstructure.

Protective:
Recommended for offshore environments, refineries, power plants, bridges and buildings. Suitable for a wide range of industrial structures. Used as a topcoat in pre-qualified NORSOK systems.

Approvals and certificates

This product contributes to the Green Buildings Standard credits. Please see section Green Building Standards.

Pre-qualified in accordance with NORSOK M-501 in selected systems
Grain, Newcastle Occupational Health
Food, Compliant with USA, FDA Title 21, Part 175.300 for dry solids

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. 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

Consult your Jotun representative for details.

Additional certificates and approvals may be available on request.

Other variants available

Hardtop XP Alu
Hardtop XPL
Hardtop XPF (Winter grade version)

Refer to separate TDS for each variant.

Colours

according to colour card and Multicolor Industry tinting system (MCI)

Product data

Property	Test/Standard	Description
Solids by volume	ISO 3233	63 ± 2 %
Gloss level (GU 60 °)	ISO 2813	gloss (70-85)
Flash point	ISO 3679 Method 1	30 °C
Density	calculated	1.4 kg/l

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Region	Regulation	Test Standard	VOC Value
US	CARB(SCM)2020 / SCAQMD rule 1113	Calculated	320 g/l
Hong Kong	Air Pollution Control (VOC) Regulation	Calculated	320 g/l
EU	European Paint Directive 2004/42/CE	Calculated	320 g/l
EU IED	Industrial Emission Directive 2010/75/EU	Calculated	320 g/l
Korea	Korea Clean Air Conservation Act	KS M ISO 11890-1	385 g/l
China	GB 30981-2020 Limit of harmful substances of industrial protective coatings	GB/T 23985-2009 8.3	330 g/l

The provided data is typical for factory produced products, subject to slight variation depending on colour.

Gloss description: According to Jotun Performance Coatings' definition.

The VOC values refer to white colour.

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.

Surface preparation

Surface preparation summary table

	Surface preparation	
Substrate	**Minimum**	**Recommended**
Coated surfaces	Clean, dry and undamaged compatible coating	Clean, dry and undamaged compatible coating

Application

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The Technical Data Sheet (TDS) is recommended to be read in conjunction with the Safety Data Sheet (SDS) and the Application Guide (AG) for this product. For your nearest local Jotun office, please visit our website at www.jotun.com

Application methods

The product can be applied by

Spray:	Use air spray or airless spray.
Brush:	Recommended for stripe coating and small areas. Care must be taken to achieve the specified dry film thickness.
Roller:	May be used. Care must be taken to achieve the specified dry film thickness.

Product mixing ratio (by volume)

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

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 polife depending on ambient temperature.

Guiding data for airless spray

Nozzle tip (inch/1000):	13-19
Pressure at nozzle (minimum):	150 bar/2100 psi

Guiding data for air spray

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

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

For maximum overcoating intervals, refer to the Application Guide (AG) for this product.

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.

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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.

Induction time and Pot life

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

Heat resistance

	Temperature	
	Continuous	Peak
Dry, atmospheric	120 °C	140 °C

Peak temperature duration max. 1 hour.

The temperatures listed relate to retention of protective properties. Aesthetic properties may suffer at these temperatures.

Product compatibility

Depending on the actual exposure of the coating system, various primers and topcoats can be used in combination with this product. Some examples are shown below. Contact Jotun for specific system recommendation.

Previous coat: epoxy, zinc epoxy, epoxy mastic, polyurethane

Packaging (typical)

	Volume (litres)	Size of containers (litres)
Hardtop XP Comp A	4.55 / 18.2	5 / 20
Hardtop XP Comp B	0.45 / 1.8	1 / 3

The volume stated is for factory made colours. Note that local variants in pack size and filled volumes can vary due to local regulations.

Storage

The product must be stored in accordance with national regulations. Keep the containers in a dry, shaded, cool, well-ventilated space and away from sources of heat and ignition. Containers must be kept tightly closed. Handle with care.

Shelf life at 23 °C

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Hardtop XP Comp A	48 month(s)
Hardtop XP Comp B	48 month(s)

In some markets commercial shelf life can be dictated shorter by local legislation. The above is minimum shelf life, thereafter the paint quality is subject to re-inspection.

Green Building Standards

This product contributes to Green Building Standard credits by meeting the following specific requirements:

LEED®v4 (2013)
MR credit: Building product disclosure and optimization
- Material Ingredients, Option 2: Material Ingredient Optimization, International Alternative Compliance Path - REACH optimization: Fully inventoried chemical ingredients to 100 ppm and not containing substances on the REACH Authorization list – Annex XIV, the Restriction list – Annex XVII and the SVHC candidate list.
- Environmental Product Declarations. Product-specific Type III EPD (ISO 14025;21930, EN 15804).

BREEAM® International (2016)
- Mat 01: Product-specific Type III EPD (ISO 14025;21930, EN 15804).

BREEAM® International (2013)
- Hea 02: VOC content for Two-pack performance Coatings SB (500 g/l) (EU Directive 2004/42/CE).

The EPDs are available at www.epd-norge.no

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Colour variation

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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.

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