Base Load Power Hub (BLPH)

SURFACE PROTECTION PROCEDURE

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List of Attachments

Attachment 1: Paint application report

Attachment 2: Dust Assessment report

Attachment 3: Environmental condition

Attachment 4: Adhesion test report

1 INTRODUCTION

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.

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.

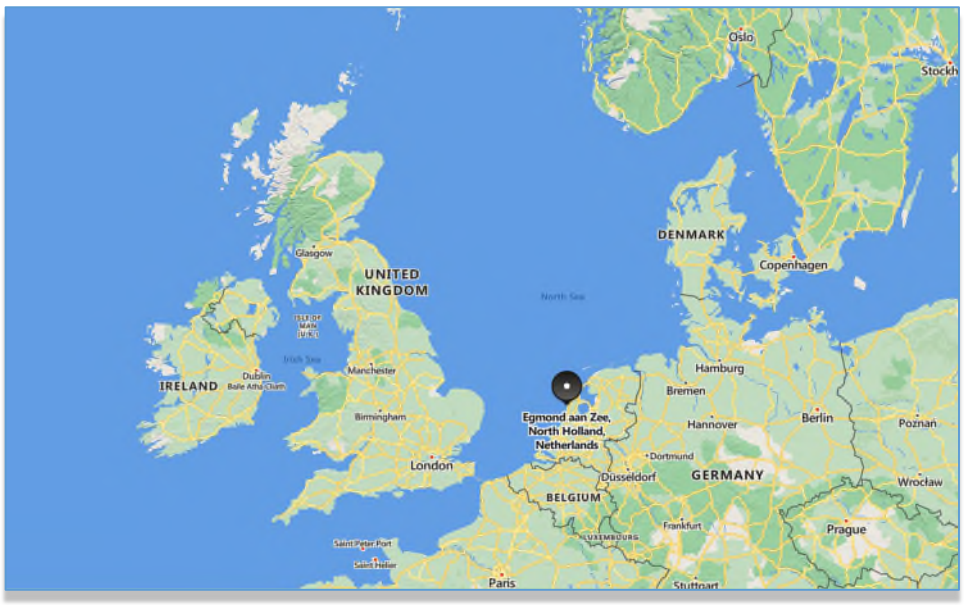


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

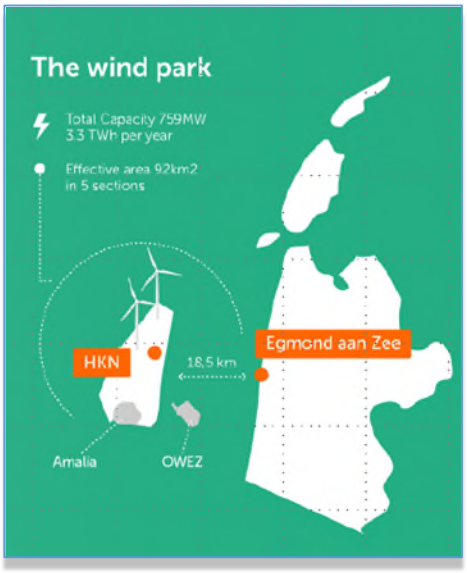


Figure 2 - Wind Park Details

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.

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.

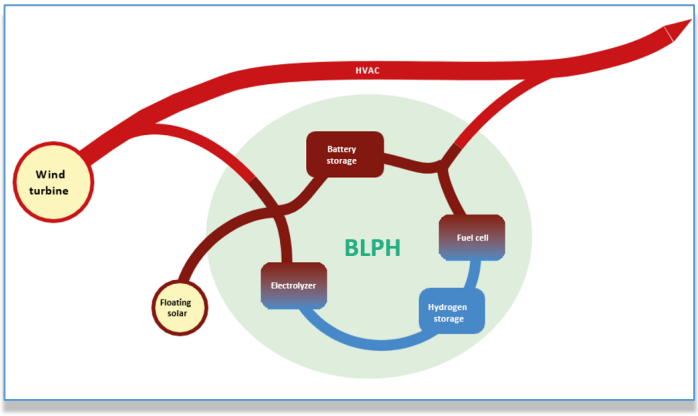


Figure 3 – BLPH Concept

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.

2 DOCUMENT SCOPE

This Coating Procedure details methods and instructions to perform surface preparation and coating application on Crosswind PROJECT in order to meet quality requirements set in both contractual documents and applicable project specification.

This Coating Procedure covers:

1) Surface preparation and coating application activities for Topside;

2) Surface preparation and coating application activities to be performed during both phases of work, "block stage" and "erection stage".

3 REFERENCES

Company Documents	
Doc. No.	Description
NORSOK-M501 REV.6	Surface Preparation and Protective Coating
Contractor Documents	
Doc. No.	Description
123A90-DDL-MAT-RE-60011	Materials Selection Report
123A90-PML-QHSE-PL-00001	Contract HSSE plan
PRO-QCI-03	Handling and Calibration of Equipment
IDL-QCI-17	Corrosion Prevention Personnel Qualification Procedure
123A90-PML-QHSE-ITP-00074	Inspection and Test Plans (ITP) for Surface Protection
Standards	
Doc. No.	Description

ASTM D4285 (2018)	Standard Test Method for Indicating Oil or Water in Compressed Air
ISO 8501-1 to 3 (2007) (2019) (2008)	Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness
ISO 8502-6 (2020)	Preparation of steel substrates before application of paints and related products. Tests 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 paints and related products. Tests for the assessment of surface cleanliness Part 9: Field method for conductometric determination of watersoluble salts
ISO 8503-1 to 4 (2012) (2012) (2012) (2012)	Preparation of steel substrates before application of paints and related products. Surface roughness characteristics of blast cleaned steel substrates
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
ISO 4628-1 to 6 (2016) (2016) (2016) (2016) (2016) (2011)	Evaluation of paint and varnish defects. Designation of intensity, quantity and size of common types of defect
ISO 4624 (2016)	Paints and varnishes. Pull-off test
NACE standard SP0287 (2016)	Standard Practice – Field measurement of surface profile of abrasive blastcleaned steel surfaces using a replica tape

Table 1 - Reference Documents

4 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project
CRA:	Corrosion Resistant Alloy
DSS:	22% Cr Duplex Stainless Steel
SDSS:	22% Cr Super Duplex Stainless Steel
SS:	Stainless steel
CPT:	Coating Procedure Test
MTDS:	Material Technical Data Sheet

SDS:	Safety data Sheet
RH:	Relative Humidity
DP:	Dew Point
DFT:	Dry Film Thickness
ITP:	Inspection and Test Plan
QC:	Quality Control
MTR:	Material Technical Representative
TSA:	Thermal Spray Aluminium
TSZ:	Thermal Spray Zinc

Table 2 - Definitions and Abbreviations

5 RESPONSABILITIES

QC INSPECTOR

QC Inspector is responsible for:

- assuring the implementation of provisions contained in this procedure;
- carrying out intermediate and final inspections to verify acceptance of works performed;
- reporting the result of inspections.

ROSETTI MARINO SUB-CONTRACTOR

With regards to surface preparation and painting application activities, Rosetti Marino hires labour directly from his usual in-house painting sub-contractor.

The Sub-contractor shall be responsible for:

- surface preparation and paint application;
- carrying out incoming paint inspections;
- performing the job in accordance with this procedure and the above mentioned specifications;
- issuing the blasting and paint application reports included adhesion test.

PAINT SUPPLIER (MTR)

MTR shall be present at construction site:

- When CPT will be performed;
- Upon demand of main contractor or sub-contractor to give technical support in case of problems with products supplied.

When the MTR will be at construction site, shall verify that:

- His paints have been stored and applied correctly;
- Application procedures qualification has been carried out correctly;
- Personnel qualification is in accordance with project requirements;
- The correct paint system and colours are being applied;
- The pre-treatment is in accordance with project requirements;
- The quality of the applied paint systems and touch-ups are in accordance with acceptance criteria of the applicable ITP.

MTR shall keep writing documentation of all the above mentioned activities.

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6 EQUIPMENT FOR INSPECTION

The equipment used for inspection shall be checked in accordance with Rosetti Corporate procedure O-PRQ-3B-003, applicable revision.

The main equipment to be used during paint activities are the following:

- Thermometer for temperature check of ambient and substrate
- Hygrometer
- Elcometer 456 for dry film thickness measurements
- Wet film thickness gauge
- Hydraulic pull-off tester
- Comparator for surface roughness check
- Bresle kit for salt test

7 RECEIVING, STORAGE AND HANDLING OF MATERIALS

All painting material will be delivered to the designated location in the original containers with intact seals and labels.

All containers are to be provided with documents or labels clearly showing contents, year and month of manufacture, and giving full traceability of production.

The Sub-contractor shall:

- Examine the integrity of drums and/or containers, setting aside those which present material leakages, absence of seals or other possible defects;
- Check expiry date of paints and elimination of the drums and/or containers which are outdated or having an expiry date that exclude their use;
- Check the correspondence between transport documents and identification lots marked on the drums and/or containers;
- Obtain the MTDS and Safety Data Sheets. Manufacturer's instruction relevant to handling and storage activities shall always be implemented;
- Check the correct colour code.

Containers shall be stored in a dry and well ventilated warehouse complying with the maximum and minimum storage temperature (as per MTDS).

Ambient condition on paint storage containers shall be fully monitored and recorded.

Flammable products, thinners, etc. shall be stored in accordance with current local regulations away from combustible materials and all precautions shall be taken to avoid creating a fire hazard.

For block stage works, blasting and painting activities will be performed inside dedicated cabin. With regards erection stage, the activities will be carried out in dedicated microclimate areas built directly on the structures with controlled ambient conditions.

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8 ITEMS NOT TO BE PAINTED

Unless otherwise specified, the following surfaces shall not be painted:

- Galvanised steel gratings;
- Galvanised & SS316 indoor sheeting;
- SS316 cable tray;
- Titanium, Copper Nickel alloys, non-metallic material, Brass, Plastic or similar;
- Instrument 6Mo, SS 316 Instrument Tubing;
- SS 316 Junction Boxes;
- All Galvanized structural bolting;
- Machined surfaces;
- Flange sealing faces;
- Movable parts such as valve spindles, stems, pump shafts or similar.
- All CRA surfaces to be installed in an internal environment such as cabinets, panels and any internal cabinet piping in CRA material.

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9 SURFACE PREPARATION

PRE-BLASTING PREPARATION

Every sub-assembly and field weld joint line will be accepted to enter the coating process/cycle only after welding final visual report is cleared off as per following points.

Sharp edges, corners and welds shall be prepared in according to ISO 8501-3 grade P3.

Hard surface layers, e.g. resulting from flame cutting, shall be removed by light grinding prior to blast cleaning.

The surfaces shall be free from any foreign matter such as weld flux residue, slivers, oil, grease, salt etc. prior to blast cleaning. Blast cleaning shall not be performed on damp surfaces or surfaces which may become damp before the application of primer.

Any oil and grease contamination shall be removed prior to blasting operations in accordance with SSPC-SP1.

Any major surface defects particularly surface laminations or scabs detrimental to the protective coating system shall be removed by suitable dressing. Where such defects have been revealed during blast cleaning and dressing has been performed, the dressed area shall be re-blasted to the specified standard.

All welds shall be inspected and if necessary repaired prior to final blast cleaning of the area. Surface pores, cavities etc. shall be removed by suitable dressing or weld repair.

Pre-blasting preparation shall be carried out for high durability in accordance with ISO 8501-3 grade P3.

Each item have to be HP washed before blasting activities.

Note: for protecting the dissimilar material will be use plastic cap or plastic tape.

BLAST CLEANING

Block stage blast cleaning will be performed with metallic grit or garnet (or similar) and painting activities will be done indoor with controlled ambient conditions.

Erection stage blast cleaning will be performed with garnet (or similar) and painting activities will be done with suitable weather conditions in encapsulated areas built directly on the structures with controlled ambient conditions.

Stainless steel and non-ferrous alloys will be blasted with garnet or similar non ferrous and free from chloride abrasive to avoid any surface contamination.

Hot dip galvanized shall be only sweep blasted by non-metallic abrasive.

All steel surfaces to be painted shall be cleaned by metal blast cleaning until the correct grade according to the ISO 8501-1 is obtained (please, see "coating systems details" section of this procedure for more information).

The surface roughness will be measured by means of surface profile comparator in accordance with ISO 8503-2. However, if necessary, some measurements could be performed by use of press-o-film testex tape

in accordance with NACE Standard SP0287. The roughness values depends from each paint system to be applied on surface (please, see coating systems details section of this procedure).

With regards to surfaces cleanliness grade and roughness listed on the dedicated paint system tables of this procedure, in case of different requirements stated on MTDS, the latter will prevail.

Blast cleaning shall be performed by qualified operators using suitable material.

Blast abrasives shall be dry, clean and free from contaminants, which will be detrimental to the performance of the coating (only dry blast cleaning will be accepted; utilisation of silica sand and copper slag is not allowed).

Spent abrasives used on open sites shall not be re-cycled.

The conductivity of abrasives shall be verify according to ASTM D 4940 standard and the maximum level accepted is 1000 µS/cm.

The size of the abrasive particles shall be such that the prepared surface profile height (anchor pattern profile) is in accordance with the requirements for the applicable coating system.

The cleanliness of the blast cleaned surfaces shall be as referred to each coating system in accordance with ISO 8501-1.

The air compressor shall supply a continuous air volume flow of at least 6 m3/h at a minimum pressure of 7 Kg/cm^2 at the outlet of each blast gun. The compressed air supplied shall not contain water or oil; suitable separators and filters shall be used at this purpose and oil and water accumulations shall be regularly purged from the receptacle. The compressed air shall be checked according to ASTM D 4782.

The air temperature at the compressor shall not exceed 110°C.

Blast cleaning shall continue for 2.5 cm on surface already blast cleaned, in order to assure proper overlapping.

Blast cleaning shall not be performed when the surface temperature of the metal is less than 3°C above dew point or the relative air humidity is higher than 85%.

Blast cleaning shall not be carried out in areas close to painting operations or to painted surfaces which are still wet and sensitive to dust or particle contamination.

Production test panels shall be prepared and coated for each individual coating system and minimum of 1 per 1000 m2.

POWER TOOL CLEANING

Power tool cleaning shall be performed in accordance with ISO 8504-3, where is not possible to blast and with Client approval case by case.

The conditions of the surfaces shall comply with ISO 8501-1.

PRE-PAINTING SURFACE CONDITIONS

The surface to be coated shall be clean, dry, and free from oil/grease and have the specific roughness and cleanliness, in accordance with the requirements for the applicable coating system.

Before application of each coat of paint, dust and all abrasive particles shall be carefully removed from the surfaces by clean, dry compressed air or with an industrial exhauster, such that the particle quantity and particle size do not exceed rating and class 2 according to ISO 8502-3. See dedicate form MOD-QCI-189. Welding slag, splashes oxidation, flux exhalations, fragments or other foreign bodies not eliminated at the assembly stage and found before or during the blast cleaning stages shall be eliminated with a suitable mechanical system, and the edges shall be rounded off. The steel defects (i.e. laminations) found after blast cleaning activities shall be removed. Small areas of defects shall be eliminated by means of suitable instruments like the scraper, otherwise they shall be grinding off and re-blasted again to obtain an acceptable anchor profile in the reference area.

The maximum content of soluble impurities on the blasted surface as sampled using ISO 8502-6 and distilled water, shall not exceed a conductivity measured in accordance with ISO 8502-6 and ISO 8502-9, corresponding to a NaCl concentration of 2 µg/cm2. Results of soluble salt test will be stated on final painting records. Area used to test for soluble salts after blasting shall be re-blast cleaned. Anyway, in case of sub-assembly, this small area can be masked off.

If high level of soluble salts is found, the item/area shall be re-cleaned with water and re-blasted.

Any trace of oil or grease remaining after blast cleaning may be removed with solvents, and the area re-blast cleaned.

The blast cleaned surfaces shall not be washed with acid, cleansing solutions or solvents. Rust-inhibitors shall not be applied.

All blast cleaned surfaces shall be painted before the deterioration of the "grade of cleanliness". In any case, any surface that has been blast-cleaned shall be coated on the same day. Areas which are blast cleaned but not painted (bevels) shall be protected with adhesive tape 5 cm wide.

A minimum of 10 cm shall be left unpainted around the circumference of each blast cleaned surface, unless the adjacent surfaces are already painted.

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10 PAINT APPLICATION

GENERAL

Daily temperature, relative humidity, dew point and surface temperature readings shall be taken at least three times per day, and more frequently when air temperature, dew point, steel temperature and relative humidity are close to the limits.

The readings shall be recorded in the Environmental Conditions Report (see attachment), which shall be made available to the Client's Representative verification upon demand.

Application of painting shall be tested and recorded on the applicable paint application report (see attachment).

The products shall be mixed and handled in ventilated and not dangerous areas.

Paint shall be prepared/mixed in compliance with the MTDS and by competent and trained painting operatives.

Before application, mixed components shall be allowed to complete the Manufacturer's recommended induction time, if necessary.

The amount of thinner added shall always be below the maximum recommended by the Paint Supplier.

Only thinner recommended by paint manufacturer shall be used.

Only appropriate low revolution rotary mixers shall be used for mixing of all paint materials.

Areas to be coated shall be protected from adverse environmental conditions. Coated surfaces shall be protected until such time as the dry film will resist exposure to the prevailing environmental conditions.

No coating shall be applied when the relative humidity is over 85% (90% in case of inorganic zinc silicate).

No coating may be applied when the temperature is lower than + 5°C (41°F) except if permitted by MTDS.

If necessary, in case of extreme environmental conditions, winter products agreed with Company representative could be used.

NOTE: In case of different requirements, stated on MTDS, the latter will prevail.

No application shall be made during foggy, misty, rainy weather or when there is a high probability of variation of weather conditions within two hours after application.

Each coat shall be applied evenly over the entire surface. Drips, bubbles and indentations shall be avoided. If such defects should occur, they shall be immediately brushed off and the surface repainted.

In the case of girders and irregular surfaces, the corners shall be painted first, and then they shall be given an extra coat.

Each coat shall be left to dry for the time specified by paint Supplier prior to the application of each consecutive coat.

If paint requires the addition of catalyst, the applicability period shall be clearly stated on the container label and that time shall not be exceeded.

When the applicability limit is reached, the spray gun shall be emptied, the remaining material discarded and the equipment cleaned and filled with a new mixture.

Paint which has coagulated or otherwise deteriorated during storage shall not be used.

The pot life of all paint shall be carefully noted, and any mixed paint that has exceeded pot life shall be discarded irrespective of apparent condition.

All traces of oil and grease shall be removed with a suitable solvent.

All coats of the coating system shall adhere perfectly to the surface. The thickness of these paint films shall be checked by Contractor's Q.C. Dept; Client's Representative will carry out spot checks for verification with gauges supplied by the Contractor.

Any areas where the film does not conform to the specifications shall be repainted with an extra thickness without extra charge to the Client.

Before the undercoat is applied any surface inaccessible to the spray shall be brush - painted with the same product to the same thickness. Stripe coats shall be applied by brush to all angles, corners, sharp edges, bolts etc. with the same product than this to be applied on the surface to be painted (except inorganic zinc silicates).

In case of zinc ethyl silicate application, the product shall be stirred at all times and if, relative humidity is below 65%, the painted surface shall be sprayed with fresh water after application to enhance curing. Before application of subsequent coat, this primer shall be checked with MEK test as per ASTM D 4752 to ensure that hydrolysis is complete.

Subsequent coats shall be applied in a contrasting shade to previous coats, to ensure 100% coverage as per project specification.

The thickness of each coat shall be checked according to ISO 19840 and recorded.

SPRAY PAINTING

Painting application shall be carried out by airless spray. Painting by means of brush may be used for touch-ups or with regards to hard to reach areas and any times that airless application is not possible to be performed only at CPY discretion.

The equipment used shall be such as to give the performance as specified by the paint Manufacturer for its application. Filters shall always prevent oil or water from entering into the air circuit. Paint containing heavy or metal pigments with a tendency to decant shall be kept in suspension with a mechanical mixer. In case of pressurised container (if used), suitable regulators and measuring devices shall be supplied both for the air sent to the pressurised container as well as for the air sent to the gun. The air shall be regulated to the minimum quantity required to atomise the material. The spray gun shall be kept at a distance of not less than 45 cm and not more than 60 cm from the surface to be painted, and shall always maintain the correct angle to the surface.

Only, parallel passes shall be made with the spray gun.

During the application each pass shall overlap the previous one by approx. 50%.

Exterior surfaces may often be sprayed in two directions (crossing lines).

This is often called the multi - pass method.

Each coat shall be applied evenly and completely over the entire surface.

All drips and spatters shall be brushed off immediately or the paint removed and the surface repainted.

Each coat shall be checked and certified.

BRUSH PAINTING

The brushes used shall be of such shape and quality as to permit good application of the paint. Shall be used for stripe coat, where the spray gun is not efficient. Round and oval brushes are generally considered most suitable for nuts and bolts and irregular textured and pitted surfaces. Wide, flat brushes are suitable for flat surfaces, but shall not be wider than 12.5 cm. The paint shall penetrate into cracks and corners.

SAFETY

Rosetti Marino and the its Painting Sub-contractors shall adhere to local and statutory regulations in respect to personnel safety. In particular, the attention shall be drawn to the potential fire and explosion hazards which may exist due to the presence of solvent vapours or air borne dust, and to the potential dangers to personnel in the vicinity of equipment operating at high nozzle pressure and using materials which may be toxic or irritant to the skin, eyes or lungs. Products containing hormone mimics, lead, cadmium, chromate, mercury or tarry substances shall not be used. Isocyanate based products or products that release di-isocyanates when heated shall not be used. Abrasive shall not contain carcinogenic substances, lead or lead compounds, biological available nickel or more than 1 weight % quartz or crystalline silica.

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11 ADDITIONAL REQUIREMENTS TO EQUIPMENT

The following general requirements are applicable to surface protection of valves, actuators, gearboxes, pumps and motors.

- Handwheels and levers shall be in stainless steel or hot dip galvanised carbon steel. The valves' gearboxes, handwheels and levers top coat colour shall be as follows: Handwheels, levers and gearboxes shall be with system 6A only primer and topcoat complete with RAL 9005. If gearboxes are in carbon steel, system 1 shall be applied.
- Unused threaded bolt holes, etc. shall be plugged or sealed.
- Valves' actuators shall be carbon steel or 316SS complete with system 1 and system 6A respectively. Topcoat colour shall be RAL 9002 white.

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12 TOUCH-UPS APPLICATION PROCEDURE

DAMAGE WITHOUT BARE METAL EXPOSURE

The damaged area shall be washed with solvent to remove all contamination and left to dry.

The paint adjacent to the damaged part shall be rounded off using sanding disks to assure the continuity of the repaired area.

The repair system shall be applied on the treated areas above described.

DAMAGE WITH BARE METAL EXPOSURE

The damaged area shall be cleaned in the same way as originally or, in the case of confined areas, by using sanding disks; the entire system shall be re-applied on the surface.

The cleaning shall be extended to the well-painted area; it shall penetrate not less than one inch into that area all around, and the edges shall be rounded off using sanding disks.

With regards to small bare metal repair, MBX Bristle Blaster may be used as a recommended tool if agreed by the Company.

HOT DIP GALVANIZED DAMAGE

The damages on hot dip galvanised surfaces to be painted shall be repaired with zinc rich epoxy before to proceed with dedicated coating system.

DEFECTS

Any defects shall be repaired before the application of further coats. For any major defects, the paint shall be removed completely by abrasive blast cleaning and the entire system shall be re-applied. In case of minor defects, the paint shall be removed by localized blast cleaning or localized power tool cleaning, and the repair system shall be applied. In any case, the edges of the surrounding coating shall be feathered back about 50 mm.

Minor defects are surface areas generally <100 cm2 or to be agreed with CPY case by case.

FIELD WELD JOINT LINES

In general the field weld joint lines areas will be covered and/or protected for creating a dedicated micro-climate ambient. After mechanical, welding activities and NDE phase the area shall be cleaned, blasted (if possible) and painted (touch-up).

In particular:

- Bare metal area: blasting at the grade stated on dedicated paint systems with garnet or similar + coating application as per painting requirements.
- Previous painted area: sandpapering or, if possible, sweep blasting (100 mm) + coating application up to required DFT.

The preferred method to be used is blasting and sweep blasting but in some particular circumstances could be impossible perform this operations. In these cases we can use hand or power tool cleaning for surface

reparation but in any case will be agreed with the Company representative. The conditions of the surfaces shall comply with grade St3 according to ISO 8501-1 unless otherwise stated on MTDS.

13 QUALIFICATION REQUIREMENTS

PRE-QUALIFICATION OF PRODUCTS

Products shall be pre-qualified according to the requirements stated in Company specification.

QUALIFICATION OF PERSONNEL

Paint operators qualification

Please see the Company System Procedure IDL-QCI-17 "Corrosion Prevention Personnel Qualification Procedure", applicable revision.

Qualification of supervisors, foremen and QC personnel

Personnel carrying out inspection or verification shall be qualified in accordance with NS 476, Inspector level II, Certified NACE Coating Inspector Level II or equivalent.

Supervisors and foremen should be qualified to tradesman level.

QUALIFICATION OF COATING PROCEDURE (CPT)

Selected coating systems shall be applied on test plates representative of the structure to be painted.

The system shall be applied in the presence of the Supplier of the paint and the Company representative, in realistic conditions likely to be present during the work at the construction site.

Inspection and testing requirements for the CPT, including acceptance criteria, shall be as given on the applicable project ITP.

The surface finish on the CPT area, and quality of the work, shall be used as a reference with respect to the quality of the work to be done during further production work.

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14 INSPECTIONS AND TESTS

Inspections and tests are planned and carried-out in accordance with the applicable project ITP (document number: 123A90-PML-QHSE-ITP-00074).

15 COATING SYSTEMS AND DECORATION COLOUR TABLES

Application	NORSOK CSDS Number	IOGP Number	Coating Type	Notes
Structural items				
Structural carbon steel with max. operating T < 120 °C	System 1		System 1: Zinc Rich Primer, min. 3 coats	-
Walkways, escape routes and lay down areas	System 4	-	System 4: Non-skid epoxy screed	
Transition Piece, Caisson	System 7A		System 7A: 2 coat two component epoxy.	
Structural carbon steel with max. operating T ≤ 80 °C in internal and fully dry and ventilated areas	System 8 Note: Manufacturer Standard coating system may be used		System 8: 1 coat two component epoxy, or Zinc rich epoxy + epoxy tie coat	-
Pressure vessels, equipment, piping and valves				
CS with max. operating T < 120°C, exteriors of equipment, vessels, piping	System 1		System 1: Zinc Rich Primer, min. 3 coats	-
CS, insulated surfaces of tanks, vessels, piping		System 1D	System 1D: Epoxy, Epoxy phenolic, Epoxy novolac	-
316/316L SS below 50°C, non-insulated	Coating not required	Coating not required	-	-
316/316L SS above 50°C, non-insulated	System 6A		System 6A: Epoxy primer + two component epoxy + topcoat	-
316/316L SS below 150°C, insulated	System 6C		System 6C: 2 coats epoxy phenolic (Epoxy, Epoxy phenolic, Epoxy novolac)	-

AREA DESCRIPTIONS	NORSOK M-501 COATING SYSTEM
All steel structural top and transition deck and Transition Piece	1
Lower part of the deck below 17.050 m, CS structure for bases and equipment structure	1
Solid sheet metal decks for walkways, escape routes and installation areas (1)	4
CS, insulated surfaces of tanks, vessels, piping	1D
Handrails and stairs in galvanized carbon steel	6B
C.S. Pipelines, valves, tanks, tanks, machinery, pumps, equipment and all types of enclosures, panels, etc. up to operating temperature of 120°C uninsulated.	1
Caisson (external side)	7A
Caisson (internal side)	7B
316SS/316L SS piping, valves, tanks, tanks, machinery pumps, equipment insulated at less than 150°C.	6C
316SS/316L SS piping, valves, tanks, tanks, machinery, pumps, equipment and all types of non-insulated fences, panels, etc.	6A
Sea water tank, external side	1
Sea water tank, internal side	As per STD manufacturer
Atmospheric Vent	1
All casing (external) panels and cabinets made of carbon steel	1 (2)
HVAC 316SS(3)	N/A
CS surfaces in dry and ventilated areas, including emergency living quarters	8
Internal walls and ceilings covered with panels, insulation or protective sheets	8

Note

1. Galvanized carbon steel grating without coating to be used for walkways.

2. Qualified manufacturers' standards according to Ref. (4) NORSOK M-501

3. All interior and exterior 316SS HVAC ducts with or without insulation must be bare.

4. All types of external enclosures and panels in 316SS, if painted, to be with system 6A (one primer and one topcoat consisting of 50µm epoxy primer and 75µm topcoat = min DFT 125µm, or Manufacturer standard qualified for off-shore environmental.

COATING SYSTEMS DETAILS

Coating System 1: blasting to Sa $2^{1/2}$ according to ISO 8501-1 and Roughness Grade Medium G according to ISO 8503.

Primer coat	Intermediate coat	Topcoat
Name of product: Jotun Barrier 80S 1 x 60 microns	Name of product: Jotun Penguard Universal 1 x 190 microns	Name of product: Jotun Hardtop XP 1 x 50 microns
Total minimum DFT	300 microns	

Coating System 4: blasting to Sa $2^{1/2}$ according to ISO 8501-1 and Roughness Grade Medium G according to ISO 8503.

Primer coat	Intermediate coat	Topcoat + Aggregate
Name of product: Jotun Jotamastic AL 1 x 150 microns	Name of product: Jotun Jotamastic AL 1 x 150 microns	Name of product: Jotun Jota Armour 1 x 1000 microns
Total DFT	1300 microns	

Coating System 6A - 6B: sweep blasting with non-metallic chloride free grit to obtain anchor profile of approximately 25 to 85 microns.

Primer coat	Intermediate coat	Topcoat
Name of product: Jotun Penguard Primer Red 1 x 50 microns	Name of product: Jotun Penguard Universal 1 x 100 microns	Name of product: Jotun Hardtop XP 1 x 60 microns
Total minimum DFT	210 microns	

Coating System 6C: sweep blasting with non-metallic chloride free grit to obtain anchor profile of approximately 25 to 85 microns.

Primer coat	Topcoat
Name of product: Jotun Epoxy HR Alluminum	Name of product: Jotun Epoxy HR Grey

1 x 125 microns	1 x 125 microns
Total minimum DFT	250 microns

Coating System 7A: blasting to Sa $2^{1/2}$ according to ISO 8501-1 and Roughness Grade Medium G according to ISO 8503.

Primer coat	Topcoat
Name of product: Jotun Penguard Pro GF, off-white 1 x 300 microns	Name of product: Jotun Penguard Pro GF, Yellow 1 x 300 microns
Total minimum DFT	600 microns

Coating System 7B: blasting to Sa $2^{1/2}$ according to ISO 8501-1 and Roughness Grade Medium G according to ISO 8503.

Primer coat	Topcoat
Name of product: Jotun Penguard Pro GF, off-white 1 x 200 microns	Name of product: Jotun Penguard Pro GF, Yellow 1 x 200 microns
Total minimum DFT	400 microns

Coating System 8: blasting to Sa $2^{1/2}$ according to ISO 8501-1 and Roughness Grade Medium G according to ISO 8503.

Primer coat	Topcoat (where specific colour is required)
Name of product: Jotun Penguard Universal, Aluminium 1 x 150 microns	
Total DFT	150 microns

APPLICABLE FOR ITEMS	COLOR	RAL NUMBER
Electric crane, hoists, actuator, electric motors, pumps, generators	GREY	RAL 7038
All structural steel, tanks, valves, machinery, equipment, shoes/sockets, H_2 vessel.	WHITE	RAL 7035
Uninsulated piping	GREY	RAL 9002

Galvanized handrails for Upper and Lower Deck structure	YELLOW	RAL 1023
Galvanized handrails for Transition Piece Stairs, South Side and North Side Stairs.	YELLOW	RAL 1023
Escape routes (if marked with paint or clips yellow RAL 1023)	GREEN	RAL 6002
Temporary structure and Lifting lugs	YELLOW	RAL 1023
Hazard areas	BLACK / YELLOW	RAL 9017 / 1016
Technical room	GREY	RAL 7035
All external and internal casings (if painted for CS)	GREY	RAL 7035
Transition Piece	YELLOW	RAL 1023

Note:

1. Lifting devices must be painted yellow.

3. All instrument control rooms must be equipped with a non-slip screed.

16 REPORTING

The painting activities reporting will be made up of the Environmental Conditions Report and of all Painting Application Reports. (See attachments)

Attachment 1: Paint application report

ROSETTI MARINO	**PAINT APPLICATION REPORT** **COMPANY:** **PROJECT:** **JOB:**

Document number:	Pages:
Item description:	Applicable Procedure:
Issued by:	Issue date:
Applicable ITP:	Reference DWG:

SURFACE PREPARATION					
Steel preparation:			Surface degreasing:		
Abrasive type & mesh:			Anchor Profile recorded [µm]:		
Steel Surface cleanliness:			Test for soluble salts [mg/m²]	Actual value:	
Dust test assessment:				Max acceptable value:	
Weather conditions:	Date & time:	Air temperature °C:	Relative humidity %:	Dew point °C:	Surface temperature °C:

Coating System Nº	Paint manufacturer:				REMARKS
	1) First Coat	2) Second Coat	3) Third Coat	4) Fourth coat	
Application date:					
Product name:					
Batch number Part A:					
Expiration date:					
Batch number Part B:					
Expiration date:					
Color:					
Application method:					
Start / Stop time:					
Air temperature:					NOTES
Surface temperature:					
Dew point:					
Relative humidity:					
Wet film thickness:					
DFT Min/Max/Av [µm]:					
Inspection date & time:					
Holiday testing: Performed ☐ Not Performed ☐ Result: OK ☐ Not OK ☐				Adhesion testing:	

EQUIPMENT		
TYPE	S. NUMBER	EXPIRE DATE

RESULT: **CONFORMING** ☐ **NOT CONFORMING** ☐

	Applicator	QC Rosetti Marino	Client/Company	IVB
Name				
Sign				

Attachment 2: Dust Assessment report

ROSETTI MARINO	DUST ASSESSMENT REPORT COMPANY: PROJECT: JOB:

Attachment number:	Performed by:

DUST ASSESSMENT IN ACCORDANCE WITH ISO 8502-3

Test 1	
Test 2	
Test 3	
Test 4	

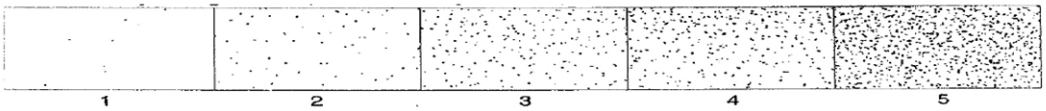
ACCEPTABLE VALUES

Dust particle size:	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Dust quantity rating:	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

ACTUAL VALUES

Dust particle size:	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Dust quantity rating:	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

REFERENCE VALUES OF DUST QUANTITY RATING



RESULT: **CONFORMING** ☐ **NOT CONFORMING** ☐

	Applicator	MTR	QC Rosetti Marino	Client/Company
Name				
Sign				

MOD-QCI-189 Rev. 00 del 26.01.2011

Attachment 3: Environmental conditions report

MOD-QCI-10, rev. 1 del 01/06/2006

ROSETTI MARINO	RILEVAMENTO CONDIZIONI AMBIENTALI ENVIRONMENTAL CONDITIONS REPORT			N°		
Settimana – Week n°	Condizioni interne - Indoor conditions			Condizioni esterne - Outdoor conditions		
Data – Date	Ore 8.00	Ore 13.00	Ore 17.00	Ore 8.00	Ore 13.00	Ore 17.00
Condizioni atmosferiche Weather conditions						
Temperatura ambiente (°C) Ambient temperature						
Temperatura item (°C) Item point						
Punto di rugiada (°C) Dew point						
Umidità relativa Relative humidity						
Q.C. ROSETTI						
Data – Date	Ore 8.00	Ore 13.00	Ore 17.00	Ore 8.00	Ore 13.00	Ore 17.00
Condizioni atmosferiche Weather conditions						
Temperatura ambiente (°C) Ambient temperature						
Temperatura item (°C) Item point						
Punto di rugiada (°C) Dew point						
Umidità relativa Relative humidity						
Q.C. ROSETTI						
Data – Date	Ore 8.00	Ore 13.00	Ore 17.00	Ore 8.00	Ore 13.00	Ore 17.00
Condizioni atmosferiche Weather conditions						
Temperatura ambiente (°C) Ambient temperature						
Temperatura item (°C) Item point						
Punto di rugiada (°C) Dew point						
Umidità relativa Relative humidity						
Q.C. ROSETTI						
Data – Date	Ore 8.00	Ore 13.00	Ore 17.00	Ore 8.00	Ore 13.00	Ore 17.00
Condizioni atmosferiche Weather conditions						
Temperatura ambiente (°C) Ambient temperature						
Temperatura item (°C) Item point						
Punto di rugiada (°C) Dew point						
Umidità relativa Relative humidity						
Q.C. ROSETTI						
Data – Date	Ore 8.00	Ore 13.00	Ore 17.00	Ore 8.00	Ore 13.00	Ore 17.00
Condizioni atmosferiche Weather conditions						
Temperatura ambiente (°C) Ambient temperature						
Temperatura item (°C) Item point						
Punto di rugiada (°C) Dew point						
Umidità relativa Relative humidity						
Q.C. ROSETTI						
Data – Date	Ore 8.00	Ore 13.00	Ore 17.00	Ore 8.00	Ore 13.00	Ore 17.00
Condizioni atmosferiche Weather conditions						
Temperatura ambiente (°C) Ambient temperature						
Temperatura item (°C) Item point						
Punto di rugiada (°C) Dew point						
Umidità relativa Relative humidity						
Q.C. ROSETTI						

Attachment 3: Adhesion test report

ROSETTI MARINO	**ADHESION TEST REPORT** **COMPANY:** **PROJECT:** **JOB:**

Document number:	Location:	
Performed by:	Date:	Time:
Applicable ITP:	Attachment number:	

Method:	
Equipment:	
Adhesive used:	
Min accept Value [MPa]:	Date of last coat applied:
Coating system:	Paint Manufacturer:

Result			
Dolly number	DFT [microns]	Strength [MPa]	Failure Description

Remarks	Legend
	A: Substrate
	B: First coat
	C: Second coat
	D: Third coat
	E: Fourth coat
	F: Glue
	G: Dolly

RESULT: **CONFORMING** ☐ **NOT CONFORMING** ☐

	Applicator	QC Rosetti Marino	Client/Company	IVB
Name				
Sign				

MOD-QCI-190 Rev. 00 del 26.01.2011

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Jotspec

Technical specification

Hollandse Kust Noord Offshore Wind Farm - Crosswing



EPC:		**Name:**	Baseload Power Hub		
Client:	Crosswing	**Unit ID:**		**Sub contr:**	Rosetti Marino
Cons/Eng:		**Version:**	1	**Date:**	08/01/2024
Project:	Hollandse Kust Noord Offshore Wind Farm - Crosswing				
Prepared by:	Angelo Susani - Jotun Coatings				

Summary

Project	Hollandse Kust Noord Offshore Wind Farm - Crosswing	**Prepared by**	Angelo Susani - Jotun Coatings		
Customer	Crosswing	**Approved by**	Angelo Susani	**Version**	1
Location	18.5 km off the coast of the province of North Holland.			**Date**	08/01/2024

The paint specification(s) include(s) the following positions and areas

Position	**Area m²**
001 (Norsok) Structures	15900
004 (Norsok) Walkways, escape routes and lay down areas	440
006A (Norsok) Piping	660
006C (Norsok) Piping	100
007A (Norsok) Splash Zone	400
007B (Norsok) Submerged	100
008 (Norsok) Structural carbon steel with max. operating temperature ≤80ºC	100
Total	

Technical specification

Project	Hollandse Kust Noord Offshore Wind Farm - Crosswing	**Prepared by**	Angelo Susani - Jotun Coatings		
Customer	Crosswing	**Approved by**	Angelo Susani	**Version**	1
Location	18.5 km off the coast of the province of North Holland.			**Date**	08/01/2024

Position	**001 (Norsok) Structures**			**ISO 12944-2 category**	N/A
Substrate	Carbon Steel			**Area** 15900 m²	**No.** 1
Surface Prep.	Surfaces to be coated shall be degreased to ISO 12944-4, Part 6.1.4 Alkaline Cleaning, and abrasive blast cleaned to Sa 2½ (ISO 8501-1) with a minimum surface profile 50 µm, grade Fine to Medium G, Ry5 (ISO 8503-2).				

Product	Type of coat	Area to paint %	Vol. solids %	Filmthickness (µm)		Loss (%)	Recoating intervals						Thinner		Consumption (l)	
							10°C		23°C		40°C					
				Dry spec.	Wet spec.		Min	Max	Min	Max	Min	Max	No.	Max %	Theor.	Practical
BARRIER 80 S, GREY	FC	100	67	60	90	30	3 h	*	2 h	*	40 min	7 d	17	5	1424	2034
PENGUARD UNIVERSAL,GREY	FC	100	72	190	264	30	7 h	20 d	4 h	14 d	2 h	10 d	17	5	3533	5047
HARDTOP XP RAL 9002	FC	100	63	50	79	30	14 h	*	7 h	*	4 h	*	10	5	1514	2163
			Total	300												

Remarks:

Technical specification

Project	Hollandse Kust Noord Offshore Wind Farm - Crosswing	**Prepared by**	Angelo Susani - Jotun Coatings		
Customer	Crosswing	**Approved by**	Angelo Susani	**Version**	1
Location	18.5 km off the coast of the province of North Holland.			**Date**	08/01/2024

Position	**004 (Norsok) Walkways, escape routes and lay down areas**			**ISO 12944-2 category**	N/A
Substrate	Carbon Steel			**Area** 440 m²	**No.** 2
Surface Prep.	Surfaces to be coated shall be degreased to ISO 12944-4, Part 6.1.4 Alkaline Cleaning, and abrasive blast cleaned to Sa 2½ (ISO 8501-1) with a minimum surface profile 50 µm, grade Medium G, Ry5 (ISO 8503-2).				

Product	Type of coat	Area to paint %	Vol. solids %	Filmthickness (µm)		Loss (%)	Recoating intervals						Thinner		Consumption (l)	
							10°C		23°C		40°C					
				Dry spec.	Wet spec.		Min	Max	Min	Max	Min	Max	No.	Max	Theor.	Practical
JOTAMASTIC 80,ALUMINIUM	FC	100	80	150	188	30	24 h	*	10 h	*	4 h	*	17	5	83	118
JOTAMASTIC 80,ALUMINIUM	FC	100	80	150	188	30	24 h	3 mth	10 h	3 mth	4 h	2 mth	17	5	83	118
JOTA ARMOUR,STD 038 GREY	FC	100	90	1000	1111	30	28 h	*	14 h	*	6 h	*	17	5	489	698
			Total	1300												

Remarks:

Technical specification

Project	Hollandse Kust Noord Offshore Wind Farm - Crosswing	**Prepared by**	Angelo Susani - Jotun Coatings		
Customer	Crosswing	**Approved by**	Angelo Susani	**Version**	1
Location	18.5 km off the coast of the province of North Holland.			**Date**	08/01/2024

Position	**006A (Norsok) Piping**			**ISO 12944-2 category**	N/A
Substrate	Stainless steel			**Area** 660 m²	**No.** 3
Surface Prep.	Sweep blasting with non-metallic and chloride free grit to obtain anchor profile of approximately 25 µm to 85 µm.				

Product	Type of coat	Area to paint %	Vol. solids %	Filmthickness (µm)		Loss (%)	Recoating intervals						Thinner		Consumption (l)	
							10°C		23°C		40°C					
				Dry spec.	Wet spec.		Min	Max	Min	Max	Min	Max	No.	Max	Theor.	Practical
PENGUARD PRIMER,RED	FC	100	51	50	98	30	8 h	3 mth	4 h	3 mth	3 h	2 mth	17	5	65	92
PENGUARD UNIVERSAL,GREY	FC	100	72	100	139	30	7 h	20 d	4 h	14 d	2 h	10 d	17	5	92	131
HARDTOP XP, RAL 6002 & 1023	FC	100	63	60	95	30	14 h	*	7 h	*	4 h	*	10	5	63	90
			Total	210												

Remarks:

Technical specification

Project	Hollandse Kust Noord Offshore Wind Farm - Crosswing	**Prepared by**	Angelo Susani - Jotun Coatings		
Customer	Crosswing	**Approved by**	Angelo Susani	**Version**	1
Location	18.5 km off the coast of the province of North Holland.			**Date**	08/01/2024

Position	**006C (Norsok) Insulated Piping**			**ISO 12944-2 category**	N/A
Substrate	Stainless Steel			**Area**	100 m² **No.** 4
Surface Prep.	Sweep blasting with non-metallic and chloride free grit to obtain anchor profile of approximately 25 µm to 85 µm.				

Product	Type of coat	Area to paint %	Vol. solids %	Filmthickness (µm)		Loss (%)	Recoating intervals						Thinner		Consumption (l)	
							10°C		23°C		40°C					
				Dry spec.	Wet spec.		Min	Max	Min	Max	Min	Max	No.	Max	Theor.	Practical
EPOXY HR, ALUMINIUM	FC	100	63	125	198	30	26 h	21 d	10 h	7 d	4 h	3 d	23	5	20	28
EPOXY HR, LIGHT GREY	FC	100	63	125	198	30	26 h	*	10 h	*	4 h	*	23	5	20	28
			Total	250												

Remarks:

Technical specification

Project	Hollandse Kust Noord Offshore Wind Farm - Crosswing	**Prepared by**	Angelo Susani - Jotun Coatings		
Customer	Crosswing	**Approved by**	Angelo Susani	**Version**	1
Location	18.5 km off the coast of the province of North Holland.			**Date**	08/01/2024

Position	**007A (Norsok) Splash Zone**			**ISO 12944-2 category**	N/A
Substrate	Carbon Steel			**Area** 400 m²	**No.** 5
Surface Prep.	Surfaces to be coated shall be degreased to ISO 12944-4, Part 6.1.4 Alkaline Cleaning, and abrasive blast cleaned to Sa 2½ (ISO 8501-1) with a minimum surface profile 50 µm, grade Medium G, Ry5 (ISO 8503-2).				

Product	Type of coat	Area to paint %	Vol. solids %	Filmthickness (µm)		Loss (%)	Recoating intervals						Thinner		Consumption (l)	
							10°C		23°C		40°C					
				Dry spec.	Wet spec.		Min	Max	Min	Max	Min	Max	No.	Max	Theor.	Practical
PENGUARD PRO GF,OFF-WHITE	FC	100	75	300	400	30	16 h	14 d	4 h	14 d	3 h	14 d	17	5	160	229
PENGUARD PRO GF, YELLOW	FC	100	75	300	400	30	16 h	*	4 h	*	3 h	*	17	5	160	229
			Total	600												

Remarks:

Technical specification

Project	Hollandse Kust Noord Offshore Wind Farm - Crosswing	**Prepared by**	Angelo Susani - Jotun Coatings		
Customer	Crosswing	**Approved by**	Angelo Susani	**Version**	1
Location	18.5 km off the coast of the province of North Holland.			**Date**	08/01/2024

Position	**007B (Norsok) Submerged**			**ISO 12944-2 category**	N/A
Substrate	Carbon Steel			**Area** 100 m²	**No.** 6
Surface Prep.	Surfaces to be coated shall be degreased to ISO 12944-4, Part 6.1.4 Alkaline Cleaning, and abrasive blast cleaned to Sa 2½ (ISO 8501-1) with a minimum surface profile 50 µm, grade Medium G, Ry5 (ISO 8503-2).				

Product	Type of coat	Area to paint %	Vol. solids %	Filmthickness (µm)		Loss (%)	Recoating intervals						Thinner		Consumption (l)	
							10°C		23°C		40°C					
				Dry spec.	Wet spec.		Min	Max	Min	Max	Min	Max	No.	Max	Theor.	Practical
PENGUARD PRO GF,OFF-WHITE	FC	100	75	175	233	30	16 h	14 d	4 h	14 d	3 h	14 d	17	5	23	33
PENGUARD PRO GF, YELLOW	FC	100	75	175	233	30	16 h	*	4 h	*	3 h	*	17	5	23	33
			Total	350												

Remarks:

Technical specification

Project	Hollandse Kust Noord Offshore Wind Farm - Crosswing	**Prepared by**	Angelo Susani - Jotun Coatings		
Customer	Crosswing	**Approved by**	Angelo Susani	**Version**	1
Location	18.5 km off the coast of the province of North Holland.			**Date**	08/01/2024

Position	**008 (Norsok) Structural carbon steel with max. operating temperature ≤80ºC**		**ISO 12944-2 category**		N/A
Substrate	Carbon Steel		**Area**	100 m² **No.**	7
Surface Prep.	Surfaces to be coated shall be degreased to ISO 12944-4, Part 6.1.4 Alkaline Cleaning, and abrasive blast cleaned to Sa 2½ (ISO 8501-1) with a minimum surface profile 50 µm, grade Medium G, Ry5 (ISO 8503-2).				

Product	Type of coat	Area to paint %	Vol. solids %	Filmthickness (µm)		Loss (%)	Recoating intervals						Thinner		Consumption (l)	
							10°C		23°C		40°C					
				Dry spec.	Wet spec.		Min	Max	Min	Max	Min	Max	No.	Max	Theor.	Practical
PENGUARD UNIVERSAL, ALUMINIUM	FC	100	72	150	208	30	7 h	*	4 h	*	2 h	*	17	5	17	24
			Total	150												

Remarks:

* please refer to the relevant technical datasheets and AG application guide for recoating and curing conditions

NR: Not recommended for this exposure or generic type:

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