

 ISOICO	 PETROPARS	SOUTH PARS GAS FIELD DEVELOPMENT PHASE 11 EPCI Contract for Topside, Ancillaries and Tripods (SP11A)	 N.I.O.C. Pars Oil & Gas Company
SP11-10-D-21-4-021-D4	Specification for Painting & Coating		Page 1 of 12 Class: 2

Specification for Painting & Coating

D4	Approved for Construction	03.May.2025	A. Nouri Delavar	M.Karimi	SH. Afsharpanah	K. Mehrdadi	
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			ENGINEER			CONTRACTOR	

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Appendix B: Internal protection of equipment by painting

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1. INTRODUCTION

1.1 General

The South Pars field is located in the Persian Gulf approximately 130 km South West of Assaluyeh and 175km West of Kish Island. The South Pars Phase 11 development facilities comprise 2 wellhead platforms named SP11A and SP11B and located around 70m water depth, two 32" sea lines associated with their 4" piggy-back returned lines, exporting the gas to the existing onshore plants. The Phase 11 development of the South Pars gas field (SP11A and SP11B) is designed for a production of 2000 MMSCFD of reservoir fluid (1000 MMSCFD for each SP11A and SP11B).

The development of SP11A is based on new 15 slots Wellhead platform and sea-line. The sea-line from SP11A Wellhead Platform (SPD11A) will send SP11A production to SP12 onshore facilities in TOMBAK via the 32" sea line. When the field starts to be depleted, a compression phase will be implemented (out of Project SOW).

In addition to the wellhead platform (SPD), a Relief platform (RP), equipped with a vertical Flare, will be connected by 2 bridges (BR1 & BR2) to the SP11A platform for personnel access. One Bridge Support Platform (BSP), supports the two bridges that allow access from SPD to RP. Typically, The SP11A Platform consists of:

1. The wellhead platform dedicated to drilling with a jack-up rig. [SPD]
2. The Relief platform, which is equipped with a vertical Flare. [RP]
3. The Bridge Support Platform [BSP]
4. The two Bridges, which connect SPD to RP through BSP [BR1, BR2]

Iran Shipbuilding & Offshore Industries Complex Co. known as ISOICO (CONTRACTOR) has been awarded to conduct and to perform the Engineering, Procurement, Supply, Fabrication, Construction, Load Out, Sea Fastening, Transportation and Installation of the SP11A Wellhead topside, ancillaries and Tripods and the commissioning of installed equipment on it, hereinafter referred to as "Project".

Scope of SLT International (ENGINEER) involvement in the Project is detail design engineering and procurement engineering services.

1.2 Purpose of the Document

This Specification defines the technical requirements for the execution of painting works of The SP11A gas field.

This specification does not cover painting systems for temporary equipment or equipment with design life less than 10 years, and for which alternative painting systems shall be submitted to Company for approval.

This document is intended to be applied to the coating of new work and the repair and maintenance of existing coating system in service.

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1.3 Key Definitions

OWNER	National Iranian Oil Company (NIOC) Pars Oil and Gas Company (POGC)
COMPANY	Petropars Ltd. (PPL)
CONTRACTOR	Iran Shipbuilding & Offshore Industries Complex Co. (ISOICO)
ENGINEER	SLT International;
VENDOR	Shall be considered to be synonymous with the term SUPPLIER as defined below
SUPPLIER	Firm or corporation who submit a quotation for the supply of the equipment
PURCHASER	Party who receives the quotation from the SUPPLIER

1.4 Abbreviations

AFC	Approved For Construction;
CA	Certifying Authority;
CRS	Comment Response Sheet;
IDC	Inter Discipline Check;
IFA	Issued For Approval;
IFR	Issued For Review;
DC	Document Controller;
EM	Engineering Manager;
EDMS	Engineering Document Management System;
LE	Lead Engineer;
PM	Project Manager;
QA	Quality Assurance;
SOW	Scope Of Work;
TBA	To Be Advised;
TBC	To Be Confirmed;
WHP	Well Head Platform;

1.5 References

The following listed documents are considered as references for preparation of this document

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1.5.1 Codes, Standards and Normative Documents

- [1] [CAP 437](#) [Standards for offshore helicopter landing areas](#)

1.5.2 Project References

- [2] Specification for the Supply of Certificates, Marking & Color Coding SP11-10-D-20-4-062-D1
- [3] SPD11A Helideck Marking Plan SP11-23-D-23-8-093

1.5.3 TOTAL References

- [4] GS COR 350 (rev.13, 2016) External protection of off-shore and coastal structures and equipment painting
- [5] GS COR 352 (rev.12, 2015) Internal protection of equipment painting

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2. FACILITY DESCRIPTION

The SP11A gas field shall be developed to produce 1000 MMSCFD reservoir fluid to supply gas to Tombak (SP 12 part) with a 32" export pipeline.

The SPD11A wellhead platform consist of a four-legged jacket substructure and a topside consist of a truss-framed structure. Facilities to be designed during the engineering phase are as follows.

2.1 Jacket Tripods

Tripods facilities to be installed at SP11A location are as follows:

- Tripod support structure for Bridge Support Platform, including piling (BSP11A);
- Tripod support structure for Flare Support Platform, including piling (RP11A);

2.2 Topside and ancillaries

A brief description of topside facilities to be installation at SPD11A location is as follows:

- 1) One WHP (SPD11A) with 15 slots; with below main equipment:
 - Well Heads;
 - Production/Test manifold;
 - Test separator;
 - Export metering system;
 - Scraper launcher;
 - HP relief KO drum;
 - Closed drain/LP flare drum;
 - Open drain system;
- 2) Associated utilities (Diesel, MEG, Methanol, KHI, Chemicals, Nitrogen, Fresh Water);
- 3) One Relief Platform (RP), including deck and flare tower, installed on the RP11A being connected by bridge to BSP11A;
- 4) One Deck installed on the BSP11A, being connected by bridges to the wellhead platform and RP11A;
- 5) Two bridges connecting SPD11A to BSP11A and BSP to RP11A;

2.3 Onshore Facilities

An Onshore Facility after sealine onshore tie-in that includes:

- Valve station;
- Pig Receiver;
- Onshore pipeline to Phase 12 Plant;
- ICSS and Telecommunication

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3. GENERAL NOTES

The following general notes to be considered in addition to the requirements of the above-mentioned Company Specifications:

- In addition to section of 4.1 of GS COR 350 (the items that should not be painted), Submerged section shall not be painted as well.
- In the section 6, In the absence of an approved organization that must certify the operators, the following minimums should be considered:
- Blasters shall have minimum 5 years' experience in blasting job. He shall understand abrasive types, size and know Nuzzle size, angle according surface and distance of surface also. He shall understand minimum and maximum pressure of Nuzzle and hand signs.
- Helper shall have minimum 2 years' experience in this job and understand hand signs.
- Painters shall have minimum 8 years' experience in painting job. He shall understand paint types, nuzzle size, Pump pressure, mixing and thinning of paint, interval time and etc. He shall understand meaning of paint data sheet and application procedures.
- In the event of conflict between this general procedure on application and the manufacturer's specification, the same shall be immediately brought to the notice of the Client. Generally, in cases of such conflicts, manufacturer's specifications/recommendations shall prevail.
- In the event of any conflict between this specification and the requirements of any of the standards/codes and/or publication referred, the requirements of this specification shall prevail.
- In case of conflict between generic name and product name, Generic name of the paint for the specified services shall be considered final.

3.1 Heliport Marking Requirement

The background color of the heliport surface is dark green, gray, or a color approved by the organization, all of which must be dark and not reflect light into the pilot's eyes[1].

No-fly zone (if necessary) due to the unauthorized height of obstacles within an angle of 150 degrees and within the heliport area: Red hatching on the heliport surface in a suitable location and in a limited manner, minimum width 30 cm and maximum 50 cm, design angle 45 degrees[1].

All sizes and writings on the heliport surface are in accordance with the figure 1. Installation of warning signs and signs such as smoking, danger, exit, traffic area, etc., in required locations[1].

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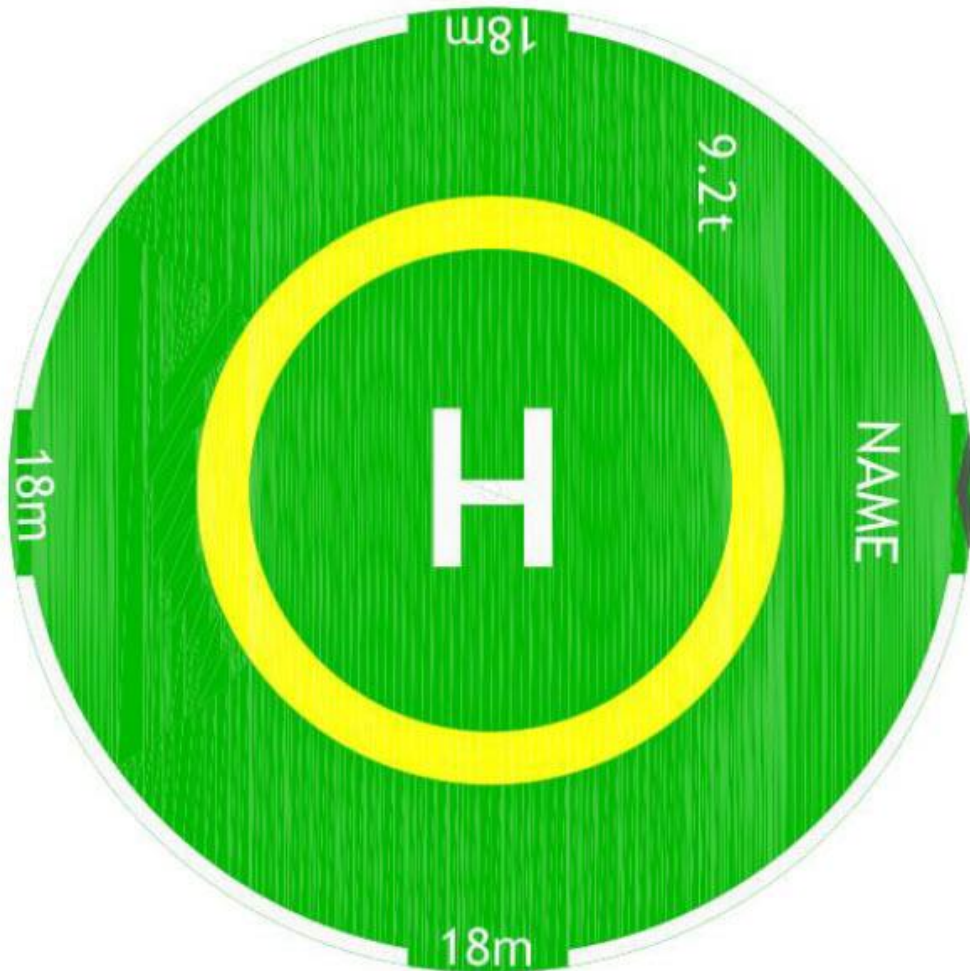


Figure1. Required sizes and writings on the heliport surface[1].

3.2 Final coat color

The final coat colors of all equipment and platform areas shall be as Table 1. Colors required to identify particular material types for piping are as indicated in Specification for the Supply of Certificates, Marking & Color Coding (SP11-10-D-20-4-062-D1)[2].

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Table1. The final coat colours of all equipment and platform areas

<u>1</u>	<u>Pipework</u>	<u>WHITE</u>
<u>2</u>	<u>Battery Rack</u>	<u>BLACK</u>
<u>3</u>	<u>All structural steel below tidal range including casing</u>	<u>BROWN (splash zone)</u>
<u>4</u>	<u>Internal flooring of equipment enclosures</u>	<u>BROWN RED</u>
<u>5</u>	<u>Floors, decks and walkways</u>	<u>BROWN RED</u>
<u>6</u>	<u>Doors</u>	<u>GREEN</u>
<u>7</u>	<u>Helideck Surface</u>	<u>GREEN</u>
<u>8</u>	<u>First Aid Box</u>	<u>GREEN</u>
<u>9</u>	<u>Control Panels</u>	<u>LIGHT GREY</u>
<u>10</u>	<u>Pumps and Motors</u>	<u>LIGHT GREY</u>
<u>11</u>	<u>Skids and Packages</u>	<u>LIGHT GREY</u>
<u>12</u>	<u>Main Generator Package</u>	<u>LIGHT GREY</u>
<u>13</u>	<u>Emergency Generator Package</u>	<u>LIGHT GREY</u>
<u>14</u>	<u>Compressor Enclosure</u>	<u>LIGHT GREY</u>
<u>15</u>	<u>Control Panels</u>	<u>LIGHT GREY</u>
<u>16</u>	<u>Switchgear</u>	<u>LIGHT GREY</u>
<u>17</u>	<u>Transformers</u>	<u>LIGHT GREY</u>
<u>18</u>	<u>Switchgear changes to LV Switchgear, DC Charger Panels, AC UPS panels</u>	<u>LIGHT GREY</u>
<u>19</u>	<u>Fire pump enclosures: External walls</u>	<u>RED</u>
<u>20</u>	<u>Firefighting equipment and piping</u>	<u>RED</u>
<u>23</u>	<u>Pedestal cranes (moving parts)</u>	<u>RED/WHITE Stripes</u>
<u>24</u>	<u>Drilling derricks and big radio tower</u>	<u>RED/WHITE stripes</u>
<u>25</u>	<u>Flare (excepted top of flare to be aluminum)</u>	<u>RED/WHITE Stripes</u>
<u>26</u>	<u>All submerged steel parts of the jacket (if required painted) excluding the splash zone</u>	<u>TRAFFIC GREY</u>
<u>27</u>	<u>Lighting posts</u>	<u>WHITE</u>
<u>28</u>	<u>Internal walls/ceilings of equipment enclosures</u>	<u>WHITE</u>
<u>29</u>	<u>Stairways and associated structure</u>	<u>WHITE</u>
<u>30</u>	<u>Buildings, walls, door & window frames (except for Fire Pump Enclosures)</u>	<u>WHITE</u>
<u>31</u>	<u>Netting framing</u>	<u>WHITE</u>
<u>32</u>	<u>Tanks, Vessels, Heat exchangers (and pipework)</u>	<u>WHITE</u>
<u>33</u>	<u>All structural steel above tidal range including structural steel for helideck</u>	<u>YELLOW</u>
<u>34</u>	<u>Escape Routes</u>	<u>YELLOW/BLACK</u>
<u>36</u>	<u>Instruments</u>	<u>Manufacturers Standard Color</u>
<u>37</u>	<u>Pipe supports</u>	<u>as nearby structure color</u>
<u>38</u>	<u>Pedestals</u>	<u>as nearby structure color</u>

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Colors Code

The Colors specified in paragraphs shall be in accordance to the RAL K1 or their equivalent of B.S. 4800 or NF.X.08-100. All colors used shall comply with these standards. Manufacturers color names or reference numbers shall not be used as reference (Table 1).

Table1. The final coat colors of all equipment and platform areas

	Color	Code for	RAL	BS 4800	NF.X.08-100
1	YELLOW	Y	1003	08 E 51	A 310
2	RED	R	3001	04 E 53	A 805
3	BROWN RED	BR	3011	04 D 45	A 840
4	LIGHT BLUE	LB	5012	20 E 51	A 570
5	DARK BLUE	DB	5003	20 C 40	A 518
6	LIGHT GREY	LG	7035	10 B 17	A 290
7	TRAFFIC GREY	TG	7042	18 B 21	A 680
8	WHITE	W	9010	00 E 55	A 665
9	BLACK	BI	9005	00 E 53	A 603
10	GREEN	G	6001	14 E 53	A 414
11	VIOLET	V	4005	22 C 37	A 730
12	YELLOW OCHRE	YO	1006	08 E 51	A 310
13	BROWN	Br	8016	06 C 39	A 005
14	SILVER GREY	S	7001	00A 05	A 624

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4. APPENDICES

The painting systems shall be in accordance with TOTAL specifications "External protection of off-shore and coastal structures and equipment by painting" (GS COR 350-2016) and " Internal protection of equipment painting" (GS COR 352-2015).

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Appendix A **External protection of off-shore and coastal structures and equipment by painting** **(GS COR 350-2016)**

GENERAL SPECIFICATION

CORROSION

GS EP COR 350

External protection of offshore and coastal structures and equipment by painting

13	11/2016	Update of Qualified Paint Supplier
12	09/2015	General revision
11	09/2013	General review - Paint system review - Salt contamination
10	10/2012	General review - Paint system review
00	02/2001	First issue
Rev.	Date	Purpose of the revision

Owning entity: DSO/TEC	Managing entity: DSO/TEC/COR
Other Approving entity(ies):	

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1. Scope

This General Specification defines the technical requirements for the execution of painting works of new built offshore or coastal structures and equipment. The specification is based on the use of high durability painting systems (as defined in [ISO 12944-1](#)) for facilities whose design life is anticipated to be more than **15 years**.

This specification does not cover painting systems for temporary equipment or equipment with design life less than 15 years, and for which alternative painting systems shall be submitted to Company for approval.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

Reference	Title
ASTM A380	Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel-Parts, Equipment, and Systems
ASTM D4285	Standard Test Method for Indicating Oil or Water in Compressed Air
ASTM D4752	Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
ASTM D4940	Standard Test Method for Conductimetric Analysis of Water Soluble Ionic Contamination of Blast Cleaning Abrasives
ASTM D5162	Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates
ISO 12944 (Parts 1; 3; 4; 7; 8)	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Parts 1; 3; 4; 7; 8
ISO 16276 (Parts 1; 2)	Corrosion protection of steel structures by protective paints systems - Assessment of, and acceptance criteria for, the adhesion/cohesion (fracture strength) of a coating - Parts 1; 2
ISO 19840	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Measurement of, and acceptance criteria for, the dry-film thickness of coating on rough surfaces
ISO 4628 (Parts 1; 2; 3; 4; 5)	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Parts 1; 2; 3; 4; 5

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Reference	Title
ISO 8501 (Parts 1; 3)	Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness - Parts 1; 3
ISO 8502 (Parts 3; 6; 9)	Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness - Parts 3; 6; 9
ISO 8503 (Parts 1; 2)	Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates - Parts 1; 2
RAL 840 HR	Colors standard
SSPC SP1	Solvent Cleaning
UKCAA CAP 437	Standards for Offshore Helicopter Landing Areas

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published.

Reference	Title
GS EP COR 001	Corrosion control on production facilities: Design and construction
GS EP COR 355	External protection of piping and equipment by thermal spray coating
GS EP COR 356	Corrosion Protection of Fasteners for Subsea and Topside Applications

3. Surfaces to be painted

All surfaces shall be painted using the relevant specified system, except when otherwise stipulated hereafter.

3.1 Items not to be painted

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

- Galvanized steel grating, stairs and associated galvanized fasteners
- Concrete structures
- Plastic and plastic coated materials, provided their resistance to UV has been demonstrated, and colour coding is not necessary
- Non ferrous materials such as 90-10 and 70-30 copper nickel alloys, monel, aluminium bronze, and nickel alloys when not thermally insulated

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- Machined surfaces
- Stainless steel tubing.

3.2 Case of stainless steels

Stainless steels shall be painted when requested in the present specification. Only piping, pipelines and vessels or other pressure containing equipment are concerned.

When requested painted in the present specification, stainless steel pipings and fittings < 2" shall be pickled and passivated according [ASTM A380](#) and topcoated with a non-pigmented polyurethane topcoat (50 µm NDFT) suitable for stainless steel surfaces. The non-pigmented polyurethane topcoat shall be submitted to Company for approval.

Any paint containing Zinc containing is prohibited on stainless steels.

When stainless steel is not required to be painted, **only surfaces under support and stickers shall be painted with the appropriate painting system.**

TSA (Thermally Sprayed Aluminium) coating according to [GS EP COR 355](#) can be used as an alternative.

3.3 Painting of fastenings

Fastenings shall be painted according [GS EP COR 356](#).

3.4 Painting under personal protection (perforated guards/sheets)

When perforated guards or sheets are used as personal protection, painting system shall be selected as for un-insulated surfaces.

4. Painting systems

The list and application areas of all painting systems are given in Appendix 2.

Corrosivity categories are given in accordance with [GS EP COR 001](#). Painting system selected for corrosivity category IM-2/IM-3 shall be also compatible with a cathodic protection.

4.1 Qualified Paint supplier

Paint suppliers shall be selected among painting manufacturer listed in the Company Approved Vendor List.

4.2 Approved systems

The painting systems approved by Company are given in Appendix 3.

4.3 Qualification of alternative painting systems

For **Suppliers already qualified**, new systems can be submitted for approval to Company at any time. The system shall fulfill internal qualification protocol from Company.

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4.4 Substitution rule

When selecting a painting system, a system designed to withstand environments with higher corrosivity shall always be applicable to lower corrosivity environments.

4.5 Colour coding

Colour coding shall be according to the schedule defined for the project. Generally, colours will be chosen to match those of installations already present in the same block or country.

If the project has no specific requirements, the colour coding shall be according to Appendix 4.

Particular attention shall be paid to the use of stickers on unpainted stainless steel surfaces. For un-painted stainless steel, the surface below the sticker shall be painted with painting system P05 without the topcoat before application of the stickers.

In any case, the painting works carried out by Contractor shall include all colour coding and marking required for service identification.

5. Certification of personnel

5.1 Operators

Operators shall be individually certified by an approved organization (ACQPA, FROSIO, etc.).

5.2 Inspectors

Inspectors shall be individually certified in accordance with NS 476 (Inspector certified level III) or NACE certified coating inspector level III. Certification shall be delivered by the following approved organizations:

- ACQPA
- FROSIO
- NACE.

6. Qualification of the application procedures

6.1 Application procedure

A detailed application procedure shall be established for Company approval based on the requirements of this specification. No painting work shall begin before the application procedure is approved by Company.

The application procedure shall follow [ISO 12944-8](#) and will include at the minimum the following information:

- Equipment/structure/piping to be coated
- Operating temperature of the equipment
- Type of substrate to be coated
- Surface preparation

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- Methods of application and application requirements
- Painting cycle
- Painting Systems to be used
- Coating products to be used
- Product data sheets (abrasives and paint materials)
- Safety data sheets
- Health and safety requirements
- Test and inspections
- Certification of the personnel
- Handling and storage
- Repair method
- Template of painting daily report.

6.2 Application procedures tests

One month before work commences, all the selected painting systems shall be applied on samples representative of the structure to be painted. The products used shall be sampled from the same batches as these intended for the works.

The system shall be applied in presence of the paint Supplier and the Company representative, in climatic conditions that are as similar as possible to the worst case conditions that can be foreseen during the work on the construction site. Application shall be performed by the painting specialist who will be responsible for application during the work, using the same dedicated equipment that will be used during the work. During surface preparation and paint application, all tests described in Appendix 1 shall be followed.

When the painting systems are fully cured, visual inspection and adhesion testing shall be carried out to confirm that the performance of the painting systems meet those specified for each system.

7. Kick off meeting

A technical kick off meeting shall be organized by the Contractor in the presence of Company specialists (HQ Corrosion Department) and Supplier to review all the details regarding the work, application procedures, and inspection test plan. All the documentation shall be submitted to Company for review at least two (2) weeks prior to this meeting.

Supplier shall provide Contractor with technical assistance. All recommendations made by Supplier other than these outlined in the present specification shall be supported by a written statement from the Supplier head office.

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8. Technical content of tenders

Tenders shall include the following information:

- Proposed paint systems for each category/location of item to be painted
- Product data sheets and Material safety data sheets
- Proposed qualification program if any
- List of derogations to the present General Specification, if any. **Derogations will not be granted for painting systems after Contract award.**
- Terms and conditions of guarantee
- A statement showing that all parties involved (Contractor, Supplier, and Applicator) will be carrying out the work according to the present specification, or if relevant, to the project particular specification, including derogations duly agreed by HQ Corrosion Department before Contract award. This statement shall also show that the guarantee is jointly underwritten by all parties and specify the durations and performance levels of the guarantee. This statement can consist in either a certificate of homologation by OHGPI (Organisme d'Homologation des Garanties en Peinture Industrielles) or a letter signed by the head office of each party involved.
- Maximum thickness tolerable for each coat and for the each full painting system
- Surface preparation and painting procedures
- Inspection test plan with acceptance criteria and frequency of inspection in accordance with Appendix 1
- A list of inspection and painting equipment to be used
- Colours to be used for each item of equipment and for the different coats, in accordance with the colour chart chosen for the project by Company
- Methods of protection of items to be painted against adverse weather conditions
- Certificates (ACQPA, FROSIO, NACE, or equivalent) of Operators and Inspectors.

9. Surface preparation

9.1 Design and preparation before blasting of surfaces to be painted

All structures and equipment shall be designed according to [ISO 12944-3](#) international standard for high durability painting systems.

All sharp edges shall be rounded (minimum radius > 2 mm).

Preparation grades of welds and other areas with surface imperfections shall be grade P3 according [ISO 8501-3](#).

The design of the item to be painted shall be such that it creates no interstice and inaccessible area.

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Any oil or grease shall be removed by washing the item to be treated with appropriate solvents or any other suitable means before beginning of the cleaning operations according to the [ISO 12944-4](#) standard or specification [SSPC SP1](#). This includes bolt holes in piping assemblies.

Weld spatter and remains of temporary welds, deposits or surface defects shall be eliminated by appropriate means; removal by deep grinding is subject to Company approval.

All mating surfaces of equipment subject to outdoor exposure shall be coated with the full coating system prior to assembly (saddles, skirts, base plates, olded components, flanges, etc.).

Contractor shall protect all equipment that is not to be painted or may be affected by the presence of abrasives or paint.

Opening in vessels, piping and other appurtenances shall be properly protected against entry of abrasive material.

Special attention shall be paid to avoid splashes of zinc paint on equipment made of austenitic steels.

9.2 Quality of abrasives

Abrasives shall be:

- Sealed in watertight packaging. Any product delivered in defective packaging shall be rejected
- Stored sheltered from the elements
- Dry, clean and Conductivity shall be less than $150 \cdot 10^{-6}$ Siemens/cm as per [ASTM D4940](#)
- Non-ferrous and chloride-free when used on stainless steel surfaces.

Abrasives containing more than 1% crystalline silica are **strictly** prohibited.

The use of copper slag or silica sand is **strictly** prohibited.

9.3 Blast cleaning

The air supply for blast cleaning shall be free of oil and water in accordance with [ASTM D4285](#).

All surfaces to be coated shall be blast-cleaned to grade of cleanliness and surface profile specified for each system in Appendix 3 of this specification.

After blast-cleaning, all dust shall be removed using a vacuum cleaner before application of the paint in order to achieve the maximum dust level 2 (quantity rating 2 max, particle size class 2 max) according [ISO 8502-3](#).

All blast-cleaned surfaces shall be coated 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.

Before painting works commence, checks for the contamination of the surface by salts shall be carried out ([ISO 8502-6](#) & [ISO 8502-9](#)) plus ferrous contamination for stainless steel surfaces.

For blast cleaning on automatic production line, Contractor shall ensure that the grit selected can achieve the required surface profile. This requirement includes determination of grit mix, as well as quantity and frequency of grit renewal. Surface profile shall be checked twice per shift and the results shall be recorded.

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Stainless steels shall be segregated, carbon steel supports for storage shall be systematically painted, and lifting equipment shall prevent iron contamination.

Stainless steel surfaces to be coated shall be etched or degreased and blasted.

The blast cleaning procedure shall be submitted to Company for approval.

9.4 Surface preparation of galvanized steel

Galvanized steel to be coated shall be cleaned, degreased and sweep blasted. After sweep blasting, the thickness of the galvanizing shall be checked to confirm that it still in accordance with the requirement.

9.5 Preparation of zinc-plated bichromated surfaces

Zinc-plated bichromated surfaces shall be cleaned and degreased.

9.6 Items which have been previously shop primed

Shop primer is for temporary protection only. It shall be completely removed before application of the final painting system. Surface preparation shall be in accordance with paragraph 9 of this specification, and grade of cleanliness and surface profile specified for each system in Appendix 3 of this specification.

10. Paint application

10.1 Procurement and storage

The quantities of paint and thinners required to perform the entire job shall be procured before the work commences, except in cases where the shelf life of the product is less than the anticipated duration of the work.

Thinners, solvents, etc. shall be stored in a suitably ventilated fireproofed building, separate from other painting consumables.

The products shall be delivered in their original sealed packaging and stored in such conditions as to avoid their degradation (controlled temperature, etc.).

The packaging shall be clearly marked with:

- Product description
- Batch number
- Fabrication date
- Expiry date.

The shelf life from the fabrication dates are:

- For zinc ethyl silicate: 6 months
- For other products: 1 year.

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10.2 Samples for QA/QC purposes

The Contractor shall take two samples from each batch of products used during the work and keep them available for Company.

10.3 Application

10.3.1 General

Paint shall always be applied to surfaces that are dry, clean and degreased, for both coating on substrate and previous coat.

Painting works shall not proceed if:

- Temperature of the substrate is less than 3°C above the dew point
- The relative humidity is more than 85% RH (90% RH for inorganic zinc silicates)
- The weather is rainy or foggy, except under shelter, and subject to verification of the atmospheric conditions
- The minimum or maximum temperature of the ambient atmosphere and the substrate are out with the limits given in the product data sheets (usually 10°C for epoxy based paint and 5°C for acryl-polyurethane topcoat).

Application shall be by airless spray.

Different colours shall be used for all successive coats of the paint system. The finishing coat of the required colour shall be sufficiently opaque to cover the shade of the undercoat.

Prior to apply a succeeding coat, all previous coatings shall be allowed to dry for at least the minimum time specified by the paint supplier. The maximum overcoating time allowed by the paint supplier shall not be exceeded. The paint supplier's advice regarding the influence of the applied coating thickness, steel temperature, relative humidity, % of thinner added, shall be taken into account in determining the correct over coating intervals.

Contractor shall keep a daily record of the dew point, relative humidity, ambient atmosphere and substrate temperatures (all measured before the work commences and twice per shift and when ambient conditions are obviously changing) to ensure that conditions are acceptable. These records shall be kept and made available to Company.

10.3.2 Stripe coats

Before spraying each coat, **stripe coats** shall be applied by brush to all angles, corners, sharp edges, bolt or rivet heads, etc. with the same product applied on the surface to be painted. The only exception is inorganic zinc silicates where only post touch shall be applied using the repair system primer (zinc rich epoxy primer).

10.3.3 Zinc ethyl silicate

During application, the product shall be stirred at all times.

If relative humidity is below 60%, the painted surface shall be sprayed with fresh water for at least two hours after application to enhance curing.

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Before the subsequent coat is applied, this primer shall be subjected to a MEK test as per [ASTM D4752](#) to ensure that hydrolysis is complete. If complete hydrolysis is not obtained within eight days of application, the coating shall be completely removed and re-applied.

10.4 Repairs

Any defect shall be repaired before the application of further coats. Subject to the agreement of Company, and after determining the type and size of the defects, the following methods of repair shall be applied:

10.4.1 Major defects (paint products, application, non conformity of test results)

The paint shall be removed completely by abrasive blast-cleaning and the entire system shall be re-applied.

10.4.2 Minor defects (localized appearance, mechanical damage, scratches, etc.)

Subject to the agreement of the Supplier of the product, the system shall be removed by localized blast-cleaning, the edges of the sound coating shall be feathered back about 50 mm, and the repair system shall be applied.

When open abrasive blasting is not permitted, vacuum blasting machine shall be used for spot repair.

11. Checks, inspection and acceptance

11.1 Checks

Throughout the duration of the work, Contractor's Quality Control department shall check all points given in Appendix 1 and record the results in its daily quality control report. Execution and supervision of paint work shall be as per defined in [ISO 12944-7](#).

11.2 Inspection test plan

An inspection test plan including all the points of Appendix 1 shall be prepared and submitted to Company for approval. The Inspection Test Plan shall clearly indicate frequency of testing for each check.

11.3 Company inspection

Company Inspector shall have free access to storage areas, workshops, yards where the works will be performed. Contractor shall also provide Company Inspector with all office facilities necessary for the execution of his work (telephone, fax, handling equipment, measuring instruments with valid calibration certificates, etc.).

Upon arrival of Company Inspector on site, Contractor shall supply him with all relevant documentation regarding the works to be carried out.

11.4 Provisional acceptance

For provisional acceptance, Company shall check that all inspections set out in Appendix 1 have been carried out and that all results are satisfactory.

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11.5 Guarantee

The Work shall be covered by a specific guarantee given by Contractor to complete Guarantees and warranties defined in the Engineering, Procurement, Supply, Construction and Commissioning Contract (EPSCC 1113 - Article 20 "GUARANTEES AND WARRANTIES").

Contractor guarantees that the Work shall be covered by performance warranties in accordance with the following requirements of the Contract:

- The maximum degree of rust shall be Ri2 according to [ISO 4628-3](#)
- The maximum degree of cracking, blistering, or flaking shall be 3S3 according to [ISO 4628-1](#), [ISO 4628-2](#), [ISO 4628-4](#) and [ISO 4628-5](#).

Guarantee shall be provided for the duration defined for each paint system in Appendix 3.

Beginning of Warranty Period as defined for each paint system in Appendix 3 starts from the effective date of the Provisional Acceptance Certificate for painting works.

11.6 Inspection at end of guarantee period

At the end of the Warranty Period a joint inspection of Work by Company, Contractor and paint supplier shall be carried out before issuance of the Final Acceptance Certificate for painting works to determine if any claims are raised.

12. Technical file

Contractor shall hand over a technical file to Company at the end of the works which shall include:

- All inspection reports
- Provisional acceptance reports
- Guarantee certificates
- Insurance certificates for the guarantee.

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Bibliography

Reference

ACQPA

ISO 9223

Title of the publication

"Association pour la Certification et la Qualification en
Peinture Anticorrosion"Corrosion of metals and alloys. Atmospheres' corrosivity.
Classification

Appendix 1 Summary of tests and inspections

Test description	Method	Frequency	Requirements
Storage of coating materials	Visual	100%	See § 10.1 of this specification
Shelf life	Visual	100%	See § 10.1 of this specification
Compressed air	ASTM D4285	Every shift	No oil, no humidity
Steel and welding imperfections	ISO 8501-3	100% of item	Grade P3 Rounding of corners, sharp edges to 2 mm radius minimum
Pre-cleaning of surfaces	ISO 12944-4 or SSPC SP1	100% of item	Free of oil and grease or other contaminants
Surface preparation			
Climatic conditions	-	- Before start and twice per shift - When the ambient conditions are obviously changing	- Temperature of substrate at least 3°C above dew point - Maximum humidity 85% RH
Conductivity of abrasives	ASTM D4940	Every shift and every batch	$< 150 \cdot 10^{-6}$ Siemens/cm
Grade of cleanliness	ISO 8501-1	100% of surface	According system sheet in Appendix 3
Anchoring profile	ISO 8503-1 ISO 8503-2	Spot check (1)	According system sheet in Appendix 3
Dust test	ISO 8502-3	Spot check (1)	Maximum level 2 (quantity rating 2 max, particle size class 2 max)
Water soluble salts	ISO 8502-6 ISO 8502-9	Spot checks (1)	Maximum 30 mg/m ² and 20 mg/m ² for immersed surfaces
Ferrous contamination (for SS surfaces)	Ferroxyl test ASTM A380	Spot checks (1)	No surface pollution
Paint application			
Climatic conditions	-	Before start and twice per shift and when the ambient conditions are obviously changing	See § 10.3.1 of this specification
Wet film thickness (WFT)	Comb gauge	- Each coat - Spot check	As per paint manufacturer data sheet for the specified DFT

Appendix 1

Test description	Method	Frequency	Requirements
Curing test (for inorganic zinc)	ASTM D4752	Spot checks (1)	Level 5
Cleanliness between coats	visual	- Each coat - 100% surface	No contaminant
Dry film thickness (DFT)	ISO 19840	- Each coat - According ISO 19840	According ISO 19840
Porosity	ASTM D5162	100% surface	No holidays: Test applicable for: - Buried items - Painting system P13 under insulation - Painting systems used in immersed zone
Adhesion test for DFT < 200 µm	ISO 16276-2	Spot checks (1)	Cross-cut test: class 0
Adhesion test for DFT ≥ 200 µm (2)	ISO 16276-1	Spot checks (1)	Minimum acceptable Values shall not be less than specified in each painting system of Appendix 3 for any single measurement. (2) Test cylinders which are bored with a central hole are forbidden
Visual inspection	visual	100% surface	No defects such as "orange peel", cracking, bubbling, pinholes, runs and sags, fish-eyes, blistering, etc.
(1) Shall be defined during technical kick off meeting, see paragraph 7 of this specification.			
(2) The adhesion tests shall be performed with <u>cyano-acrylate glue as LOCTITE 496</u> or equivalent.			

Appendix 2 List of painting systems

Important warning:

- Painting system with minimum level of solvent shall be preferred
- Lead chromates in paint are strictly forbidden
- Maximum operation temperature given in table hereafter could be different depending chosen supplier.

Operating temperature (°C)		Corrosivity categories as per GS EP COR 001	System N°.	Remarks
Mini	Maxi			
ATMOSPHERIC ZONE: PIPING AND PRESSURE VESSELS				
Carbon steel, Un-insulated				
- 40	+80	C5-M / CX	P01	
ATMOSPHERIC ZONE: STRUCTURES, VALVES, EQUIPMENT, EXTERIOR OF STORAGE TANKS				
Carbon steel, Un-insulated				
- 40	+80	C5-M / CX	P01/P01^{2nd}	For floating roof tanks extend by 1.5 m down on the inside
ATMOSPHERIC ZONE: STRUCTURES, PIPING, VALVES, PRESSURE VESSELS, EQUIPMENT, EXTERIOR OF STORAGE TANKS				
Carbon steel, Un-insulated:				
+81	+200	C5-M / CX	P13	Including adjacent surfaces
+201	+400	C5-M / CX	P11	Including adjacent surfaces
Carbon steel, Insulated:				
-40	+200	C5-M / CX	P13	
+201	+400	C5-M / CX	P11^{2nd}	
Stainless steel, Un-insulated, type AISI 304, 304L, 321 and types AISI 316 and 316L:				
- 40	+80	C5-M / CX	P05	
+81	+200	C5-M / CX	P13	
+201	+400	C5-M / CX	P11^{2nd}	
Stainless steel, Un-insulated, type AISI 904, duplex and super duplex:				
-40	100	C5-M / CX	Not painted	Except under stickers, see Appendix 4, and except under support (P05 ^{2nd})
+101	+200	C5-M / CX	P13	
+201	+400	C5-M / CX	P11^{2nd}	

Operating temperature (°C)		Corrosivity categories as per GS EP COR 001	System N°.	Remarks
Mini	Maxi			
Stainless steel, Insulated, all types:				
-40	+200	C5-M / CX	P13	
+201	+400	C5-M / CX	P11 ^{2nd}	
Galvanized surfaces:				
-40	+80	C5-M / CX	P05	
Zn/bi Cr surfaces:				
-40	+80	C5-M / CX	P06	Above 80°C,system adapted to adjacent surfaces systems
Cold services: Carbon steel and stainless steel surfaces				
-180	+200	C5-M / CX	P18	
Fire-proofed surfaces				
-40	+80	C5-M / CX	P04	For Concrete type PFP (not allowed offshore). The painting system, painting application and overcoating conditions shall be approved by PFP supplier.
-40	+70	C5-M / CX	P04 ^{2nd}	For Intumescent epoxy type PFP . The painting system, painting application and overcoating conditions shall be approved by PFP supplier.
-40	+90	C5-M / CX	P13	Under blanket type PFP
JACKET:				
Zone 1: carbon steel and stainless steel (Splash zone)				
-40	+60	(C5-M / CX)+ Im2	P07/P07 ^{2nd} (Note 1)	- Between the crest level of the 100 years wave superimposed on the maximum surge height plus the normal Mean High Water Springs (MHWS) and 3 m below the Lowest Astronomical Tide (LAT) or the annual swell, whichever is the greater. - Boat-landing, Bumpers For stainless steel, P07^{2nd} shall be used
Zone 2: carbon steel and stainless steel (Immersed zone)				
-40	+60	Im2	P08	Area from the bottom of the jacket (including buried part) to 2 m above the stability floor.

Operating temperature (°C)		Corrosivity categories as per GS EP COR 001	System N°.	Remarks
Mini	Maxi			
Zone 3: carbon steel (Emerged zone)				
-40	+60	C5-M / CX	P09/P09 ^{2nd}	Area between the crest level of the 50 years wave superimposed on the maximum surge height plus the normal Mean High Water Springs (MHWS) and the top of the structure.
ROOMS: OPEN (WORKSHOP TYPE) AND AIR CONDITIONED				
Visible parts				
-40	+80	C3 / C4 / C5-M	P15/P15 ^{2nd}	Walls, ceilings
Non visible parts				
-40	+80	C3 / C4 / C5-M	P16	Walls, ceilings: e.g. insulated wall and ceiling
Floors				
-40	+80	C5-M / CX	P02/P02 ^{2nd}	P15 for floors under concrete. For Escape route/ non-skid areas, non-skid particles shall be added to the painting system.
OTHER				
Buried items				
-40	+80	Im3	P07 ^{2nd}	Top coat acryl polyurethane can be applied to increase eventual chemical resistance
Floors, escape routes				
-40	+80	C5-M / CX	P02/P02 ^{2nd}	For Escape route/ non-skid areas, non-skid particles shall be added to the painting system
Helideck: landing area				
-40	+80	C5-M / CX	P03/P03 ^{2nd}	Coating shall comply with UKCAA CAP 437 with minimum surface friction coefficient of 0.85 in all directions. For safety marking of Helideck, a polyurethane topcoat shall be used.
Machines (e.g. Electrical motors):				
-40	+80	C5-M / CX	P14	
Chassis/skid of package:				
-40	+80	C5-M / CX	P01/P01 ^{2nd}	
I tubes, J tubes, caissons: external surfaces				
-40	+60	C5-M / CX and Im2	P07 ^{2nd}	

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Appendix 2

Operating temperature (°C)		Corrosivity categories as per GS EP COR 001	System N°.	Remarks
Mini	Maxi			
Disposal caisson, sea water lift caisson: internal surfaces				
-40	+60	IM-2	P07 ^{2nd}	
+61	+90	IM-2	P05 ^{2nd}	
Sump caissons: internal surfaces				
-40	+60	IM-2	P08	
Subsea equipment (wellheads, manifolds, etc.) un-insulated. Carbon steel and stainless steel				
-40	+60	IM-2	P08	Top coat shall be light colour
+61	+90	IM-2	P17	
Subsea equipment (wellheads, manifolds, etc.) insulated. Carbon steel and stainless steel				
-40	+120	IM-2	P17	The painting system, painting application and overcoating conditions shall be approved by <u>insulation material supplier</u>
Note 1: If above 80°C, the splash zone of flare structure shall be clad with Inconel 625 or Monel K500 or equivalent.				

Appendix 3 Suppliers' systems

Coding for Suppliers

Suppliers	Code
CARBOLINE	C
HEMPEL	H
JOTUN	J
PPG	P

Coding for type of paint

Binders	Codes	Remarks
Zinc ethyl silicate	ESI	
Rich Zinc epoxy	EPRZ	
Epoxy	EP	
Phenolic Epoxy	EPPH	
Ester Epoxy	EPES	
Glass flake Epoxy	EPGF	
Polyurethane	PUR	
Silicone	SI	
Vinyl-ester	VY	
Novolac Epoxy	EPN	
Glass flake Novolac Epoxy	EPNGF	

P 01										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P01C	1	ESI	Carbozinc 11	60	Repair P01C	1	EPRZ	Carbozinc 858	60	
	2	EP	Carboguard 893SG	30		2	EP	Carboguard 893SG	40	
	3	EP	Carboguard 893	150		3	EP	Carboguard 893	150	
	4	PUR	Carbothane 134 series	50		4	PUR	Carbothane 134 series	50	
	Total NDFT:					290	Total NDFT:			
P 01 H	1	ESI	Galvosil 1570	60	Repair P01H	1	EPRZ	Avantguard 750 (1736G)	60	
	2	EP	Hempadur 1557	30		2	EP	Hempadur 1557	40	
	3	EP	Hempadur 4588	150		3	EP	Hempadur 4588	150	
	4	PUR	Hempathane HS 5561	50		4	PUR	Hempathane HS 5561	50	
	Total NDFT:					290	Total NDFT:			
P 01 J	1	ESI	Resist 86	60	Repair P01J	1	EPRZ	Barrier plus	60	
	2	EP	Penguard Tie coat 100	30		2	EP	Penguard Tie coat 100	40	
	3	EP	Penguard universal	150		3	EP	Penguard universal	150	
	4	PUR	Hardtop XP	50		4	PUR	Hardtop XP	50	
	Total NDFT:					290	Total NDFT:			
P 01 P	1	ESI	Sigmazinc 158	60	Repair P01P	1	EPRZ	Sigmazinc 68 SP	60	
	2	EP	SigmaCover 522	30		2	EP	SigmaCover 522	40	
	3	EP	SigmaCover 410	150		3	EP	SigmaCover 410	150	
	4	PUR	Sigmadur 550	50		4	PUR	Sigmadur 550	50	
	Total NDFT:					290	Total NDFT:			

Remarks
Specific guarantee requirements: 5 years
Qualification / acceptance requirements: Minimum required pull-off test value: - 3 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 5 MPa for checks made with hydraulic tester (Type PAT or equivalent).

P 01 second										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P01^{2nd} C	1	EPRZ	Carbozinc 858	60	Repair P01^{2nd} C	1	EPRZ	Carbozinc 858	60	
	2	EP	Carboguard 893	100		2	EP	Carboguard 893	100	
	3	EP	Carboguard 893	100		3	EP	Carboguard 893	100	
	4	PUR	Carbothane 134 series	50		4	PUR	Carbothane 134 series	50	
				Total NDFT:					Total NDFT:	
				310					310	
P01^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	Repair P01^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	
	2	EP	Hempadur 4588	100		2	EP	Hempadur 4588	100	
	3	EP	Hempadur 4588	100		3	EP	Hempadur 4588	100	
	4	PUR	Hempathane HS 5561	50		4	PUR	Hempathane HS 5561	50	
				Total NDFT:					Total NDFT:	
				310					310	
P01^{2nd} J	1	EPRZ	Barrier plus	60	Repair P01^{2nd} J	1	EPRZ	Barrier plus	60	
	2	EP	Penguard universal	100		2	EP	Penguard universal	100	
	3	EP	Penguard universal	100		3	EP	Penguard universal	100	
	4	PUR	Hardtop XP	50		4	PUR	Hardtop XP	50	
				Total NDFT:					Total NDFT:	
				310					310	
P01^{2nd} P	1	EPRZ	Sigmazinc 68 SP	60	Repair P01^{2nd} P	1	EPRZ	Sigmazinc 68 SP	60	
	2	EP	SigmaCover 410	100		2	EP	SigmaCover 410	100	
	3	EP	SigmaCover 410	100		3	EP	SigmaCover 410	100	
	4	PUR	Sigmadur 550	50		4	PUR	Sigmadur 550	50	
				Total NDFT:					Total NDFT:	
				310					310	

Remarks
Specific guarantee requirements: 5 years
Qualification / acceptance requirements: Minimum required pull-off test value: - 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

P 02										
Surface preparation:					Surface preparation for repair:					
Grade of cleanliness: Sa 3 (ISO 8501-1)					Grade of cleanliness: Sa 2 ½ (ISO 8501-1)					
Roughness: Grit-medium (G) (ISO 8503-2)					Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P02 C	1	ESI	Carbozinc 11	60	Repair P02 C	1	EPRZ	Carbozinc 858	60	Incorporate Filler 47 to Carboguard 1209 for non-slip system
	2	EP	Carboguard 893SG	30		2	EP	Carboguard 893SG	40	
	3	EPGF	Carboguard 1209	500		3	EPGF	Carboguard 1209	500	
	4	PUR	Carbothane 134 series	50		4	PUR	Carbothane 134 series	50	
	Total NDFT:					640	Total NDFT:			
P02 H	1	ESI	Galvosil 1570	60	Repair P02 H	1	EPRZ	Avantguard 750 (1736G)	60	Incorporate Hempel's anti-slint 67500 for non-slip system
	2	EP	Hempadur 1557	30		2	EP	Hempadur 1557	40	
	3	EPGF	Hempadur GF 3587	500		3	EPGF	Hempadur GF 3587	500	
	4	PUR	Hempathane HS 5561	50		4	PUR	Hempathane HS 5561	50	
	Total NDFT:					640	Total NDFT:			
P02 J	1	ESI	Resist 86	60	Repair P02 J	1	EPRZ	Barrier plus	60	Incorporate Dust with Jotun antiskid Medium aggregates on Penguard pro GF while still wet (not polymerized) for non-slip system
	2	EP	Penguard Tie coat 100	30		2	EP	Penguard Tie coat 100	40	
	3	EPGF	Penguard pro GF	500		3	EPGF	Penguard pro GF	500	
	4	PUR	Hardtop XP	50		4	PUR	Hardtop XP	50	
	Total NDFT:					640	Total NDFT:			
P02 P	1	ESI	Sigmazinc 158	60	Repair P02 P	1	EPRZ	Sigmazinc 68 SP	60	Incorporate PPG 888 aggregates for non-slip system
	2	EP	SigmaCover 522	30		2	EP	SigmaCover 522	40	
	3	EPGF	Sigmashield 400	500		3	EPGF	Sigmashield 400	500	
	4	PUR	Sigmadur 550	50		4	PUR	Sigmadur 550	50	
	Total NDFT:					640	Total NDFT:			

Remarks
Specific guarantee requirements: 5 years
Qualification / acceptance requirements: Minimum required pull-off test value:

- 3 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 5 MPa for checks made with hydraulic tester (Type PAT or equivalent).

P 02 second										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P02^{2nd} C	1	EPRZ	Carbozinc 858	60	Repair P02^{2nd} C	1	EPRZ	Carbozinc 858	60	Incorporate Filler 47 to Carboguard 1209 for non-slip system
	2	EP	Carboguard 893	100		2	EP	Carboguard 893	100	
	3	EPGF	Carboguard 1209	500		3	EPGF	Carboguard 1209	500	
	4	PUR	Carbothane 134 series	50		4	PUR	Carbothane 134 series	50	
	Total NDFT:			710		Total NDFT:			710	
P02^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	Repair P02^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	Incorporate Hempel's anti-slint 67500 for non-slip system
	2	EP	Hempadur 4588	100		2	EP	Hempadur 4588	100	
	3	EPGF	Hempadur GF 3587	500		3	EPGF	Hempadur GF 3587	500	
	4	PUR	Hempathane HS 5561	50		4	PUR	Hempathane HS 5561	50	
	Total NDFT:			710		Total NDFT:			710	
P02^{2nd} J	1	EPRZ	Barrier plus	60	Repair P02^{2nd} J	1	EPRZ	Barrier plus	60	Incorporate Dust with Jotun antiskid Medium aggregates on Penguard pro GF while still wet (not polymerized) for non-slip system
	2	EP	Penguard universal	100		2	EP	Penguard universal	100	
	3	EPGF	Penguard pro GF	500		3	EPGF	Penguard pro GF	500	
	4	PUR	Hardtop XP	50		4	PUR	Hardtop XP	50	
	Total NDFT:			710		Total NDFT:			710	
P02^{2nd} P	1	EPRZ	Sigmazinc 68 SP	60	Repair P02^{2nd} P	1	EPRZ	Sigmazinc 68 SP	60	Incorporate PPG 888 aggregates for non-slip system
	2	EP	SigmaCover 410	100		2	EP	SigmaCover 410	100	
	3	EPGF	Sigmashield 400	500		3	EPGF	Sigmashield 400	500	
	4	PUR	Sigmadur 550	50		4	PUR	Sigmadur 550	50	
	Total NDFT:			710		Total NDFT:			710	

Remarks
Specific guarantee requirements: 5 years
Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

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P 03										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P03 C	1	ESI	Carbozinc 11	60	Repair P03 C	1	EPRZ	Carbozinc 858	60	Incorporate Filler 24 to Carboguard 1209 for non-slip system
	2	EP	Carboguard 893SG	30		2	EP	Carboguard 893SG	40	
	3	EPGF	Carboguard 1209	500		3	EPGF	Carboguard 1209	500	
	4					4				
	Total NDFT:			590		Total NDFT:			590	
P03 H	1	ESI	Galvosil 1570	60	Repair P03 H	1	EPRZ	Avantguard 750 (1736G)	60	Incorporate Hempel's anti-silint 67500 for non-slip system
	2	EP	Hempadur 1557	30		2				
	3	EPGF	Hempadur multistrength GF 3587	500		3	EPGF	Hempadur multistrength GF 3587	540	
	4					4				
	Total NDFT:			590		Total NDFT:			600	
P03 J	1	EPGF	Penguard pro GF	300	Repair P03 J	1	EPGF	Penguard pro GF	300	Incorporate Dust with Jotun antiskid Medium aggregates on Penguard pro GF while still wet (not polymerized) for non-slip system
	2	EPGF	Penguard pro GF	300		2	EPGF	Penguard pro GF	300	
	3	PUR	Hardtop XP	50		3	PUR	Hardtop XP	50	
	4					4				
	Total NDFT:			650		Total NDFT:			650	
P03 P	1	EP	SigmaCover 522	40	Repair P03 P	1	EP	SigmaCover 522	40	Incorporate PPG 888 aggregates for non-slip system
	2	EP	SigmaCover 240	300		2	EP	SigmaCover 240	300	
	3	EP	SigmaCover 240	300		3	EP	SigmaCover 240	300	
	4	PUR	Sigmadur 550	50		4	PUR	Sigmadur 550	50	
	Total NDFT:			690		Total NDFT:			690	

Remarks
Specific guarantee requirements: 5 years
Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

P 03 second										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P03^{2nd} C	1	EPRZ	Carbozinc 858	60	Repair P03^{2nd} C	1	EPRZ	Carbozinc 858	60	Incorporate Filler 24 to Carboguard 1209 for non-slip system
	2	EP	Carboguard 893	100		2	EP	Carboguard 893	100	
	3	EPGF	Carboguard 1209	500		3	EPGF	Carboguard 1209	500	
	4					4				
	Total NDFT:			660		Total NDFT:			660	
P03^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	Repair P03^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	Incorporate Hempel's anti-slip 67500 for non-slip system
	2	EP	Hempadur 4588	100		2	EP	Hempadur 4588	100	
	3	EPGF	Hempadur multistrength GF 3587	500		3	EPGF	Hempadur multistrength GF 3587	500	
	4					4				
	Total NDFT:			660		Total NDFT:			660	
-	1	-	-	-	Repair P03^{2nd} I	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair P03^{2nd} J	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair P03^{2nd} P	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

Remarks
Specific guarantee requirements: 5 years
Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

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P 04										
Surface preparation:					Surface preparation for repair:					
Grade of cleanliness: Sa 3 (ISO 8501-1)					Grade of cleanliness: Sa 2 ½ (ISO 8501-1)					
Roughness: Grit-medium (G) (ISO 8503-2)					Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P04 C	1	ESI	Carbozinc 11	60	Repair P04 C	1	EPRZ	Carbozinc 858	60	
	2	EP	Carboguard 893SG	30		2	EP	Carboguard 893SG	30	
	3	EP	Carbomastic 15	150		3	EP	Carbomastic 15	150	
	4					4				
	Total NDFT:			240		Total NDFT:			250	
P04 H	1	ESI	Galvosil 1570	60	Repair P04 H	1	EPRZ	Avantguard 750 (1736G)	60	
	2	EP	Hempadur 1557	30		2	EP	Hempadur 1557	40	
	3	EP	Hempadur 4588	150		3	EP	Hempadur 4588	150	
	4					4				
	Total NDFT:			240		Total NDFT:			250	
P04 J	1	ESI	Resist 86	60	Repair P04 J	1	EPRZ	Barrier plus	60	
	2	EP	Penguard Tie coat 100	30		2	EP	Penguard Tie coat 100	40	
	3	EP	Penguard universal	150		3	EP	Penguard universal	150	
	4					4				
	Total NDFT:			240		Total NDFT:			250	
P04 P	1	ESI	Sigmazinc 158	60	Repair P04 P	1	EPRZ	Sigmazinc 68 SP	60	
	2	EP	SigmaCover 522	30		2	EP	SigmaCover 522	40	
	3	EP	SigmaCover 410	150		3	EP	SigmaCover 410	150	
	4					4				
	Total NDFT:			240		Total NDFT:			250	

P 04 second

Surface preparation:					Surface preparation for repair:					
Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P04 ^{2nd} C	1	EPRZ	Carbozinc 858	60	Repair P04 ^{2nd} C	1	EPRZ	Carbozinc 858	60	
	2	EP	Carboguard 893SG	30		2	EP	Carboguard 893SG	30	
	3	PFP layer				3	PFP layer			
	4	PUR	Carbothane 134 series	50		4	PUR	Carbothane 134 series	50	
	Total NDFT:			-		Total NDFT:			-	
P04 ^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	Repair P04 ^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	
	2	EP	Hempadur 1557	30		2	EP	Hempadur 1557	30	
	3	PFP layer				3	PFP layer			
	4	PUR	Hempathane HS 5561	50		4	PUR	Hempathane HS 5561	50	
	Total NDFT:			-		Total NDFT:			-	
P04 ^{2nd} J	1	EPRZ	Barrier plus	60	Repair P04 ^{2nd} J	1	EPRZ	Barrier plus	60	
	2	EP	Penguard Tie coat 100	30		2	EP	Penguard Tie coat 100	30	
	3	PFP layer				3	PFP layer			
	4	PUR	Hardtop XP	50		4	PUR	Hardtop XP	50	
	Total NDFT:			-		Total NDFT:			-	
P04 ^{2nd} P	1	EPRZ	Sigmazinc 68 SP	60	Repair P04 ^{2nd} P	1	EPRZ	Sigmazinc 68 SP	60	
	2	EP	SigmaCover 522	30		2	EP	SigmaCover 522	30	
	3	PFP layer				3	PFP layer			
	4	PUR	Sigmadur 550	50		4	PUR	Sigmadur 550	50	
	Total NDFT:			-		Total NDFT:			-	

Remarks

Painting system under intumescent epoxy PFP shall be approved by passive fire protection supplier.

Specific guarantee requirements: 10 years for overall paint + PFP system

Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

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P 05										
Surface preparation: Sweep blasting with fine abrasives Roughness: Grit-fine (G) (ISO 8503-2)					Surface preparation for repair: Sweep blasting with fine abrasives Roughness: Grit-fine (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	System	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P05 C	1	EP	Carboguard 893SG	30	Repair P05C	1	EP	Carboguard 893SG	30	
	2	EP	Carboguard 893	150		2	EP	Carboguard 893	150	
	3	PUR	Carbothane 134 series	50		3	PUR	Carbothane 134 series	50	
	4					4				
				Total NDFT: 230					Total NDFT: 230	
P 05 H	1	EP	Hempadur 1555	30	Repair P05H	1	EP	Hempadur 1555	30	
	2	EP	Hempadur 4588	150		2	EP	Hempadur 4588	150	
	3	PUR	Hempathane HS 5561	50		3	PUR	Hempathane HS 5561	50	
	4					4				
				Total NDFT: 230					Total NDFT: 230	
P 05 J	1	EP	Penguard Tie coat 100	30	Repair P05J	1	EP	Penguard Tie coat 100	30	
	2	EP	Penguard universal	150		2	EP	Penguard universal	150	
	3	PUR	Hardtop XP	50		3	PUR	Hardtop XP	50	
	4					4				
				Total NDFT: 230					Total NDFT: 230	
P 05 P	1	EP	Sigmacover 280	50	Repair P05P	1	EP	Sigmacover 280	50	
	2	EP	SigmaCover 410	150		2	EP	SigmaCover 410	150	
	3	PUR	Sigmatur 550	50		3	PUR	Sigmatur 550	50	
	4					4				
				Total NDFT: 250					Total NDFT: 250	

Remarks
Specific guarantee requirements: 5 years - Only cracking blistering, and flaking requirements
Qualification / acceptance requirements: Minimum required pull-off test value: - 2 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 4 MPa for checks made with hydraulic tester (Type PAT or equivalent).

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P 05 second										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit - coarse(C) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit - coarse(C) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P05^{2nd} C	1	VY	Plasite 4100	500	Repair P05^{2nd} C	1	VY	Plasite 4100	500	
	2	VY	Plasite 4100	500		2	VY	Plasite 4100	500	
	3					3				
	4					4				
	Total NDFT:			1000		Total NDFT:			1000	
P05^{2nd} H	1	VY	Hempel's Vinyl ester GF 3591	500	Repair P05^{2nd} H	1	VY	Hempel's Vinyl ester GF 3591	500	
	2	VY	Hempel's Vinyl ester GF 3591	500		2	VY	Hempel's Vinyl ester GF 3591	500	
	3					3				
	4					4				
	Total NDFT:			1000		Total NDFT:			1000	
P05^{2nd} J	1	VY	Chemflake special	500	Repair P05^{2nd} J	1	VY	Chemflake special	500	
	2	VY	Chemflake special	500		2	VY	Chemflake special	500	
	3					3				
	4					4				
	Total NDFT:			1000		Total NDFT:			1000	
P05^{2nd} P	1	VY	Sigmashield 4801	500	Repair P05^{2nd} P	1	VY	Sigmashield 4801	500	
	2	VY	Sigmashield 4801	500		2	VY	Sigmashield 4801	500	
	3					3				
	4					4				
	Total NDFT:			1000		Total NDFT:			1000	

Remarks

Specific guarantee requirements: 5 years

Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

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P 06										
Surface preparation:					Surface preparation for repair:					
Degreasing					Degreasing					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 06 C	1	EP	Carboguard 893SG	30	Repair P06C	1	EP	Carboguard 893SG	30	
	2	EP	Carboguard 893	150		2	EP	Carboguard 893	150	
	3	PUR	Carbothane 134 series	50		3	PUR	Carbothane 134 series	50	
	4					4				
	Total NDFT:			230		Total NDFT:			230	
P 06 H	1	EP	Hempadur 1555	30	Repair P06H	1	EP	Hempadur 1555	30	
	2	EP	Hempadur 4588	150		2	EP	Hempadur 4588	150	
	3	PUR	Hempathane HS 5561	50		3	PUR	Hempathane HS 5561	50	
	4					4				
	Total NDFT:			230		Total NDFT:			230	
P 06 J	1	EP	Penguard Tie coat 100	30	Repair P06J	1	EP	Penguard Tie coat 100	30	
	2	EP	Penguard universal	150		2	EP	Penguard universal	150	
	3	PUR	Hardtop XP	50		3	PUR	Hardtop XP	50	
	4					4				
	Total NDFT:			230		Total NDFT:			230	
P 06 P	1	EP	Sigmacover 280	30	Repair P06P	1	EP	Sigmacover 280	30	
	2	EP	SigmaCover 410	150		2	EP	SigmaCover 410	150	
	3	PUR	Sigmadur 550	50		3	PUR	Sigmadur 550	50	
	4					4				
	Total NDFT:			230		Total NDFT:			230	

Remarks

Specific guarantee requirements: 5 years - Only cracking blistering, and flaking requirements

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P 07										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P07 C	1	ESI	Carbozinc 11	60	Repair P07C	1	EPRZ	Carbozinc 858	60	
	2	EP	Carboguard 893SG	30		2	EPGF	Carboguard 1209	450	
	3	EPGF	Carboguard 1209	380		3				
	4					4				
				Total NDFT:					510	
P 07 H	1	ESI	Galvosil 1570	60	Repair P07H	1	EPRZ	Avantguard 750 (1736G)	60	
	2	EP	Hempadur 1557	30		2	EP	Hempadur multistrength 4554	450	
	3	EP	Hempadur multistrength 4554	380		3				
	4					4				
				Total NDFT:					510	
P 07 J	1	ESI	Resist 86	60	Repair P07J	1	EPRZ	Barrier plus	60	
	2	EP	Penguard Tie coat 100	30		2	EPGF	Penguard pro GF	450	
	3	EPGF	Penguard pro GF	380		3				
	4					4				
				Total NDFT:					510	
P 07 P	1	ESI	Sigmazinc 158	60	Repair P07P	1	EPRZ	Sigmazinc 68 SP	60	
	2	EP	SigmaCover 522	30		2	EPGF	SigmaShield 400	450	
	3	EPGF	SigmaShield 400	380		3				
	4					4				
				Total NDFT:					510	

Remarks
Specific guarantee requirements: 5 years
Qualification / acceptance requirements: Minimum required pull-off test value: - 3 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 5 MPa for checks made with hydraulic tester (Type PAT or equivalent).

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Appendix 3

P 07 second										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P07^{2nd} C	1	EPGF	Carboguard 1209	500	Repair P07^{2nd} C	1	EPGF	Carboguard 1209	500	
	2	EPGF	Carboguard 1209	500		2	EPGF	Carboguard 1209	500	
	3					3				
	4					4				
	Total NDFT:			1000		Total NDFT:			1000	
P07^{2nd} H	1	EPGF	Hempadur multi-strenght GF 3587	500	Repair P07^{2nd} H	1	EPGF	Hempadur multi-strenght GF 3587	500	
	2	EPGF	Hempadur multi-strenght GF 3587	500		2	EPGF	Hempadur multi-strenght GF 3587	500	
	3					3				
	4					4				
	Total NDFT:			1000		Total NDFT:			1000	
P07^{2nd} J	1	EPGF	Penguard pro GF	500	Repair P07^{2nd} J	1	EPGF	Penguard pro GF	500	
	2	EPGF	Penguard pro GF	500		2	EPGF	Penguard pro GF	500	
	3					3				
	4					4				
	Total NDFT:			1000		Total NDFT:			1000	
P07^{2nd} P	1	EPGF	SigmaShield 400	500	Repair P07^{2nd} P	1	EPGF	SigmaShield 400	500	
	2	EPGF	SigmaShield 400	500		2	EPGF	SigmaShield 400	500	
	3					3				
	4					4				
	Total NDFT:			1000		Total NDFT:			1000	

Remarks

Specific guarantee requirements: 5 years

Qualification / acceptance requirements: Minimum required pull-off test value:

- 6 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 8 MPa for checks made with hydraulic tester (Type PAT or equivalent).

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P 08										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P08 C	1	EPGF	Carboguard 1209	200	Repair P08 C	1	EPGF	Carboguard 1209	200	
	2	EPGF	Carboguard 1209	200		2	EPGF	Carboguard 1209	200	
	3					3				
	4					4				
	Total NDFT:			400		Total NDFT:			400	
P08 H	1	EPGF	Hempadur multi-strenght GF 3587	200	Repair P08 H	1	EPGF	Hempadur multi-strenght GF 3587	200	
	2	EPGF	Hempadur multi-strenght GF 3587	200		2	EPGF	Hempadur multi-strenght GF 3587	200	
	3					3				
	4					4				
	Total NDFT:			400		Total NDFT:			400	
P08 J	1	EPGF	Penguard pro GF	200	Repair P08 J	1	EPGF	Penguard pro GF	200	
	2	EPGF	Penguard pro GF	200		2	EPGF	Penguard pro GF	200	
	3					3				
	4					4				
	Total NDFT:			400		Total NDFT:			400	
P08 P	1	EPGF	SigmaShield 400	200	Repair P08 P	1	EPGF	SigmaShield 400	200	
	2	EPGF	SigmaShield 400	200		2	EPGF	SigmaShield 400	200	
	3					3				
	4					4				
	Total NDFT:			400		Total NDFT:			400	

Remarks
Specific guarantee requirements: 3 years, cracking, blistering & flaking requirements only

Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

P 09										
Surface preparation:					Surface preparation for repair:					
Grade of cleanliness: Sa 3 (ISO 8501-1)					Grade of cleanliness: Sa 2 ½ (ISO 8501-1)					
Roughness: Grit-medium (G) (ISO 8503-2)					Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P09 C	1	ESI	Carbozinc 11	60	Repair P09C	1	EPRZ	Carbozinc 858	60	
	2	EP	Carboguard 893SG	30		2	EP	Carboguard 893	250	
	3	EP	Carboguard 893	200		3	PUR	Carbothane 134 series	40	
	4	PUR	Carbothane 134 series	50		4				
	Total NDFT:					340	Total NDFT:			
P 09 H	1	ESI	Galvosil 1570	60	Repair P09H	1	EPRZ	Avantguard 750 (1736G)	60	
	2	EP	Hempadur 1557	30		2	EP	Hempadur 4588	250	
	3	EP	Hempadur 4588	200		3	PUR	Hempathane HS 5561	50	
	4	PUR	Hempathane HS 5561	50		4				
	Total NDFT:					340	Total NDFT:			
P 09 J	1	ESI	Resist 86	60	Repair P09J	1	EPRZ	Barrier plus	60	
	2	EP	Penguard Tie coat 100	30		2	EP	Penguard universal	250	
	3	EP	Penguard universal	200		3	PUR	Hardtop XP	50	
	4	PUR	Hardtop XP	50		4				
	Total NDFT:					340	Total NDFT:			
P 09 P	1	ESI	Sigmazinc 158	60	Repair P09P	1	EPRZ	Sigmazinc 68 SP	60	
	2	EP	SigmaCover 522	30		2	EPGF	SigmaShield 400	250	
	3	EPGF	SigmaShield 400	200		3	PUR	Sigmadur 550	50	
	4	PUR	Sigmadur 550	50		4				
	Total NDFT:					340	Total NDFT:			

Remarks
Specific guarantee requirements: 5 years
Qualification / acceptance requirements: Minimum required pull-off test value: - 3 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 5 MPa for checks made with hydraulic tester (Type PAT or equivalent).

P 09 second										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P09^{2nd} C	1	EPRZ	Carbozinc 858	60	Repair P09^{2nd} C	1	EPRZ	Carbozinc 858	60	
	2	EP	Carboguard 893	100		2	EP	Carboguard 893	100	
	3	EP	Carboguard 893	200		3	EP	Carboguard 893	200	
	4	PUR	Carbothane 134 series	50		4	PUR	Carbothane 134 series	50	
	Total NDFT:			410		Total NDFT:			410	
P09^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	Repair P09^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	
	2	EP	Hempadur 4588	100		2	EP	Hempadur 4588	100	
	3	EP	Hempadur 4588	200		3	EP	Hempadur 4588	200	
	4	PUR	Hempathane HS 5561	50		4	PUR	Hempathane HS 5561	50	
	Total NDFT:			410		Total NDFT:			410	
P09^{2nd} J	1	EPRZ	Barrier plus	60	Repair P09^{2nd} J	1	EPRZ	Barrier plus	60	
	2	EP	Penguard universal	100		2	EP	Penguard universal	100	
	3	EP	Penguard universal	200		3	EP	Penguard universal	200	
	4	PUR	Hardtop XP	50		4	PUR	Hardtop XP	50	
	Total NDFT:			410		Total NDFT:			450	
P09^{2nd} P	1	EPRZ	Sigmazinc 68 SP	60	Repair P09^{2nd} P	1	EPRZ	Sigmazinc 68 SP	60	
	2	EP	SigmaCover 410	100		2	EP	SigmaCover 410	100	
	3	EP	SigmaCover 410	200		3	EP	SigmaCover 410	200	
	4	PUR	Sigmadur 550	50		4	PUR	Sigmadur 550	50	
	Total NDFT:			410		Total NDFT:			410	

Remarks
Specific guarantee requirements: 5 years
Qualification / acceptance requirements: Minimum required pull-off test value: - 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

P 10: NOT TO BE USED										
<u>Surface preparation:</u>					<u>Surface preparation for repair:</u>					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

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P 11										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P11 C	1	ESI	Carbozinc 11	60	Repair P11 C	1	SI	Thermaline 4700	20	
	2	SI	Thermaline 4700	20		2	SI	Thermaline 4700	20	
	3	SI	Thermaline 4700	20		3				
	4					4				
	Total NDFT:			100		Total NDFT:			40	
P11 H	1	ESI	Galvosil 1570	60	Repair P11H	1	SI	Hempel's silicone 1690	40	
	2	SI	Silicone ALU 5691	25		2	SI	Silicone ALU 5691	25	
	3	SI	Silicone ALU 5691	25		3	SI	Silicone ALU 5691	25	
	4					4				
	Total NDFT:			110		Total NDFT:			90	
P11 J	1	ESI	Resist 86	60	Repair P11 J	1	SI	Solvalitt	20	
	2	SI	Solvalitt	20		2	SI	Solvalitt	20	
	3	SI	Solvalitt	20		3				
	4					4				
	Total NDFT:			100		Total NDFT:			40	
P11 P	1	ESI	Sigmazinc 158	60	Repair P11 P	1	SI	Sigmatherm 540	25	
	2	SI	Sigmatherm 540	25		2	SI	Sigmatherm 540	25	
	3	SI	Sigmatherm 540	25		3				
	4					4				
	Total NDFT:			110		Total NDFT:			50	

Remarks
Specific guarantee requirements: 1 year
Qualification / acceptance requirements: Adhesion as per ISO 16276-2 on primer only: Cross cut test: Class 0

P 11 second										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P11^{2nd} C	1	SI	Thermaline 4700	25	Repair P11^{2nd} C	1	SI	Thermaline 4700	25	
	2	SI	Thermaline 4700	25		2	SI	Thermaline 4700	25	
	3					3				
	4					4				
	Total NDFT:			50		Total NDFT:			50	
P11^{2nd} H	1	SI	Silicone ALU 5691	25	Repair P11^{2nd} H	1	SI	Silicone ALU 5691	25	
	2	SI	Silicone ALU 5691	25		2	SI	Silicone ALU 5691	25	
	3					3				
	4					4				
	Total NDFT:			50		Total NDFT:			50	
P11^{2nd} J	1	SI	Solvalitt	25	Repair P11^{2nd} J	1	SI	Solvalitt	25	
	2	SI	Solvalitt	25		2	SI	Solvalitt	25	
	3					3				
	4					4				
	Total NDFT:			50		Total NDFT:			50	
P11^{2nd} P	1	SI	Sigmatherm 540	25	Repair P11^{2nd} P	1	SI	Sigmatherm 540	25	
	2	SI	Sigmatherm 540	25		2	SI	Sigmatherm 540	25	
	3					3				
	4					4				
	Total NDFT:			50		Total NDFT:			50	

Remarks
Specific guarantee requirements: 1 year

P 12: NOT TO BE USED										
<u>Surface preparation:</u>					<u>Surface preparation for repair:</u>					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	4	-	-	-		4	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

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P 13										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 13 C	1	EPPH	Thermaline 400 Primer	150	Repair P13C	1	EPPH	Thermaline 400 Primer	150	
	2	EPPH	Thermaline 400 Finish coat	150		2	EPPH	Thermaline 400 Finish coat	150	
	3					3				
	4					4				
				Total NDFT:					300	
P 13 H	1	EPPH	Hempadur 8567	125	Repair P13H	1	EPPH	Hempadur 8567	125	
	2	EPPH	Hempadur 8567	125		2	EPPH	Hempadur 8567	125	
	3					3				
	4					4				
				Total NDFT:					250	
P 13 J	1	EPPH	Epoxy HR	125	Repair P13J	1	EPPH	Epoxy HR	125	
	2	EPPH	Epoxy HR	125		2	EPPH	Epoxy HR	125	
	3					3				
	4					4				
				Total NDFT:					250	
P 13 P	1	EPPH	PhenGuard 930	100	Repair P13P	1	EPPH	PhenGuard 930	100	
	2	EPPH	PhenGuard 935	100		2	EPPH	PhenGuard 935	100	
	3	EPPH	PhenGuard 940	100		3	EPPH	PhenGuard 940	100	
	4					4				
				Total NDFT:					300	

Remarks
Specific guarantee requirements: 3 years

Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

P 14										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 14 C	1	EPRZ	Carbozinc 858	60	Repair P14C	1	EPRZ	Carbozinc 858	60	
	2	EP	Carboguard 893	150		2	EP	Carboguard 893	150	
	3	PUR	Carbothane 134 series	50		3	PUR	Carbothane 134 series	50	
	4					4				
	Total NDFT:			260		Total NDFT:			260	
P 14 H	1	EPRZ	Avantguard 750 (1736G)	60	Repair P14H	1	EPRZ	Avantguard 750 (1736G)	60	
	2	EP	Hempadur 4588 MIO	150		2	EP	Hempadur 4588 MIO	150	
	3	PUR	Hempathane HS 5561	50		3	PUR	Hempathane HS 5561	50	
	4					4				
	Total NDFT:			260		Total NDFT:			260	
P 14 J	1	EPRZ	Barrier plus	60	Repair P14J	1	EPRZ	Barrier plus	60	
	2	EP	Penguard universal	150		2	EP	Penguard universal	150	
	3	PUR	Hardtop XP	50		3	PUR	Hardtop XP	50	
	4					4				
	Total NDFT:			260		Total NDFT:			260	
P 14 P	1	EPRZ	Sigmazinc 68 SP	60	Repair P14P	1	EPRZ	Sigmazinc 68 SP	60	
	2	EP	SigmaCover 410	150		2	EP	SigmaCover 410	150	
	3	PUR	Sigmadur 550	50		3	PUR	Sigmadur 550	50	
	4					4				
	Total NDFT:			260		Total NDFT:			260	

Remarks
Specific guarantee requirements: 3 years
Qualification / acceptance requirements: Minimum required pull-off test value: - 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

P 15										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 15 C	1	ESI	Carbozinc 11	60	Repair P15C	1	EPRZ	Carbozinc 858	60	
	2	EP	Carboguard 893SG	30		2	EP	Carboguard 893SG	40	
	3	EP	Carboguard 893	150		3	EP	Carboguard 893	150	
	4					4				
				Total NDFT:					250	
P 15 H	1	ESI	Galvosil 1570	60	Repair P15H	1	EPRZ	Avantguard 750 (1736G)	60	
	2	EP	Hempadur 1557	30		2	EP	Hempadur 1557	40	
	3	EP	Hempadur 4588	150		3	EP	Hempadur 4588	150	
	4					4				
				Total NDFT:					250	
P 15 J	1	ESI	Resist 86	60	Repair P15J	1	EPRZ	Barrier plus	60	
	2	EP	Penguard Tie coat 100	30		2	EP	Penguard Tie coat 100	40	
	3	EP	Penguard universal	150		3	EP	Penguard universal	150	
	4					4				
				Total NDFT:					250	
P 15 P	1	ESI	Sigmazinc 158	60	Repair P15P	1	EPRZ	Sigmazinc 68 SP	60	
	2	EP	SigmaCover 522	30		2	EP	SigmaCover 522	30	
	3	EP	SigmaCover 410	150		3	EP	SigmaCover 410	150	
	4					4				
				Total NDFT:					240	

Remarks
Specific guarantee requirements: 3 years
Qualification / acceptance requirements: Minimum required pull-off test value: - 3 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 5 MPa for checks made with hydraulic tester (Type PAT or equivalent).

P 15 second										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P15^{2nd} C	1	EPRZ	Carbozinc 858	60	Repair P15^{2nd} C	1	EPRZ	Carbozinc 858	60	
	2	EP	Carboguard 893	100		2	EP	Carboguard 893	100	
	3	EP	Carboguard 893	150		3	EP	Carboguard 893	150	
	4					4				
	Total NDFT:			310		Total NDFT:			310	
P15^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	Repair P15^{2nd} H	1	EPRZ	Avantguard 750 (1736G)	60	
	2	EP	Hempadur 4588	100		2	EP	Hempadur 4588	100	
	3	EP	Hempadur 4588	150		3	EP	Hempadur 4588	150	
	4					4				
	Total NDFT:			310		Total NDFT:			310	
P15^{2nd} J	1	EPRZ	Barrier plus	60	Repair P15^{2nd} J	1	EPRZ	Barrier plus	60	
	2	EP	Penguard universal	100		2	EP	Penguard universal	100	
	3	EP	Penguard universal	150		3	EP	Penguard universal	150	
	4					4				
	Total NDFT:			310		Total NDFT:			310	
P15^{2nd} P	1	EPRZ	Sigmazinc 68 SP	60	Repair P15^{2nd} P	1	EPRZ	Sigmazinc 68 SP	60	
	2	EP	SigmaCover 410	100		2	EP	SigmaCover 410	100	
	3	EP	SigmaCover 410	150		3	EP	SigmaCover 410	150	
	4					4				
	Total NDFT:			310		Total NDFT:			310	

Remarks
Specific guarantee requirements: 3 years
Qualification / acceptance requirements: Minimum required pull-off test value: - 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).

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Appendix 3

P 16										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 16 C	1	ESI	Carbozinc 11	60	Repair P16C	1	-	-	-	
	2					2	-	-	-	
	3					3	-	-	-	
	4					4	-	-	-	
	Total NDFT:			60		Total NDFT:			-	
P 16 H	1	ESI	Galvosil 1570	60	Repair P16H	1	-	-	-	
	2					2	-	-	-	
	3					3	-	-	-	
	4					4	-	-	-	
	Total NDFT:			60		Total NDFT:			-	
P 16 J	1	ESI	Resist 86	60	Repair P16J	1	-	-	-	
	2					2	-	-	-	
	3					3	-	-	-	
	4					4	-	-	-	
	Total NDFT:			60		Total NDFT:			-	
P 16 P	1	ESI	Sigmazinc 158	60	Repair P16P	1	-	-	-	
	2					2	-	-	-	
	3					3	-	-	-	
	4					4	-	-	-	
	Total NDFT:			60		Total NDFT:			-	

P 17										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 17 C	1	EPPH	Thermaline 400 Primer	150	Repair P17C	1	EPPH	Thermaline 400 Primer	150	
	2	EPPH	Thermaline 400 Finish coat	150		2	EPPH	Thermaline 400 Finish coat	150	
	3					3				
	4					4				
	Total NDFT:			300		Total NDFT:			300	
P 17 H	1	EPPH	Hempadur 3590	300	Repair P17H	1	EPPH	Hempadur 3590	300	
	2	EPPH	Hempadur 3590	300		2	EPPH	Hempadur 3590	300	
	3					3				
	4					4				
	Total NDFT:			600		Total NDFT:			600	
P 17 J	1	EPPH	Tankguard plus	100	Repair P17J	1	EPPH	Tankguard plus	100	
	2	EPPH	Tankguard plus	100		2	EPPH	Tankguard plus	100	
	3	EPPH	Tankguard plus	100		3	EPPH	Tankguard plus	100	
	4					4				
	Total NDFT:			300		Total NDFT:			300	
P 17 P	1	EPPH	PhenGuard 930	100	Repair P17P	1	EPPH	PhenGuard 930	100	When used on non insulated surfaces, and when specific topcoat colour is required, Phenguard 940 topcoat can be changed by Sigmaline 780.
	2	EPPH	PhenGuard 935	100		2	EPPH	PhenGuard 935	100	
	3	EPPH	PhenGuard 940	100		3	EPPH	PhenGuard 940	100	
	4					4				
	Total NDFT:			300		Total NDFT:			300	

Remarks
Specific guarantee requirements: 3 years

Qualification / acceptance requirements: Minimum required pull-off test value:

- 3 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 5 MPa for checks made with hydraulic tester (Type PAT or equivalent).

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Appendix 3

P 18										
Surface preparation:					Surface preparation for repair:					
Grade of cleanliness: Sa 3 (ISO 8501-1)					Grade of cleanliness: Sa 2 ½ (ISO 8501-1)					
Roughness: Grit-medium (G) (ISO 8503-2)					Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 18 C	1	EPPH	Thermaline 400 Primer	125	Repair P18C	1	EPPH	Thermaline 400 Primer	125	
	2	EPPH	Thermaline 400 Finish coat	125		2	EPPH	Thermaline 400 Finish coat	125	
	3					3				
	4					4				
	Total NDFT:					250	Total NDFT:			
P 18 H	1	EPPH	Hempadur 8567	120	Repair P18H	1	EPPH	Hempadur 8567	120	
	2	EPPH	Hempadur 8567	120		2	EPPH	Hempadur 8567	120	
	3					3				
	4					4				
	Total NDFT:					240	Total NDFT:			
P 18 J	1	EPPH	Epoxy HR	125	Repair P18J	1	EPPH	Epoxy HR	125	
	2	EPPH	Epoxy HR	125		2	EPPH	Epoxy HR	125	
	3					3	-			
	4					4	-			
	Total NDFT:					250	Total NDFT:			
P 18 P	1	EPPH	Sigmatherm 230	120	Repair P18P	1	EPPH	Sigmatherm 230	120	
	2	EPPH	Sigmatherm 230	120		2	EPPH	Sigmatherm 230	120	
	3					3				
	4					4				
	Total NDFT:					240	Total NDFT:			

Remarks
Warning: In all case, the maximum individual DFT per coat shall not exceed 150 µm.
Specific guarantee requirements: 3 years
Qualification / acceptance requirements: Minimum required pull-off test value: - 3 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 5 MPa for checks made with hydraulic tester (Type PAT or equivalent).

Appendix 4 Colour coding

1. Colours

Basic colours are, from [RAL 840 HR](#):

- Yellow - **RAL 1003**
- Black - **RAL 9005**
- Red - **RAL 3001**
- Aluminium grey for high temperature.

2. Vessels and Piping identification

Using stickers on un-painted stainless steel is strictly forbidden. For un-painted stainless steel, the surface below the sticker shall be painted with painting system P05 without the topcoat for temperature up to 80°C and painting system P13 for temperature up to 200°C, before application of the stickers.

2.1 Subject

This part of appendix defines the high durability characteristics of the identification stickers on vessels and piping of offshore platforms.

2.2 Sticker definitions

2.2.2 Service temperature

- -29°C
- +200°C

2.2.3 Stickers sizes

Formats are determined according to pipe diameter.

Piping diameters	Sticker sizes
2" to 4"	300 x 150 mm
6" to 12"	450 x 225 mm
> 14"	600 x 300 mm

2.2.4 Adhesive material

Considering all technical constraint and durability required the selected material is **Scotchmark 7980** or equivalent.

This consists of white polyester film glued with high resistant acrylic adhesive.

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Appendix 4

Construction (nominal thicknesses of components):

- Polyester: 64 micrometers
- Adhesive: 25 micrometers
- Protection: 170 micrometers.

The support is specifically designed to obtain maximum adhesion of inks to guarantee high durability and resistance.

2.2.5. Printing

The printing is specially adapted to provide high durability.

Two colours are generally used per sticker coated with an anti UV varnish.

The colours are defined according to Pantone or RAL standards.

2.3 Application / vessels and piping identification

The stickers are delivered already cut with separation at the back to facilitate the positioning.

The application is carried out by removing the finest protection in order to position the sticker correctly on support before gluing the final part.

The density of sticker application should be of 3 m and a maximum of 20D intervals and on either side of each valve, elbow, fitting, wall penetration and any other places where identification of fluid is necessary.

2.4 Storage condition

To preserve correctly they should be stored flat in a dry place with moderate temperature (< 40°C).

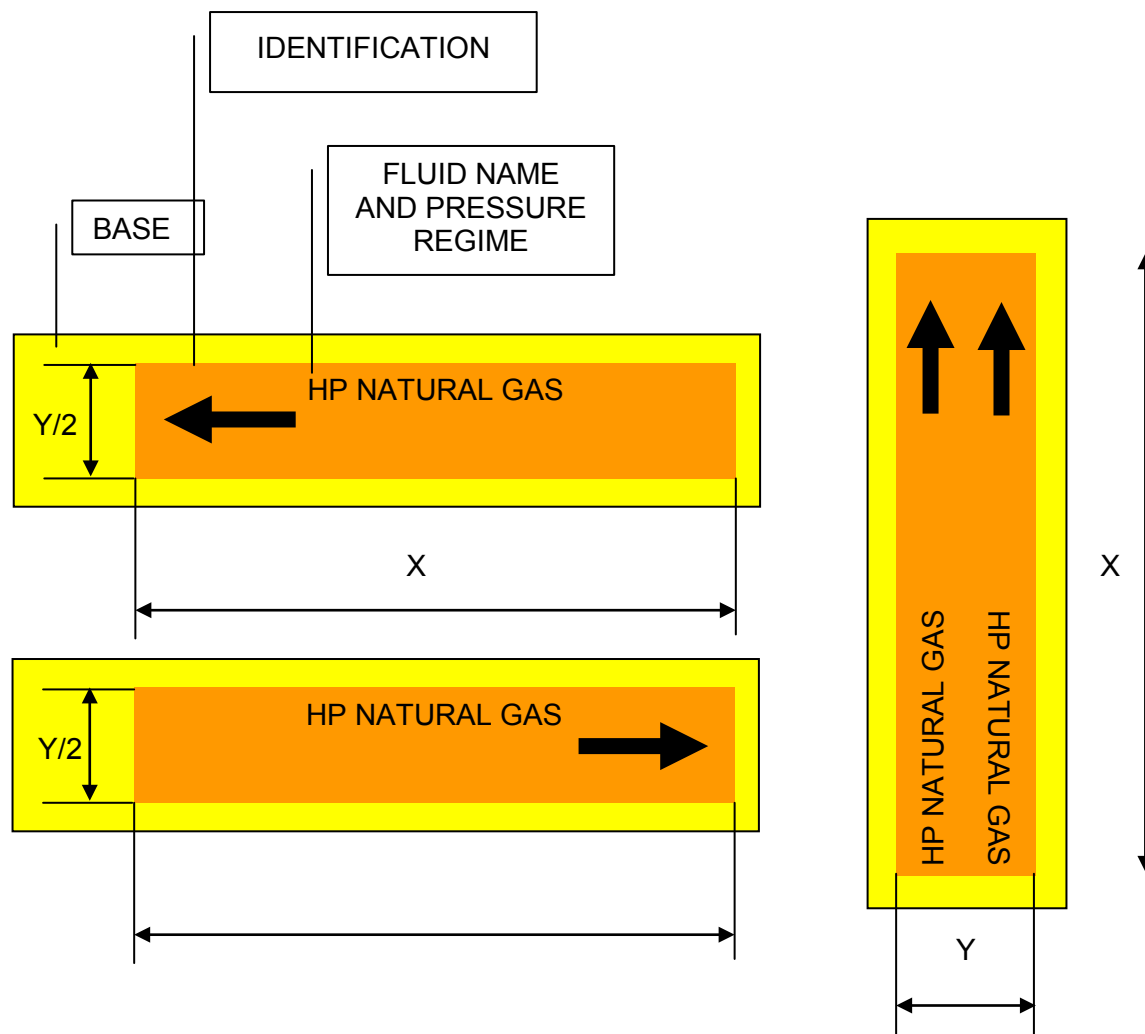
2.5 Checks

Stickers are applied without bubbles with full surface adhesion.

Peeling test conforms to DIN 500014. Minimum adhesion value is 5 MPa.

2.6 Examples

2.6.1 Principle



Both type of label should be acceptable.

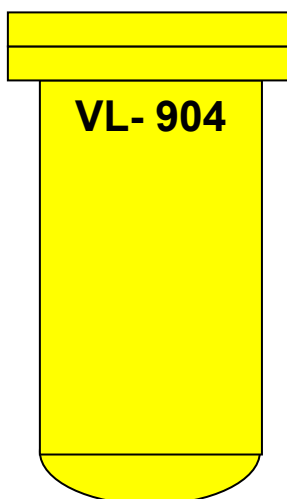
2.6.2 Piping Identification

	FIRE WATER	→	
	METHANOL	→	
	COOLING WATER	→	
	CLOSED DRAIN	→	
	INSTRUMENT AIR	→	
	HP FLARE	→	
	HP CRUDE OIL	→	
	MP CONDENSATE	→	

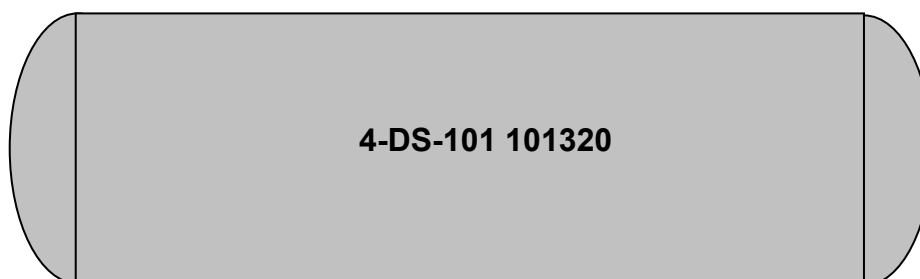
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Appendix 4
2.6.3 Vessel identification

The tag number of pressure vessels and other process equipment shall be in black on both side of the shell with letters of maximum 300 mm height and minimum 150 mm height visible from all side of the vessel.



Operating temperature under 80°C.



Operating temperature above 80°C.

 ISOICO		SOUTH PARS GAS FIELD DEVELOPMENT PHASE 11 EPCI Contract for Topside, Ancillaries and Tripods (SP11A)	
SP11-10-D-21-4-021-D4	Specification for Painting & Coating	Appendix B Class: 2	

Appendix B **Internal protection of equipment** **by painting** **(GS COR 352-2015)**

GS EP COR 352

SEPTEMBRE 2015

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GENERAL SPECIFICATION

CORROSION

GS EP COR 352

Internal protection of equipment by painting

12	09/2015	General revision
11	09/2013	H ₂ S resistant painting system added - New paint supplier
10	10/2012	General review - New paint Supplier
08	10/2011	General review - New paint Supplier - Methanol Tanks paint systems
00	02/2001	First issue
Rev.	Date	Purpose of the revision

Owning entity: DSO/TEC	Managing entity: DSO/TEC/COR
------------------------	------------------------------



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1. Scope

This document defines the technical requirements for the execution of painting works for high durability internal protection of equipment against corrosion and/or of products against pollution or contamination.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
ACQPA	"Association pour la Certification et la Qualification en Peinture Anticorrosion"
ASTM A380	Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel -Parts, Equipment, and Systems
ASTM D4285	Standard Test Method for Indicating Oil or Water in Compressed Air
ASTM D4752	Standard test method for measuring MEK resistance of ethyl silicate (inorganic) Zinc-rich primer by solvent rub
ASTM D4940	Standard test method for conductimetric analysis of water soluble ionic contamination of Blasting abrasives
ASTM D5162	Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates
ISO 12944 (Parts 3; 4; 7; 8)	Paints and varnishes. Corrosion protection of steel structures by protective paint systems - Parts 3; 4; 7; 8
ISO 16276 (Parts 1; 2)	Corrosion protection of steel structures by protective paint systems - Assessment of, and acceptance criteria for, the adhesion/cohesion (fracture strength) of a coating - Parts 1; 2
ISO 19840	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Measurement of, and acceptance criteria for, the dry-film thickness of coating on rough surfaces
ISO 4628 (Parts 1; 2; 3; 4; 5)	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Parts 1; 2; 3; 4; 5
ISO 8501 (Parts 1; 3)	Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness - Parts 1; 3



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Reference	Title
ISO 8502 (Parts 3; 4; 6; 9)	Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness - Parts 3; 4; 6; 9
ISO 8503 (Parts 1; 2)	Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates - Parts 1; 2
NACE SP 0178	Design, Fabrication, and Surface Finish Practices for Tanks and Vessels to Be Lined for Immersion Service
SSPC SP1	Solvent Cleaning

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
Not applicable	

3. Painting systems

The list and application areas of all painting systems are given in Appendix 2.

3.1 Qualified Paint supplier

Paint suppliers shall be selected among painting manufacturer listed in the Company Approved Vendor List.

3.2 Approved systems

The painting systems approved by Company are given in Appendix 3.

3.3 Qualification of alternative painting systems

For **Suppliers already qualified**, new systems can be submitted for approval to Company at any time. The system shall fulfill internal qualification protocol from Company.

3.4 Painting system compatible with H₂S

For process vessels, when H₂S partial pressure is above 3.5 mbar, only painting system **P102** shall be used.

Depending selected paint supplier, some painting system P102 are qualified or not for H₂S. Refer to **P102** system sheet in Appendix 3.



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4. General philosophy

When a painting system is used for internal protection of equipment, it will usually be associated with cathodic protection by sacrificial anodes, unless otherwise specified. The chosen painting system shall therefore be compatible with cathodic protection.

In order to avoid rapid consumption of sacrificial anodes, internals of vessels and tanks shall be painted wherever possible, especially if these internals are made of stainless steel. From an economic standpoint, careful consideration shall therefore be given to the use of carbon steel when internals can be painted.

5. Certification of personnel

5.1 Operators

Operators shall be individually certified by an approved organization ([ACQPA](#), FROSIO, etc.).

5.2 Inspectors

Inspectors shall be individually certified in accordance with NS 476 (Inspector certified level III) or NACE certified coating inspector level III. Certification shall be delivered by the following approved organizations:

- [ACQPA](#)
- FROSIO
- NACE.

6. Qualification of the application procedures

6.1 Application procedure

A detailed application procedure shall be established for Company approval based on the requirements of this specification. No painting work shall begin before the application procedure is approved by Company.

The application procedure shall follow [ISO 12944-8](#) and will include at the minimum the following information:

- Equipment/structure/piping to be coated
- Operating temperature of the equipment
- Type of substrate to be coated
- Surface preparation
- Methods of application and application requirements
- Painting cycle
- Painting Systems to be used
- Coating products to be used



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- Product data sheets (abrasives and paint materials)
- Safety data sheets
- Health and safety requirements
- Test and inspections
- Certification of the personnel
- Handling and storage
- Repair method
- Template of painting daily report.

6.2 Application procedures tests

One month before work commences, all the selected systems shall be applied on samples representative of the structure to be painted. The products used shall be sampled from the same batches as these intended for the works.

The system shall be applied in presence of the paint Supplier and the Company representative, in climatic conditions that are as similar as possible to the worst case conditions that can be foreseen during the work on the construction site. Application shall be performed by the painting specialist who will be responsible for application during the work, using the same dedicated equipment that will be used during the work.

When the painting systems are fully cured, visual inspection and adhesion testing shall be carried out to confirm that the performance of the painting systems meet those specified for each system.

7. Kick off meeting

A technical kick off meeting shall be organized by the Contractor in the presence of Company specialists (HQ Corrosion Department) and Supplier to review all the details regarding the work, application procedures, and inspection test plan. All the documentation shall be submitted to Company for review at least two (2) weeks prior to this meeting.

Supplier shall provide Contractor with technical assistance. All recommendations made by Supplier other than these outlined in datasheets or in the present specification shall be supported by a written statement from the Supplier head office.

8. Technical content of tenders

Tenders shall include the following information:

- Proposed paint systems for each category/location of item to be painted
- Product data sheets
- Proposed qualification program if any
- List of derogations to the present General Specification, if any. **Derogations will not be granted for painting systems after Contract award**



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- Terms and conditions of guarantee
- A statement showing that all parties involved (Contractor, Supplier, and Applicator) will be carrying out the work according to the present specification, or if relevant, to the project particular specification, including derogations duly agreed by HQ Corrosion Department before Contract award. This statement shall also show that the guarantee is jointly underwritten by all parties and specify the durations and performance levels of the guarantee. This statement can consist in either a certificate of homologation by OHGPI (Organisme d'Homologation des Garanties en Peinture Industrielles) or a letter signed by the head office of each party involved.
- Maximum thickness tolerable for each coat and for the each full painting system
- Surface preparation and painting procedures
- Inspection test plan with acceptance criteria and frequency of inspection in accordance with Appendix 1
- A list of inspection and painting equipment to be used
- Colours to be used for each item of equipment and for the different coats, in accordance with the colour chart chosen for the project by Company
- Methods of protection of items to be painted against adverse weather conditions
- Certificates ([ACQPA](#), FROSIO, NACE, or equivalent) of Operators and Inspectors.

9. Surface Preparation

9.1 Design and preparation before blasting of surfaces to be painted

All equipment shall be designed according to [ISO 12944-3](#) international standard for high durability paint systems.

All Sharp edges shall be rounded (minimum radius > 2 mm).

Preparation grades of welds, edges and other areas with surface imperfections shall be grade **P3** according [ISO 8501-3](#), and **level C** for filled welded tee joint and lap weld according [NACE SP 0178](#).

The design of the item to be painted shall be such that it creates no interstice and inaccessible area.

All oil or grease shall be removed by washing the item to be treated with appropriate solvents or any other suitable means before beginning of blast-cleaning operations according to [ISO 12944-4](#) or [SSPC SP1](#). This includes bolt holes in piping assemblies.

Weld spatter and remains of temporary welds, deposits or surface defects shall be eliminated by appropriate means; removal by deep grinding is subject to Company approval.

All mating surfaces of equipment shall be coated with the full coating system prior to assembly (base plates, bolted components, flanges, etc.).

Contractor shall protect all equipment that is not to be painted or may be affected by the presence of abrasives or paint. Special attention shall be paid to avoid splashes of zinc paint on equipment made of austenitic steels.



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9.2 Quality of abrasives

Abrasives shall be:

- Sealed in watertight packaging. Any product delivered in defective packaging shall be rejected
- Stored sheltered from the elements
- Dry, clean and Conductivity shall be less than $150 \cdot 10^{-6}$ Siemens/cm as per [ASTM D4940](#)
- Non-ferrous and chloride-free when used on stainless steel surfaces.

Abrasives containing more than 1% crystalline silica are **strictly prohibited**.

The use of copper slag or silica sand is **strictly prohibited**.

9.3 Blast cleaning

The air supply for blast cleaning shall be free of oil and water and in accordance with [ASTM D4285](#).

All surfaces to be coated shall be blast-cleaned to grade of cleanliness and surface profile specified for each system in Appendix 3.

After blast-cleaning, all dust shall be removed using a vacuum cleaner before application of the paint in order to achieve the **maximum dust level 2** (quantity rating 2 max, particle size class 2 max) according [ISO 8502-3](#). All blast-cleaned surfaces shall be coated 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.

Before painting works commence, checks for the contamination of the surface by salts shall be carried out ([ISO 8502-6](#) & [ISO 8502-9](#)) plus ferrous contamination for stainless steel surfaces

For blast cleaning on automatic production line, Contractor shall ensure that the grit selected can achieve the required surface profile. This requirement includes determination of grit mix, as well as quantity and frequency of grit renewal. Surface profile shall be checked twice per shift and the results shall be recorded.

Stainless steels shall be segregated, carbon steel supports for storage shall be systematically painted, and lifting equipment shall prevent iron contamination.

Stainless steel surfaces to be coated shall be etched or degreased and blasted.

The blast cleaning procedure shall be submitted to Company for approval.

10. Paint application

10.1 Shop primer

The shop primer is for temporary protection. It shall be completely removed before application of the painting system.



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10.2 Procurement and storage

The quantities of paint and thinners required to perform the entire job shall be procured before the work commences, except in cases where the shelf life of the product is less than the anticipated duration of the work.

Thinners, solvents, etc. shall be stored in a suitably ventilated fireproofed building, separate from other painting consumables.

The products shall be delivered in their original sealed packaging and stored in such conditions as to avoid their degradation (controlled temperature, etc.).

The packaging shall be clearly marked with:

- Product description
- Batch number
- Fabrication date
- Expiry date.

The shelf life from the fabrication dates are:

- For zinc ethyl silicate: 6 months
- For other products: 1 year
- Specific cases: according to Manufacturer's recommendation with Company approval.

10.3 Application

10.3.1 General

Paint shall always be applied to surfaces that are dry, clean and degreased, for both coating on substrate and previous coat.

Painting works shall not proceed if:

- Temperature of the substrate is less than 3°C above the dew point
- The relative humidity is more than 85% RH (90% RH for inorganic zinc silicates)
- The weather is rainy or foggy, except under shelter, and subject to verification of the atmospheric conditions
- The minimum and maximum temperature of the ambient atmosphere and the substrate are out with the limits given in the product datasheets. Minimum application temperature is usually 10°C.

During the painting works, the Applicator shall also paint two specimen plates (200 mm x 100 mm) per equipment and per system.

Different colours shall be used for all successive coats of the paint system. The finishing coat of the required colour shall be sufficiently opaque to cover the shade of the undercoat.

Application shall be by airless spray.



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Contractor shall keep a daily record of the dew point, relative humidity, ambient atmosphere and substrate temperatures (all measured before the work commences and twice per shift and when ambient conditions are obviously changing) to ensure that conditions are acceptable. These records shall be kept and made available to Company.

10.3.2 Stripe coats

Before spraying each coat, **stripe coats** shall be applied by brush to all angles, corners, sharp edges, bolt or rivet heads, etc. with the same product applied on the surface to be painted.

10.3.3 Zinc ethyl silicate

During application, the product shall be stirred at all times.

If relative humidity is below 65%, the painted surface shall be sprayed with fresh water for at least two hours after application to enhance curing.

Before the subsequent coat is applied, this primer shall be subjected to a MEK test as per [ASTM D4752](#) to ensure that hydrolysis is complete. If complete hydrolysis is not obtained within eight days of application, the coating shall be completely removed and re-applied.

10.4 Repairs

Any defect shall be repaired before the application of further coats. Subject to the agreement of Company, and after determining the type and size of the defects, the following methods of repair shall be applied:

10.4.1 Major defects (paint products, application, non conformity of test results)

The paint shall be removed completely by abrasive blast-cleaning and the entire system shall be re-applied.

10.4.2 Minor defects (localized appearance, mechanical damage, scratches, etc.)

Subject to the agreement of the Supplier of the product, the system shall be removed by localized blast-cleaning, the edges of the sound coating shall be feathered back about 50 mm, and the repair system shall be applied.

When open abrasive blasting is not permitted, vacuum blasting machine shall be used for spot repair.

11. Checks, inspection and acceptance

11.1 Checks

Throughout the duration of the work, Contractor's Quality Control department shall check all points given in Appendix 1 and record the results in its daily quality control report. Execution and supervision of paint work shall be as per defined in [ISO 12944-7](#).



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11.2 Inspection test plan

An inspection test plan including all the points in Appendix 1 shall be prepared and submitted to Company for approval. The Inspection Test Plan shall clearly indicate frequency of testing for each check.

11.3 Company inspection

Company Inspector shall have free access to storage areas, workshops, yards where the works will be performed. Contractor shall also provide Company Inspector with all office facilities necessary for the execution of his work (telephone, fax, handling equipment, measuring instruments with valid calibration certificates, etc.).

Upon arrival of Company Inspector on site, Contractor shall supply him with all relevant documentation regarding the works to be carried out.

11.4 Provisional acceptance

For provisional acceptance, Company shall check that all inspections set out in section Appendix 1 have been carried out and that all results are satisfactory.

11.5 Guarantee

The Work shall be covered by a specific guarantee given by Contractor to complete Guarantees and warranties defined in the Engineering, Procurement, Supply, Construction and Commissioning Contract (EPSCC 1113 - Article 20 "GUARANTEES AND WARRANTIES").

Contractor guarantees that the Work shall be covered by performance warranties in accordance with the following requirements of the Contract:

- The maximum degree of rust shall be Ri2 according to [ISO 4628-3](#)
- The maximum degree of cracking, blistering, or flaking shall be 3S3 according to [ISO 4628-1](#), [ISO 4628-2](#), [ISO 4628-4](#) and [ISO 4628-5](#).

Guarantee shall be provided for the duration defined for each paint system in Appendix 3.

Beginning of Warranty Period as defined for each paint system in Appendix 3 starts from the effective date of the Provisional Acceptance Certificate.

11.6 Final acceptance

At the end of the Warranty Period a joint inspection of Work by Company and Contractor shall be carried out before issuance of the Final Acceptance Certificate for painting works to determine if any claims are raised.



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12. Technical file

Contractor shall hand over a technical file to Company at the end of the works which shall include:

- All inspection reports.
- Provisional acceptance reports
- Guarantee certificates
- Approval and/or test certificates for coatings in contact with specific products: food products, jet fuel, etc.
- Insurance certificates for the guarantee.



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Reference

GS EP COR 351

ISO 9223

Title of the publication

External protection of structures and equipment by painting.
Floating structures

Corrosion of metals and alloys. Atmospheres' corrosivity.
Classification



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Appendix 1

Appendix 1 Summary of tests and inspections

Test description	Method	Frequency	Requirements
Storage of coating materials	Visual	100%	See § 10.2
Shelf life	Visual	100%	See § 10.2
Compressed air	ASTM D4285	Every shift	No oil, No humidity
Pre-cleaning of surfaces	ISO 12944-4 or SSPC SP1	100% of item	Free of oil and grease or other contaminants
Steel and welding imperfections	ISO 8501-3 NACE SP 0178	100% of item	Grade P3 according ISO 8501-3 Rounding of corners, sharp edges to 2 mm radius minimum Level C for filled welded tee joint and lap weld according NACE SP 0178
Surface preparation			
Climatic conditions	-	- Before start and twice per shift - When the ambient conditions are obviously changing	- Temperature of substrate at least 3°C above dew point - Maximum humidity 85% RH
Conductivity of abrasives	ASTM D4940	Every shift	<150.10 ⁻⁶ Siemens/cm
Grade of cleanliness	ISO 8501-1	100% of surface	According system sheet in Appendix 3
Anchoring profile	ISO 8503-1 ISO 8503-2	Spot check (1)	According system sheet in Appendix 3
Dust test	ISO 8502-3	Spot check (1)	Maximum level 2 (quantity rating 2 max, particle size class 2 max)
Water soluble salts	ISO 8502-6 ISO 8502-9	Spot checks (1)	Maximum 20mg/m ²
Ferrous contamination (for SS surfaces)	Ferroxyl test ASTM A380	Spot checks (1)	No surface pollution
Paint application			
Climatic conditions	-	Before start and twice per shift and when the ambient conditions are obviously changing	See § 10.3.1 of this specification



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Appendix 1

Test description	Method	Frequency	Requirements
Wet film thickness (WFT)	Comb gauge	- Each coat - Spot check	As per paint technical data sheet for the specified DFT
Curing test (for inorganic zinc)	ASTM D4752	Spot checks (1)	Level 5
Cleanliness between coats	Visual	- Each coat - 100% surface	No contaminant
Dry film thickness (DFT)	ISO 19840	- Each coat - According ISO 19840	According ISO 19840 and each painting system of Appendix 3
Porosity test	ASTM D5162	100% surface	No holidays For system P110 see note (3)
Adhesion test for DFT<200 µm	ISO 16276-2	Spot checks (1)	Cross-cut test class 0
Adhesion test for DFT>200 µm (2)	ISO 16276-1	Spot checks (1)	Minimum acceptable Values shall not be less than specified in each painting system of Appendix 3 for any single measurement. Test cylinders which are bored with a central hole are forbidden
Visual inspection	Visual	100% surface	No defects such as "orange peel", cracking, bubbling, pinholes, runs and sags, fish-eyes, blistering, etc.
(1) Shall be defined during technical kick off meeting, see paragraph 7 of this specification (2) The adhesion tests shall be performed with cyano-acrylate glue as LOCTITE 496 or equivalent. (3) For painting system P110, holiday detection shall be done with the following procedure: After full curing of the coating (as per paint manufacturer recommendations), tank shall be washed down with fresh water and 1 meter of water shall be left in the bottom. The test duration shall be minimum 2 days. Any porosity highlighted by this method shall be repaired. After test, tank shall be fully dried.			



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Appendix 2

Appendix 2 List of systems

Important warning: The maximum operating temperatures indicated in the following table can be different depending the selected paint supplier.

The maximum operating temperatures per paint supplier are given in each painting system of Appendix 3.

ITEM	OPERATING TEMPERATURE (°C)		SYSTEM N°.	REMARKS
	MINI	MAXI		
1. <u>FACTORY PREPAINTED</u>				
Shop primer	-	-	P108	Factory prepainting is always eliminated before application of the final system
2. <u>STORAGE TANKS</u>				
(t < 60°C)	-010	+060	P 103	Hydrocarbons: Crude oil, Condensates, etc.
Hydrocarbons, crude oil, condensates, etc.				
Tank with fixed roof	-010	+060	P 103	- Roof inner side - Sheel: Extend 2 m down from the roof and 1 m up from the bottom - Bottom inner Additional protection by sacrificial anodes required
Tank with floating roof	-010	+060	P103	- Sheel: Extend 1 m up from the bottom - Bottom inner Additional protection by sacrificial anodes required
Inside Floating roof - Voids	-010	+060	P 207	
Bottom underside	-010	+060	P 107	
Industrial water				
Decantation	-010	+050	P104	Additional protection by sacrificial anodes required
Seawater	-010	+050	P104	
Brackish water	-010	+050	P104	
Fire water	-010	+050	P104	
Drinking water & fresh water ([salts]<25 mg/l)				
	-010	+050	P105	Health and safety report



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ITEM	OPERATING TEMPERATURE (°C)		SYSTEM N°.	REMARKS
	MINI	MAXI		
Finished products				
Gas oil	-010	+050	P106	Type approval by authorized organization
Jet fuel	-010	+050	P109	
Methanol	-010	+050	P110	
3. <u>PROCESS VESSELS</u>				
Hydrocarbon with pH ₂ S < 3.5 mbar				
	-010	+060	P101	
	+61	+120	P102	
Hydrocarbon with pH ₂ S > 3.5 mbar				
	-10	+120	P102	Depending selected paint supplier, some painting system can be used with up to 15% H ₂ S in the process fluid
Industrial water				
Decantation	-010	+050	P104	Additional protection by sacrificial anodes required
Seawater	-010	+050	P104	
Brackish water	-010	+050	P104	
Fire water	-010	+050	P104	



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Appendix 3

Appendix 3 Suppliers' systems

Supplier coding

Supplier	Code
BELZONA	B
CARBOLINE	C
CHESTERTON	Cn
HEMPEL	H
INTERNATIONAL PAINTS	I
JOTUN	J
PPG	P
SAKAPHEN	Sk

Binders coding

Binders	Codes	Remarks
Zinc ethyl silicate	ESI	
Epoxy	EP	
Phenolic Epoxy	EPPH	
Modified Phenol formaldehyde resin	PFM	
Glass flake Epoxy	EPGF	
Vinyl-ester	VY	
Novolac Epoxy	EPN	
Composite Ceramic	CC	



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Appendix 3

P 101										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 101 C	1	EPPH	Phenoline 1205	200	Repair P101C	1	Same as the initial painting system			
	2	EPPH	Phenoline 1205	200		2				
	3					3				
	Total NDFT:			400		Total NDFT:				
P 101 H	1	EP	Hempadur 4575	200	Repair P101H	1	Same as the initial painting system			
	2	EP	Hempadur 4575	200		2				
	3					3				
	Total NDFT:			400		Total NDFT:				
P 101 I	1	EP	Interline 975	200	Repair P101I	1	Same as the initial painting system			
	2	EP	Interline 975	200		2				
	3					3				
	Total NDFT:			400		Total NDFT:				
P 101 J	1	EPPH	Tankguard storage	200	Repair P101J	1	Same as the initial painting system			
	2	EPPH	Tankguard storage	200		2				
	3					3				
	Total NDFT:			400		Total NDFT:				
P 101 P	1	EP	SigmaGuard CSF 650	200	Repair P101P	1	Same as the initial painting system			
	2	EP	SigmaGuard CSF 650	200		2				
	3					3				
	Total NDFT:			400		Total NDFT:				
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

Remarks

Specific guarantee requirements: 3 years: Blistering 1 (S2) and degree of rusting Ri 2

Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).



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P 102										
Surface preparation:					Surface preparation for repair:					
Grade of cleanliness: Sa 3 (ISO 8501-1)					Grade of cleanliness: Sa 2 ½ (ISO 8501-1)					
Roughness: Grit - coarse(C) (ISO 8503-2)					Roughness: Grit - coarse(C) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 102 B	1	EPPH	Belzona 1391	1000	Repair P102B	1	Same as the initial painting system			-Not approved with H ₂ S partial pressure above 3.5 mbar -Can be use for temperature up to 120°C
	2			2						
	Total NDFT:			1000		Total NDFT:				
P 102 C	1	EPN	Plasite 4550S	800	Repair P102C	1	Same as the initial painting system			-Can be used with up to 15% H ₂ S -Can be use for temperature up to 120°C
	2			2						
	Total NDFT:			800		Total NDFT:				
P 102 Cn	1	CC	ARCHT-T	500	Repair P102Cn	1	Same as the initial painting system			-Can be used with up to 15% H ₂ S -Can be use for temperature up to 110°C
	2	CC	ARCHT-T	500		2				
	3			3						
	Total NDFT:			1000		Total NDFT:				
P 102 H	1	VY	Hempadur 3591	600	Repair P102H	1	Same as the initial painting system			-Can be used with up to 15% H ₂ S -Can be use for temperature up to 90°C
	2	VY	Hempadur 3591	600		2				
	3			3						
	Total NDFT:			1200		Total NDFT:				
P 102 I	1	VY	Interline 955	600	Repair P102I	1	Same as the initial painting system			-Not approved with H ₂ S partial pressure above 3.5 mbar -Can be use for temperature up to 90°C
	2	VY	Interline 955	600		2				
	3			3						
	Total NDFT:			1200		Total NDFT:				
P 102 J	1	VY	Chemflake special	600	Repair P102J	1	Same as the initial painting system			-Can be used with up to 15% H ₂ S -Can be use for temperature up to 120°C
	2	VY	Chemflake special	600		2				
	3			3						
	Total NDFT:			1200		Total NDFT:				
P 102P	1	EPPH	Phenguard 930	90	Repair P102P	1	Same as the initial painting system			-Can be used with up to 15% H ₂ S - Can be use for temperature up to 80°C
	2	EPPH	Novaguard 840	375		2				
	3			3						
	Total NDFT:			465		Total NDFT:				
P 102 Sk	1	PFM	Si 14 EG	250	Repair P102Sk	1	PFM	Si 14 EG RE	250	-Can be used with up to 15% H ₂ S -Can be use for temperature up to 180°C
	2			2						
	Total NDFT:			250		Total NDFT:				
P 102 Sk bis	1	VY	VCF 14 EG	600	Repair P102Sk bis	1	Same as the initial painting system			-Not approved with H ₂ S partial pressure above 3.5 mbar - Can be use for temperature up to 180°C
	2	VY	VCF 14 EG	600		2				
	Total NDFT:			1200		Total NDFT:				

Remarks

Specific guarantee requirements:: 3 years: No Blistering and Degree of rusting Ri 2

Qualification / acceptance requirements: Minimum required pull-off test value:

- 6 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 8 MPa for checks made with hydraulic tester (Type PAT or equivalent).



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P 103										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 103 C	1*	EP	Carboguard 193 VF	40	Repair P103C	1	Same as the initial painting system			
	2	EP	Carboguard 942	400		2				
	3					3				
	Total NDFT:			440		Total NDFT:				
P 103 H	1*	EP	Hempadur 1559	40	Repair P103H	1	Same as the initial painting system			
	2	EPPH	Hempadur 3576	400		2				
	3					3				
	Total NDFT:			440		Total NDFT:				
P 103 I	1*	EP	Interline 982	30	Repair P103I	1	Same as the initial painting system			
	2	EPPH	Interline 984	400		2				
	3					3				
	Total NDFT:			430		Total NDFT:				
P 103 J	1*	EP	Penguard Tie coat 100	40	Repair P103J	1	Same as the initial painting system			
	2	EPPH	Tankguard storage	200		2				
	3	EPPH	Tankguard storage	200		3				
	Total NDFT:			440		Total NDFT:				
P 103 P	1	EP	SigmaGuard CSF 650	200	Repair P103P	1	Same as the initial painting system			
	2	EP	SigmaGuard CSF 650	200		2				
	3					3				
	Total NDFT:			400		Total NDFT:				
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

Remarks

*: Primer coat only as a holding primer if necessary

Specific guarantee requirements: 3 years: Blistering 1 (S2) and degree of rusting Ri 2

Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).



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P 104										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 104 C	1*	EP	Carboguard 193 VF	40	Repair P104C	1	Same as the initial painting system			
	2	EP	Carboguard 942	400		2				
	3					3				
	Total NDFT:			440		Total NDFT:				
P 104 H	1	EP	Hempadur 4554	400	Repair P104H	1	Same as the initial painting system			
	2					2				
	Total NDFT:			400		Total NDFT:				
P 104 I	1	EP	Interline 975	400	Repair P104I	1	Same as the initial painting system			Can be use for temperature up to 60°C
	2					2				
	Total NDFT:			400		Total NDFT:				
P 104 J	1	EPPH	Tankguard storage	200	Repair P104J	1	Same as the initial painting system			Can be use for temperature up to 60°C
	2	EPPH	Tankguard storage	200		2				
	3					3				
	Total NDFT:			400		Total NDFT:				
P 104 P	1	EP	SigmaGuard CSF 650	200	Repair P104P	1	Same as the initial painting system			Can be use for temperature up to 60°C
	2	EP	SigmaGuard CSF 650	200		2				
	3					3				
	Total NDFT:			400		Total NDFT:				
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

Remarks
Specific guarantee requirements: 3 years: Blistering 1 (S2) and degree of rusting Ri 2
Qualification / acceptance requirements: Minimum required pull-off test value: - 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).



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P 105										
Surface preparation:					Surface preparation for repair:					
Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 105 C	1	EP	Carboguard 891	125	Repair P105C	1	Same as the initial painting system			Health and safety report N°. AWWA C210
	2	EP	Carboguard 891	125		2				
	3					3				
	Total NDFT:			250		Total NDFT:				
P 105 H	1	EP	Hempadur 3556	150	Repair P105H	1	Same as the initial painting system			Certificate from "Water research centre, Slough, England" - Fresh water tank and pipes internal - test report n°MA3362/0
	2	EP	Hempadur 3556	150		2				
	3									
	Total NDFT:			300		Total NDFT:				
P 105 I	1	EP	Interline 975	400	Repair P105I	1	Same as the initial painting system			The Water Quality Center certificate ref: P22368/ C23592/ 2400
	2					2				
	Total NDFT:			400		Total NDFT:				
P 105 J	1	EP	Tankguard DW	150	Repair P105J	1	Same as the initial painting system			Norwegian Institute of Public Health has approved the white and red colours for use in contact with potable water. The approval requires curing at temperature min 23°C for 7 days after application
	2	EP	Tankguard DW	150		2				
	3					3				
	Total NDFT:			300		Total NDFT:				
P 105 P	1	EP	SigmaGuard CSF 585	300	Repair P105P	1	Same as the initial painting system			Certificate from "KIWA, Holland, ref. K12 827/03 and National Institute of Public Health. Norway, ref. N°. 99/730-MINT/ ARMI/ 523.2".
	2					2				
	Total NDFT:			300		Total NDFT:				
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

Remarks
Specific guarantee requirements: 3 years: No blistering, No cracking, No flaking
Qualification / acceptance requirements: Minimum required pull-off test value: - 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or - 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).



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P 106										
Surface preparation:					Surface preparation for repair:					
Grade of cleanliness: Sa 3 (ISO 8501-1)					Grade of cleanliness: Sa 2 ½ (ISO 8501-1)					
Roughness: Grit-medium (G) (ISO 8503-2)					Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 106 C	1	EPPH	Phenoline 187primer	100	Repair P106C	1	Same as the initial painting system			
	2	EPPH	Phenoline 187finish	100		2				
	3					3				
	Total NDFT:			200		Total NDFT:				
P 106 H	1	EP	Hempadur 8567	100	Repair P106H	1	Same as the initial painting system			
	2	EP	Hempadur 8567	100		2				
	3									
	Total NDFT:			200		Total NDFT:				
P 106 I	1	EPPH	Interline 984	200	Repair P106I	1	Same as the initial painting system			
	2					2				
	Total NDFT:			200		Total NDFT:				
P 106 J	1	EPPH	Tankguard storage	200	Repair P106J	1	Same as the initial painting system			
	2					2				
	Total NDFT:			200		Total NDFT:				
P 106 P	1	EP	SigmaGuard CSF 650	200	Repair P106P	1	Same as the initial painting system			
	2					2				
	Total NDFT:			200		Total NDFT:				
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

Remarks

Specific guarantee requirements: 3 years: No blistering, No cracking, No flaking

Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).



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P 107										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 107 C	1	EP	Carboguard 890	300	Repair P107C	1	Same as the initial painting system			
	2					2				
	Total NDFT:			300		Total NDFT:				
P 107 H	1	EP	Hempadur multi-strength 4554	300	Repair P107H	1	Same as the initial painting system			
	2					2				
	Total NDFT:			300		Total NDFT:				
P 107 I	1	EP	Interzone 954	300	Repair P107I	1	Same as the initial painting system			
	2					2				
	Total NDFT:			300		Total NDFT:				
P 107 J	1	EP	Penguard Universal	200	Repair P107J	1	Same as the initial painting system			
	2					2				
	Total NDFT:			200		Total NDFT:				
P 107 P	1	EP	Sigmashield 880	300	Repair P107P	1	Same as the initial painting system			
	2					2				
	Total NDFT:			300		Total NDFT:				
-	1	-	-	-	-	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

Remarks

Qualification / acceptance requirements: Minimum required pull-off test value:
 - 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
 - 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).



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P 108										
Surface preparation: Grade of cleanliness: Sa 3 (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					Surface preparation for repair: Grade of cleanliness: Sa 2 ½ (ISO 8501-1) Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 108 C	1	ESI	Carboweld 11 P	25	Repair P108C	1	NA			
	2					2				
	Total NDFT:			20		Total NDFT:				
P 108 H	1	ESI	Shoppriemer ZS 1589	20	Repair P108H	1	NA			
	2					2				
	Total NDFT:			20		Total NDFT:				
P 108 I	1	ESI	Interplate 855	25	Repair P108I	1	NA			
	2					2				
	Total NDFT:			25		Total NDFT:				
P 108 J	1	EP	Muki EPS	25	Repair P108J	1	NA			
	2					2				
	Total NDFT:			25		Total NDFT:				
P 108 P	1	ESI	Sigmaweld 199	25	Repair P108P	1	NA			
	2					2				
	Total NDFT:			25		Total NDFT:				
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	Total NDFT:			-		Total NDFT:			-	



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P 109										
Surface preparation:					Surface preparation for repair:					
Grade of cleanliness: Sa 3 (ISO 8501-1)					Grade of cleanliness: Sa 2 ½ (ISO 8501-1)					
Roughness: Grit-medium (G) (ISO 8503-2)					Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 109 C	1	EPPH	Phenoline 187 primer	130	Repair P109C	1	Same as the initial painting system			NAVSEC approval 23236-75
	2	EPPH	Phenoline 187 finish	130		2				
	3					3				
	Total NDFT:			260		Total NDFT:				
P 109 H	1	EP	Hempadur 1540	80	Repair P109H	1	Same as the initial painting system			Aviation certificate: BP - BP/4/46
	2	EP	Hempadur 1540	80		2				
	3	EP	Hempadur 1540	80		3				
	Total NDFT:			240		Total NDFT:				
P 109 I	1	EPPH	Interline 984	350	Repair P109I	1	Same as the initial painting system			Air BP specification F2D2 and UK DEF Stan80-97 certification.
	2					2				
	Total NDFT:			350		Total NDFT:				
P 109 J	1	EPPH	Tankguard storage	125	Repair P109J	1	Same as the initial painting system			Approvals according to Defence standard 80-97 Annex G issue 3 by DERA Paints and Coatings
	2	EPPH	Tankguard storage	125		2				
	3					3				
	Total NDFT:			250		Total NDFT:				
P 109 P	1	EP	SigmaGuard CSF 650	300	Repair P109P	1	Same as the initial painting system			Air BP F2D2 section 2.1 tank lining
	2					2				
	Total NDFT:			300		Total NDFT:				
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

Remarks

Specific guarantee requirements: 3 years: No Blistering and Degree of rusting Ri 2

Qualification / acceptance requirements: Minimum required pull-off test value:

- 4 MPa for checks made with mechanical tester (type Ersad, Satec, or equivalent), or
- 6 MPa for checks made with hydraulic tester (Type PAT or equivalent).



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P 110										
Surface preparation:					Surface preparation for repair:					
Grade of cleanliness: Sa 3 (ISO 8501-1)					Grade of cleanliness: Sa 2 ½ (ISO 8501-1)					
Roughness: Grit-medium (G) (ISO 8503-2)					Roughness: Grit-medium (G) (ISO 8503-2)					
System code	Coat	Binder	Supplier's reference	NDFT (µm)	Repair system	Coat	Binder	Supplier's reference	NDFT (µm)	General note
P 110 C	1	ESI	Carbozinc 11	60	Repair P110C	1	Same as the initial painting system			
	2					2				
	3					3				
	Total NDFT:			60		Total NDFT:				
P 110 H	1	ESI	Galvosil 1570	60	Repair P110H	1	Same as the initial painting system			
	2					2				
	3					3				
	Total NDFT:			60		Total NDFT:				
P 110 I	1	ESI	Interzinc 22	60	Repair P110I	1	Same as the initial painting system			
	2					2				
	Total NDFT:			60		Total NDFT:				
P 110 J	1	ESI	Tankguard Zinc	60	Repair P110J	1	Same as the initial painting system			
	2					2				
	3					3				
	Total NDFT:			60		Total NDFT:				
P 110 P	1	ESI	Sigmaguard 750	60	Repair P110P	1	Same as the initial painting system			
	2					2				
	Total NDFT:			60		Total NDFT:				
-	1	-	-	-	Repair	1	-	-	-	
	2	-	-	-		2	-	-	-	
	3	-	-	-		3	-	-	-	
	Total NDFT:			-		Total NDFT:			-	

Remarks

Specific guarantee requirements: 5 years, Degree of rusting Ri 2

Qualification / acceptance requirements: NA