

GENERAL SPECIFICATION

CORROSION

GS EP COR 450

**External protection of structures and equipment by
painting
Maintenance works**

08	10/2012	General review - Paint system review
07	10/2011	General review - new paint Supplier - Supplementary requirements to ISO 20340 removed from § 5.3
06	10/2009	General and standard list review - New deck paint system - Environmental aspects
05	10/2008	General review
00	02/2001	First issue
Rev.	Date	Purpose of the revision

Owning entity: DEV/TEC

Managing entity: DEV/TEC/COR

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1. Scope

This General Specification defines the technical requirements for the execution of maintenance coating operations for the external protection of structures and equipment (**GS EP COR 350**, **GS EP COR 351** and **GS EP COR 354**).

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". Certified systems by ACQPA
API Bulletin 91, June 2007	Planning and conducting surface preparation and coating operations for oil & natural gas drilling and production facilities in a marine environment
ASTM D 4940	Standard test method for conductimetric analysis of water soluble ionic contamination of Blasting abrasives
Decision 2000/532/CE	COMMISSION DECISION of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste
Decision 2003/33/CE	COUNCIL DECISION of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II to Directive 1999/31/EC
EN 12457-2	Characterization of waste - Leaching - Compliance test for leaching of granular waste materials and sludges
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. Determination of dry film thickness. Non-destructive magnetic flux method
ISO 20340	Paints and varnishes-Performance requirements for protective paint systems for offshore and related structures
ISO 2808	Paints and varnishes. Determination of film thickness
ISO 4628 (Parts 1; 2; 3; 4; 5; 6)	Evaluation of paint and varnish defects. Designation of intensity, quantity and size of common types of defect - Parts 1; 2; 3; 4; 5; 6

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Reference	Title
ISO 8501 (Parts 1; 2; 3)	Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness - Parts 1; 2; 3
ISO 8502 (Parts 1; 2; 3; 4; 6; 9)	Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness - Parts 1; 2; 3; 4; 6; 9
ISO 8503 (Parts 1; 2; 3; 4)	Preparation of steel substrates before application of paints and related products. Surface profile of abrasive blast-cleaned steel - Parts 1; 2; 3; 4
ISO 8504 (Parts 1; 2; 3)	Preparation of steel substrates before application of paints and related products. Methods for surface preparation - Parts 1; 2; 3
RAL 840 HR	Colours standard
US EPA CFR 261.24	Code of Federal regulation - 40 CFR PART 261, Subpart C - Characteristics of Hazardous Waste, Toxicity characteristic

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
GS EP COR 350	External protection of offshore and coastal structures and equipment by painting
GS EP COR 351	External protection of structures and equipment by painting. Floating structures
GS EP COR 354	External protection of onshore structures and equipment by painting

3. General

Prior to start maintenance works process with call for tenders a complete inspection of structure, equipment and piping shall be performed.

All safety aspect shall be considered in particular to treat piping and equipment.

4. Environmental aspects

During the preparation of maintenance works, their potential impact on the environment shall be considered, in order to define the appropriate mitigation measures:

- Painting systems and application methods shall be selected considering solvent emissions and paint overspray minimisation.

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- Abrasives shall be selected according to § 8.2.
- Spot abrasive blasting surface preparation of rusted areas shall be preferred to the full surface preparation to limit environmental potential contamination.
- To complete historical records on the painting systems in place, a representative sample of abrasive surface preparation of rusted area and sweep blasting on adjacent surface shall be taken during the qualification phase, to perform analyses and identify potential contaminants. These analyses shall be performed in accordance with local regulations when they exist. Without specific local regulation, EU or US regulations should be taken as reference (see Appendix 5).
- Wherever safe and practicable, blasting techniques, confinement methods and spent abrasive recovery means shall be defined to reduce the discharge of spent abrasive to the surrounding environment, in compliance with applicable local and international regulations:
 - Onshore: spent abrasive shall be recovered and collected in appropriate containers
 - Offshore: [API Bulletin 91](#) recommended practices should be used as guidelines.
- Waste generated during maintenance works (paint waste, spent abrasive, etc.) shall be categorised according to local regulatory constraints and affiliate Waste Management Plan. Disposal options shall be defined depending on anticipated quantities to be generated, contaminants content, and available waste disposal infrastructures (reprocessing & recycling, incineration, hazardous/non hazardous waste landfill, etc.) and shall be approved by Company.
- Among all disposal options, spent abrasive discharge at sea may be considered under the following conditions:
 - Discharge at sea is only acceptable when authorized by local legislation
 - It should be justified with a cost - benefit analysis, considering from one hand the risk of discharge at sea, and from the other hand the efficiency and associated risks of access & containment means for the alternative option (recovery/skip to shore/onshore disposal).
 - The risk of discharge at sea should be assessed considering the spent abrasive quantities/contaminants content and the environment context (shallow water in sensitive areas, deep offshore, etc.). Criteria for acceptable risk level, including but not limited to contaminants content (see Appendix 5) should be defined by Company in a particular specification.
 - Upon Company request, the risk evaluation should be supported by a modelling study, for example with DREAM/PARTRACK software. In such case, the parameters requested for the completion of this study (such as grain size, toxicity tests, biodegradation tests, etc.) should be defined on a case by case basis.

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5. Painting systems

Painting systems are defined according to the following parameters:

- Type of substrate
- Atmosphere or environment
- Minimum and maximum Operating temperatures.

5.1 Reference code for painting systems for onshore, offshore and coastal areas

5.1.1 Coding system

Part 1: Atmosphere or environment

Atmosphere or environment	Category of corrosivity
Rural - RU	C3
Industrial - IN	C4, 5-I
Marine - MA	C5-M
Buried - EN	C5-M
Immersed - IM	C5-M

Part 2: Substrate

AF	Ferritic (carbon) steel or cast iron
AI	Austenitic stainless steels and special alloys
AG	Galvanized steels
AB	Cadmium-plated bichromated steels
PL	Plastics
BE	Concretes and similar products

Part 3: Operating temperatures

SNNN/SNNN: two-zone code containing the symbol + or - and three digits (NNN) indicating the minimum and maximum Operating temperatures respectively.

5.1.2 Identification of painting systems

Systems are identified as follows:

RU	AF	+ 121/+300	
Parameter 1	Parameter 2	Parameter 3	System number

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5.2 Approved systems

The approved systems are given in the referenced lists:

- For structures and equipment in areas classified as corrosive categories C5-I, C5-M, the approved systems are given in Appendix 3
- For structures and equipment in areas classified as corrosivity categories C3 and C4 the approved systems are selected from the [ACQPA](http://www.acqpa.com) reference systems and can be found on www.acqpa.com.

Each year, approved paint Supplier will fill in the tables of Appendix 3, thereby proposing the painting systems for the new revision of the present specification. A meeting will be held between Supplier and Company in order to discuss new proposals and to finalise the list of approved painting systems for the coming year. Following this, Supplier will then issue a statement certifying that no alternative painting system (already qualified or not) than these agreed during the meeting will be submitted for Company projects or maintenance works unless previously discussed with, and duly authorised by TEC/COR.

Supplier's painting systems will not be included in the present specification unless such statement has been issued.

5.3 Approval of alternative painting systems

For **Suppliers already approved** as per Appendix 1, new systems can be submitted for approval to Company at any time and at Suppliers expenses. In that case, a full qualification programme shall be submitted to Company, with sufficient time to allow for the testing to be carried out, for approval together with the name of the third party and independent laboratory which is proposed to perform the test programme. Company reserves the right to amend the qualification programme proposed and to witness testing at any stage. Accelerated corrosion testing shall be carried out according to the latest version of [ISO 20340](http://www.iso.org). Other testing may be required depending on the specific industrial application.

In parallel, Contractor shall present a full contingency plan describing all the painting systems to be used, should qualification tests fail. Qualification of alternative systems will not be considered by Company unless the contingency plan is submitted.

In Any case, if Contractor wishes to use any painting system which is not listed in the present General Specification, a formal derogation shall be requested from TEC/COR, outlining the reasons for a new painting system to be used, as well as the steps to be taken, including planning, to qualify the alternative system. If Contractor eventually fails to fulfill its qualification programme in time, then the proposed painting system will be refused by Company without any further discussion, and the contingency plan will be used.

5.4 Substitution rule

In selecting paint systems, a system designed to withstand environments with higher corrosivity shall always be applicable in a lower corrosivity environment.

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6. Certification of personnel

6.1 Operators

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

6.2 Scaffolders

Operators shall be individually certified by an approved organization (Conform, Setho, etc.).

6.3 Inspectors

Inspectors shall be individually certified by an approved organization ([ACQPA](#), FROSIO, NACE International minimum level 3 with peer review, etc.).

7. 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 MSDS (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 TEC/COR 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, including confinement and used abrasive recovery methods, and waste disposal options
- Inspection test plan with acceptance criteria and frequency of inspection
- 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 of scaffolders (Conform, Setho; etc.), of painting Operators and Inspectors ([ACQPA](#), FROSIO, NACE International minimum level 3, etc.).

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8. Surface preparation

As a general rule, spot abrasive blasting shall be used for rusted areas and sweep blasting shall be used around these areas where no rust is visible.

8.1 Preparation before blasting of surfaces to be painted

All oil or grease shall be removed by washing the item to be painted with appropriate solvents or any other suitable means before beginning of blast-cleaning operations. 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. Special attention shall be paid to avoid splashes of zinc paint on equipment made of austenitic steels.

All blast-cleaned surfaces shall be coated before the deterioration of the "grade of cleanliness" specified in the system can be compromised. Any surface that has been blast-cleaned shall be coated on the same day.

8.2 Quality of abrasives

Only non metallic abrasives shall be used.

Abrasives shall be sealed in watertight packaging. Any product delivered in defective packaging shall be rejected. Products must be stored sheltered from the elements.

Conductivity of abrasives shall be less than $150 \cdot 10^{-6}$ Siemens/cm as per [ASTM D 4940](#) and salt contamination of the surface shall be less than 40 mg/m².

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

8.3 Blast cleaning of carbon steel (AF)

All surfaces to be coated shall be blast-cleaned ([ISO 8504](#)) according to:

- The grade of cleanliness ([ISO 8501](#) standard)
- The surface profile Ra ([ISO 8503](#) standard: roughness meter with adapted cut-off or visio tactile surface profile comparator)

specified for each system in Appendix 3.

After blast-cleaning, all dust must be removed using a vacuum cleaner before application of the paint in order to achieve the maximum dust level specified for each system in Appendix 3 ([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](#)).

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The surface preparation procedure shall be submitted to Company for approval.

8.4 Blast cleaning of stainless steels (AI)

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 blast-cleaned with a non-ferrous and chlorine-free abrasive.

The blast cleaning procedure to be submitted to Company shall include:

- Abrasive composition to obtain a surface roughness of Ra = 10 microns (8 microns acceptable locally)
- Dust level (maximum level 2 maximum according to [ISO 8502-3](#))
- Substrate contamination checks. Ferrous contamination/direct colorimetry method using Prussian blue (potassium ferricyanide) - no surface pollution is acceptable.

8.5 Surface preparation of galvanised steel (AG)

Galvanized steel to be coated shall be cleaned, degreased and sweep blasted.

8.6 Preparation of zinc or cadmium plated bichromated surfaces (AB)

Zinc or cadmium-plated bichromated surfaces shall be cleaned and degreased.

9. Paint application

9.1 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.) and to contain spillages (bundled area). The packaging shall be clearly marked with the product description, the batch number, the fabrication date and the expiry date.

The shelf life from the fabrication dates shall be:

- For vinyl ester, polyester or equivalent: 6 months
- For other products: 1 year
- Specific cases: according to Manufacturer's recommendation with Company approval.

9.2 Samples for QA/QC purposes

From each batch of products used during the work, the Contractor shall take two samples to be made available to Company.

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9.3 Qualification of application procedure for each system

Two months before work commences:

- All the selected systems shall be applied on test plates representative of the structure to be painted. The products used shall be sampled from the same batches than these intended for the works.

The system shall be applied in the presence of the Supplier of the paint and the Company representative, in climatic conditions that are as similar as possible to 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 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 in Appendix 3.

- During qualification, a compatibility test shall be performed to evaluate the impact of the maintenance paint system on the existing paint system: The maintenance paint system shall, as a minimum, preserve the residual adhesion of the existing paint system. In case of reduction of the adhesion, a new maintenance paint system shall be chosen.
- Characterization of spent abrasive shall be done for environmental impact.

9.4 Kick off meeting

A technical kick off meeting shall be organized by the Contractor in the presence of Company specialists (TEC/COR) 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 Supplier head office.

9.5 Application

9.5.1 General

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

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
- 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 outwith the limits given in the product data sheets (usually 10°C for epoxy based paint and 5°C for acryl-polyurethane topcoat).

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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.

Application shall be by airless spray.

Stripe coats shall be applied by brush to all angles, corners, sharp edges, bolt or rivet heads, etc. with the same product than this to be applied on the surface to be painted.

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.

The thickness of each coat, including frequency and tolerance shall be checked by the Contractor according to [ISO 19840](#). The values shall be recorded and made available to Company.

9.5.2 Zinc or cadmium-plated bichromated bolting

All surfaces of the bolting assemblies, including threads shall be coated. The topcoat shall be applied after assembly is completed.

9.5.3 Painting of fastenings

For bolting, the following applies:

- Stainless steel: Not painted
- Carbon steel: Primer of system P06 of [GS EP COR 350](#) (30 microns of epoxy) applied before installation and the remaining layers (intermediate and finish coat) applied after installation.

For dudgeons, painting (system P06 of [GS EP COR 350](#)) will be done after installation.

9.6 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:

9.6.1 Major defects

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

9.6.2 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.

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10. Checks, inspection and acceptance

10.1 Checks

Throughout the duration of the work, Contractor's Quality Control department shall check the following points and record the results in its daily quality control report.

- Construction quality:
 - Rounding of corners, sharp edges to 2 mm radius minimum
 - Form, quality and continuity of welds.
- Surface preparation quality:
 - Grade of cleanliness: Sa 2 1/2 according to [ISO 8501](#)
 - Cleanliness: no grease or oil, dust level 2 maximum according to [ISO 8502-3](#)
 - Anchoring profile: G medium according to [ISO 8503](#).
- Contamination including chlorides: according to [ISO 8502-6](#) and [ISO 8502-9](#), 40 mg/m² maximum.
- Climatic conditions for application all measured before the work commences and twice per shift and when the ambient conditions are obviously changing): temperature of substrate at least 3°C above dew point, maximum humidity 85% RH, ambient temperature (> 10°C for epoxy, > 5°C for polyurethane), weather conditions.
- State of curing of primer and of each coat.
- Interval between coats (in accordance with Supplier product datasheets).
- Wet film thickness for each coat immediately after application.
- Number of coats, DFT of each coat and of the final system according to [ISO 2808](#) and [ISO 19840](#).
- Appearance and colour.
- Adherence

The tests shall be carried out only when the system is completely dry and fully cured.

- Systems with DFT less than 200 µm: cross-cut test class 0 according to [ISO 16276-2](#)
- Systems with DFT above 200 µm: pull-off test according to [ISO 16276-1](#): Unless specified in the system sheet in Appendix 3, the minimum values acceptable are 3 MPa for checks made with mechanical equipment (type Ersad, Satec, or equivalent) and 5 MPa for checks made with hydraulic equipment (Type PAT or equivalent). The equipment must be fitted with a gauge indicating the pulling force.

The adhesion tests shall be performed with cyano-acrylate glue as LOCTITE 496 or equivalent.

- Visual inspection results: no defects such as "orange peel", cracking, bubbling, pinholes, runs and sags, blistering, etc.

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10.2 Inspection test plan

An inspection test plan including all the points in section 8.1 shall be prepared and submitted to Company. The Inspection Test Plan shall clearly indicate frequency of testing for each check.

10.3 Provisional acceptance

Before provisional acceptance, Company shall check that all the inspections set out in subsection 10 have been carried out and that all the results are satisfactory.

10.4 Guarantees

The Work shall be covered by a specific guarantee given by Contractor to complete Guarantees and warranties defined in the Contract.

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

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

Guarantee shall be provided for duration as 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.

10.5 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.

11. 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

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EN 1004	Mobile access and working towers made of prefabricated elements: Materials, dimensions, design loads, safety and performance requirements
EN 12810-1	Façade scaffolds made of prefabricated components. Part 1: Product specifications
EN 12811-1	Temporary works equipment. Part 1: Scaffolds - Performance requirements and general design
ISO 787-10	General methods of test for pigments and extenders. Part 10: Determination of density. Pyknometer method
ISO 1513	Paints and varnishes. Examination and preparation of samples for testing
ISO 2812-1	Paints and varnishes - Determination of resistance to liquids. Part 1: General method
ISO 2812-2	Paints and varnishes - Determination of resistance to liquids. Part 2: Water immersion method
ISO 3678	Paints and varnishes. Print-free test
ISO 4578	Adhesives. Determination of peel resistance of high-strength adhesive bonds. Floating roller method
ISO 6270	Paints and varnishes. Determination of resistance to humidity: continuous condensation
ISO 7253	Paints and varnishes. Determination of resistance to neutral salt spray
ISO 7724-1 to 3	Paints and varnishes. Determination of colour and colour difference
ISO 9223	Corrosion of metals and alloys. Atmospheres' corrosivity. Classification
ISO 11124-2 to 4	Preparation of steel substrates before application of paints and related products. Specifications for metallic blast-cleaning abrasives
ISO 11125-1 to 7	Preparation of steel substrates before application of paints and related products. Methods for testing metallic blast-cleaning abrasives
ISO 11126-6	Preparation of steel substrates before application of paints and related products. Specifications for metallic blast-cleaning abrasives. Part 6: Iron furnace slag

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ISO 11126-7	Preparation of steel substrates before application of paints and related products. Specifications for non-metallic blast-cleaning abrasives. Part 7: Fused aluminium oxide
ISO 11126-8	Preparation of steel substrates before application of paints and related products. Specifications for metallic blast-cleaning abrasives. Part 8: Olivine sand
ISO 11127-1 to 7	Preparation of steel substrates before application of paints and related products. Methods for testing non-metallic blast-cleaning abrasives
ISO 12944-1	Paints and varnishes-Corrosion protection of steel structures by paint systems. Part 1: General introduction
ISO 12944-2	Paints and varnishes-Corrosion protection of steel structures by paint systems. Part 2: Classifications of environments
ISO 12944-4	Paints and varnishes-Corrosion protection of steel structures by paint systems. Part 4: Surface types and preparation
ISO 12944-7	Paints and varnishes-Corrosion protection of steel structures by paint systems. Part 7: Execution and supervision of painting work
ISO 12944-8	Paints and varnishes-Corrosion protection of steel structures by paint systems. Part 8: Development of specifications for new and maintenance work
NF A49-711 Appendix K	Steel tubes. External coating with three polypropylene layers coating. Application by extrusion
NACE SP0178	Fabrication details, surface finish requirements, and proper design considerations for tanks and vessels to be lined for immersion service
Recommendation R408 dated June 10, 2004	Recommendation R408 dated June 10, 2004: CNAMTS-recommendation adopted by the (<i>French</i>) Public Works and Construction Industry National Technical Committee - <i>CTNIBTP</i> -concerning the erection, use and dismantling of temporary scaffolding
(French) Construction Federation (FFB): Professional Guide to Scaffolding	Professional Guide for the erection and use of scaffolding compiled by the (<i>French</i>) National Association of Scaffolding and Related Professions
Decree 2004-924 dated September 1, 2004	(<i>French</i>) Decree 2004-924 dated September 1, 2004 relating to the use of work equipment made available for temporary work at height amending the Labour Code (second part: Council of State Decrees) and Decree no. 65-48 dated January 8, 1965

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Directive 2001/45/EC

Directive 2001/45/EC issued by the European Parliament and Council dated June 27, 2001 amending Council Directive 89/655/EEC concerning the minimum safety and health requirements for the use of work equipment by workers at work (second individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC)

London Convention (LC 72) amended by 1996 Protocol

Convention on the prevention of marine pollution by dumping of wastes and other matter

Order dated December 21, 2004

Order (*French Arrêté*) dated December 21, 2004 relating to inspection of scaffolding, amending the appendix to the Order dated December 22, 2000 relating to the terms and procedures for approval of organisations responsible for inspecting the compliance of work equipment.

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Appendix 1

Appendix 1 Approved list of Suppliers

Supplier	Code	Phone No.	Fax No.	Remarks
CARBOLINE	C	+33 1 60 06 55 66	+33 1 60 06 55 70	Carboline.France @stoncor.com
CHUGOKU	Ch	+31 167 526 100	+31 167 522 059	x.hagenaars@cmpeurope.eu
HEMPEL	H	+33 3 44 08 28 90	+33 3 44 08 28 99	jmb@hempel.com dbo@hempel.com
INTERNATIONAL COATINGS	I	+33 2 35 22 13 72	+33 2 35 22 13 78	Frederic.coulon@akzonobel.com
JOTUN	J	+33 1 45 19 38 87	+33 1 45 19 38 94	Xavier.dubois@jotun.com
PPG	P	+33 1 70 03 11 11	+33 1 70 03 11 06	Pascal.digonnet@ppg.com
MAESTRIA	M	+33 5 61 67 97 40	+33 5 61 67 48 17	dandreu@maestria.fr

Appendix 2 List of systems

Important warning:

- Intervals between coats are given for 20°C and a relative humidity of 60%.
- The **ACQPA** systems are the corresponding certified systems.
- The temperatures indicated in the code are the mini/maxi Operating temperatures.
- Painting system with minimum level of solvent shall be preferred
- Lead chromates in paint are strictly forbidden.
- **ACQPA** internet address: www.acqpa.com

Structure	Code	System No.	Remarks
Deck			
Structures	RU AF -010/+080 IN AF -010/+080 MA AF -010/+080	ACQPA M01 M01	
Floors	RU AF -010/+080 IN AF -010/+080 MA AF -010/+080	ACQPA M04 M04	
Helideck	IN AF -010/+080 MA AF -010/+080	P03 P03	
Fire-proofed surfaces	RU AF -010/+080 IN AF -010/+080 MA AF -010/+080	ACQPA M01 M01	
Galvanized surfaces	RU AG -010/+080 IN AG -010/+080 MA AG -010/+080	ACQPA M01 M01	All galvanized surfaces, except gratings, stairs and associated galvanized fasteners
Cd/bi Cr surfaces Zn/bi Cr surfaces	RU AB -010/+080 IN AB -010/+080 MA AB -010/+080	ACQPA M01 M01	Above 80°C, system adapted to adjacent surfaces systems
High temperature structures	RU AF +201/+400 IN AF +201/+400 MA AF +201/+400	P11 P11 P11	Flare type structures Including adjacent surfaces

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Appendix 2

Structure	Code	System No.	Remarks
Jacket			
Zone:1 (Splash zone)	MA AF -010/+080	M03	Area subject to swell and splashes between tidal datum minus the value of the annual swell trough and the level located 0.5 m below the jacket's first horizontal wind-bracing level
Zone:2 (Immersed zone)	MA AF -010/+080	N.A.	Boat-landing, Bumpers I tubes and J tubes of hose lines and electrical cables Sump caissons Casings of lifting pumps
Zone:3 (Emerged zone)	MA AF -010/+080	M03	Area from between the level located at 0.5 m below the first horizontal wind-bracing level and the +6 m level

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Appendix 2

Structure	Code	System No.	Remarks
Pressure vessels			
Uninsulated: $t \leq 80^{\circ}\text{C}$	RU AF -010/+080 IN AF -010/+080 MA AF -010/+080	ACQPA M01 M01	
$81 \leq t \leq 200^{\circ}\text{C}$	RU AF +081/+200 IN AF +081/+200 MA AF +081/+200	P10 P10 P10	Including adjacent surfaces
$201 \leq t \leq 400^{\circ}$	RU AF +201/+400 IN AF +201/+400 MA AF +201/+400	P11 P11 P11	Including adjacent surfaces
Insulated: $T < 90^{\circ}\text{C}$	RU AF -030/+089 IN AF -030/+089 MA AF -030/+089	ACQPA M01 M01	
Insulated: $90 \leq t \leq 200^{\circ}\text{C}$	RU AF +090/+200 IN AF +090/+200 MA AF +090/+200	P13 P13 P13	
Chassis	RU AF -010/+080 IN AF -010/+080 MA AF -010/+080	ACQPA M01 M01	
Galvanized surfaces	RU AG -010/+080 IN AG -010/+080 MA AG -010/+080	ACQPA M01 M01	All galvanized surfaces, except gratings, stairs and associated galvanized fasteners
Cd/bi Cr surfaces Zn/bi Cr surfaces	RU AB -010/+080 IN AB -010/+080 MA AB -010/+080	ACQPA M01 M01	Above 80°C , system adapted to adjacent surfaces systems

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Appendix 2

Structure	Code	System No.	Remarks
Piping			
Uninsulated: $t \leq 80^{\circ}\text{C}$	RU AF -010/+080 IN AF -010/+080 MA AF -010/+080	ACQPA M01 M01	
$81 \leq t \leq 200^{\circ}\text{C}$	RU AF +081/+200 IN AF +081/+200 MA AF +081/+200	P10 P10 P10	Including adjacent surfaces
$201 \leq t \leq 400^{\circ}\text{C}$	RU AF +201/+400 IN AF +201/+400 MA AF +201/+400	P11 P11 P11	Including adjacent surfaces
Insulated: $t \leq 90^{\circ}\text{C}$	RU AF -030/+089 IN AF -030/+089 MA AF -030/+089	M01 M01 M01	
Insulated: $90 \leq t \leq 200^{\circ}\text{C}$	RU AF +090/+200 IN AF +090/+200 MA AF +090/+200	P13 P13 P13	
Galvanized surfaces	RU AG -010/+080 IN AG -010/+080 MA AG -010/+080	ACQPA M01 M01	All galvanized surfaces, except gratings, stairs and associated galvanized fasteners
Cd/bi Cr surfaces Zn/bi Cr surfaces	RU AB -010/+080 IN AB -010/+080 MA AB -010/+080	ACQPA M01 M01	Above 80°C , system adapted to adjacent surfaces systems
Machines			
$t \leq 80^{\circ}\text{C}$	RU AF -010/+080 IN AF -010/+080 MA AF -010/+080	ACQPA M01 M01	
Rooms			
Open (workshop type)	RU AF -010/+080 IN AF -010/+080 MA AF -010/+080	ACQPA M01 M01	Bulkheads, ceilings

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Appendix 2

Structure	Code	System No.	Remarks
Storage vessels			
Outer skin	RU IN AG -010/+080 AG -010/+080 MA AG -010/+080	ACQPA M01 M01	For floating roof tanks extend by 1.5 m down on the inside
Galvanized surfaces	RU AG -010/+080 IN AG -010/+080 MA AG -010/+080	ACQPA M01 M01	All galvanized surfaces, except gratings, stairs and associated galvanized fasteners
Cd/bi Cr surfaces Zn/bi Cr surfaces	RU AB -010/+080 IN AB -010/+080 MA AB -010/+080	ACQPA M01 M01	Above 80°C, system adapted to adjacent surfaces systems

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Appendix 3

Appendix 3 Suppliers' systems

Binders coding

Binders	Codes	Remarks
Rich Zinc epoxy	EPRZ	[Zn] > 80%
Epoxy	EP	
Modified Epoxy	EPM	
Glass flake Epoxy	EPGF	
Polyurethane	PUR	

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Appendix 3

System No. **M 01 C**
Coating **Structure and Equipment**
Supplier **CARBOLINE**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	Carbomastic 15 Alu	150 microns	90	85	48 hours	unlimited
Tie-coat							
Intermediate	EPM	Carboguard 890	150 microns	77	85	8 hours	unlimited
Finish coat	PUR	Carbothane PU134	50 microns	57	85	24 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	Carbomastic 15 Alu	150 microns	90	85	48 hours	unlimited
Tie-coat							
Intermediate	EPM	Carboguard 890	150 microns	77	85	8 hours	unlimited
Finish coat	PUR	Carbothane PU134	50 microns	57	85	24 hours	unlimited

4. Remarks

Operating temperature resistance: less than 80°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 02 C**
 Coating **High Temperature Piping and Equipment**
 Supplier **CARBOLINE**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
 Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPM	Carbomastic 15 Alu	200 microns	90	85	48 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPM	Carbomastic 15 Alu	200 microns	90	85	48 hours	unlimited

4. Remarks

Applicable coating on substrates at temperatures of up to 80°C.

Operating temperature resistance:	less than 150°C
Guarantee: 3 years	Degree of rusting Ri 2 Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 03 C**
Coating **Structures Splash Zone**
Supplier **CARBOLINE**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPGF	Carboguard 690 GF	500 microns	80	85	24 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPGF	Carboguard 690 GF	500 microns	80	85	24 hours	unlimited

4. Remarks

Repairs on sweep-blasting.

Operating temperature resistance:	less than 60°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 6 MPa	

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Appendix 3

System No. **M 04 C**
Coating **Floors**
Supplier **CARBOLINE**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit-medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPM	Carbomastic 15 Alu	150 microns	90	85	48 hours	unlimited
Tie-coat							
Intermediate	EPGF	Carboguard 1209	450 microns	88.5	85	16 hours	14 days
Finish coat	PUR	Carbothane 134	50 microns	57	80	24 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPM	Carbomastic 15 Alu	150 microns	90	85	48 hours	unlimited
Tie-coat							
Intermediate	EPGF	Carboguard 1209	450 microns	88.5	85	16 hours	14 days
Finish coat	PUR	Carbothane 134	50 microns	57	80	24 hours	unlimited

4. Remarks

Incorporate aggregates as filler 47 for non-slip system directly in paint Carboguard 1209 (Carboguard 1210)

Operating temperature resistance: less than 80°C
Specific guarantee requirements: 3 years Ri2
Qualification / acceptance requirements: Minimum mechanical pull-off test value of 4 MPa (mechanical tester)

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Appendix 3

System No. **M 01 Ch**
Coating **Structure and Equipment**
Supplier **CHUGOKU**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EP	Bannoh 1500 AL	150 microns	72	85	24 hours	30 days
Tie-coat							
Intermediate	EP	Bannoh 1500	150 microns	72	85	24 hours	30 days
Finish coat	PUR	Unymarine HS	50 microns	57	85	8 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EP	Bannoh 1500 AL	150 microns	72	85	24 hours	30 days
Tie-coat							
Intermediate	EP	Bannoh 1500	150 microns	72	85	24 hours	30 days
Finish coat	PUR	Unymarine HS	50 microns	57	85	8 hours	unlimited

4. Remarks

Operating temperature resistance: less than 80°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 02 Ch**
 Coating **High Temperature Piping and Equipment**
 Supplier **CHUGOKU**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
 Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPPH	Epicon T-800HS-GF	200 microns	75	85	16 hours	5 days

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPPH	Epicon T-800HS-GF	200 microns	75	85	16 hours	5 days

4. Remarks

Applicable coating on substrates at temperatures of up to 80°C.

Operating temperature resistance:	less than 150°C
Guarantee: 3 years	Degree of rusting Ri 2 Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 03 Ch**
 Coating **Structures Splash Zone**
 Supplier **CHUGOKU**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
 Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPGF	Permax NO 3300	500 microns	80	85	12 hours	7 days

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPGF	Permax NO 3300	500 microns	80	85	12 hours	7 days

4. Remarks

Operating temperature resistance: less than 60°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 6 MPa

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Appendix 3

System No. **M 04 Ch**
Coating **Floors**
Supplier **CHUGOKU**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit-medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPGF	PERMAX NO 3300	300 microns	80	85	12 hours	3 days
Tie-coat							
Intermediate	EPGF	PERMAX NO 3300	300 microns	80	85	12 hours	7 days
Finish coat	PUR	Unymarine HS	50 microns	57	85	8 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPGF	PERMAX NO 3300	300 microns	80	85	12 hours	3 days
Tie-coat							
Intermediate	EPGF	PERMAX NO 3300	300 microns	80	85	12 hours	7 days
Finish coat	PUR	Unymarine HS	50 microns	57	85	8 hours	unlimited

4. Remarks

Incorporate aggregates for non-slip system on fresh second coat of Permax NO 3300

Operating temperature resistance: less than 80°C
Specific guarantee requirements: 3 years Ri2
Qualification / acceptance requirements: Minimum mechanical pull-off test value of 4 MPa (mechanical tester)

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Appendix 3

System No. **M 01 H**
 Coating **Structure and Equipment**
 Supplier **HEMPEL**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
 Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	Hempadur 4588MIO	150 microns	85	85	12 hours	unlimited
Tie-coat							
Intermediate	EPM	Hempadur 4588	150 microns	80	85	6 hours	unlimited
Finish coat	PUR	Hempathane 5561	50 microns	65	85	16 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	Hempadur 4588MIO	150 microns	85	85	12 hours	unlimited
Tie-coat							
Intermediate	EPM	Hempadur 4588	150 microns	80	85	6 hours	unlimited
Finish coat	PUR	Hempathane 5561	50 microns	65	85	16 hours	unlimited

4. Remarks

Operating temperature resistance: less than 80°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 02 H**
Coating **High Temperature Piping and Equipment**
Supplier **HEMPEL'S**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer							
Tie-coat	EPM	Hempadur 1557	100 microns	54	85	16 hours	unlimited
Intermediate	EPM	Hempadur 1557	100 microns	54	85	16 hours	unlimited
Finish coat							

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer							
Tie-coat	EPM	Hempadur 1557	100 microns	54	85	16 hours	unlimited
Intermediate	EPM	Hempadur 1557	100 microns	54	85	16 hours	unlimited
Finish coat							

4. Remarks

Applicable coating on substrates at temperatures of up to 80°C.

Operating temperature resistance:	less than 150°C
Guarantee: 3 years	Degree of rusting Ri 2 Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 03 H**
Coating **Structures Splash Zone**
Supplier **HEMPEL'S**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPGF	Hempadur GF 3587	500 microns	87	85	4 hours	7 days

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPGF	Hempadur GF 3587	500 microns	87	85	4 hours	7 days

4. Remarks

Operating temperature resistance: less than 60°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 6 MPa

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Appendix 3

System No. **M 04 H**
Coating **Floors**
Supplier **HEMPEL'S**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit-medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPM	Hempadur multistrength 4554	300 microns	85	85	16 hours	5 days
Tie-coat							
Intermediate	EPM	Hempadur multistrength 4554	300 microns	85	85	16 hours	5 days
Finish coat	PUR	Hempathane 5561	50 microns	65	85	16 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPM	Hempadur multistrength 4554	300 microns	85	85	16 hours	5 days
Tie-coat							
Intermediate	EPM	Hempadur multistrength 4554	300 microns	85	85	16 hours	5 days
Finish coat	PUR	Hempathane 5561	50 microns	65	85	16 hours	unlimited

4. Remarks

Incorporate aggregates for non-slip system on fresh second coat of Hempadur multistrength 4554

Operating temperature resistance: less than 80°C
Specific guarantee requirements: 3 years Ri2
Qualification / acceptance requirements: Minimum mechanical pull-off test value of 4 MPa (mechanical tester)

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Appendix 3

System No. **M 01 I**
Coating **Structure and Equipment**
Supplier **INTERNATIONAL COATINGS**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	Interseal 670 HS Alu	150 microns	82	85	8 hours	3 months
Tie-coat							
Intermediate	EPM	Interseal 670 HS	150 microns	82	85	8 hours	3 months
Finish coat	PUR	Interthane 990	50 microns	57	85	10 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	Interseal 670 HS Alu	150 microns	82	85	8 hours	3 months
Tie-coat							
Intermediate	EPM	Interseal 670 HS	150 microns	82	85	8 hours	3 months
Finish coat	PUR	Interthane 990	50 microns	57	85	10 hours	unlimited

4. Remarks

Operating temperature resistance: less than 80°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 02 I**
 Coating **High Temperature Piping and Equipment**
 Supplier **INTERNATIONAL COATINGS**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
 Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPM	Interplus 256	200 microns	83	85	17 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPM	Interplus 256	200 microns	83	85	17 hours	unlimited

4. Remarks

Applicable coating on substrates at temperatures of up to 80°C.

Operating temperature resistance:	less than 150°C
Guarantee: 3 years	Degree of rusting Ri 2 Minimum mechanical pull-off test value: 4 MPa

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System No. **M 03 I**
 Coating **Structures Splash Zone**
 Supplier **INTERNATIONAL COATINGS**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
 Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPGF	Interzone 505	500 microns	90	85	6 hours	4 days

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPGF	Interzone 505	500 microns	90	85	6 hours	4 days

4. Remarks

Operating temperature resistance: less than 60°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 6 MPa

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Appendix 3

System No. **M 04 I**
Coating **Floors**
Supplier **INTERNATIONAL COATINGS**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit-medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPGF	Interzone 505	300 microns	90	85	6 hours	4 days
Tie-coat							
Intermediate	EPGF	Interzone 505	300 microns	90	85	6 hours	4 days
Finish coat	PUR	Interthane 990	50 microns	57	85	10 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPGF	Interzone 505	300 microns	90	85	6 hours	4 days
Tie-coat							
Intermediate	EPGF	Interzone 505	300 microns	90	85	6 hours	4 days
Finish coat	PUR	Interthane 990	50 microns	57	85	10 hours	unlimited

4. Remarks

Incorporate GMA 132 aggregates for non-slip system on fresh second coat of Interzone 505

Operating temperature resistance: less than 80°C
Specific guarantee requirements: 3 years Ri2
Qualification / acceptance requirements: Minimum mechanical pull-off test value of 4 MPa (mechanical tester)

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Appendix 3

System No. **M 01 J**
Coating **Structure and Equipment**
Supplier **JOTUN**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	Jotamastic 87 Alu	150 microns	87	85	10 hours	unlimited
Tie-coat							
Intermediate	EPM	Jotamastic 87	150 microns	82	85	10 hours	unlimited
Finish coat	PUR	Hardtop XP	50 microns	63	85	7 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max..
Primer	EPM	Jotamastic 87 Alu	150 microns	87	85	10 hours	unlimited
Tie-coat							
Intermediate	EPM	Jotamastic 87	150 microns	82	85	10 hours	unlimited
Finish coat	PUR	Hardtop XP	50 microns	63	85	7 hours	unlimited

4. Remarks

Operating temperature resistance: less than 80°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 02 J**
Coating **High Temperature Piping and Equipment**
Supplier **JOTUN**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPM	Epoxy HR	200 microns	63	85	10 hours	30 days

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPM	Epoxy HR	200 microns	63	85	10 hours	30 days

4. Remarks

Applicable coating on substrates at temperatures up to 150°C.

Operating temperature resistance:	up to 200°C
Guarantee: 3 years	Degree of rusting Ri 2 Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 03 J**
 Coating **Structures Splash Zone**
 Supplier **JOTUN**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
 Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPGF	Marathon XHB	500 microns	96	85	10 hours	3 days
Tie-coat							
Intermediate							
Finish coat							

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPGF	Marathon XHB	500 microns	96	85	10 hours	3 days
Tie-coat							
Intermediate							
Finish coat							

4. Remarks

Operating temperature resistance: less than 60°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 6 MPa

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Appendix 3

System No. **M 04 J**
Coating **Floors**
Supplier **JOTUN**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit-medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPM	Jotamastic 87 Alu	300 microns	87	85	10 hours	unlimited
Tie-coat							
Intermediate	EPM	Jotamastic 87	300 microns	82	85	10 hours	unlimited
Finish coat	PUR	Hardtop XP	50 microns	63	85	7 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPM	Jotamastic 87 Alu	300 microns	87	85	10 hours	unlimited
Tie-coat							
Intermediate	EPM	Jotamastic 87	300 microns	82	85	10 hours	unlimited
Finish coat	PUR	Hardtop XP	50 microns	63	85	7 hours	unlimited

4. Remarks

Incorporate aggregates (Aluminium oxides) for non-slip system on fresh coat of Jotamastic 87

Operating temperature resistance: less than 80°C
Specific guarantee requirements: 3 years Ri2
Qualification / acceptance requirements: Minimum mechanical pull-off test value of 4 MPa (mechanical tester)

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Appendix 3

System No. **M 01 M**
Coating **Structure and Equipment**
Supplier **MAESTRIA**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	Ferrocote Alu	150 microns	88	85	16 hours	1 year
Tie-coat							
Intermediate	EPM	Ferrocote	150 microns	80	85	12 hours	1 year
Finish coat	PUR	Polystria	50 microns	52	85	10 hours	1 year

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	Ferrocote Alu	150 microns	88	85	16 hours	1 year
Tie-coat							
Intermediate	EPM	Ferrocote	150 microns	80	85	12 hours	1 year
Finish coat	PUR	Polystria	50 microns	52	85	10 hours	1 year

4. Remarks

Operating temperature resistance: less than 80°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 02 M**
Coating **High Temperature Piping and Equipment**
Supplier **MAESTRIA**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPM	Ferrocote Alu	200 microns	88	85	16 hours	1 year

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPM	Ferrocote Alu	200 microns	88	85	16 hours	1 year

4. Remarks

Applicable coating on substrates at temperatures of up to 80°C.

Operating temperature resistance:	less than 150°C
Guarantee: 3 years	Degree of rusting Ri 2 Minimum mechanical pull-off test value: 4 MPa

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System No. **M 03 M**
Coating **Structures Splash Zone**
Supplier **MAESTRIA**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EP	Epodux IM 209	500 microns	85	85	5 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EP	Epodux IM 209	500 microns	85	85	5 hours	unlimited

4. Remarks

Operating temperature resistance: less than 60°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 6 MPa

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Appendix 3

System No. **M 04 M**
Coating **Floors**
Supplier **MAESTRIA**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit-medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EP	Epodux IM 209	300 microns	85	85	5 hours	unlimited
Tie-coat							
Intermediate	EP	Epodux IM 209	300 microns	85	85	5 hours	unlimited
Finish coat	PUR	Polystria	50 microns	52	85	10 hours	1 year

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EP	Epodux IM 209	300 microns	85	85	5 hours	unlimited
Tie-coat							
Intermediate	EP	Epodux IM 209	300 microns	85	85	5 hours	unlimited
Finish coat	PUR	Polystria	50 microns	52	85	10 hours	1 year

4. Remarks

Incorporate aggregates for non-slip system on fresh second coat of Ferrocote

Operating temperature resistance: less than 80°C
Specific guarantee requirements: 3 years Ri2
Qualification / acceptance requirements: Minimum mechanical pull-off test value of 4 MPa (mechanical tester)

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Appendix 3

System No. **M 01 P**
Coating **Structure and Equipment**
Supplier **PPG**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	SigmaCover 630 Alu	150 microns	83	85	9 hours	9 months
Tie-coat							
Intermediate	EPM	SigmaCover 630 color	150 microns	83	85	9 hours	9 months
Finish coat	PUR	Sigmadur 550	50 microns	56	85	6 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer	EPM	SigmaCover 630 Alu	150 microns	83	85	9 hours	9 months
Tie-coat							
Intermediate	EPM	SigmaCover 630 color	150 microns	83	85	9 hours	9 months
Finish coat	PUR	Sigmadur 550	50 microns	56	85	6 hours	unlimited

4. Remarks

Operating temperature resistance: less than 80°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 02 P**
Coating **High Temperature Piping and Equipment**
Supplier **PPG**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EP	Sigmaline 2000	250 microns	100	85	24 hours	2 months

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EP	Sigmaline 2000	250 microns	100	85	24 hours	2 months

4. Remarks

Applicable coating on substrates at temperatures of up to 80°C.

Operating temperature resistance:	less than 160°C
Guarantee: 3 years	Degree of rusting Ri 2 Minimum mechanical pull-off test value: 4 MPa

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Appendix 3

System No. **M 03 P**
Coating **Structures Splash Zone**
Supplier **PPG**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit - medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPGF	SigmaShield 400	500 microns	91	85	24 hours	3 months

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats	
						min.	max.
Primer Tie-coat Intermediate Finish coat	EPGF	SigmaShield 400	500 microns	91	85	24 hours	3 months

4. Remarks

Operating temperature resistance: less than 60°C		
Guarantee: 3 years	Degree of rusting Ri 2	Minimum mechanical pull-off test value: 6 MPa

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Appendix 3

System No. **M 04 P**
Coating **Floors**
Supplier **PPG**

1. Surface preparation

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)
Roughness Grit-medium (G) (ISO 8503-2:1988)

2. Coating system

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPGF	SigmaShield 400	300 microns	91	85	24 hours	3 months
Tie-coat							
Intermediate	EPGF	SigmaShield 400	300 microns	91	85	24 hours	3 months
Finish coat	PUR	Sigmadur 550	50 microns	56	85	6 hours	unlimited

3. Repair system

Grade of cleanliness Sa 2 ½ (ISO 8501-1:1988)

Constitution	Binder	Supplier's reference	Nominal thickness	Volume of solids (%)	RH max. (%)	Interval between coats @ 20°C	
						min.	max.
Primer	EPGF	SigmaShield 400	300 microns	91	85	24 hours	3 months
Tie-coat							
Intermediate	EPGF	SigmaShield 400	300 microns	91	85	24 hours	3 months
Finish coat	PUR	Sigmadur 550	50 microns	56	85	6 hours	unlimited

4. Remarks

Incorporate aggregates as Aluminium oxide for non-slip system on fresh second coat of

Operating temperature resistance: less than 80°C
Specific guarantee requirements: 3 years Ri2
Qualification / acceptance requirements: Minimum mechanical pull-off test value of 4 MPa (mechanical tester)

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Appendix 4 Colours Coding

1. Colours

Basic colours are:

- Yellow - [RAL 1003](#)
- Black - [RAL 9005](#)
- Red - [RAL 3001](#)
- Aluminium grey for high temperature.

If polychromy is required following specification could be applied.

2. Vessels and Piping identification

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

2.2.1 Supports concerned

- Carbon steel painted according to the General Specification
- Stainless steel piping
- Monolar - Hypalon family on top sides insulated network.

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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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).

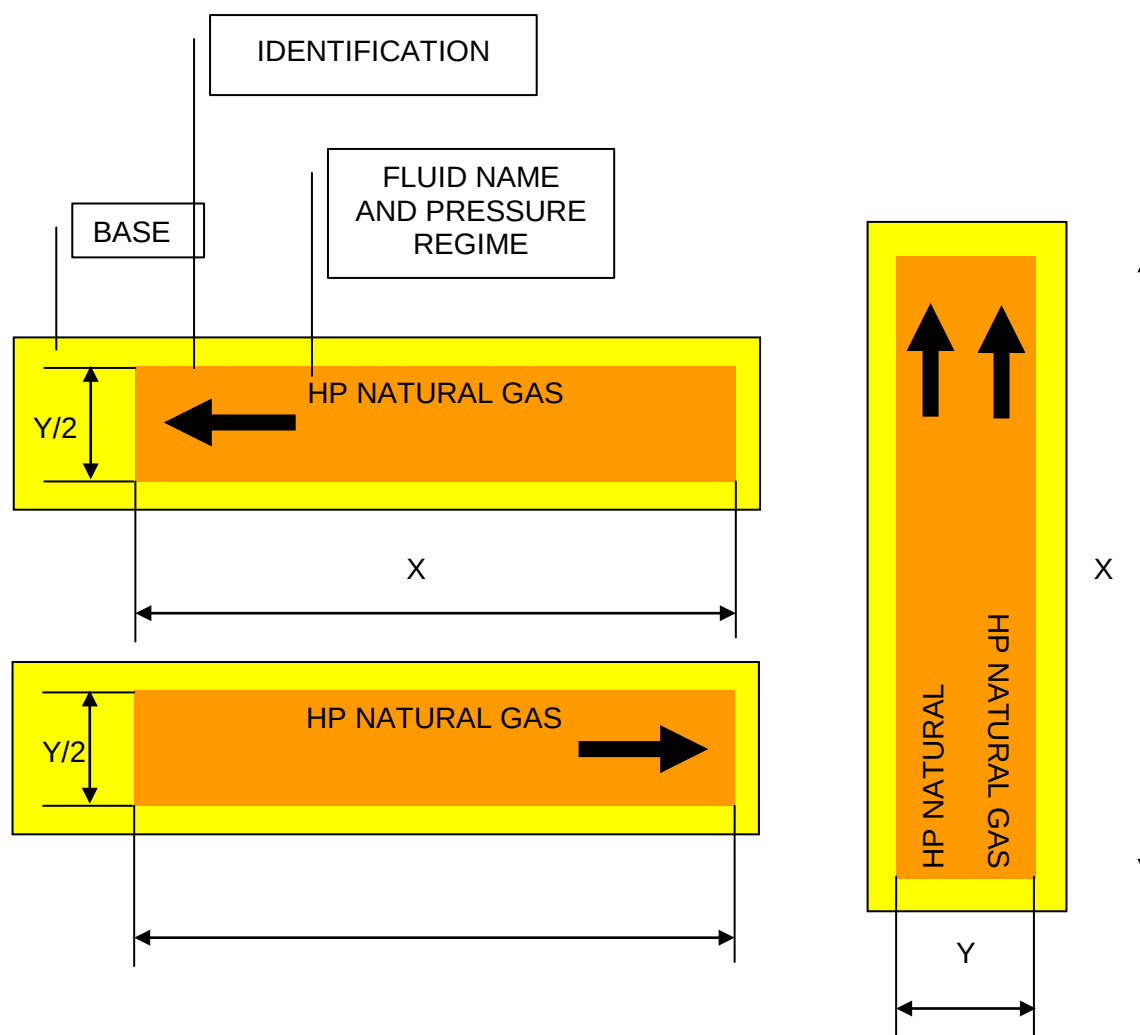
2.5 Checks

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	→	

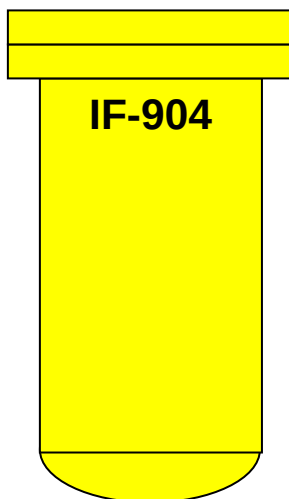
Note: French version is available.

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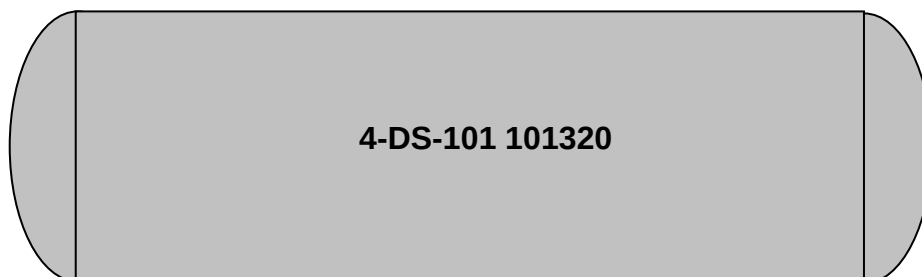
Appendix 4

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.

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Appendix 5 Characterization of spent abrasive

In countries without any specific local regulation, the following EU or US regulations should be used as a reference for the characterization of spent abrasive, in particular to select the appropriate type of landfill for disposal.

This characterization should also be considered during the risk analysis performed when a discharge at sea is envisaged.

EU

As per the list of wastes defined in the [Decision 2000/532/CE](#) (dated 03/05/2000), wastes from paint or varnish removal containing organic solvents or other dangerous substances can be categorised either hazardous (code = 08 01 17*) or non hazardous (code = 08 01 18), according to their hazardous properties.

The [Decision 2003/33/CE](#) (dated 19/12/2002) establishes criteria for the acceptance of waste at landfills for inert, non hazardous and hazardous waste. Acceptance criteria include limit leaching values for a list of contaminants (leaching test [EN 12457-2](#)).

For the purpose of this specification, the analyses should focus on the following elements:

Contaminant	Regulatory acceptable level (mg/kg of dry waste for a ratio liquid/solid = 10 l/kg)		
	Landfill for inert waste	Landfill for non hazardous waste	Landfill for hazardous waste
Arsenic	0.5	2	25
Barium	20	100	300
Cadmium	0.04	1	5
Copper	2	50	100
Chromium	0.5	10	70
Lead	0.5	10	50
Mercury	0.01	0.2	2
Nickel	0.4	10	40
Zinc	4	50	200

USA

According to [US EPA CFR 261 24](#), a solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure (TCLP), test Method 1311 in "Test Methods for evaluating Solid waste, Physical/Chemical methods", EPA Publication SW-486, the extract from a representative sample of the waste contains any of the contaminant listed at a concentration equal or greater than the respective regulatory level. It is then considered as hazardous waste.



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Appendix 5

For the purpose of this specification, the analysis should focus on the following elements:

Contaminant	Regulatory level (mg/l)
Arsenic	5
Barium	100
Cadmium	1
Chromium	5
Lead	5
Mercury	0.2