



Exploration & Production

GENERAL SPECIFICATION

CORROSION

GS COR 354

External protection of onshore structures and equipment by painting

02	10/03	General review – Change of Group name and logo
01	10/02	Abrasives, stainless steel paint system
00	10/01	First issue
Rev.	Date	Notes



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1. Scope

This standard specification defines the technical requirements for the execution of coating operations for the high durability external corrosion protection of on shore structures and equipment.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
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 12944-3	Paints and varnishes-Corrosion protection of steel structures by paint systems. Part 3: Design and constructive requirements
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 T 34 550	Paints and varnishes- Corrosion protection of steel structures by protective paints sytems - Specifications
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 11126-3	Preparation of steel substrates before application of paints and related products. Specifications for metallic blast-cleaning abrasives: copper refinery slag
ISO 11126-6	Preparation of steel substrates before application of paints and related products. Specifications for metallic blast-cleaning abrasives: iron furnace slag
ISO 11126-7	Preparation of steel substrates before application of paints and related products. Specifications for non-metallic blast-cleaning abrasives: fused aluminium oxide

Reference	Title
ISO 11126-8	Preparation of steel substrates before application of paints and related products. Specifications for metallic blast-cleaning abrasives: 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 8501-1	Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness. Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings
ISO 8501-2	Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness. Part 2: Visual assessment of surface cleanliness
ISO 8501-3	Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness. Part 3: Preparation grades of welds, cut edges and other areas with surface imperfections
ISO 8502-1 to 4	Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness
ISO 8502-6	Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness: extraction of soluble contaminants for analysis-The Bresle method
ISO 8502-9	Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness: Field method for conductometric determination of water-soluble salts.
ISO 8503-1 to 4	Preparation of steel substrates before application of paints and related products. Surface profile of abrasive blast-cleaned steel
ISO 8504-1 to 3	Preparation of steel substrates before application of paints and related products. Methods for surface preparation
ISO 4578	Adhesives. Determination of peel resistance of high-strength adhesive bonds
ISO 1513	Paints and varnishes. Examination and preparation of samples for testing
ISO 19840	Paints and varnishes. Determination of dry film thickness. Non-destructive magnetic flux method
NF T 30-125	Paints. Determination of wet film thickness
ISO 2409	Paints and varnishes. Cross-cut test
ISO 4624	Paints and varnishes. Pull-off test

Reference	Title
ISO 7253	Paints and varnishes. Determination of resistance to neutral salt sprays
ISO 787-10	General methods of test for pigments and extenders - Part 10: Determination of density. Pyknometer method
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 6270	Paints and varnishes - Determination of resistance to damp (continuous condensation)
ISO 4628-1	Evaluation of paint and varnish defects. Designation of intensity, quantity and size of common types of defect - Part 1: General principles and rating schemes
ISO 4628-2	Evaluation of paint and varnish defects. Designation of intensity, quantity and size of common types of defect - Part 2: Designation of degree of blistering
ISO 4628-3	Evaluation of paint and varnish defects. Designation of intensity, quantity and size of common types of defect - Part 3: Designation of degree of rusting
ISO 4628-4	Evaluation of paint and varnish defects. Designation of intensity, quantity and size of common types of defect - Part 4: Designation of degree of cracking
ISO 4628-5	Evaluation of paint and varnish defects. Designation of intensity, quantity and size of common types of defect - Part 5: Designation of degree of flaking
ISO 4628-6	Evaluation of paint and varnish defects. Designation of intensity, quantity and size of common types of defect - Part 6: Rating of degree of chalking by tape method
ISO 9223	Corrosion of metals and alloys. Atmospheres corrosivity. Classification
ISO 3678	Paints and varnishes. Print-free test
ISO 7724-1 to 3	Paints and varnishes. Determination of colour and colour difference
NF A 49 711	External triple layer polypropylene based coating - Appendix K: Test for evaluating delamination resistance under negative polarization

Professional Documents

Reference	Title
RAL 840 HR ACQPA	Colors standard "Association pour la Certification et la Qualification en Peinture Anticorrosion". Certified systems by ACQPA

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
ASTM D 4752	Standard test method for measuring MEK resistance of ethyl silicate (inorganic) Zinc-rich primer by solvent rub
ASTM D 4940	Standard test method for conductimetric analysis of water soluble ionic contamination of Blasting abrasives
NACE RP 0178	Fabrication details, surface finish requirements, and proper design considerations for tanks and vessels to be lined for immersion service

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS COR 350	External protection of off-shore and related structures and equipment by painting: Floating structures
GS COR 352	Internal protection of equipment by painting

3. Conditions of use

Paint systems are defined according to the following parameters:

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

3.1 Definition of substrate types

3.1.1 Ferritic steel and cast iron

Carbon steel and cast iron.

3.1.2 Austenitic stainless steel and special alloys

Stainless or nickel steel, monel, etc.

3.1.3 Galvanized steels

Hot dip Zinc-coated carbon steels.

3.1.4 Galvanized and cadmium-plated bichromated steels

Carbon steels coated with cadmium or zinc and then bichromated.

3.1.5 Plastics

Thermosetting plastics or resins, reinforced or not.

3.1.6 Concretes and similar products

Different types of cement-based, or fire-proofing products.

3.2 Parameter coding system and identification of systems

3.2.1 Parameter coding system

3.2.1.1 Parameter 1: atmosphere or environment

Atmosphere or environment	Category of corrosivity
Rural-RU	C3 / C4
Industrial-IN	C5-I

3.2.1.2 Parameter 2: Substrate

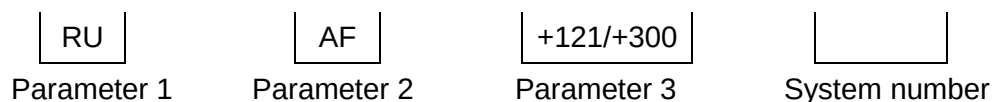
AF	Ferritic steel or cast iron
AI	Austenitic stainless steels and special alloys
AG	Galvanized steels
AB	Galvanized or cadmium-plated bichromated steels
PL	Plastics
BE	Concretes and similar products

3.2.1.3 Parameter 3: Operating temperatures

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

3.2.2 Identification of systems

Systems are identified as follows:



3.3 Approved systems

The approved systems are given in the referenced lists:

- The structures in areas classified in corrosivity categories C3, C4 the approved systems are selected from the ACQPA reference systems.
- For structures in areas classified as corrosive categories C5-I, the approved systems are specified in the reference standards

3.4 Substitution rule

In selecting paint systems, a system designed to withstand high aggressivity shall always be applicable in a lower corrosivity environment.

4. Conditions of application

4.1 Grade of cleanliness

This is specified in each system.

4.2 Surface roughness (Ra)

This shall be measured using a roughness meter with adapted cut-off. The roughness value, Ra, required is specified in each system.

It could be characterized with ISO surface profile comparators.

4.3 Substrates contamination

They are defined according to ISO standards and compatible with the high durability of the paint systems:

- Salts contamination
- Dust level
- Others
- Etc.

4.4 Preparation of AF type surfaces

All structures and equipment are built with a design in accordance with ISO standard for high durability of the paint systems.

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

There is no interstice, not inaccessible area, etc.

All oil or grease shall be removed by washing with appropriate solvents or any other suitable means before beginning blast-cleaning operations.

Bolt holes in piping assemblies shall be cleaned with solvent before blast-cleaning.

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

The CONTRACTOR shall protect all equipment that is not to be painted or liable to be affected by the presence of abrasives or paint. Special attention shall be paid to avoiding splashes of zinc paint on equipment made of austenitic steels to prevent stress cracking corrosion at high temperatures.

All surfaces to be coated shall be blast-cleaned according to the recommendations defined for each system.

For any surface blast-cleaned on the construction site, all dust must be removed using an industrial vacuum cleaner before the application of the paint.

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.

The proposal shall be submitted to the OWNER for approval.

4.5 Preparation of AF surfaces on automatic production lines in steel Operating plants

These operations shall comply with current standards.

All surfaces to be coated shall be blast-cleaned to grade of cleanliness Sa 3.

The CONTRACTOR's proposal defining the profile that affords maximum adhesion shall include the following elements:

- Surface roughness (Ra)
- Dust level
- Substrate contamination checks
- Abrasive composition.

The proposal shall be submitted to the OWNER for approval.

The CONTRACTOR shall check the roughness (Ra) twice per shift using a surface roughness recording instrument. Inspection forms and charts shall be handed over to the OWNER.

4.6 Preparation of AG or AI surfaces

4.6.1 AG surfaces

Galvanized surfaces to be coated shall be cleaned, degreased and etched using the product specified in the systems.

4.6.2 AI surfaces

To obtain the roughness required for adhesion of the chosen system, stainless steel surfaces to be coated shall be etched or degreased and blast-cleaned with a non-ferrous and chlorine-free abrasive.

The CONTRACTOR's proposal defining the profile that affords maximum adhesion shall include the following elements:

- Abrasive composition
- Surface roughness – Ra: 8/10 micrometres / Low in relation to the product to be implemented – endeavour to keep it to a minimum of 10 micrometres roughness.
- Dust level - level 2 maximum.
- Substrate contamination checks. ferrous contamination / direct colorimetry method using Prussian blue (potassium ferricyanide) – no surface pollution can be accepted.
- Applicable paint systems:
 - Stainless steel as 304, 321 → system P 05 on all surface;
 - Stainless steel as 316L, 904, duplex, ... → system P 05 second only on thermally insulated piping or to prevent corrosion risk in interstices.

The proposal shall be submitted to COMPANY for approval.

4.7 Preparation of AB surfaces

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

4.8 Conditions for products

4.8.1 Procurement and storage

4.8.1.1 Paints and thinners

All major paint systems are certified by a third part laboratory in accordance with standards and approved by COMPANY.

The quantities required to coat the structure 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.

The products shall stored in optimal conditions for their best conservation (air-conditioned store, etc.), and delivered in their original packaging. The packaging precise the batch number, the fabrication date and expired date.



The maximum expired dates considered starting to the fabrication dates are:

- For zinc ethyl silicate six (6) months
- For another products one (1) year
- For some particular products in accordance with the products maker recommendations and the OWNER approval.

4.8.1.2 Abrasives

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

Conductivity shall be less than $150 \cdot 10^{-6}$ SIEMENS/cm and salt contamination shall be less than 40 mg/m².

Notes:

- Conductivity for the treatment of immersed areas shall be less than $30 \cdot 10^{-6}$ SIEMENS/cm and salt contamination shall be less than 20 mg/m².
- Using copper slag is forbidden to avoid copper surface contamination.

4.8.2 Samples

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

4.8.3 Qualification of the application procedures for the different systems

One month before work commences, all the chosen systems shall be applied (graded) on representative elements of the structure. The products used shall be taken from the same batches as those intended for the structure.

The system shall be applied in the presence of the SUPPLIER of the coating products and the OWNER's 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.

4.9 Application conditions

A pre-operational technical meeting shall be organized by the CONTRACTOR in the presence of the OWNER and the SUPPLIERS to analyze all the details concerning performance of the work, and the application and inspection principles.

The SUPPLIERS shall provide the CONTRACTOR with technical assistance.

Minimum and maximum times between coats shall be consistent with the data sheets and with the schedule of the work.

Paint shall always be applied to surfaces that are dry, clean and degreased (substrate or previous coat).

Paint shall never be applied before the temperature of the substrate is at least 3°C above the dew point.

Paint shall never be applied in rainy or foggy weather, except under shelter, and subject to verification of the atmospheric conditions.

The minimum and maximum temperatures of the ambient atmosphere and the support shall be limited in accordance with the product data sheets. The minimum application temperature for:

- Epoxy is 10°C
- Top coat type acryl-polyurethane is 5°C.

The CONTRACTOR shall keep a continuous daily record of the temperature, ambient atmosphere and relative humidity. He shall record the temperature of the support to determine the dew point before and during the work to ensure that the application conditions are acceptable. These records shall be kept and made available to the OWNER.

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 shall be checked by the CONTRACTOR. The measured values shall be recorded and made available to the OWNER.

The thickness tolerances and the minimum frequency for thickness measurement are defined in the related standard .

The CONTRACTOR shall ensure that his work does not show any defects, such as:

- "Orange peel"
- Cracking
- Bubbling
- Pin-holes
- Runs and sags
- Blistering
- Etc.

Special cases:

- Zinc ethyl silicate

During application, the product shall be stirred at all times. It shall be sprayed systematically with fresh water for at least two hours after application. Before covering, this primer shall be subjected to a soaking test using MEK (Methyl ethyl Ketone) to ensure that hydrolysis is total.

If complete hydrolysis is not obtained within eight days after application, the coating shall be completely removed and re-done.

- Galvanized or cadmium-plated bichromated bolting

All surfaces shall be coated.

4.10 Defect repair conditions

Subject to the agreement of the OWNER and after determining the scale and type of the defects, the following methods of repair shall be applied:

4.10.1 Major defects (products, application and unsatisfactory tests results)

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

4.10.2 Minor defects (localized appearance, scratches, etc.)

Subject to the agreement of the SUPPLIER of the product and according to the system chosen, localized blast-cleaning with total or partial elimination of the system and re-painting.

5. Certification of personnel

5.1 Operators

Whatever the application process used for the liquid paints and the nature of the environment, the operators shall be individually certified by an approved organization (ACQPA, FROSIO, etc.).

5.2 Inspectors

The inspectors shall be individually certified by an approved organization (ACQPA, FROSIO, NACE international minimum level 3, etc.).

6. Technical content of tenders

Tenders shall specify the following:

- Proposed paint system(s)
- Product data sheets
- Certificates specifying the durations, requirements and performance levels of warranties as issued by the Office d'Homologation des Garanties de Peinture Industrielle or equivalent
- Location of each system on the structure
- Maximum thickness of each coat to ensure the properties of the coat concerned and of the system as a whole
- A list of the various painting and inspection phases
- Minimum and maximum intervals between coats for each system and according to climatic conditions
- A list of inspection and painting materials used in the workshop and on site
- Surface preparation conditions, indicating the methods to be used to obtain the required roughness value
- Conditions of application of the coats that make up the systems
- Colours to be used for each item of equipment and for the different coats, in accordance with the colour chart chosen by the OWNER
- Measures taken to protect against adverse weather conditions.
- The personnel certificates of the operators and inspectors.

7. Checks, inspection and acceptance

7.1 Checks

Throughout the duration of the work, the CONTRACTOR's Quality Control department shall check the following points in accordance with the chosen system. The results of these checks shall be recorded (quality control report).

- Construction quality
 - Suitability for the coating:
 - Corners, sharp edges
 - Form, quality and continuity of welds.
- Surface preparation quality:
 - Grade of cleanliness
 - Cleanliness (dust level, etc.)
 - Roughness, Ra.
- Salts contamination or others
- Climatic conditions for application
- Substrate temperature
- Drying and polymerization state of primer and of each coat
 - Special case of zinc ethyl silicate: washing with fresh water and solvent test.
- Interval between coats
- Number of coats
 - This shall be in accordance with the system(s) chosen
- Wet film thickness of each coat on application
- Thickness of the various coats and of the final system
 - According to the tolerances specified in the standards referred to in section **Erreur! Source du renvoi introuvable.**
- Appearance and colours
 - In accordance with the requirements of subsections 4.9.
- Adherence
 - The tests shall be carried out only when the system is completely dry and fully polymerized.
- Cross-cut test (systems less than 200 µm)
 - The test shall be carried out in accordance with the standard and shall be applied even for a multi-coat system.
 - The adherence test results based on the use of a scalpel and after application of adhesive tape shall comply with class 0.

- Pull-off test (systems 200 µm or above)

The tests shall be carried out in accordance with the standard. The minimum level of performance shall be 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) except another indication in the system's data sheets.

The measuring instrument must be fitted with a storage pressure gauge recording pulling force.

In the system's data sheets only the minimum performance level obtained with mechanical equipment are indicated.

7.2 Inspection

An inspection plan shall be drawn up including all the points in precedent subsection.

As part of the quality assurance plan, the OWNER shall define inspection procedures for the different work and inspection phases.

7.3 Provisional acceptance

At handover time, the OWNER shall check that all the inspections set out in subsection 7.1 have been carried out and that all the results are satisfactory.

7.4 Guarantees

The coatings shall be covered by a specific guarantee, the duration, criteria and levels of performance of which shall be specified in each system's data sheet.

The CONTRACTOR, the APPLIER and the SUPPLIER shall jointly underwrite the guarantee.

7.5 Final acceptance

An inspection shall be carried out at the end of the warranty period.

8. Technical file

The technical file, handed over by the CONTRACTOR at the end of the work, shall include:

- Certificate specifying duration, criteria and levels of performance of the guarantees
- The insurance certificate for the guarantee.
- The various inspection reports.
- Provisional acceptance reports.



Appendix 1 Approved list of SUPPLIERS*

SUPPLIER	Code	Phone No.	Fax No.	Remarks
AMERON	A	01 30-71-50-50	01-30-53-49-07	technical.nl@ameron-bv.com
CARBOLINE	C	01-60-06-55-66	01-60-06-55-70	Carboline.France @stoncor.com
HEMPEL	H	03-44-08-28-90	03-44-08-28-99	stephane_moritz@fr.hempel.com
INTERNATIONAL COATINGS	I	02-35-22-13-50	02-35-22-13-52	edward.grattepanche@uk.akzonobel.com
JOTUN	J	01-45-19-38-87	01-45-19-38-94	jose.menaches@jotun.com
SIGMAKALON	SF	01-57-61-01-65	01-57-61-01-82	Frederic.Coulon@SigmaKalon.com
MAESTRIA	M	05-61-67-97-40	05-61-67-05-47	acceuil@maestria.fr

* Another SUPPLIER could be proposed only with COMPANY approval

Appendix 2 List of systems

Important warning:

- Zinc ethyl silicate-based primers are systematically sprinkled with fresh water at least two hours
- After application to ensure hydrolysis.
- The minimum interval between coats depends on the results of the "MEK test".
- 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.
- ACQPA: Internet address www.acqpa.com

Structure	Code	System No.	Remarks
Structures			
Structures	RU AF -010/+080 IN AF -010/+080	ACQPA ACQPA	
Floors	RU AF -010/+080 IN AF -010/+080	ACQPA P02	
Galvanized surfaces	RU AG -010/+080 IN AG -010/+080	ACQPA P05	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	ACQPA P06	Above 80°C, system adapted to adjacent surfaces systems.
High temperature structures	RU AF +121/+400 IN AF +121/+400	P11 P11	Flare type structures.



Structure	Code	System No.	Remarks
Pressure vessels			
Uninsulated: $t \leq 80^{\circ}\text{C}$	RU AF -010/+080 IN AF -010/+080	ACQPA P01	
$81 \leq t \leq 120^{\circ}\text{C}$	RU AF +081/+120 IN AF +081/+120	P10 P10	Including adjacent surfaces
$121 \leq t \leq 400^{\circ}$	RU AF +121/+400 IN AF +121/+400	P11 P11	Including adjacent surfaces
Insulated: $t < 89^{\circ}\text{C}$	RU AF -030/+089 IN AF -030/+089	P12 P12	
$90 \leq t \leq 200^{\circ}\text{C}$	RU AF +090/+200 IN AF +090/+200	P13 P13	
Chassis	RU AF -010/+080 IN AF -010/+080	ACQPA P01	
Galvanized surfaces	RU AG -010/+080 IN AG -010/+080	ACQPA P05	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	ACQPA P06	Above 80°C , system adapted to adjacent surfaces systems

Structure	Code	System No.	Remarks
Piping			
Uninsulated: $t \leq 80^{\circ}\text{C}$	RU AF -010/+080 IN AF -010/+080	ACQPA P01	
$81 \leq t \leq 120^{\circ}\text{C}$	RU AF +081/+120 IN AF +081/+120	P10 P10	Including adjacent surfaces
$121 \leq t \leq 400^{\circ}$	RU AF +121/+400 IN AF +121/+400	P11 P11	Including adjacent surfaces
Insulated: $t < 90^{\circ}\text{C}$	RU AF -030/+089 IN AF -030/+089	P12 P12	
$90 \leq t \leq 200^{\circ}\text{C}$	RU AF +090/+200 IN AF +090/+200	P13 P13	
Galvanized surfaces	RU AG -010/+080 IN AG -010/+080	ACQPA P05	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	ACQPA P06	Above 80°C , system adapted to adjacent surfaces systems
Machines			
$t \leq 80^{\circ}\text{C}$	RU AF -010/+080 IN AF -010/+080	ACQPA P14	SUPPLIER's system applied if approved by TOTAL
Rooms			
Open (workshop type)	RU AF -010/+080 IN AF -010/+080	ACQPA P15	Bulkheads, ceilings
Air conditioned	RU AF -010/+080 IN AF -010/+080	ACQPA	
Storage vessels			
External surfaces	RU AG -010/+080 IN AG -010/+080	ACQPA P01	For floating roof tanks extend by 1.5 m down on the inside
Galvanized surfaces	RU AG -010/+080 IN AG -010/+080	ACQPA P05	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	ACQPA P06	Above 80°C , system adapted to adjacent surfaces systems.



Appendix 3 SUPPLIERS' systems

See ACQPA internet site: www.acgpa.com

The minimum warranty shall be 5 years Ri 2

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. Polychromy system

2.1 Successive coats

Each successive coat tint shall be different from the previous one.

2.2 Pipe identification

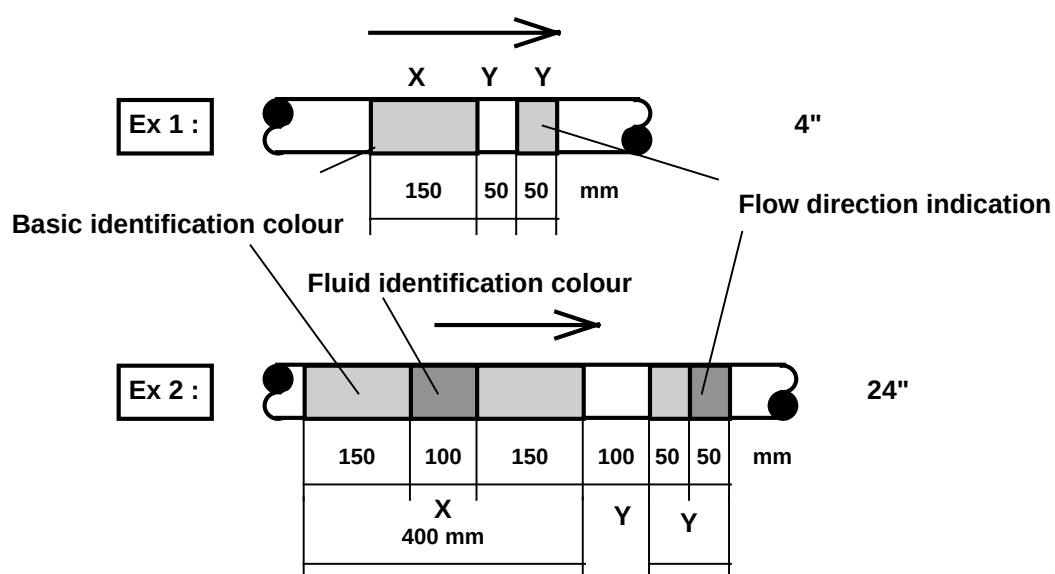
Pipes shall be identified according to carried fluid as stipulated in the attached colour coding tables.

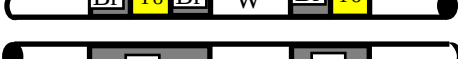
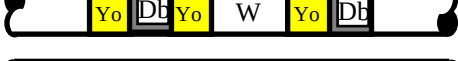
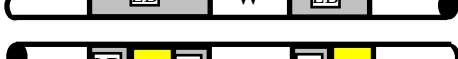
Note 1: The basic identification colour shall be applied means of a sprayed band X mm wide around the pipe at a maximum of 2 m intervals and on either side of each valve, fitting, wall penetration and any other places where identification of the fluid is necessary.

Note 2: The fluid identification colour shall be applied by spray. It shall be Y mm wide all around the pipe and placed in the middle of the basic identification colour.

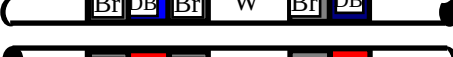
Note 3: Code indications, i.e. information regarding the nature of the fluid and direction of flow arrows, shall be painted in black letters on the white pipe background adjacent to the basic identification colour band. The flow direction shall be indicated by a repetition of the basic and fluid identification colours sprayed downstream at Y mm apart and Y mm wide, as shown below.

PIPE O. D.				
	$\leq 6"$	$>6" - \leq 12"$	$>12" - \leq 24"$	$> 24"$
X mm	150	250	400	600
Y mm	50	75	100	150



SERVICE	PIPELINE MARKING	FLOW DIRECTION
		
CRUDE OIL		HC
DIESEL OIL		DO
HYDRAULIC OIL		HO
LUBE OIL		LO
SEAL OIL		SO
HELIFUEL		HE
CONDENSATE / NGL		CD
NAPHTA		NH
PROCESS GAS		PG
FLARE GAS		FL
HYDROCARBON (GAS)		HG
FUEL GAS		FG
GAS INJECTION		GI
EXHAUST		EX
INERT GAS		IG
INSTRUMENT AIR		IA
PLANT AIR		PA
ATMOSPHERIC VENT		ATH
HALON GAS		HLG
GLYCOL		GLC

SERVICE	PIPELINE MARKING	FLOW DIRECTION
		
METHANOL		ME
FREON		F
CHEMICAL INJECTION		CL
H. P. STEAM		SH
L. P. STEAM		SL
L. P. STEAM CONDENS.		SC
WATER INJECTION		WI
SEA WATER		SW
PROCESS WATER		PW
COOLING WATER		CW
FIRE WATER		FW
DRINKING WATER		DW
UTILITY/FRESH WATER		UW
COLD WATER SERVICE		CWS
CHILLED WATER		CHW
HOT WATER SERVICE		HWS
WASTE SEWAGE		WS
OILY WATER		OL
OPEN DRAIN		OD
HYDRO. CLOSED DRAIN		DR

SERVICE	PIPELINE MARKING	FLOW DIRECTION
		
WASTE OIL DRAIN		DR
CEMENT LIQUID		CE
BULK BARYTES		BB
BULK CEMENT		BC
HIGH PRES. CEMENT		HPC
L. P. OIL MUD		LM
MUD OIL		MO
H.P. OIL MUD		HM
KILL FLUID		KF

2.3 Final coat colour

The final coat colours of all equipment and platform areas shall be as follows.

2.3.1 Exterior

All submerged steel parts of the jacket (if required painted) excluding the splash zone	Traffic grey
All structural steel below tidal range (splash zone) including casing	Brown
All structural steel above tidal range including structural steel for helideck	Yellow
Pipe supports	As nearby structure colour
Lighting posts	White
Guard rails (Handrails)	White
Pedestal cranes (moving parts)	Red/white stripes
Pedestals	As nearby structure colour
Bridge structure	Yellow
Tanks, vessels, heat exchangers	White
Pipework (See Appendix 2)	Base colour: white Identification (ISO R508)
All equipment and package	Light grey
Internal walls/ceilings of equipment enclosures	White



Internal flooring of equipment enclosures	Brown red
Fire pump enclosures: External walls	Red
Internal walls & ceiling	White
Control Panels	Light grey
Moving parts and	Red/white
Overhead obstructions	Stripes
Fire fighting equipment and piping	Red
Stairways and associated structure	White
Runway beams (external and internal)	Yellow/black Stripes
Escape routes (external and internal)	Black/yellow Stripes
Drilling derricks and big radio tower	Red/white Stripes
Floors, decks and walkways	Brown red
Doors	Green
Buildings, walls, door & window frames (except for Fire Pump Enclosures)	White
Helideck structural	Yellow
Helideck Surface	Green
Helideck markings	White/yellow
Life boat davits	Yellow
Grating	As the supporting Frame colour
Netting framing	White
Flare (excepted top of flare to be aluminium)	Red/white

2.3.2 Interior of Technical Areas/Buildings

Structural Steel	Yellow
Cladding and Ceiling *	White
Floors *	Brown red
Tanks, Vessels, Heat exchangers and pipework	White (Piping identification in accordance with ISO R508 , see section Appendix 2)
Pumps and Motors	Light grey
Skids and Packages	Light grey
Main Generator Package	Light grey



Emergency Generator Package	Light grey
Compressor Enclosure	Light grey
Control Panels	Light grey
Switchgear	Light grey
Transformers	Light grey
Fire Fighting Equipment (incl Diesel Engine and piping)	Red
Doors	Green
First Aid Box	Green
Instruments	MANUFACTURERS Standard colour
Moving Parts and Overhead Obstructions	Red/white stripes
Escape Routes	Black/yellow Stripes

* Except Control Room, Technical Room, Laboratories and other specific areas. Colour choice for these to be determined based on VENDOR's standard systems and COMPANY requirements.

Interior of **living quarter modules and offices** to be finalised during detailed engineering phase and submitted to COMPANY approval.



2.4 Colours

The Colours specified in annex shall be in accordance to the RAL K1.

All colours used shall comply with these standards. MANUFACTURERS colour names or reference numbers shall not be used as reference.

Colour	Code for pipeline marking	RAL Reference
Yellow	Y	1003
Red	R	3001
Brown red	BR	3009
Light blue	LB	5015
Dark blue	DB	5003
Light grey	LG	7035
Traffic grey	TG	7042
White	W	9010
Black	Bl	9005
Green	G	6001
Violet	V	4005
Yellow ochre	Yo	1006
Brown	Br	8003
Silver grey	S	7001