

GENERAL SPECIFICATION

CORROSION

GS EP COR 251

Internal coating of water injection pipelines
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Rev.	Date	Purpose of the revision

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1. Scope

This specification covers requirements and methods of tests for liquid epoxy paints and internal coatings made with such paints in pipes and fittings for the conveyance of water in water injection pipelines. It also deals with the application and inspection of the paint. Other paints or paint systems are not excluded provided they comply with the requirements given in this specification.

The coating consists of one or two layers, and is normally plant-applied on blast cleaned steel by airless spray or conventional spray techniques.

Note: The internal coating shall be applied AFTER application of the external coating.

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
ASTM D4940	Standard test method for conductimetric analysis of water soluble ionic contamination of blasting abrasives
ISO 15741	Paints and varnishes: Friction-reduction coatings for the interior of on and off shore steel pipelines for non corrosive gases
ISO 2808	Paints and varnishes - Determination of film thickness
ISO 4624	Paints and varnishes. Pull-off test
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 8502 (Parts 3; 6; 9)	Preparation of steel substrates before application of paints and related products - Tests for the assessment of surface cleanliness - Parts 3; 6; 9
ISO 8503 (Parts 1; 2)	Preparation of steel substrates before application of paints and related products. Surface profile of abrasive blast-cleaned steel - Parts 1; 2

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Total General Specifications

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

Reference	Title
Not applicable	

3. Coating material

3.1 General

The plant applied coating shall be able to withstand:

- Storage and transport temperatures which can vary between -10°C and +50 °C
- Installation of pipes by conventional laying methods
- Continuous exposure to treated sea water containing corrosion inhibitors and biocides.

3.2 Type of coating

The coating shall be a two component epoxy system with a dry film thickness (DFT) of 300 microns applied in one (or two) layer(s).

A full qualification file (product characteristics and application parameters and trials) according to the guidelines of this standard shall be submitted to Company for approval.

3.3 Qualification of coating materials

The following documentation shall be submitted to Company for approval:

- Data sheet of the product
- Certificate of conformity: The certificate of conformity is a document issued by the raw material Manufacturer (specific to each raw material). It is a list of physical or chemical characteristics controlled for every production batches. For each of these characteristics, a conformity range is reported by the Manufacturer. Conformity certificate shall be considered valid for one year, provided there is no change of any kind for the product for that period.

When submitted to Company for approval during qualification, Company reserves the right to request changes with regards to Manufacturer's specification ranges for each of the characteristics.

- Certificate of analysis: The certificate of analysis is issued by raw material Manufacturer with every batch of product. It reports all characteristics controlled on the corresponding batch.

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The content of certificate of analysis shall be equivalent to the certificate of conformity, except that measured values shall be reported instead of conformity range or Manufacturer specification.

- Certificate from independent laboratory that the product is suitable for water transportation.

3.4 Qualification of cured paint film

The coating will present the following characteristics:

- To be stable at the service temperature for the lifetime of the pipeline
- To have good adhesion to the steel, and not be impaired during storage, transport and laying operations
- To present good resistance against abrasion and scratching
- To present good resistance to the transported fluid (saline water and chemical additives). In addition, the coating shall have low moisture absorption, an ability to withstand the weather conditions (storage) and shall not be affected by heating during girth welding.
- The flexibility of the coating shall be sufficient to withstand bending without detectable defects during the laying operation (up to 3% elongation).

3.5 Contractor obligations

- The contractor shall submit to the Company the certified copies of the technical tests performed by the Manufacturer to check the physical properties and the behaviour of all products to be used for coating operations
- The contractor shall submit to Company detailed specifications from the supplier concerning the materials to be used, with the instruction for the handling and application of all materials used for plant and field coating
- All products have to be approved by Company before starting the coating operations.

4. Coating application

4.1 Surface preparation

First check that the surfaces are free from any foreign matter such as welding flux, welding spatter, salts, oil or grease. If necessary, wash the surfaces with a high pressure jet of fresh water. Remove organic contaminants using detergent or suitable organic solvents.

Salt contamination shall be checked as per [ISO 8502-6](#) and [ISO 8502-9](#). Salt content shall not be higher than 2 micrograms per square centimetre.

Then abrasive blast clean the surfaces to surface preparation grade Sa 3 in accordance to [ISO 8501-1](#).

Remove, using suitable methods, any surface irregularities or imperfections which may have become visible.

The dust level shall be 2 maximum as per [ISO 8502-3](#).

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Check the surface profile. Unless otherwise agreed, it shall correspond to “G medium” as per [ISO 8503-2](#). No values of Ry5 measured as per [ISO 8503-4](#) shall be lower than 40 microns. The use of replica tape to assess the roughness is not allowed. At start of production, cleanliness and salt contamination of abrasives shall be checked as per [ASTM D4940](#): Conductivity shall be lower than 1000 microSiemens/cm and no oil visible after 30 minutes. No Silica grit is allowed.

During and after blast cleaning and prior to application of the coating material, the temperature of the steel surface shall be at least 3°C above the dew point or the minimum curing temperature given by the coating material Manufacturer, whichever is the highest.

4.2 Coating application

- Shall be in accordance with Manufacturer recommendation
- Thickness of dry film: 300 microns in one or two coats. Absolute minimum: 250 microns.
- Glass panel and steel panel shall be coated at the same time for control purposes (see 4.3)

4.3 Inspection plan

Items	Method	Frequency	Acceptance criteria
Coating material			
Name of product	Visual examination	Once per shift	As specified
Name of manufacturer	Visual examination	Once per shift	As specified
Batch number	Visual examination	Once per shift	As specified
Surface condition prior to surface preparation	Visual examination	Every pipe	As specified
Surface condition after surface preparation	Visual examination	Every pipe	As specified
Surface cleanliness	ISO 8501-1 ISO 8502-3	Every pipe Twice per shift	As specified As specified
Surface profile	ISO 8503-1	Twice per shift	As specified
Salt contamination	ISO 8502-6 and ISO 8502-9	Once per shift	As specified
Surface imperfections (dents, laps...)	Visual examination	Every pipe	Subject to agreement
Environmental conditions in the painting area			
Ambient temperature	Instrumental	Continuously	As specified
Steel temperature	Instrumental	Twice per hour	As specified
Relative humidity	Instrumental	Continuously	As specified

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Items	Method	Frequency	Acceptance criteria
Dew point	Instrumental	Once per shift	As specified
Cured paint film on pipes			
Appearance and continuity	Visual examination	Every pipe	No sagging
Dry film thickness	ISO 2808, method 10	3 per shift	As specified
Porosity (pinholes)	Wet sponge test Annex G of ISO 15741	The test shall be carried out only if porosity test on glass panels constitute a failure	As specified
Cured paint film on steel panels Adhesion Curing test	ISO 4624 Manufacturer recommendation	3 per shift	3 MPa Minimum As per manufacturer recommendation
Paint film on glass test panel Porosity (pinholes)	Annex E of ISO 15741	3 per shift and every new batch	Max 5 pores