

DEP SPECIFICATION

**EXTERNAL POLYETHYLENE AND
POLYPROPYLENE COATING FOR LINE PIPE
(AMENDMENTS/SUPPLEMENTS TO ISO/DIS 21809-1:2009)**

DEP 31.40.30.31-Gen.

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DESIGN AND ENGINEERING PRACTICE



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PART I INTRODUCTION AND GENERAL REQUIREMENTS

1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for factory applied external polyethylene and polypropylene coating applied for corrosion and abrasion protection of steel pipes, bends and fittings of buried or submerged pipelines. It specifies the requirements for coating materials, coating application, inspection and testing and gives procedures for the qualification of coating materials and coating applicators.

The DEP is applicable to coating applied on line pipe by one of the following coating processes:

- powder sintering;
- sleeve or cross-head extrusion;
- side extrusion.

This DEP is also applicable to coating applied on bends and fittings by powder sintering or equivalent coating application processes.

This DEP may also serve as a foundation for multi-layer insulation systems.

Part II of this DEP amends, supplements and deletes various clauses of ISO/DIS 21809-1:2009. Part II follows the clause numbering ISO/DIS 21809-1:2009 for easy reference.

This DEP is a revision of the DEP of the same number and title dated April 2003; see (Part I, 1.6) regarding the changes.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them.

This DEP is intended for use by all parties involved in the design, procurement, manufacturing, coating and transport of polyethylene or polypropylene coated line pipe for oil and gas production, oil refineries, chemical plants, gas plants and marketing depots and installations. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process should be implemented. This is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements may be more stringent than in this DEP the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable as regards safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviations from the requirements of this DEP which are considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the authorities concerned with the object of obtaining agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Applicator** is the party that applies the coating to the line pipe in its coating plant.

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for its design and construction. The Principal will generally specify the technical requirements. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.3.2 Specific definitions

Adhesive – an intermediate coating layer to improve adhesion between the primer and the coating.

Batch – the amount of materials produced within one uninterrupted production run of maximum 10 hours under constant production conditions.

Chemical pre-treatment – treatment of the blast cleaned pipe surface with a chemical solution (e.g. phosphate), before application of the primer to improve the adhesion of the coating to the substrate.

Holiday – a defect penetrating through the coating to the steel pipe surface, of such dimensions that it is detectable by means of the specified procedures.

Inspector – the party appointed by the Principal to witness the Applicator's quality control of coating materials and the coating process.

Primer – an intermediate coating layer, applied directly onto the pre-treated steel surface to improve the adhesion of the final coating to the pipe surface.

Qualification trial – process of application of the total coating system and subsequent inspection/testing of its properties to confirm that the coating system and coating applicator are adequate to produce the coating of specified properties. The qualification trial shall be carried out before any production coating is allowed.

Shift – a set of pipes coated in one production run of which the beginning and end coincide with a change in personnel. In the context of the quality control procedures of this DEP, the maximum duration of a shift is 10 h.

Side extrusion – a coating process whereby hot extruded films of coating materials are wrapped around the pipe in layers. The pipes are moved past the extrusion head in a spiral motion. The extruded coating film is fused together to form a continuous adherent sheath around the pipe.

Sintering – the coating process whereby the coating material is sprayed onto the preheated pipe surface in the form of powder and is fused to a homogeneous and continuous layer under the influence of the heat from the pipe material.

Sleeve extrusion or crosshead extrusion – a coating process whereby a hot extruded sleeve of coating material is applied around the pipes while the pipes are moved through the extrusion head in a linear motion.

Three layer system – a pipe coating system consisting of three layers: primer, adhesive and outer layer.

Unit of production – unless otherwise specified, a set of pipes coated in one production run on the same coating line, using the same coating technique, having the same nominal diameter and wall thickness and coated with the same coating products. Breaks in production caused by equipment or plant breakdown, factory shutdown or any other interruption exceeding three days shall be the end of a production run. Subsequent start-up constitutes a new unit of production.

1.4 ABBREVIATIONS

AFC	Approved For Construction
FBE	Fusion Bonded Epoxy
ITP	Inspection and Test Plan
MP	Manufacturing Plan
PE	Polyethylene
PP	Polypropylene
QP	Quality Plan
UV	Ultraviolet (light)

1.5 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section number is shown in brackets. Other documents referenced in this DEP are listed in (Part III).

1.6 CHANGES FROM THE PREVIOUS EDITION

The previous edition of this DEP was dated April 2003 and was a stand-alone document.. This revision is written in the form of amendments/supplements to ISO/DIS 21809-1:2009 and it is therefore impractical to summarise the changes here.

1.7 COMMENTS ON THIS DEP

Comments on this DEP may be sent to the Administrator at standards@shell.com, using the DEP Feedback Form. The DEP Feedback Form can be found on the main page of "DEPs on the Web", available through the Global Technical Standards web portal <http://www.shell.com/standards> and on the main page of the DEPs DVD-ROM.

2. GENERAL REQUIREMENTS

2.1 GENERAL

Part II of this DEP amends, supplements and deletes various clauses/paragraphs of ISO/DIS 21809-1:2009. Wherever reference is made to ISO/DIS 21809-1, it shall be understood to mean ISO/DIS 21809-1:2009 as amended/supplemented by this DEP.

For ease of reference, the clause numbering of ISO/DIS 21809-1 has been used throughout Part II of this DEP. Clauses of ISO/DIS 21809-1 that are not mentioned in this DEP shall remain applicable as written.

2.2 DOCUMENT HIERARCHY

In the event of conflicts between contract documents, AFC drawings, specifications and other referenced standards, the following document hierarchy shall apply:

- Contract or agreement (including any approved exceptions)
- AFC drawings – latest revisions
- Principal's specifications (including project specific information)
- Industry Standards (e.g. ISO, NACE)

2.3 SAFETY

Application of coatings can include the use of hazardous materials, operations and equipment. This DEP does not purport to address all the potential safety concerns associated with their use. It is the responsibility of the Applicator to establish appropriate safety and health requirements and determine any regulatory requirements or limitations prior to use

Health, Safety and Environment concerns shall be identified and included in the detailed coating procedure and pre-job discussions. All surface preparation and coating application systems shall undergo a complete safety inspection and checkout prior to use.

Adequate exhaust/ventilation equipment shall be used, as required, for removal of any air contaminated products to achieve acceptable air quality standards and to protect personnel.

The safe practices recommended in industry standards shall be followed. Waste material shall be handled and disposed of properly. Protective equipment requirements in the Manufacturer's Material Safety Data Sheet(s) shall be followed.

Coating work pieces shall be electrically grounded (earthed) as required to eliminate static charges associated with surface preparation and coating operations.

2.4 COMPANY ACCESS

The Principal's representative, including independent inspectors or consultants as may be engaged by the Principal, shall be permitted access to the coating application site at any time to conduct performance analyses, including quality control tests of the materials being used.

The Principal's representative has the right to reject any or all work or equipment that in his/her opinion does not conform to these requirements. Any work that in the opinion of the Principal's representative does not comply with these requirements shall be rectified at the Contractor's expense.

The Principal's representative has the right to request quality control tests at any time in addition to those completed at pre-determined intervals.

2.5 PRE-JOB MEETING

The Applicator shall schedule a pre-job meeting to ensure that job requirements are fully understood.

The personnel present at the meeting shall include, but not be limited to, the Principal's representative, and the Applicator's representatives for coating supervision, quality control and safety. If required a technical representative of the Manufacturer shall be present.

Roles and responsibilities shall be clarified at the pre-job meeting, such as when the Principal deals with the Applicator, who are the focal points and how administration procedures are executed. It shall be confirmed that all parties have the latest version of the Contract, technical specifications, AFC drawings and ITP.

PART II AMENDMENTS/SUPPLEMENTS TO ISO/DIS 21809-1:2009

3 TERMS AND DEFINITIONS

Definitions in (I-1.3) of this DEP shall also apply.

4 SYMBOLS AND ABBREVIATED TERMS

Abbreviations in (I-1.4) of this DEP shall also apply.

6 INFORMATION SUPPLIED BY THE PURCHASER

6.1 GENERAL INFORMATION

Add the following:

For a specific project, the Principal shall supply technical information to the Contractor regarding the project, in particular the installation and operating conditions. This information shall contain as a minimum:

- project name;
- the type (PE/PP) and thickness of coating required;
- maximum/minimum design and operating temperature of the pipeline;
- description of steel pipe;
- the applicable line pipe specification;
- the geographical area (land/subsea);
- expected field joint coating with application guidelines;
- cutback configuration and finish;
- expected ambient temperatures during installation;
- installation method;
- soil and backfill conditions for land pipelines;
- seabed trenching, laying and burial conditions for subsea pipelines;
- subsequent coatings to be applied (e.g. weight coating, insulation);
- requirements for anti-slip treatment;
- requirements for temporary protection of pipe ends;
- type of cathodic protection system.

The Principal shall indicate whether a specific brand of coating shall be used or whether the Contractor shall select the coating.

Add the following:

6.3 INFORMATION TO BE SUBMITTED BY THE CONTRACTOR

The Contractor shall submit information to the Principal on the coating system to be used. This information shall contain as a minimum:

- system identification;
- Manufacturer's data;
- system qualification information;
- coating application procedures;
- the name(s) of the proposed coating Applicator(s);
- Applicator's qualification information;
- Quality Plan consisting of Manufacturing Plan (MP) and Inspection and Test Plan (ITP).

The Contractor shall confirm that the coating system is suitable for use under the specified conditions.