

DEP SPECIFICATION

**CONCRETE COATING OF LINEPIPE
(AMENDMENTS/SUPPLEMENTS TO ISO 21809-5)**

DEP 31.40.30.30-Gen.

February 2012

ECCN EAR99

DESIGN AND ENGINEERING PRACTICE



© 2012 Shell Group of companies

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, published or transmitted, in any form or by any means, without the prior written permission of the copyright owner or Shell Global Solutions International BV.

This document contains information that is classified as EAR99 and, as a consequence, can neither be exported nor re-exported to any country which is under an embargo of the U.S. government pursuant to Part 746 of the Export Administration Regulations (15 C.F.R. Parts 746) nor can be made available to any national of such country. In addition, the information in this document cannot be exported nor re-exported to an end-user or for an end-use that is prohibited by Part 744 of the Export Administration Regulations (15 C.F.R. Parts 744).

PREFACE

DEP (Design and Engineering Practice) publications reflect the views, at the time of publication, of Shell Global Solutions International B.V. (Shell GSI) and, in some cases, of other Shell Companies.

These views are based on the experience acquired during involvement with the design, construction, operation and maintenance of processing units and facilities. Where deemed appropriate DEPs are based on, or reference international, regional, national and industry standards.

The objective is to set the standard for good design and engineering practice to be applied by Shell companies in oil and gas production, oil refining, gas handling, gasification, chemical processing, or any other such facility, and thereby to help achieve maximum technical and economic benefit from standardization.

The information set forth in these publications is provided to Shell companies for their consideration and decision to implement. This is of particular importance where DEPs may not cover every requirement or diversity of condition at each locality. The system of DEPs is expected to be sufficiently flexible to allow individual Operating Units to adapt the information set forth in DEPs to their own environment and requirements.

When Contractors or Manufacturer/Suppliers use DEPs, they shall be solely responsible for such use, including the quality of their work and the attainment of the required design and engineering standards. In particular, for those requirements not specifically covered, the Principal will typically expect them to follow those design and engineering practices that will achieve at least the same level of integrity as reflected in the DEPs. If in doubt, the Contractor or Manufacturer/Supplier shall, without detracting from his own responsibility, consult the Principal.

The right to obtain and to use DEPs is restricted, and is granted by Shell GSI (and in some cases by other Shell Companies) under a Service Agreement or a License Agreement. This right is granted primarily to Shell companies and other companies receiving technical advice and services from Shell GSI or another Shell Company. Consequently, three categories of users of DEPs can be distinguished:

- 1) Operating Units having a Service Agreement with Shell GSI or another Shell Company. The use of DEPs by these Operating Units is subject in all respects to the terms and conditions of the relevant Service Agreement.
- 2) Other parties who are authorised to use DEPs subject to appropriate contractual arrangements (whether as part of a Service Agreement or otherwise).
- 3) Contractors/subcontractors and Manufacturer/Suppliers under a contract with users referred to under 1) or 2) which requires that tenders for projects, materials supplied or - generally - work performed on behalf of the said users comply with the relevant standards.

Subject to any particular terms and conditions as may be set forth in specific agreements with users, Shell GSI disclaims any liability of whatsoever nature for any damage (including injury or death) suffered by any company or person whomsoever as a result of or in connection with the use, application or implementation of any DEP, combination of DEPs or any part thereof, even if it is wholly or partly caused by negligence on the part of Shell GSI or other Shell Company. The benefit of this disclaimer shall inure in all respects to Shell GSI and/or any Shell Company, or companies affiliated to these companies, that may issue DEPs or advise or require the use of DEPs.

Without prejudice to any specific terms in respect of confidentiality under relevant contractual arrangements, DEPs shall not, without the prior written consent of Shell GSI, be disclosed by users to any company or person whomsoever and the DEPs shall be used exclusively for the purpose for which they have been provided to the user. They shall be returned after use, including any copies which shall only be made by users with the express prior written consent of Shell GSI. The copyright of DEPs vests in Shell Group of companies. Users shall arrange for DEPs to be held in safe custody and Shell GSI may at any time require information satisfactory to them in order to ascertain how users implement this requirement.

All administrative queries should be directed to the DEP Administrator in Shell GSI.

TABLE OF CONTENTS

PART I	INTRODUCTION	5
1.1	SCOPE.....	5
1.2	DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS	5
1.3	DEFINITIONS	5
1.4	CROSS-REFERENCES	6
1.5	SUMMARY OF MAIN CHANGES	6
1.6	COMMENTS ON THIS DEP	6
1.7	DUAL UNITS.....	6
PART II	GENERAL REQUIREMENTS	7
1.1	GENERAL	7
1.2	DOCUMENT HIERARCHY	7
1.3	SAFETY	7
1.4	PRINCIPAL ACCESS	7
1.5	PRE-JOB MEETING	8
PART III	AMENDMENTS/SUPPLEMENTS TO ISO 21809-5: 2010	9
1.	Scope	9
3.	Terms and definitions.....	9
4.	Symbols and abbreviated terms	9
4.2	Abbreviated terms.....	9
6.	Information supplied by the purchaser	9
6.1	General information	9
7.	Materials.....	9
7.1	Pipe	9
7.2	Cement.....	9
7.4	Aggregate – Fine and coarse.....	10
7.6	Lightweight aggregate.....	10
7.7	Recycled concrete as aggregate	10
7.8	Water.....	10
7.9	Steel reinforcement.....	10
9.	Coating application.....	10
9.1	Qualification	10
9.2	Application of concrete coating	12
9.4	Pipe	12
9.5	Steel reinforcement.....	12
9.6	Concrete cutback	13
9.7	Anode installation.....	13
9.7	Anodes	13
10.	Curing methods	13
11.	Inspection and testing	13
11.1	General	13
11.2	Test procedures	15
11.3	Retesting	19
12.	Repair of concrete coated pipe	19
12.1	General	19
12.2	Damaged areas	19
12.3	Cracks	20
12.4	Gaps.....	20
13.	Markings	20
14.	Handling and storage	20
15.	Test reports and certificates of compliance	21

Annex C (normative) Data Sheet.....22

PART IV REFERENCES 23

PART I INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for materials, qualification, application, testing and handling of materials required for the application of reinforced concrete coating externally to pre-coated pipe for use in pipeline transportation systems for the petroleum and natural gas industries in marine environments, estuaries, rivers, wadis, swamps, etc. It is based on to ISO 21809-5:2010.

The external application of concrete is primarily used for the negative buoyancy of pipes used in buried or submerged pipeline systems and/or for the mechanical protection of the pipe and its pre-coating.

This DEP is applicable to concrete thicknesses of 25 mm (1 in) or greater.

Part III of this DEP gives amendments and supplements the clauses of ISO 21809-5:2010.

This DEP includes the installation of anodes (including pin brazing) into the qualification but excludes the design or purchase of anodes.

The scope of this DEP does not include:

- a) specific design requirements (these would be established in the pipeline design);
- b) the choice of anti-corrosion coating or its application;
- c) the design, purchase and installation of buckle/crack arrestors;
- d) the use of intermediate coatings (e.g. anti-slip coatings);
- e) slotting of the concrete to reduce bending stiffness.

This is a revision of the DEP of the same number dated December 1999; see (1.5) 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 Manufacturer/Suppliers nominated by them.

This DEP is intended for use in facilities related to oil and gas production, distribution and supply/marketing. Application in other facilities may also apply.

When DEPs are applied, a Management of Change (MOC) process shall 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 with regard to the safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

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 it. 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

To maintain proper context with ISO 21809-5 terminology, the phrases “Purchaser” and “applicator” have been maintained in this DEP where such context and alignment with ISO 21809-5 terminology is important. In such cases, the phrases “Principal” and “Contractor” as used in this DEP are generally equivalent to the phrases “Purchaser” and “Applicator” respectively.

1.4 CROSS-REFERENCES

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

1.5 SUMMARY OF MAIN CHANGES

This DEP is a revision of the DEP of the same number dated December 1999. It incorporates the content of and supersedes DEP 31.40.30.30-DWP, Concrete Coating of Line Pipe, and 26TS-006, Application and Field Removal of Concrete Weight Coating on Line Pipe.

1.6 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.

1.7 DUAL UNITS

This DEP contains both the International System (SI) units, as well as the corresponding US Customary (USC) units, which are given following the SI units in brackets. When agreed by the Principal, the indicated USC values/units may be used.

PART II GENERAL REQUIREMENTS

1.1 GENERAL

Part III of this DEP is written as amendments and supplements to ISO 21809-5:2010.

Whenever reference is made to ISO, it shall be understood to mean ISO 21809-5:2010 as amended/supplemented by this DEP.

For ease of reference, the clause numbering of ISO 21809-5:2010 has been used throughout (Part III).

Unless specified in this DEP, all occurrences of the word "should" in ISO shall be replaced with the word "shall".

Clauses in ISO 21809-5:2010, which are not mentioned in this DEP shall remain valid as written.

1.2 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)

1.3 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.

1.4 PRINCIPAL 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.

1.5 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.