

DEP SPECIFICATION

CRA-CLAD AND CRA-LINED STEEL PIPE (AMENDMENTS/SUPPLEMENTS TO API SPEC 5LD)

DEP 31.40.20.32-Gen.

September 2011

DESIGN AND ENGINEERING PRACTICE



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PART I INTRODUCTION

1.1 SCOPE

This DEP specifies the minimum requirements for the purchase of seamless and welded corrosion resistant alloy (CRA) clad or lined steel pipe for both sour and non-sour service.

This DEP is based on API Spec 5LD, third edition, September 1, 2009. Part II of this DEP is written in the form of amendments and supplements to API Spec 5LD.. All clauses of API 5LD not modified by this DEP remain valid as written.

Circumferential welds are not included in the scope of this DEP. Where circumferential welds (joints) are permitted in production of the linepipe, the requirements are specified in the Project pipeline installation specification; see (Part II), .

The material properties, testing and inspection requirements for the carbon steel backing material, together with the overall dimensional tolerances for the finished pipe, are specified in DEP 31.40.20.37-Gen.

The appendices of this DEP give specific requirements for the following:

- Linepipe to be subjected to high strain;
- Weldability testing;
- Line pipe for deepwater projects, including steel catenary riser;

This is a revision of the DEP of the same number dated October 1995; see (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. Any authorised access to DEPs does not for that reason constitute an authorization to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in facilities related to oil and/or gas transmission pipelines and related facilities. It is intended for use by Exploration and Production, Manufacturing, Chemicals or Supply/Distribution companies that require the use of linepipe. Application in other facilities may also apply.

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 could 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 regards 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

term	definition
Defect (in NDT)	A discontinuity or group of discontinuities whose indication(s) do(es) not meet specified acceptance criteria.
Flaw/Discontinuity (in NDT)	An interruption, which may be either intentional or unintentional, in the physical structure or configuration of a pipe.
Indication (in NDT)	Evidence of a discontinuity that requires interpretation to determine its significance.
Inspection release note	A document issued by the Principal to authorise shipment (applicable only if the Principal has been involved in monitoring production, inspection and/or documentation).
Minimum operating temperature	The minimum temperature to which the pipeline or section of pipeline may be exposed during normal operational activities, including start-up and shut-down operations and controlled blowdown, but excluding abnormal situations such as pipeline ruptures.
Pipe bevel	The total weld preparation machined on the end of a pipe.
Plate or coil	The pipe material for welded pipe before forming into the shape of a pipe.
Purchaser	Term used in API Spec 5LD which has the same meaning as Principal.
Radiological	Term used in API Spec 5LD which has the same meaning as radiographic. The term radiographic is used in this DEP.
Seal weld	Weld performed on the ends of lined pipe to seal the annulus between the CRA liner and carbon steel base pipe.
Weld overlay clad end	Weld overlay performed on the ends of lined pipe to seal the annulus between the CRA liner and the carbon steel base pipe.

1.4 ABBREVIATIONS

term	definition
CLA	- centre line average
CRA	- corrosion resistant alloy
DEP	- design and engineering practice
DN	- diameter nominal
DSAW	- double submerged arc welding
GMAW	- gas metal arc welding
HAZ	- heat affected zone
HFW	- high frequency welding
ID	- inside diameter
NDT	- non-destructive testing

OD	-	outside diameter
PREN	-	Pitting resistance equivalent number
UNS	-	universal numbering system
UT	-	ultrasonic testing
WPS	-	welding procedure specification

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 by this DEP are listed in (Part IV).

1.6 SUMMARY OF MAIN CHANGES

This DEP is a revision of the DEP of the same number dated October 1995. The following are the main, non-editorial changes.

Old section	New section	Change
Genral	General	Aligned with DEP 31.40.20.37, duplicate details removed from this DEP
2.2	5	Added: handling and welding guidance for Clad and lined pipe
2.1.c	5.2.2	Addition of HFW and DSAW base pipe for Lined pipe manufacture
2.4	5	Details removed, and replaced with reference to DEP 31.40.20.37
5.3	8.3.b	Acceptance criteria for bond strength in CRA Lined pipe added

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://sww.shell.com/standards> and on the main page of the DEPs DVD-ROM.

PART II GENERAL REQUIREMENTS

1.1 GENERAL

Part III of this DEP is written as amendments and supplements to API Specification 5LD Third Edition, September 1, 2009. Wherever reference is made to API SPEC 5LD, it shall be understood to mean API Specification 5LD Third Edition, September 1, 2009, as amended/supplemented by this DEP.

For ease of reference, the clause numbering of API SPEC 5LD has been used throughout Part III of this DEP.

Clauses in API SPEC 5LD, which are not mentioned in this DEP, shall remain valid as written.

Circumferential welds are not included in the scope of this DEP. Where circumferential welds (joints) are permitted in production of the linepipe, the requirements for the circumferential welds shall be included in the Project pipeline installation specification, which shall be included in the Purchase Order.

Unless otherwise stated in this DEP, the material properties, testing and inspection requirements for the carbon steel backing material, together with the overall dimensional tolerances for the finished pipe, shall be as specified in DEP 31.40.20.37-Gen., amending ISO 3183, 2nd edition, 2007 (PSL2).

All references to API 5L within API SPEC 5LD shall be taken as referring to DEP 31.40.20.37-Gen. and ISO 3183. Specific references to DEP 31.40.20.37-Gen. and ISO 3183 are made throughout this DEP.

NOTE: API 5L, 44th edition is identical in content and section numbering to ISO 3183 2nd edition, with the exception of minor deviations listed in Annex D of API 5L.

1.2 PRINCIPAL'S ACCESS AND ACTIVITIES

The Principal's representatives shall be permitted to witness all chemical testing, mechanical testing, and equipment calibration, and to inspect all pipe. Sufficient notice (at least 14 days) shall be given of the time at which the production run is to begin.

The Principal's representatives shall have free entry at all times to all parts of the Manufacturer's works that will concern the manufacture, testing, inspection, quality control and shipping of the pipe ordered. This includes the steel mill and the pipe mill. The Manufacturer shall make available to the Principal's representatives, without charge, all reasonable facilities to inspect, measure, and test the pipe in all stages of production. For example, this includes ultrasonic equipment for wall thickness confirmation.

The Principal's representative shall have the option to examine all materials rejected for any reason. The Principal's representative shall be informed of any pipe fractures occurring during hydrostatic testing and of any test specimen failures to meet the requirements for any reason. All failed materials shall be retained until examined by the Principal's representative.

The Manufacturer shall allow the Principal's representative to inspect each length of pipe after manufacture and testing are completed but prior to loading for shipment.

PART III AMENDMENTS/SUPPLEMENTS TO API SPEC 5LD

1. SCOPE

1.1 COVERAGE

Delete the third paragraph and replace with the following:

Grades of base metal covered by this specification are L360, L390, L415, L450 and L485 (X52, X56, X60, X65 and X70). Grades of the CRA layer covered are Grades S31603, N08825, N06625 and any other alloy specified by the Principal in the purchase order.

Add new section:

1.4 QUALITY SYSTEM

The Manufacturer shall establish and maintain a quality assurance system in accordance with ISO 9001, or an approved equivalent, and shall furnish to the Principal a quality plan specific to the items stated in the purchase order.

2 REFERENCED STANDARDS

2.3 NORMATIVE STANDARDS

Add the following:

See also Part III of this DEP.

3 DEFINITIONS AND ACRONYMS

Add the following:

See also Part 1 (1.3 and 1.4) of this DEP.

5. MANUFACTURING OF CLAD AND LINED STEEL PIPE

5.2 DESCRIPTION OF CLAD AND LINED STEEL PIPE

Delete:

API 5L PSL2 where it appears in Section (5.2)

Replace with

DEP 31.40.20.37-Gen. and ISO 3183, PSL2

NOTE: The requirements of ISO 3183 Annex H (sour service) do not apply

Add the following before 5.2.1:

During all stages of manufacture, contamination of the CRA layer with carbon steel shall be avoided. Direct contact of the CRA layer with carbon steel handling equipment (e.g. hooks) is prohibited. Separate hand tools for CRA and carbon steel shall be used, and precautions shall be taken to avoid contamination during all stages of manufacturing, including grit blasting and cutting.

For the overlay of the longitudinal seam in the case of welded, clad pipe and for the pipe end overlay or seal welding in the case of lined pipe the following shall apply:

309MoL, consumables shall be used in the welding of 316L clad/lined pipe. The Mo content of the 309 MoL weldmetal shall be equal to or exceed that of the cladding/lining.