

DEP SPECIFICATION

TLP TENDON AND FLOATING STRUCTURE TOP-TENSIONED RISER SEAM-WELDED TUBULAR REQUIREMENTS

DEP 39.01.20.35-Gen.

February 2015

ECCN EAR99

DESIGN AND ENGINEERING PRACTICE



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1. INTRODUCTION

1.1 SCOPE

This new DEP specifies requirements and gives recommendations for the manufacture, testing and inspection of Level 1 carbon steel and low-alloy steel double submerged arc welded (DSAW) seam-welded tubulars meeting the following criteria, for use as tension leg platform (TLP) tendons and floating structure top-tensioned risers.

Specified minimum yield strength (SMYS)	345 MPa – 552 MPa (50 ksi - 80 ksi)
Wall thickness	22.23 mm – 50 mm (0.875 in - 2 in)

It is intended that individual tubulars meeting the requirements of this DEP are suitable for fabrication into longer lengths by girth welding.

This DEP is a revision of, and supersedes, Shell Oil Company Supplement 3, dated December 1990, which has been used for manufacture, testing and inspection of all previous Shell TLP tendons and Shell-designed TLP drilling risers.

The custodianship of this DEP in Shell is under the Civil, Structures and Offshore (CSO) Engineering Discipline.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorized 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 authorized 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 offshore oil and gas production. It is specifically intended for TLP tendons and floating structure top-tensioned risers; however, its application to other types of equipment and structures, SMYSs or wall thicknesses outside of the ranges specified herein is not precluded. In such cases specific project requirements will usually be needed to augment or modify requirements specified herein. Application to other types of equipment and structures shall be as required by Principal.

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 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 authorized 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
BOP	bead-on-plate test
CTOD	crack tip opening displacement
DEP	Design and Engineering Practice
DSAW	double submerged arc welded
HAZ	heat affected zone
ID	inside diameter
ITP	Inspection and Test Plan – Plan that includes inspection and test requirements and provides forms with columns or spaces for the Principal and Contractor, if applicable, to indicate third-party inspector inspection activities, e.g., monitor, witness, hold points, etc. for the operations to be undertaken
QP	Quality Plan. Reference ISO 9000 Paragraphs 2.7.2.b and 3.7.5. Quality Plan – Plan that includes inspection and test requirements and provides forms with columns or spaces for the Principal and Contractor, if applicable, to indicate 3rd-party inspector inspection activities, e.g., monitor, witness, hold points, etc. for the operations to be undertaken. It is required that the QP be approved by the Principal. A QP is also known as an Inspection and Test Plan (ITP).
LAST	Lowest anticipated service temperature
MPS	Manufacturing procedure specification. Reference ISO 9000 Paragraphs 2.7.2.c, 2.7.2.e, 3.4.5 and 3.7.3. The MPS clearly defines the sequence of operations and process controls to be implemented at each manufacturing step as well as specifically annotate any procedures, processing parameters, or requirements that deviate from this DEP. It is required that the MPS be approved by the Principal.
MOC	Management of Change
MT	magnetic particle testing
NDT	nondestructive testing
OD	outside diameter
PT	liquid penetrant testing
RT	radiographic inspection
SAW	submerged arc welding
SI	International System units
SMYS	specified minimum yield strength
TLP	tension leg platform
TTR	top-tensioned riser

Term	Definition
TPI	Third-party inspector appointed by the Principal to represent the Principal in matters pertaining to quality, inspection and testing at the manufacturing facility (mill)
USC	US Customary units
UT	ultrasonic inspection
VT	visual inspection
WPQT	weld procedure qualification tests

1.4 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section or clause number is shown in brackets (). Other documents referenced by this DEP are listed in (13).

1.5 SUMMARY OF MAIN CHANGES

This is a new DEP.

1.6 COMMENTS ON THIS DEP

Comments on this DEP may be submitted to the Administrator using one of the following options:

Shell DEPs Online (Users with access to Shell DEPs Online)	Enter the Shell DEPs Online system at https://www.shelldeps.com Select a DEP and then go to the details screen for that DEP. Click on the "Give feedback" link, fill in the online form and submit.
DEP Feedback System (Users with access to Shell Wide Web)	Enter comments directly in the DEP Feedback System which is accessible from the Technical Standards Portal http://www.shell.com/standards . Select "Submit DEP Feedback", fill in the online form and submit.
DEP Standard Form (Other users)	Use DEP Standard Form 00.00.05.80-Gen. to record feedback and email the form to the Administrator at standards@shell.com .

Feedback that has been registered in the DEP Feedback System by using one of the above options will be reviewed by the DEP Custodian for potential improvements to the DEP.

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.

1.8 NON NORMATIVE TEXT (COMMENTARY)

Text shown in italic style in this DEP indicates text that is non-normative and is provided as explanation or background information only.

Non-normative text is normally indented slightly to the right of the relevant DEP clause.

2. GENERAL

2.1 QUALITY CONTROL/QUALITY PLAN (ITP)

1. This DEP supplements project specifications which govern overall fabrication of TLP tendons and floating structure top-tensioned risers. Unless specifically deleted/waived by this DEP, all provisions of the applicable project specifications shall apply, including the requirement for development and implementation of a written Quality Management System and ITP.
2. The ITP shall define the following:
 - a. all inspections and the sequence in which the inspections are to be performed during manufacture, testing and inspection of TLP tendon and floating-structure-top-tensioned riser DSAW seam-welded tubulars
 - b. levels of involvement for the Manufacturer/Supplier's quality control/inspection personnel, Principal-appointed third party inspectors (TPIs), and the Principal.
3. Principal approval shall be obtained of the ITP and any associated revisions prior to commencement of welding and inspection.
4. The Quality Management System shall be in compliance with ISO 9001.

2.2 LOWEST ANTICIPATED SERVICE TEMPERATURE

1. Unless otherwise specified by the Principal, lowest anticipated service temperature (LAST) shall be 0 °C (32 °F) for tubulars which are continuously exposed during their service life to splashzone or marine atmospheric service and 4.4 °C (40 °F) for tubulars which are continuously exposed during their service life to subsea-only service.

2.3 ATTRIBUTES TO BE SPECIFIED BY PRINCIPAL

1. The following shall be specified by the Principal:
 - a. the SMYS,
 - b. outside diameter,
 - c. wall thickness and length nominal values and tolerances,
 - d. any special dimensional or other requirements,
 - e. any specific or proprietary chemical compositions, and
 - f. any other special requirements not specifically covered in this DEP.
2. Inside diameter will not be specified independently; however, for the purposes of this DEP, it shall be defined as the specified outside diameter minus two times the specified wall thickness.

2.4 CONTRACTOR PROCUREMENT SPECIFICATION AND APPROVAL OF THE TUBULAR MANUFACTURER/SUPPLIER AND MANUFACTURING FACILITIES AND SUBCONTRACTED CHEMICAL ANALYSIS OR MECHANICAL TESTING LABORATORIES

1. This DEP may be used directly for procurement or, at the Contractor's option; the Contractor may prepare a detailed Procurement Specification which is compatible with the Contractor's document format and quality system.
2. As a minimum, the Contractor's Procurement Specification shall incorporate all requirements contained herein and shall require approval by the Principal. The tubular Manufacturer/Supplier and manufacturing facilities, as identified in the manufacturing procedure specification (MPS), shall require approval by the Principal.

3. Any subcontracted chemical analysis or mechanical testing laboratories shall be approved by the Principal. Chemical analysis and mechanical testing laboratories shall hold a current accreditation by an independent third-party organization to ISO 17025.

2.5 UNDERLYING PLATE SPECIFICATION

1. Plates from which tubulars are subsequently formed shall be manufactured and qualified in accordance with DEP 37.81.20.33-Gen. including Appendix 1, as a minimum. Modifications to the above specification and specific deletions or identifications of non-applicable parts are given herein.
2. Some statements and/or required values in DEP 37.81.20.33-Gen. may be repeated for clarity or special emphasis; however, unless specifically deleted/waived by this DEP, all applicable provisions of DEP 37.81.20.33-Gen. shall apply.
3. Ultrasonic examination of each plate in accordance with DEP 37.81.20.33-Gen. section 7, shall be required.

2.6 UNDERLYING TUBULAR SPECIFICATION

1. Tubulars shall be manufactured and tested in accordance with API SPEC 2B, as a minimum. Amendments to API SPEC 2B are given herein.
2. Unless specifically deleted/waived by this DEP, all applicable provisions of API SPEC 2B shall apply.

Some statements and/or required values in API SPEC 2B may be repeated for clarity or special emphasis.

Conformance to this DEP also results in conformance to API SPEC 5L.

2.7 LONGITUDINAL SEAM WELDING REQUIREMENTS

1. Longitudinal seam welding (both primary and repair) shall be qualified and conducted in accordance with DEP 37.81.10.33-Gen. as amended below.
2. Longitudinal seam welding shall be qualified and conducted using the requirements for Critical steels with CTOD testing, as a minimum.
3. Unless specifically deleted/waived by this DEP, all applicable provisions of DEP 37.81.10.33-Gen. shall apply to seam welding.

Some statements and/or required values in DEP 37.81.10.33-Gen. may be repeated for clarity or special emphasis.

4. The entirety of DEP 37.81.10.33-Gen., Section 6, is not applicable and shall be replaced by (7).
5. Longitudinal seam welding procedure qualification shall include all-weld-metal tensile tests using standard 12.5 mm (0.5 in) diameter round specimens and weld-metal Charpy V-notch tests if not already required by DEP 37.81.10.33-Gen.
6. Test specimens for tensile and V-notch tests shall be taken such that their gauge lengths and notches are located as follows:
 - a. At the approximate seam weld centreline,
 - b. As near as possible to the tubular OD,
 - c. As near as possible to the tubular ID,
 - d. In the OD weld/ID weld overlap region.