

DEP SPECIFICATION

STRUCTURAL DESIGN OF TENDON SYSTEMS FOR DEEPWATER OFFSHORE TENSION LEG PLATFORMS (AMENDMENTS/SUPPLEMENTS TO API RP 2T)

DEP 37.81.10.21-Gen.

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DESIGN AND ENGINEERING PRACTICE



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TABLE OF CONTENTS

PART I	INTRODUCTION	4
1.1	SCOPE.....	4
1.2	DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS	4
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	7
PART III	AMENDMENTS/SUPPLEMENTS TO SECTION 9 of API RP 2T	8
9.	TENDON SYSTEM DESIGN	8
9.1	GENERAL	8
9.2	GENERAL DESIGN	8
9.3	MATERIAL CONSIDERATIONS	9
9.4	DESIGN LOADS	11
9.5	LOAD ANALYSIS METHODS.....	11
9.6	STRUCTURAL DESIGN AND FABRICATION	11
9.7	TRANSPORTATION, HANDLING AND INSTALLATION PROCEDURES	15
9.8	OPERATIONAL PROCEDURES	15
9.9	CORROSION PROTECTION	15
PART IV	REFERENCES	16

APPENDICES

APPENDIX A:	TENDON FATIGUE DESIGN AND ANALYSIS	18
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PART I INTRODUCTION

1.1 SCOPE

This new DEP specifies requirements and gives recommendations for the design and analysis of structural steel tendon systems for deepwater Tension Leg Platforms (TLPs). It is intended primarily for use by design engineers developing the “approved for construction” drawings for the tendons. Design and analysis may include all structural components including tendon Main Body Sections (MBSSs), Tendon Top Termination Assemblies (TTTAs) and Tendon Bottom Termination Assemblies (TBTAs). The overall Global Performance of the TLP system is not included in the scope of this DEP.

This DEP is based on section 9 of API RP 2T, 3rd Edition and AWS D1.1. Part III of this DEP contains text that clarifies, amends and supplements the content in the API standard. In a number of cases, additional requirements and recommendations are provided pertaining to the various sections/clauses of API RP 2T. For ease of reference, the clause numbering of API RP 2T has been used throughout Part III of this DEP.

Specific project requirements concerning the mooring system to be designed, general project background information and any project specific changes to the standard design specifications should be specified in a separate project specific variation DEP. Where a conflict exists between the Project specific documents and this DEP, the project specifications shall govern.

This DEP should be used jointly with the Principal's tendon fabrication and welding, materials, loadout and transport DEPs referenced in this DEP.

This DEP supersedes the former Deepwater standard of the same number (DEP 37.81.10.31-EPP).

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 authorisation 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 exploration and production facilities. 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 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.

The word **may** indicates an acceptable course of action.

“Will” is normally used in connection with an action by Principal rather than by a Contractor.

1.3.2 Specific definitions

Term	Definition
Drawings	The detailed engineering drawings or drafting models prepared for this project along with any databases, spreadsheets or data files, including any revisions.
Hull	The partially submerged portion of the TLP whose displacement provides vertical support for the structure.
Specific Project Requirements	Those requirements which are specific to this project and which are detailed in the Project variation DEP.
Tendons	The vertical members used to connect the TLP to the seafloor and restrict motion. These members are initially tensioned and provide a lateral restraining force when the TLP displaces.
UOE pipe manufacturing	Pipe manufacturing process in which plate is pressed into a U and then an O shape and then is expanded circumferentially. The finished pipe shape is determined during the manufacturing process and can be optimized by balancing the manufacturing parameters, pipe compression and expansion. Through the optimization of crimping, U-press, and O-press operations, it is possible to control pipe diameter and wall thickness (ovality) to the point where the specifications are met. Enhanced tolerances that have been achieved for pipe roundness, wall thickness and diameter, have reduced design and production related uncertainty and resulted in optimized wall thickness.

1.3.3 Abbreviations

Term	Definition
ASME	American Society of Mechanical Engineering
AWS	American Welding Society
BS	British Standards
CP	Cathodic Protection
DEP	Design and Engineering Practice
DSAW	Dual Submerged Arc Welding
FEA	Finite Element Analysis
GSI	Global Solutions International
ID	Inside Diameter
MBS	Main Body Section
MOC	Management of Change
OD	Outside Diameter
rms	root mean square
SAF	Stress Amplification Factor
SPR	Specific Project Requirements
SWW	Shell Wide Web
Sy	Sy = specified minimum yield strength (SMYS)
TFL	Target Fatigue Life
TLP	Tension Leg Platform
UOE	
VIV	Vortex Induced Vibrations

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 REFERENCES).

1.5 SUMMARY OF MAIN CHANGES

This DEP supersedes the former Deepwater standard (DEP 37.81.10.31-EPP).

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://swwww.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

The following standard shall be applied, as amended by this DEP:

- API Recommended Practice 2T, (3RD Edition, 2010)

Part III of this DEP specifies requirements in addition to or superseding those detailed in section 9 of API RP 2T, and is written as clarifications, amendments and supplements to API RP 2T.

Not every section of API RP 2T is commented upon. As such, this shall imply that no additional requirement or clarification is necessary to the overarching API specification.

The Lead Technical Engineer shall resolve conflicts that occur between different codes and standards.