

DEP SPECIFICATION

OFFSHORE CONSTRUCTION SPECIFICATION FOR DEEPWATER PIPELINES, FLOWLINES AND RISERS

DEP 37.81.41.33-Gen.

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DESIGN AND ENGINEERING PRACTICE



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1. INTRODUCTION

1.1 SCOPE

This new DEP specifies offshore construction of deepwater pipelines, flowlines and risers, and related hardware and appurtenances, including but not limited to pipeline end manifolds PLETs (pipeline end termination) (sleds), in-line sleds, jumpers, and spool pieces. "Deep Water" is generally defined as water depth in which diver access is not possible or impractical. For general purposes this depth is approximately 300 m (985 ft).

This DEP is intended to cover the complete installation of facilities described in the Scope of Work. However, the omission of any essential provisions from this document cannot be construed to relieve the Contractor of any duty or obligation necessary for the complete installation and testing of the facilities ready for use and operation.

This DEP may be applied to shallow water construction of pipelines, flowlines and risers, if so specified by the Principal. All requirements of this DEP apply, unless a deviation for shallow water construction is specifically identified by the Principal. Where appropriate, the adjective "deepwater" can then be removed from the specific language in the specifications.

This DEP covers the following main topics:

- Offshore Project Management,
- Requirements for installation engineering and installation procedures, and
- Offshore installation activities.

This DEP supersedes the deepwater projects DEP 37.81.41.33-EPP dated February 2010; 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 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 gas production on deepwater pipeline, flowline, and riser projects. 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.

The word **may** is an option to be confirmed with the Principal.

The word **Work** is used to define the work to be executed by the Contractor as defined in the Invitation to Tender or Contract Scope of Work.

1.3.2 Abbreviations

AFC	Approved for Construction
ASOG	Activity Specific Operation Guidelines
A&R	Abandonment and Recovery
DP	Dynamic Positioning
ECA	Engineering Critical Assessment
FAT	Factory Acceptance Testing
FEA	Finite Element Analysis
FMEA	Failure Mode and Effects Analysis
HSSE	Health, Safety, Security and Environmental
MOC	Management of Change
NDE	Non Destructive Examination
PLET	Pipeline End Termination
RAO	Response Amplitude Operator
ROV	Remotely Operated Vehicle
ROW	Right of Way
SCR	Steel Catenary Riser
UPS	Uninterrupted Power Supply
VIV	Vortex Induced Vibration

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 (11).

1.5 SUMMARY OF MAIN CHANGES

This DEP supersedes the deepwater projects DEP 37.81.41.33-EPP dated February 2010. The following are the main, non-editorial changes.

Old section	New section	Change
4.10	4.10	Updated to reflect changes in API RP 1111 4 th Edition as compared to API RP 1111 3 rd Edition
4.25	4.25	Deleted HSSE Requirements because they are covered in the HSSE Section of the Contract
9	9	Removed language related to DP requirements that are already covered in DEP 37.90.10.32-Gen.

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.

2. GENERAL

2.1 REVIEW OF PROJECT PLANS, PROCEDURES AND CALCULATIONS

2.1.1 General

The Contractor shall present written specific detailed project plans and procedures, including calculations, of the proposed installation to the Principal for review and approval, before any construction commences.

The Contractor shall, at a minimum, submit the documents listed in (2.1.2) through (2.1.5) to the Principal.

2.1.2 Project Management Reports

As per the Administrative Section of the Contract.

2.1.3 Health, Safety, Security and Environmental (HSSE) Reporting

HSSE requirements are specified in separate HSSE Section of the Contract.

2.1.4 Installation Engineering

Installation Analyses and Design Analyses for any hardware that is part of the Work (e.g. PLETs, manifolds, abandonment and recovery [A&R] heads, lifting analyses).

2.1.5 Installation Procedures and Manuals

- Vessel Equipment qualification testing;
- Installation Procedures;
- Weld Procedure Qualifications and Welder Qualification records as per DEP 37.81.40.31-Gen.;

NOTE: The Principal may specify use of DEP 61.40.20.30-Gen. instead of DEP 37.81.40.31-Gen. In that case, this will be defined in the list of Project Specifications.

- Load Out Plan for pipe and other hardware;
- Mooring procedures, if anchored vessels are used;
- Pipe Abandonment and Recovery Procedures;
- Subsea equipment, e.g. PLET, /Sled/Manifold/Sled/Jumper installation procedures;
- Wet/Dry Buckle Recovery Procedure;
- Dynamic Positioning (DP) Procedures as per DEP 37.90.10.32-Gen.

These procedures shall cover the full range of water depths for the proposed work. Specific requirements are further detailed in (4) of this DEP.

2.2 PROGRESS MEETINGS AND REPORTS

As per the Administrative Section of the Contract.

2.3 ACCESS AND AUTHORITY

The Principal, including independent inspectors or consultants, as may be contracted by the Principal, shall be permitted access to the fabrication sites, offshore construction vessels and onshore support/load-out sites at any time for the purpose of conducting performance analyses, including quality control tests of the materials being used. The Principal has the right to access the bridge on Contractor vessels.

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

2.4 OFFICE, FACILITIES AND ACCOMMODATIONS

The Contractor shall make available at no additional cost to the Principal on each of their construction vessels or other offshore work sites under their control, and including on subcontracted offshore vessels, a Principal's Representative office with phone for the Principal's own business use, dedicated high-speed internet connection, and fax and copy facilities readily available. The office(s) shall each have adequate space, desks and file cabinets for at least twelve (12) Principal representatives/inspectors on the primary construction vessel and four (4) on other vessels. The Contractor shall provide assistance to the Principal in setting up satellite communications and make Internet service available for business communications.

The Contractor shall at no additional cost to the Principal make available suitable accommodations and provide meals for the above-mentioned Principal's representatives. Unless specifically agreed to otherwise by the Principal, these accommodations shall as a minimum be six (6) two-man cabins on the primary construction vessels and two (2) two-man cabins on other support vessels.

In addition, should the Principal require the presence of a warranty surveyor on board, the Contractor shall make available suitable accommodations including office space for the warranty surveyor, in the client quarters.

The Contractor shall provide video monitors in the Principal's Representative office of pipe monitoring equipment, remotely operated vehicle (ROV) camera, and welding station (for J-lay welding).

2.5 CHANGE CONTROL

The Contractor and the sub-contractors shall have an effective change control procedure in place, including a change control register. The Contractor shall provide the Principal with a copy of the Change Control Procedures at the time of the bid, including a sample of a recent change control register.

2.6 MARINE VESSEL AUDITS AND COMPLIANCE

All Vessels and Vessel Operators shall be approved by the Principal prior to use.

Prior to deployment for execution of the Work, all vessels utilized in the execution shall be inspected using the Oil Companies International Maritime Forum – Offshore Vessel Inspection Database (OCIMF-OVID) programme or equivalent.

3 ONSHORE FABRICATION AND HANDLING OF MATERIALS AND LOAD-OUT

3.1 ONSHORE FABRICATION OF PIPE AND RELATED APPURTENANCES

All pipe and related appurtenance fabrication, including pipe handling, sorting, welding and assembly shall be in accordance with DEP 37.81.41.30-Gen.

3.2 LOAD-OUT AND OFFSHORE SUPPLY

If the Principal supplies coated pipe to the Contractor, the Contractor shall witness load-out tally done by Coating Contractor and sign for receipt of all pipe at that time. The Contractor shall inspect all pipe and coating for any damages at the time of load-out and any damage observed shall be noted on the load-out tally. At the Contractor's option, pipe may be re-measured by the Contractor to verify footage, however a Principal's Representative shall witness all measurements.

The Contractor shall prepare for the Principal's review and approval a pipe preservation plan for pipe in the custody of the Contractor, both before fabrication into multi-joints or reeled pipe stalks, and thereafter. This is especially important if the pipe is stored for an extensive time prior to load-out.

During laying of the pipe, pipe mill fabrication footage stencilled on the pipe will be used to determine the length of installed pipe when these stencilled numbers are available. Should these numbers not be available, the Contractor shall measure each joint with a steel tape and record the tally to the nearest 3 mm (1/8 in).

The Contractor shall provide load-out procedures, including detailed stacking plans for offshore supply barges and other transport vessels. All valves, fittings, and other materials except pipe shall be transported offshore on supply boats or other suitable vessels. Only pipe shall be transported on pipe haul barges, unless specifically approved by the Principal. The Contractor shall assign an experienced load-out supervisor in charge of load-out and communications with the Coating Contractor and Principal.

The Contractor is responsible for providing a Marine Warranty surveyor to certify the load-out of each supply vessel.

The Contractor shall provide an up-to-date load-out schedule to the Principal. Should the Principal supply coated pipe or other materials to the Contractor, the Contractor shall provide at least 72 hours notice to the Principal and the Principal's Coating Contractor or other material Supplier of arrival time and load-out schedule.

To the extent practical, supply barge mooring alongside the pipelay vessel shall be avoided when the pipelay vessel is positioned over existing subsea equipment. Mooring of supply barges is subject to development and review of written procedures. Specifically the risk of dropped mooring lines that can be pulled into vessel thrusters shall be assessed and proper controls to minimize such risk shall be put in place.

3.3 RETURN OF MATERIALS

At the completion of the job, the Contractor shall load all surplus pipe, material, and fittings that are the Principal's property and transport the surplus material to a location designated by the Principal. The Contractor shall unload all surplus material at the designated location. All returned materials and equipment shall be cleaned. All returned pipe shall have the ends squared or bevelled with all burrs removed, and in approximately 12 m (39.4 ft) lengths, unless otherwise agreed to by the Principal.

4 PIPELINE CONSTRUCTION

4.1 ATMOSPHERIC WELDING AND NDE

All atmospheric welding and non destructive examination (NDE) of pipelines, flowlines, risers including temporary welds and associated appurtenances (including but not limited to spooling lead/tail strings, PLETs, valve assemblies, etc.) shall be in compliance with DEP 37.81.40.31-Gen.

NOTE: The Principal may specify the use of DEP 61.40.20.30-Gen. instead of DEP 37.81.40.31-Gen. in the list of Project Specifications.

4.2 FIELD JOINT COATING

All field joint coating shall be in accordance with the Principal's project specifications for field joint coatings. The Contractor shall demonstrate the compatibility of the proposed field joint coating system with the parent coating for the proposed installation method. All qualification testing to confirm the compatibility of the Contractor's proposed field joint coating system shall be undertaken at no additional cost to the Principal and be in accordance with the Principal's specifications for qualification of insulation coatings.

4.3 CATHODIC PROTECTION SYSTEMS

Sacrificial anodes shall be installed and commissioned in accordance with DEP 30.10.73.32-Gen. and DEP 37.81.20.31-Gen.

4.4 MARINE PAINTING

Any appurtenances provided by the Contractor that are part of the Work shall be painted in accordance with the Principal's project specification for painting of offshore pipeline components.

4.5 ALLOWABLE STRESSES AND STRAINS DURING CONSTRUCTION

Pipe shall be handled during coating, storage, shipping (including loading and off-loading), upending, and welding so that the bending strain during any of these operations does not exceed 0.0010. This requirement applies to single pipe joints, multi-joints and pipe stalks fabricated for reeling.

The pipeline tension shall be maintained so that when installing, abandoning, or recovering pipe, the maximum static bending strain in the sag bend of the suspended pipe span does not exceed 0.0015 at all times. Total combined dynamic and static bending strain shall not exceed 0.0017 for the maximum anticipated weather conditions. The Principal will consider deviations from the sag bend bending strain limitations for singular instances where such deviation may facilitate installation. One such instance may be lowering of a steel centenary riser (SCR) just prior to transfer to the receiving host facility. A change request needs to contain adequate analysis to show why the change is of benefit and that there is no adverse impact on the pipe or appurtenances. The curvature of the pipelay stinger shall be designed and vessel position shall be optimized to minimize bending strains and fatigue damage to the pipe end during pipelay, abandonment, or recovery operations. Static bending strains of pipe on the stinger and ramp shall not exceed 0.0020 except that bending strains forward of the NDE station shall remain below 0.00075. Total combined static and dynamic bending strain for pipe on the stinger shall not exceed 0.0025 for the maximum anticipated weather conditions.

The Contractor shall be capable of dealing safely with accidentally flooded pipe. As a minimum, the Contractor shall be capable of safely abandoning accidentally flooded pipe, without overloading any of the pipelay equipment.