

DEP SPECIFICATION

GEOTECHNICAL DESIGN OF FOUNDATIONS FOR DEEPWATER SUBSEA SYSTEMS

DEP 37.81.10.16-Gen.

February 2016

ECCN EAR99

DESIGN AND ENGINEERING PRACTICE



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PREFACE

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When Contractors or Manufacturers/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.

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

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1. INTRODUCTION

1.1 SCOPE

This new DEP specifies requirements and gives recommendations for geotechnical analysis and design of shallow foundations for subsea applications.

This DEP is intended to address installation and stability of a variety of subsea structures, either supported directly on the seafloor or embedded into the foundation soil, that resist vertical (gravity) loads, sliding, torsional and overturning resistances. Relevant subsea structure types include manifolds, flowline termination sleds and umbilical units.

This DEP is applicable for static and quasi-static analysis of shallow foundations. Shallow foundations are defined as foundations that have a depth of embedment less than their minimum lateral dimension ($L/D < 1$).

For structural design, see DEP 37.81.10.31-Gen.

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 oil and gas production. This DEP may also be applied in other similar facilities.

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 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
Accept, Accepted, or Acceptance	Principal's written agreement that the submitted item has been performed in accordance with the requirements.
Action	External load applied to the structure (direct action), or an imposed deformation or acceleration (indirect action).
Action Factor	Partial safety factor applied to the action, or load.
Administrator	Person responsible for administration of the DEP system.
Auditable	Observable, measurable, is neither vague nor ambiguous, and has finite acceptance/rejection criteria.
Contract Drawings	Detailed engineering drawings prepared for this project and all official revisions to those drawings. The "General Data Sheet" contains a list of Contract Drawings.
Design Situation	Set of physical conditions representing real conditions during a certain time interval for which the design will demonstrate that relevant limit states are not exceeded.
Displacement	Change in the form or dimensions of a body (soil mass) produced by stress.
External Standard	Standard issues under the auspices of a non-Group entity, e.g., ISO, EN, ANSI, BS, API.
Group	Companies forming the Royal Dutch/Shell Group.
Group Standard	Industry recognised standard used by the Group.
Limit State	State beyond which the structure no longer fulfils the relevant design criteria.
Material Factor	Partial safety factor applied to the strength of the soil.
OU Variation	Supplement to a Group Standard, generated by the Operating Unit (OU) to reflect the regional/local requirements of that OU.
Representative Value	Value assigned to a basic variable for verification of a limit state.
Review	Principal's right, but not obligation, to comment on the submitted item. Contractor may begin construction of the item following submittal.
Settlement	Downward movement of a structure as a result of its own weight and other loads.
Standard	A document, established by consensus and approved by a recognised body that provides, for common and repeated use, rules, guidelines or characteristics for activities and their results, aimed at the achievement of the optimum degree of order in a given context.
Standard Drawing	A standard, primarily pictorial, representing an item or configuration and is considered to have wide applicability in Shell.
Subcontractor	Any person or company having a subcontract with any Contractor to perform work covered under this DEP.

1.3.3 Abbreviations

Term	Definition
AISC	American Institute of Steel Construction
ALS	Accidental Limit State
ALE	Accidental Level Earthquake
CPT	Cone Penetration Tests
EPP	SIEP – Exploration and Production – Projects
FEED	Front End Engineering Design
FLS	Fatigue Limit State
OU	An Operating Unit of the Royal Dutch/Shell Group
SI	International System of Units
SLS	Serviceability Limit State
ULS	Ultimate Limit State
USC (Units)	United States Customary (Units)

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 (7) and (8).

1.5 SUMMARY OF MAIN CHANGES

This is a new DEP. It is based on the EPP of the same number dated March 2008. It has been updated to reflect ISO 19901-4:2016 and of API RP 2GEO:2015.

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://sww.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.