



Exploration & Production

GENERAL SPECIFICATION

SURVEYS

GS EP GEO 702

Requirements for design and installation of skirted foundations and suction anchors

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1. Scope

1.1 Objective

This document gives the minimum requirements applicable for the design and installation of skirted foundations and suction anchors, with the objective to obtain satisfactory and consistent quality in the studies and works to be provided by the Contractor in charge of design or installation of such structures.

It covers the following foundations and anchors:

- Relatively large skirted foundations, made of steel or concrete, for fixed jacket structures or gravity-based structures
- Skirted foundations of limited size for subsea production structures and manifolds
- Suction anchors used in temporary moorings for exploration drilling rigs (MODUs)
- Suction anchors used in permanent moorings for production structures (e.g. FPSO/FSO, TLP, semi-submersible FPU, or other DDCUs such as the SPAR).

This General Specification applies to:

- Acquisition and interpretation of specific site and soil data
- Geotechnical and structural design considerations
- Requirements for monitoring of the installation behaviour.

Deviations from any of the requirements defined herein shall be treated as non-conformances in accordance with Company procedures.

1.2 Abbreviations

The following abbreviations are used:

- **API** American Petroleum Institute
- **CPTU** Cone Penetration Test with pore pressure measurement
- **DDCU** Deep Draught Caisson Unit
- **FPSO/FSO** Floating Production Storage and Off-loading vessel
- **FPU** Floating Production Unit
- **ISO** International Standard Organisation
- **MODU** MOBILE Drilling Unit
- **MSCL** Multi Sensor Core Logging
- **OLT** Off-Loading Terminal (buoy)
- **ROV** Remotely Operated Vehicle
- **SPS** Subsea Production System
- **TLM** Taut Leg Mooring
- **TLP** Tension Leg Platform

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

This specification is complementary to the following documents:

- **GS EP STR 100** and **GS EP STR 101** for design of offshore jackets and subsea structures
- **GS EP SPS 001**, **GS EP SPS 002** and **GS EP GEO 701** for subsea production systems
- **GS EP GEO 101** and **GS EP GEO 201** for site investigation equipment and procedures.

Therefore, this specification shall be read in conjunction with above documents and the other Company specifications and standards identified herein.

Standards

Reference	Title
ISO 19900	Petroleum and Natural Gas Industries - Offshore Structures - Part 1: General Requirements
ISO 19901 (Parts 4; 7)	Petroleum and natural gas industries - Specific requirements for offshore structures - (Parts 4; 7)
ISO 19902	Petroleum and Natural Gas Industries - Fixed Steel Offshore Structures
ISO 19904-1	Petroleum and Natural Gas Industries - Floating Offshore Structures - Part 1: Monohulls, Semi-submersibles and Spars

Professional Documents

Reference	Title
AISC ASD	Manual of Steel Construction - Allowable Stress Design
API Bull 2U	Bulletin on Stability Design of Cylindrical Shells
API RP 2A LRFD	Recommended Practice for Planning, Designing and Constructing Fixed Structures - Load and Resistance Factor Design
API RP 2A WSD	Recommended Practice for Planning, Designing, and Constructing Fixed Structures - Working Stress Design / Load and Resistance Factor Design
API RP 2GEO	Geotechnical and Foundation Design Considerations
API RP 2SK	Recommended Practice for Design and Analysis of Stationkeeping Systems for Floating Structures



Reference	Title
API RP 2T	Recommended Practice for Planning, Designing and Constructing Tension Leg Platforms
DNV-RP-E303	Recommended Practice for Design and Installation of Suction Anchors

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Andersen and Jostad (2002)	"Shear Strength Along Outside Wall of Suction Anchors in Clay after Installation", ISOPE 2002
Andersen and Jostad (2004)	"Shear Strength Along Inside of Suction Anchor Skirt Wall in Clay", OTC paper 16844, 2004
Colliat and Colliard (2010)	"Set-Up of Suction Piles in Deepwater Gulf of Guinea Clays", ISFOG 2010
Colliat et al. (2010)	"Centrifuge Testing of Suction Piles in Deepwater Nigeria Clay - Effect of Stiffeners and Set-Up Time", ISFOG 2010
Deng and Carter (2002)	"A Theoretical Study of the Vertical Uplift Capacity of Suction Caissons", ISOPE 2002
Raines et al. (2005)	"Centrifuge Modelling of Suction Piles in Clay", ISFOG 2005

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Reference	Title
GS EP GEO 101	Offshore Geotechnical Soil Survey
GS EP GEO 201	Offshore Geophysical Surveys
GS EP GEO 701	Geotechnical Data and Foundation Design Considerations for Subsea Production Systems and Pipelines