



Exploration & Production

GENERAL SPECIFICATION

SUBSEA SYSTEMS

GS EP SPS 002

Design of subsea structures

07	01/2011	General revision
06	10/2009	General revision
05	10/2008	General revision
04	10/2007	General revision
00	10/2002	First issue
Rev.	Date	Notes

Owner: EP/TDO/TEC

Managing entity: EP/TDO/TEC/SBS



Contents

1. Scope	3
2. Reference documents.....	3
3. Introduction	6
3.1 Responsibility.....	6
3.2 Abbreviations	6
4. General requirements	7
4.1 Functional requirements.....	7
4.2 Intervention requirements	7
4.3 Corrosion Protection Requirements	9
4.4 Abandonment requirement.....	9
5. Structure requirements.....	10
5.1 Introduction	10
5.2 Design requirements.....	11
5.3 Concept 1: Multiwell Template with Manifold requirements	12
5.4 Requirements for Concepts 2A and 2B Individual Wells connected to a Subsea Manifold Centre in cluster or satellite configuration	13
5.5 Concept 3: two slot structure.....	14
5.6 Concept 4: Individual wells.....	14
5.7 Jumper requirements	14
6. Piping system requirements	14
6.1 Functional requirements for manifold piping system.....	14
6.2 Manifold barrier requirements	15
6.3 Piping design requirements.....	15
6.4 Preservation requirements for piping system	17
6.5 Additional requirements for piggable lines.....	17
6.6 Valves.....	18
7. Installation requirements.....	18
7.1 Transportation requirements	18
7.2 Lifting requirements	18
8. Interfaces	20



1. Scope

The purpose of this specification is to provide specific requirements for Subsea Structures.

This specification covers the following development concepts:

- **Concept 1:** Multi-well Template with Production Manifold:
 - Concept 1A Integrated template/manifold
 - Concept 1B Modular template/manifold
- **Concept 2:** Individual Wells Connected to a Subsea Manifold Centre
 - Concept 2A Cluster configuration
 - Concept 2B Satellite configuration
- **Concept 3:** Two slots structure
- **Concept 4:** Individual wells in daisy chain configuration (Production or injection).

The specification covers both permanently installed structures, equipment and associated tools, temporary equipment required for offshore installation and commissioning of the systems as well as potential intervention work.

The document is valid for all phases of a field development such as engineering, procurement, construction, testing, installation, commissioning and operation.

Specific requirements to valves in the manifold systems or other valves on Subsea Structures are defined in separate specifications listed hereafter.

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 technical specification is complementary to document **GS EP SPS 001**. Therefore this technical specification shall be read in conjunction with said document and the other Company specifications and standards identified herein.

The specification for design of Subsea Structures shall furthermore comply with Company project specifications and other standards listed hereafter unless otherwise stated by Company.

The reference list does not include all specifications, codes and standards that may be applicable for Subsea Structures. The reference list includes Regulations, Company Specifications and Standards where specific references have been made in this document.

**Standards**

Reference	Title
ISO 13628-1	Petroleum and Natural Gas Industries - Design and Operation of Subsea Production Systems - Part 1: General Requirements and Recommendations
ISO 13628-4	Petroleum and Natural Gas Industries - Design and Operation of Subsea Production Systems - Part 4: Subsea Wellhead and Tree Equipment
ISO 13628-6	Petroleum and Natural Gas Industries - Design and Operation of Subsea Production Systems Part 6: Subsea Production Control Systems
ISO 13628-8	Petroleum and Natural Gas Industries - Design and Operation of Subsea Production Systems - Part 8: Remotely Operated Vehicle (ROV) Interfaces on Subsea Production Systems
ISO 13628-9	Petroleum and Natural Gas Industries - Design and Operation of Subsea Production Systems - Part 9: Remotely Operated Tool (ROT) Intervention Systems

Professional Documents

Reference	Title
DNV	Rules for Planning and Execution of Marine Operations
DNV	Rules for Certification of Lifting Appliances
DNV 2.7-1	Certification Note 2.7-1. Offshore Containers
DNV RP F112	Design of Duplex Stainless Steel Subsea Equipment Exposed to cathodic Protection

Regulations

Reference	Title
Not applicable	



Codes

Reference	Title
API RP 1111	Design, Construction, Operation, and Maintenance of Offshore Hydrocarbon Pipelines (Limit State Design)
ASME B31.3	Chemical Plant and Petroleum Refinery Piping
ASME B31.4	Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids
ASME B31.8	Gas Transmission and Distribution Piping Systems
DNV OS F101	Submarine pipeline systems

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP COR 100	Design of cathodic protection of offshore structures
GS EP COR 350	External protection of offshore and coastal structures and equipment by painting
GS EP COR 560	Physical and chemical treatment of hydrostatic test water
GS EP GEO 702	Requirements for design and installation of skirted foundation and suction anchors
GS EP PLR 100	Submarine pipeline systems
GS EP PLR 102	Design of submarine pipelines as per API RP 1111 and ASME B31.4/31.8
GS EP PLR 103	Design of submarine pipelines as per DNV-OS- F101
GS EP PLR 105	Design of submarine pipelines as per ISO 13623
GS EP PVV 614	Welding of duplex and superduplex stainless steel
GS EP PVV 619	Piping or pressure vessel components in duplex and superduplex stainless steel
GS EP SPS 001	Design philosophy and requirements for Subsea Stations
GS EP SPS 003	Foundation design considerations for subsea stations
GS EP SPS 004	Subsea Manifold System Gate Valves
GS EP SPS 005	Subsea ball valves
GS EP SPS 006	Service valves in subsea stations



Reference	Title
GS EP SPS 007	Tie-in systems
GS EP SPS 008	Thermal insulation of subsea stations
GS EP SPS 009	Corrosion protection of subsea stations
GS EP SPS 011	Mechanical completion for subsea stations
GS EP SPS 012	Documentation requirements for subsea stations
GS EP SPS 015	Subsea gate valves and actuators in subsea Xmas-tree systems
GS EP SPS 016	Subsea insert chokes and associated running and retrieval tools
GS EP SPS 019	Subsea production control system
GS EP SPS 021	Subsea mateable electrical/optical connectors
GS EP SPS 022	Environmental testing of subsea electronics
GS EP SPS 023	Cleaning and Flushing of Hydraulic Systems
GS EP STR 201	Materials for offshore steel structures
GS EP STR 301	Fabrication of offshore steel structures
GS EP STR 401	Loadout, seafastening, transportation and installation of offshore structures
GS EP STR 404	Marine aspects for load-out, transportation and installation of offshore structures

3. Introduction

3.1 Responsibility

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

It is the responsibility of anyone who supplies structures and equipment according to this specification to ensure compliance with all relevant statutory requirements.

3.2 Abbreviations

The following abbreviations are used:

- ANSI American National Standards Institute
- BOP Blow Out Preventer
- CCDS Cuttings and Cement Disposal System
- FAT Factory Acceptance Test
- FBS Foundation and Bottom Structure
- HISC Hydrogen Induced Stress Cracking
- HP High Pressure

- Hs Significant waveheight
- ID Internal Diameter
- JM Jumper Module
- LP Low Pressure
- MM Manifold Module
- ND Nominal Diameter
- PLM Pigging Loop Module
- ROT Remote Operated Tool
- ROV Remote Operated Vehicle
- SI Scale Inhibitor
- SP Spare
- SU Service Umbilical
- TMGB Template Mounted Guide Base
- Tp Peak spectral period
- XT Christmas Tree

4. General requirements

4.1 Functional requirements

Templates and Satellite Structures shall be designed for BOP envelopes of semisubmersible and monohull drilling rigs suited for the field waterdepth as a minimum. The design shall preferably allow for any BOP orientation in steps of 90°. Recommendation is that rig shall be able to work at any well slot on the same template without having to change heading.

The Subsea Structures shall protect piping and valve arrangements and other equipment from dropped objects. An impact energy value of 10-kJ/diameter 100 mm shall be considered.

All modules shall preferably be independently retrievable. Production capability should be maintained after retrieval of one or more X-Mas trees from a Subsea Production Station.

Design of Subsea Structures shall ensure that cement return and accumulation of cuttings are clearly visible by ROV around each wellhead area.

4.2 Intervention requirements

The Subsea Structures shall be designed for required access with both working and inspection ROVs with envelopes according to industrial standards.

In general, the Subsea Structures shall be designed to minimise risk for snagging of ROV umbilical and local guide wires. Typical components can be guide funnels, stand-off anodes, electrical connectors in parking positions and in connected positions, installation rigging arrangements, etc.