

GENERAL SPECIFICATION

SUBSEA SYSTEMS

GS EP SPS 009

Corrosion Protection of Subsea Stations

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1. Scope

This document defines the minimum requirements for the design, installation and commissioning of external Cathodic Protection (CP) and coatings of subsea production systems.

CP shall be implemented using galvanic (or sacrificial) anodes.

This specification defines only specific aspects for subsea production systems, in complement to **GS EP COR 100** and **GS EP COR 201**.

2. Reference Documents

This technical specification is complementary to **GS EP SPS 001**. The reference documents listed below form an integral part of this General Specification.

The reference list does not include all specifications, codes and standards that may be applicable for corrosion protection of subsea stations. The reference list includes Standards and Company Specifications where specific references have been made in this document.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
API RP 2SK	Design and Analysis of Stationkeeping Systems for Floating Structures
DNV-RP-B401	Cathodic Protection Design
ISO 12944-6	Paints and Varnishes - Corrosion Protection of Steel Structures by Protective Paint Systems - Part 6 Laboratory Performance Test Methods
ISO 15589-2	Petroleum and natural gas industries - Cathodic protection of pipeline transportation systems - Part 2 Offshore pipelines

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP COR 100	Design of cathodic protection of offshore structures
GS EP COR 102	Design of cathodic protection of sealine by sacrificial anodes
GS EP COR 201	Supply of sacrificial anodes
GS EP COR 220	Three layer polyethylene external coating for pipelines

Reference	Title
GS EP COR 221	Three layer polypropylene external coating for pipelines
GS EP COR 230	External laminated glass fibre/resin based coating for risers of sea line
GS EP COR 231	External elastomer based coating for risers of sea line
GS EP COR 350	External protection of offshore and coastal structures and equipment by painting
GS EP COR 401	Installation of anodes on submerged pipelines
GS EP COR 420	External field joint coatings of pipelines
GS EP COR 502	Control by electrical measurements of cathodic protection of submerged pipelines
GS EP SPS 001	Subsea Production Systems General Design Requirements
GS EP SPS 012	Documentation requirements for subsea stations
GS EP SPS 029	Metallic Materials for Subsea Production Facilities

3. Abbreviated Terms

API	American Petroleum Institute
CCF	Closed Caisson Foundation
CP	Cathodic Protection
COR	Corrosion
CRA	Corrosion Resistant Alloy
DNV	Det Norske Veritas
FPU	Floating Production Unit
HIC	Hydrogen Induced Cracking
ISO	International Standardization Organisation
NACE	National Association of Corrosion Engineers
PPS	Project Particular Specification
ROV	Remotely Operated Vehicle
UFR	Umbilicals, Flowline and Risers
SCR	Steel Catenary Risers
SPS	Subsea Production System

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4. Qualification and Certification of Cathodic Protection Design Specialists

Design of CP systems to be installed on subsea production systems shall be carried out exclusively by competent specialized personnel. The qualification of each of the specialists working for such a design shall be demonstrated to Company before commencement of the job. Therefore the verification of the formal Certification of the individuals shall be carried out as follows:

- Design work or verification to be carried out by level 3 certified personnel.

Accepted Certification schemes are AFNOR Competence (Seawater Application Sector), APCE (Seawater Application Sector), Institute of Corrosion, NACE (National Association of Corrosion Engineers) International. Any other Certification scheme shall be approved by Company.

Any use of non certified personnel for CP design shall be subject to the approval of Company on a case by case basis (demonstration of competence through detailed curriculum vitae and description of experience).

5. Cathodic Protection of Subsea equipment

This specification is a complement to [GS EP COR 100](#) and [GS EP COR 201](#), dedicated to deep sub-sea conditions. Reference shall be made to these specifications for general requirements on CP, which are not included in this document.

5.1 Cathodic Protection Basis Design Data

Each subsea system shall be subjected to separate detailed CP design calculations.

5.1.1 Cathodic Potential Requirements

For carbon steel, the following potential criteria shall be reached on the structures:

- More negative than -800 mV/Ag-AgCl-seawater in aerated seawater
- More negative than -900 mV/Ag-AgCl-seawater in a seawater environment with a potential high content of sulphate reducing bacteria and for the lower side of the mud mats.

For carbon steel with specified minimum yield strength greater than or equal to 550 MPa, the potential shall remain more positive than -1100 mV/Ag-AgCl-sea water.

For other materials, potential requirements shall be in accordance with [ISO 15589-2](#) Table 1 and material requirements shall be in accordance with [GS EP SPS 029](#) § 6 to avoid hydrogen embrittlement.

5.1.2 Sea water Resistivity

The seawater resistivity is specified in [GS EP COR 100](#).

Note: The requirement to increase resistivity for water depths greater than 150 m.