SLOVENSKI STANDARD
oSIST prEN ISO 19901-9:2017

01-julij-2017

Industrija za predelavo nafte in zemeljskega plina - Posebne zahteve za naftne ploščadi - 9. del: Celovitost storitev upravljanja (ISO/DIS 19901-9:2017)

Petroleum and natural gas industries - Specific requirements for offshore structures - Part 9: Structural integrity management (ISO/DIS 19901-9:2017)

Erdöl- und Erdgasindustrie - Spezielle Anforderungen für Offshore-Anlagen - Teil 9: Integritätsmanagement für Konstruktionen (ISO/DIS 19901-9:2017)

Industries du pétrole et du gaz naturel - Exigences spécifiques relatives aux structures en mer - Partie 9: Gestion de l'intégrité structurelle (ISO/DIS 19901-9:2017)

Ta slovenski standard je istoveten z: **prEN ISO 19901-9**

ICS:

75.180.10	Oprema za raziskovanje, vrtanje in odkopavanje	Exploratory, drilling and extraction equipment

oSIST prEN ISO 19901-9:2017 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 19901-9

ISO/TC **67**/SC **7** Secretariat: **BSI**

Voting begins on: **2017-04-26**

Voting terminates on: **2017-07-18**

Petroleum and natural gas industries — Specific requirements for offshore structures —

Part 9: Structural integrity management

Industries du pétrole et du gaz naturel — Exigences spécifiques relatives aux structures en mer — Partie 9: Gestion de l'intégrité structurelle

ICS: 75.180.10

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 19901-9:2017(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 19901-9 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 7, *Offshore structures*.

This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

ISO 19901 consists of the following parts, under the general title *Petroleum and natural gas industries — Specific requirements for offshore structures*:

— *Part 9: Structural integrity management*

— *Part [n]:*

— *Part [n+1]:*

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee ISO/TC 67, Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries, Subcommittee SC 7, Offshore structures.

This first edition of ISO 19901-9 cancels and replaces ISO 19902:2007, Clauses 23, 24 and 25, which have been withdrawn.

A list of all parts in the ISO 19901 series can be found on the ISO website.

Introduction

Structural integrity management (SIM) is the implementation of engineering, inspection, maintenance, monitoring and remediation activities required to demonstrate the fitness-for-service of a structure for its intended application throughout its service life and prevent/mitigate severe or catastrophic health, safety, environmental, or structural incidents. The SIM process provides a proactive measure to monitor, evaluate and assess structural condition and establish a process to validate the structural integrity of an offshore platform.

Purpose of SIM is to provide a process for demonstrating the structural integrity of the platform throughout its intended design service life on a fit-for-service basis. Approaches to dealing with SIM vary depending upon field life, type of structure and sophistication of regional infrastructure where the structure is located. In turn, these factors can influence the philosophical approach to the specification of SIM which can vary from one involving emphasis on the use of monitoring equipment to one with a preference for the extensive use of inspections. Additionally, design decisions on safety factors, design margins, corrosion protection, component redundancy and system reliabilities will influence the SIM strategy and program. Regardless, the resulting SIM aims to maintain the structural integrity of the platform throughout its service life.

SIM choices are made in the design (e.g. selection of materials, condition monitoring systems, new or proven technology, robustness of design, redundancy, and fabrication/installation methods) that will influence SIM activities during the operations phase. Implementation of a SIM can benefit significantly from design decision, such as providing access for inspection and maintenance.

SIM process is used to develop an inspection program, scope and frequency that, when executed, can provide information on the condition of the structure, which can be used to understand present and emerging risk from operating the topsides, and provide information for determining the ongoing strategy for mitigating that risk. A well-implemented SIM process will maintain the structure's fitness-for-service for the operational life of the platform and through the decommissioning process.

Initial SIM development begins early as part of the structure's new design or reuse, ideally during the structure's concept and select stages. Most of the initial SIM data, strategies and program philosophies will be generated during the design by the project team and ultimately handed over to the structure's operating team. Once commissioned, the effective operation of the structure is contingent on the provided SIM philosophy and design documentation from the project team. These deliverables (e.g. design documents, drawings, computer models) are most useful to the operating team when they are complete, up-to-date (i.e. reflect as commissioned installation), organized, in a usable format and readily accessible. To provide sustainable SIM, the project team and operating team work collaboratively during the project in defining the necessary SIM deliverables.

Project and operating teams have important roles in the initial specification and development of the SIM process, including the identification of how the structure is expected to respond and the limitations inherent in the design, whether in the form of loading limitations or environmental restrictions that could apply to weather-sensitive operations. The project team in charge of the design is generally responsible for developing the SIM data, initial strategies and program philosophy that will be handed over to the operations team.

Platform operating team is responsible for validating that the design data are comprehensive and complete. In addition the operating team is responsible for demonstrating that the SIM strategies conform to owner risk criteria, regional regulations and that the SIM strategies are workable based on location infrastructure and capabilities. National and regional regulations can require SIM documentation in a form suitable for verification or for review by a regulator.

Platform operating team is responsible for maintaining the structure in such a way that it can safely fulfil its intended future use according to the provisions of this document and of the relevant structure-specific standard in the series of documents applicable to offshore structures.

Petroleum and natural gas industries — Specific requirements for offshore structures — Part 9: Structural integrity management

1 Scope

This document specifies principles for the structural integrity management (SIM) of offshore structures subjected to known or foreseeable types of actions.

This document specifies requirements and provides recommendations applicable to the following types of fixed steel offshore structures for the petroleum and natural gas industries:

— caissons, free-standing and braced;

— jackets;

— monotowers;

— towers.

This document covers all topsides and structures above sea level, including but not limited to the main decks, deck legs, topsides modules, crane pedestals, helideck, drilling derrick, skid beams, flare booms, exhaust towers, radio tower, conductor support frames, and lifeboat davits. In addition, it is applicable to compliant bottom founded structures, steel gravity structures, jack-ups, other bottom founded structures and other structures related to offshore structures (e.g. underwater oil storage tanks, bridges and connecting structures), to the extent to which its requirements are relevant.

This document contains requirements for planning and engineering of the following tasks:

a) integrity management data requirements;

b) in-service inspection and integrity management of both new and existing structures;

c) assessment of existing structures;

d) evaluation of structures for reuse at different locations;

e) evaluation of structures for their future removal.

ISO 19904-1 is applicable to the integrity management (IM) of hull, moorings and marine systems of existing floating offshore structures. However, this document is applicable to the structural integrity management of the topsides structural components of floating facilities.

ISO 19905-1 is applicable to the IM of the legs, primary hull structure, spudcans, jacking-systems and marine systems of existing mobile jack-up offshore structures and for setting the structural integrity performance level. However, this document is applicable to the structural integrity management of permanently located jack-ups.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19900:2013, *Petroleum and natural gas industries — General requirements for offshore structures*

ISO 19901-1, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 1: Metocean design and operating considerations*

ISO 19901-2, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 2: Seismic design procedures and criteria*

ISO 19901-4, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 4: Geotechnical and foundation design considerations*

ISO 19901-5, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 5: Weight control during engineering and construction*

ISO 19902, *Petroleum and natural gas industries — Fixed steel offshore structures*

ISO 19906, *Petroleum and natural gas industries — Arctic offshore structures*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19900, ISO 19901-1, ISO 19901-2, ISO 19901-4, ISO 19901-5, ISO 19902, ISO 19906 and the following apply.

3.1
air gap
clearance between the highest water surface that occurs during the extreme metocean conditions and the underside of the cellar deck

3.2
anomaly
in-service survey measurement, which is outside the threshold acceptable from the design or most recent fitness-for-service assessment

3.3
assessment
detailed qualitative or quantitative determination of the structural component or system strength

3.4
assurance
process to confirm that SIM is performed in conformity with the procedures set out in the SIM policy and written description, and complies with applicable legislation

3.5
collapse
load bearing capacity of the platform, at which the jacket structure or deck columns are no longer able to support vertical loads

3.6
consequence
effects of an abnormal event, such as metocean, seismic, ice or accidental, on personnel, the environment, or property

3.7
continual improvement
ongoing implementation of findings of reviews to improve the SIM process

3.8
continued service
demonstration of fitness-for-service of the structure to the end of the extended anticipated operating service life

3.9
defect
imperfection, fault, or flaw in a structural component

3.10
emergency response plan
written document associated with a company asset, which defines the actions intended to protect people, the environment, and property from adverse consequences associated with emergency situations

3.11
evaluation
review of condition of the structure compared to that when it was last assessed and other parameters that affect the integrity and risk levels to confirm or otherwise that the existing structural assessments still apply

3.12
failure
insufficient strength or inadequate performance of a structure or system, preventing it from fulfilling its intended performance requirements

3.13
fit-for-service
demonstration that the continued in-situ operation of a structure in its as-is condition and present or planned operating configuration does not cause unacceptable risk to life-safety, the environment or the business

3.14
fitness-for-service
engineering evaluations performed to demonstrate the structural integrity of structural component that could contain a flaw or damage or that could be operating under specific conditions that could produce a failure

3.15
information management
process by which historical and operational documents, data and information are collected, communicated and stored

3.16
inspection
visit to the platform and the associated survey activities for purposes of collecting data required in evaluating its structural integrity for continued operation

3.17
inspection program
scope of work for the offshore execution of the inspection activities to determine the condition of the structure

3.18
inspection strategy
systematic approach to the development of a plan for the in-service inspection of a structure

3.19
maintenance
upkeep of the required condition of the structure by proactive intervention based on output from the structural evaluation

3.20
mitigation
limitation of negative consequence or reduction in likelihood of particular event or condition

3.21
non-redundant
platform for which its global capacity is reached when one of its primary structural elements reaches its maximum capacity

3.22
owner
party who owns the physical infrastructure and is responsible for maintaining structural integrity

3.23
performance level
criteria for which an existing platform should achieve to confirm fitness-for-service

3.24
performance standard
statement of the performance required of a system, item of equipment, person or procedure and which is used as the basis for managing the hazard through the lifecycle of the platform

3.25
policy
intention and direction of the owner with respect to the SIM related processes and activities

3.26
prior exposure
historical exposure of a platform to the design metocean, seismic or ice events

3.27
practice
formal document that establishes the technical criteria, methods and processes

3.28
procedure
written directive, usually arranged chronologically, which provides details or steps required to perform a given activity

3.29
redundancy
availability of alternate load paths in a structure following the failure of one or more structural components

3.30
residual strength
ultimate strength of an offshore structure in a damaged condition

3.31
reserve strength ratio
measure of the ultimate load carrying capacity of a platform, defined as the ratio of the base shear at ultimate capacity to the base shear from the 100-year reference criteria