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Petroleum and natural gas industries - Specific requirements for offshore structures - Part 3: Topsides structure (ISO 19901-3:2014)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 05/15

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English Version

Petroleum and natural gas industries - Specific requirements for offshore structures - Part 3: Topsides structure (ISO 19901-3:2014)

Industries du pétrole et du gaz naturel - Exigences spécifiques relatives aux structures en mer - Partie 3: Superstructures (ISO 19901-3:2014)

Erdöl- und Erdgasindustrie - Spezielle Anforderungen an Offshore-Anlagen - Teil 3: Topsides structure (ISO 19901-3:2014)

This European Standard was approved by CEN on 4 December 2014.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN ISO 19901-3:2014) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" in collaboration with Technical Committee CEN/TC 12 “Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries” the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2015, and conflicting national standards shall be withdrawn at the latest by June 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 19901-3:2010.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 19901-3:2014 has been approved by CEN as EN ISO 19901-3:2014 without any modification.

STN EN ISO 19901-3: 2015

INTERNATIONAL STANDARD

ISO 19901-3

Second edition
2014-12-15

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

Part 3: Topsides structure

Industries du pétrole et du gaz naturel — Exigences spécifiques relatives aux structures en mer —

Partie 3: Superstructures

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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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 19901-3 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 edition cancels and replaces the first edition (ISO 19901-3:2010), which has 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 1: Metocean design and operating considerations*

— *Part 2: Seismic design procedures and criteria*

— *Part 3: Topsides structure*

— *Part 4: Geotechnical and foundation design considerations*

— *Part 5: Weight control during engineering and construction*

— *Part 6: Marine operations*

— *Part 7: Stationkeeping systems for floating offshore structures and mobile offshore units*

— *Part 8: Marine soil investigations*

A future Part 9 dealing with structural integrity management is under preparation.

The first edition of ISO 19901-3:2010 included a number of serious typographical errors. A 'Corrected' version of the first edition was issued in December 2011. This 'Corrected' version first edition was subsequently issued by some national standards organisations. To ensure all national standards bodies issue a 'Corrected' version of the document, TC 67/SC 7 decided to produce a second edition of 19901-3 which incorporates the following changes from the original issue in 2010:

— in 4.1, the symbol S_d for design internal force or moment has been added;

— in 8.1, Formulae (7), (8) and (9) have been amended to include symbol S_d and the second paragraph has been reworded to reflect the changes in the equations;

— in 9.18, first paragraph, new values have been given for variable action for the grating and plating as well as for the contribution of personnel to the total variable action allowance;

— in A.7.10.4.2.2, the text has been reworded and Formula (A.1) has been amended, in line with the modifications in 8.1;

— in A.8.1, Formula (A.5) has been corrected by changing “max” to “min”;

— in B.2, Table B.1, the value of Young’s modulus has been amended so as to be in accordance with the default value recommended in ISO 19902;

— in Tables B.3, B.4, B.5, B.7, B.8 and B.9, some values have been updated to reflect the change in Young’s modulus;

— in B.3.3, Table B.4, the symbol for utilization has been corrected;

— in B.4.5, Table B.10, all values for compression and for compression and bending have been amended, as well as the value for the minimum ratio;

— in B.4.5, first and second paragraphs, the building code correspondence factor has been amended and a sentence about its applicability has been added;

— in Annex C, Table C.1, the existing building code correspondence factor has been amended and a second correspondence factor, relating to CSA S16-09, has been added;

— in the Bibliography, Reference[3] has been updated with a more recent edition; references in the text (see A.5.2, A.8.3.1, A.8.3.2, A.8.3.3 and A.8.3.4) have been updated accordingly.

In producing the second edition the following additional minor corrections have been applied to the 2011 ‘Corrected’ version of the first edition:

— in 9.5.3.4 the units of the area-imposed action corrected to kN/m^2;

— in 9.6.2 the description of off-lead and side-lead in Table 5 improved;

— in A.7.10.4.2.3 the reference to section A.7.10.2.4 changed to A.7.10.4.2.4;

— in A.11.3 minor text correction;

— in Annex B Table B.1, symbols for bending amplification reduction factor corrected to $C_{m,y}$ and $C_{m,z}$

ISO 19901 is one of a series of International Standards for offshore structures. The full series consists of the following International Standards:

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

— ISO 19901 (all parts), *Petroleum and natural gas industries — Specific requirements for offshore structures*

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

— ISO 19903, *Petroleum and natural gas industries — Fixed concrete offshore structures*

— ISO 19904-1, *Petroleum and natural gas industries — Floating offshore structures — Part 1: Monohulls, semi-submersibles and spars*

— ISO 19905-1, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 1: Jack-ups*

— ISO/TR 19905-2, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 2: Jack-ups commentary and detailed sample calculation*

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

Introduction

The series of International Standards applicable to types of offshore structure, ISO 19900 to ISO 19906, constitutes a common basis covering those aspects that address design requirements and assessments of all offshore structures used by the petroleum and natural gas industries worldwide. Through their application, the intention is to achieve reliability levels appropriate for manned and unmanned offshore structures, whatever the type of structure and the nature or combination of the materials used.

It is important to recognize that structural integrity is an overall concept comprising models for describing actions, structural analyses, design rules, safety elements, workmanship, quality control procedures and national requirements, all of which are mutually dependent. The modification of one aspect of design in isolation can disturb the balance of reliability inherent in the overall concept or structural system. The implications involved in modifications, therefore, need to be considered in relation to the overall reliability of all offshore structural systems.

The series of International Standards applicable to types of offshore structure is intended to provide wide latitude in the choice of structural configurations, materials and techniques, without hindering innovation. Sound engineering judgement is therefore necessary in the use of these International Standards.

This part of ISO 19901 has been prepared for those structural components of offshore platforms which are above the wave zone and are not part of the support structure or of the hull. Previous national and international standards for offshore structures have concentrated on design aspects of support structures, and the approach to the many specialized features of topsides has been variable and inconsistent, with good practice poorly recorded.

Historically, the design of structural components in topsides has been performed to national or regional codes for onshore structures, modified in accordance with experience within the offshore industry, or to relevant parts of classification society rules. While this part of ISO 19901 permits use of national or regional codes, and indeed remains dependent on them for the formulation of component resistance equations, it provides modifications that result in a more consistent level of component safety between support structures and topsides structures.

In some aspects, the requirements for topsides structures are the same as, or similar to, those for fixed steel structures; in such cases, reference is made to ISO 19902, with modifications where necessary. Annex A provides background to, and guidance on, the use of this part of ISO 19901, and is intended to be read in conjunction with the main body of this part of ISO 19901. The clause numbering in Annex A follows the same structure as that in the body of the normative text in order to facilitate cross-referencing.

Annex B provides an example of the use of national standards for onshore structures in conjunction with this part of ISO 19901.

Regional information on the application of this part of ISO 19901 to certain specific offshore areas is provided in Annex C.

In International Standards, the following verbal forms are used:

— “shall” and “shall not” are used to indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted;

— “should” and “should not” are used to indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited;

— “may” is used to indicate a course of action permissible within the limits of the document;

— “can” and “cannot” are used for statements of possibility and capability, whether material, physical or causal.

INTERNATIONAL STANDARD **ISO 19901-3:2014(E)**

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

Part 3: Topsides structure

1 Scope

This part of ISO 19901 gives requirements for the design, fabrication, installation, modification and structural integrity management for the topsides structure for an oil and gas platform. It complements ISO 19902, ISO 19903, ISO 19904-1, ISO 19905-1 and ISO 19906, which give requirements for various forms of support structure. Requirements in this part of ISO 19901 concerning modifications and maintenance relate only to those aspects that are of direct relevance to the structural integrity of the topsides structure.

The actions on (structural components of) the topsides structure are derived from this part of ISO 19901, where necessary in combination with other International Standards in the ISO 19901 series. The resistances of structural components of the topsides structure can be determined by the use of international or national building codes, as specified in this part of ISO 19901. If any part of the topsides structure forms part of the primary structure of the overall structural system of the whole platform, the requirements of this part of ISO 19901 are supplemented with applicable requirements in ISO 19902, ISO 19903, ISO 19904-1, ISO 19905-1 and ISO 19906.

This part of ISO 19901 is applicable to the topsides of offshore structures for the petroleum and natural gas industries, as follows:

— topsides of fixed offshore structures;

— discrete structural units placed on the hull structures of floating offshore structures and mobile offshore units;

— certain aspects of the topsides of arctic structures.

This part of ISO 19901 is not applicable to those parts of the superstructure of floating structures that form part of the overall structural system of the floating structure; these parts come under the provisions of ISO 19904-1. This part of ISO 19901 only applies to the structure of modules on a floating structure that do not contribute to the overall integrity of the floating structural system.

This part of ISO 19901 is not applicable to the structure of hulls of mobile offshore units.

This part of ISO 19901 does not apply to those parts of floating offshore structures and mobile offshore units that are governed by the rules of a recognized certifying authority and which are wholly within the class rules.

Some aspects of this part of ISO 19901 are also applicable to those parts of the hulls of floating offshore structures and mobile offshore units that contain hydrocarbon processing, piping or storage.

This part of ISO 19901 contains requirements for, and guidance and information on, the following aspects of topsides structures:

— design, fabrication, installation and modification;

— in-service inspection and structural integrity management;

— assessment of existing topsides structures;

— reuse;

— decommissioning, removal and disposal;

— prevention, control and assessment of fire, explosions and other accidental events.

This part of ISO 19901 applies to structural components including the following:

— primary and secondary structure in decks, module support frames and modules;

— flare structures;

— crane pedestal and other crane support arrangements;

— helicopter landing decks (helidecks);

— permanent bridges between separate offshore structures;

— masts, towers and booms on offshore structures.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2631-1, *Mechanical vibration and shock — Evaluation of human exposure to whole-body vibration — Part 1: General requirements*

ISO 2631-2, *Mechanical vibration and shock — Evaluation of human exposure to whole-body vibration — Part 2: Vibration in buildings (1 Hz to 80 Hz)*

ISO 13702, *Petroleum and natural gas industries — Control and mitigation of fires and explosions on offshore production installations — Requirements and guidelines*

ISO 19900, *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 19901-6, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 6: Marine operations*

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

ISO 19903, *Petroleum and natural gas industries — Fixed concrete offshore structures*

ISO 19904-1, *Petroleum and natural gas industries — Floating offshore structures — Part 1: Monohulls, semi-submersibles and spars*

ISO 19905-1, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 1: Jack-ups*

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