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Industrija za predelavo nafte in zemeljskega plina - Betonske konstrukcije naftnih ploščadi (ISO/DIS 19903:2017)

Petroleum and natural gas industries - Concrete offshore structures (ISO/DIS 19903:2017)

Erdöl- und Erdgasindustrie - Feststehende Offshore-Betonkonstruktionen (ISO 19903:2006); Englische Fassung EN ISO 19903:2006

Industries du pétrole et du gaz naturel - Structures en mer en béton (ISO/DIS 19903:2017)

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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 19903 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.

The second edition of this document is prepared to reflect the updated edition of ISO 19900 and other revisions in the ISO 19000 series, and to clarify the use of reference standards for design. In addition, the systematic review of the document has revealed minor inconsistencies and need for clarifications in the text.

No major technical issues have been subject to revision, even though the document has been revised to better explain that it is also applicable for design of floating offshore concrete structures. This is also reflected in the new title of the document in which the term “fixed” has been removed.

Subclause 7.3.3 on soil-structure interaction has been amended in order to be more precise on selection of soil parameters. Subclause 7.4.2.1 has been revised in order to better address dynamic aspects pertaining to floating concrete structures.

Introduction

The series of documents applicable to offshore structures, 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 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 such modifications, therefore, need to be considered in relation to the overall reliability of all offshore structural systems.

The series of documents applicable to the various 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 documents.

This document was developed based on experience gained from the design, execution and use of a number of fixed concrete platforms, in particular from more than 40 years of experience with such structures in the North Sea. The background documents used for developing this document are from the following types:

- national regulations and other requirements from the authorities;
- regional standards;
- national standards;
- operator's company specifications;
- scientific papers and reports;
- reports from inspection of structures in use.

This document applies the concept of a reference standard for design. The text that previously referred to NS 3473.E, the former Norwegian standard for concrete design, which has been widely used for design of fixed offshore concrete platforms, is amended in this document as NS 3473.E as part of the Eurocode program has been withdrawn and is no longer maintained.

This document now draws on the experience gained with fixed and floating concrete offshore structures. This experience shows that concrete offshore structures perform well and are durable in the marine environment. These structures are all unique, one-of-a-kind structures, purpose-made for a particular location and a particular set of operating requirements. This is reflected in this document by the fact that it gives guidance rather than detailed prescriptive rules. This document reflects in particular the experience and the conditions in the North Sea and the East coast of Canada, and the design rules and practices used there, but is intended for worldwide application.

In order to provide a standard that will be useful to the industry, a comprehensive treatment of some topics is provided where there is currently no other relevant reference. For such well-known topics as the design formulas for concrete structural members, this document is intended to be used in conjunction with a suitable reference standard for basic concrete design (see 8.1.1). The designer can use suitable national or regional design standards that provide the required level of safety. Only other ISO documents will be referenced directly in the text.

Petroleum and natural gas industries — Concrete offshore structures

1 Scope

This document specifies requirements and provides recommendations applicable to fixed, floating and grounded concrete offshore structures for the petroleum and natural gas industries and for structures supporting nationally important power generation, transmission or distribution facility. This document specifically addresses:

- a) the design, construction, transportation and installation of new structures, including requirements for in-service inspection and possible removal of structures;
- b) the assessment of structures in service;
- c) the assessment of structures for reuse at other locations.

This document is intended to cover the engineering processes needed for the major engineering disciplines to establish a facility for offshore operation.

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 1920-3, *Testing of concrete — Part 3: Making and curing test specimens*

ISO 1920-4, *Testing of concrete — Part 4: Strength of hardened concrete*

ISO 4463-1, *Measurement methods for building — Setting-out and measurement — Part 1: Planning and organization, measuring procedures, acceptance criteria* 19903:2019

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ISO 6934 (all parts), *Steel for the prestressing of concrete*

ISO 6935 (all parts), *Steel for the reinforcement of concrete*

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 19901-3, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 3: Topsides structures*

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*

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

ISO 19901-8, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 8: Marine soil investigations*

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*

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

ISO 22966, *Execution of concrete structures*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19900 and the following apply.

NOTE Terms and definitions relevant for the use of this document are also found in ISO 19901-2, ISO 19901-4, ISO 19901-6 and ISO 19902.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1**abnormal design situation**

design situation in which conditions exceed conventionally specified design conditions and which is used to mitigate against very remote events

Note 1 to entry: Abnormal design situations are used to provide robustness against events with a probability of typically 10^{-4} per annum or lower by avoiding, for example, gross overloading.

3.2**abnormal level earthquake****ALE**

intense earthquake of abnormal severity under the action of which the structure should not suffer complete loss of integrity

Note 1 to entry: The ALE event is comparable to the abnormal event in the design of structures which are described in ISO 19901-2 and ISO 19902. When exposed to the ALE, a manned structure is supposed to maintain structural and/or floatation integrity for a sufficient period of time to enable evacuation to take place.

[SOURCE: ISO 19901-2:2004, 3.1, modified – Reference to ISO 19903 changed to ISO 19901-2 in note 1 to entry.]

3.3**accidental design situation**

design situation involving exceptional conditions of the structure or its exposure

EXAMPLE Impact, fire, explosion, local failure or loss of intended differential pressure (e.g. buoyancy).