

SLOVENSKI STANDARD

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Petroleum and natural gas industries - Specific requirements for offshore structures - Part 4: Geotechnical and foundation design considerations (ISO 19901-4:2003)

Petroleum and natural gas industries - Specific requirements for offshore structures - Part 4: Geotechnical and foundation design considerations (ISO 19901-4:2003)

Erdöl- und Erdgasindustrie - Offshore-Plattformen - Teil 4: Geotechnische und Fundament-Auslegungsmerkmale (ISO 19901-4:2003)

Industries du pétrole et du gaz naturel - Exigences spécifiques relatives aux structures en mer - Partie 4: Bases conceptuelles des fondations (ISO 19901-4:2003)

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75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment
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**Petroleum and natural gas industries - Specific requirements for
offshore structures - Part 4: Geotechnical and foundation design
considerations (ISO 19901-4:2003)**

Industries du pétrole et du gaz naturel - Exigences
spécifiques relatives aux structures en mer - Partie 4:
Bases conceptuelles des fondations (ISO 19901-4:2003)

Erdöl- und Erdgasindustrie - Offshore-Plattformen - Teil 4:
Geotechnische und Fundament-Auslegungsmerkmale (ISO
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This European Standard was approved by CEN on 10 July 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

EN ISO 19901-4:2003 (E)

Foreword

This document (EN ISO 19901-4:2003) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum and natural gas industries" in collaboration with Technical Committee CEN/TC 12 "Materials, equipment and offshore structures for petroleum 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 February 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

NOTE FROM CMC The foreword is susceptible to be amended on reception of the German language version. The confirmed or amended foreword, and when appropriate, the normative annex ZA for the references to international publications with their relevant European publications will be circulated with the German version.

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The text of ISO 19901-4:2003 has been approved by CEN as EN ISO 19901-4:2003 without any modifications.

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

Part 4: Geotechnical and foundation design considerations

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

Partie 4: Bases conceptuelles des fondations

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@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.

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 19901-4 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*.

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

- *Part 4: Geotechnical and foundation design considerations*
- *Part 5: Weight control during engineering and construction*

The following parts of ISO 19901 are under preparation:

- *Part 1: Metocean design and operating considerations*
- *Part 2: Seismic design procedures and criteria*
- *Part 3: Topsides structure*
- *Part 6: Marine operations*
- *Part 7: Stationkeeping systems for floating offshore structures and mobile offshore units*

ISO 19901 is one of a series of 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, *Petroleum and natural gas industries — Floating offshore structures*
- ISO 19905-1, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 1: Jack-ups*

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- ISO/TR 19905-2, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 2: Jack-ups commentary*
- ISO 19906, *Petroleum and natural gas industries — Arctic offshore structures*

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Introduction

The offshore structures International Standards ISO 19900 to ISO 19906 constitute 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 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 offshore structures International Standards are intended to provide a 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.

The overall concept of structural integrity is described above. For foundations, some additional considerations apply. These include the time, frequency and rate at which actions are applied, the method of foundation installation, the properties of the surrounding soil, the overall behaviour of the seabed, effects from adjacent structures and the results of drilling into the seabed. All of these, and any other relevant information, need to be considered in relation to the overall reliability of the foundation.

The design practice for the foundations of offshore structures has proved to be an innovative and evolving process over the years since the 1950s. This evolution is expected to continue and is encouraged. Therefore, circumstances can arise when the procedures described herein or in the other International Standards ISO 19902 to ISO 19906 (or elsewhere) are insufficient on their own to ensure that a safe and economical foundation design is achieved.

Seabed soils vary. Experience gained at one location is not necessarily applicable at another. The scope of the site investigation for one structure is not necessarily adequate for another. Extra caution is necessary when dealing with unfamiliar soils or foundation concepts. This part of ISO 19901 is intended to provide wide latitude in the choice of site investigation techniques and foundation solutions, without hindering innovation. Sound engineering judgement is therefore necessary in the use of this part of ISO 19901.

For an offshore structure and its foundations, the action effects at the interface between the structure's subsystem and the foundation's subsystem(s) are internal forces, moments and deformations. When addressing the foundation's subsystem(s) in isolation, these internal forces, moments and deformations may be considered as actions on the foundation's subsystem(s) and this approach is followed in this part of ISO 19901.

To meet certain needs of industry for linking software to specific elements in this part of ISO 19901, a special numbering system has been permitted for figures, tables and equations.

Some background to and guidance on the use of this part of ISO 19901 is provided for information in Annex A. Guidance on foundations in carbonate soils is provided for information in Annex B. There is, as yet, insufficient knowledge and understanding of such soils to produce normative requirements.

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

Part 4: Geotechnical and foundation design considerations

1 Scope

This part of ISO 19901 contains requirements and recommendations for those aspects of geoscience and foundation engineering that are applicable to a broad range of offshore structures, rather than to a particular structure type. Such aspects are

- site characterization,
- soil and rock characterization,
- design and installation of foundations supported by the seabed (shallow foundations), and
- identification of hazards.

Aspects of soil mechanics and foundation engineering that apply equally to offshore and onshore structures are not addressed. The user of this part of ISO 19901 is expected to be familiar with such aspects.

NOTE 1 Particular requirements for the design of piled foundations, which have a traditional association with fixed steel structures, are given in ISO 19902.

NOTE 2 Particular requirements for the design of shallow gravity foundations, which have a traditional association with fixed concrete structures, are detailed in ISO 19903.

NOTE 3 Particular requirements for the anchor points of mooring systems of floating structures are detailed in ISO 19901-7 ^[65].

NOTE 4 Particular requirements for the design of spud can foundations, which have a traditional association with jack-up mobile offshore units (MOUs), are detailed in ISO 19905 (all parts).

2 Normative references

The following referenced documents are indispensable for the application 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, *Petroleum and natural gas industries — General 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 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*