INTERNATIONAL STANDARD

ISO 19900

First edition
2002-12-01

Petroleum and natural gas industries — General requirements for offshore structures

Industries du pétrole et du gaz naturel — Exigences générales pour les structures en mer

Reference number
ISO 19900:2002(E)

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

Published in Switzerland

Contents

Page

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.

ISO 19900 was prepared by Technical Committee ISO/TC 67, *Petroleum and natural gas industries*, Subcommittee SC 7, *Offshore structures*.

This first edition of ISO 19900 cancels and replaces ISO 13819-1:1995, which has been editorially revised.

ISO 19900 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 19901-4, *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*

The following International Standards are under preparation:

ISO 19901-1, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 1: Meteocean 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 structure*

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

ISO 19904, *Petroleum and natural gas industries — Floating offshore structures including stationkeeping*

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*

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

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 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 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 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.

ISO 19900 applies to offshore structures and is in accordance with the principles of ISO 2394 (see Reference [1] in the Bibliography). It includes, where appropriate, additional provisions that are specific to offshore structures.

Petroleum and natural gas industries — General requirements for offshore structures

1 Scope

This International Standard specifies general principles for the design and assessment of structures subjected to known or foreseeable types of actions. These general principles are applicable worldwide to all types of offshore structures including bottom-founded structures as well as floating structures and to all types of materials used including steel, concrete and aluminium.

This International Standard specifies design principles that are applicable to the successive stages in construction (namely fabrication, transportation and installation), to the use of the structure during its intended life and to its decommissioning. Generally, the principles are also applicable to the assessment or modification of existing structures. Aspects related to quality control are also addressed.

This International Standard is applicable to the design of complete structures including substructures, topsides structures, vessel hulls, foundations and mooring systems.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
action
external load applied to the structure (direct action) or an imposed deformation or acceleration (indirect action)

EXAMPLE An imposed deformation can be caused by fabrication tolerances, settlement, temperature change or moisture variation.

NOTE An earthquake typically generates imposed accelerations.

2.2
action effect
effect of actions on structural components

EXAMPLE Internal force, moment, stress or strain.

2.3
air gap
clearance between the highest water surface that occurs during the extreme environmental conditions and the lowest exposed part not designed to withstand wave impingement

2.4
appurtenance
part of the structure that is installed to assist installation, to provide access or protection, or for transfer of fluids

2.5
basic variable
one of a specified set of variables representing physical quantities which characterize actions, environmental influences, geometrical quantities, or material properties including soil properties

2.6
catenary mooring
mooring system where the restoring action is provided by the distributed weight of mooring lines

2.7
characteristic value
value assigned to a basic variable associated with a prescribed probability of not being violated by unfavourable values during some reference period

NOTE The characteristic value is the main representative value. In some design situations a variable can have two characteristic values, an upper and a lower value.

2.8
compliant structure
structure that is sufficiently flexible that applied lateral dynamic actions are substantially balanced by inertial reactions

2.9
conductor
tubular pipe extending upward from the sea floor or below containing pipes that extend into the petroleum reservoir

2.10
decommissioning
process of shutting down a platform and removing hazardous materials at the end of its production life

2.11
design criteria
quantitative formulations that describe the conditions to be fulfilled for each limit state

2.12
design service life
assumed period for which a structure is to be used for its intended purpose with anticipated maintenance, but without substantial repair being necessary

2.13
design situation
set of physical conditions representing real conditions during a certain time interval for which the design will demonstrate that relevant limit states are not exceeded

2.14
design value
value derived from the representative value for use in the design verification procedure

2.15
exposure level
classification system used to define the requirements for a structure based on consideration of life safety and of environmental and economic consequences of failure

NOTE The method for determining exposure levels are described in ISO 19902[2]. An exposure level 1 platform is the most critical and exposure level 3 the least. A normally manned platform which cannot be reliably evacuated before a design event will be an exposure level 1 platform.

2.16
fit-for-purpose
meeting the intent of an International Standard although not meeting specific provisions of that International Standard in local areas, such that failure in these areas will not cause unacceptable risk to life-safety or the environment

2.17
fixed structure
structure that is bottom founded and transfers all actions on it to the seabed

2.18
floating structure
structure where the full weight is supported by buoyancy

2.19
jack-up
mobile offshore unit that can be relocated and is bottom founded in its operating mode

NOTE A jack-up reaches its operational mode by lowering legs to the sea floor and then jacking the hull to the required elevation.

2.20
mobile offshore unit
MOU
structure intended to be frequently relocated to perform a particular function

2.21
limit state
state beyond which the structure no longer fulfils the relevant design criteria

2.22
nominal value
value assigned to a basic variable determined on a non-statistical basis, typically from acquired experience or physical conditions

2.23
platform
complete assembly including structure, topsides and, where applicable, foundations

2.24
reference period
period of time used as basis for determining values of basic variables

2.25
reliability
ability of a structure or a structural component to fulfil the specified requirements

2.26
representative value
value assigned to a basic variable for verification of a limit state

2.27
resistance
capacity of a component, or a cross-section of a component, to withstand action effects without failure

2.28
return period
reciprocal of the probability of exceeding an event during a particular period of time

NOTE The return period is the average time (usually in years) between occurrences of an event exceeding a specified magnitude.

2.29
riser
tubular used for the transport of fluids between the sea floor and a termination point on the platform

NOTE For a fixed structure the termination point is usually the topsides. For floating structures the riser may terminate at other locations of the platform.

2.30
scour
removal of seabed soils caused by currents and waves

NOTE Such erosion can be due to natural processes or can be due to interruption of the natural flow regime near the sea floor by structural elements.

2.31
splash zone
area of a structure that is frequently wetted due to waves and tidal variations

2.32
structural system
load-bearing components of a structure and the way in which these components function together

2.33
structural component
physically distinguishable part of a structure

EXAMPLE Column, beam, stiffened plate, tubular joint, or foundation pile.

2.34
structural model
idealization of the structural system used for design or assessment

2.35
structure
organized combination of connected parts designed to withstand actions and provide adequate rigidity

2.36
structure orientation
position of a structure in plan referenced to a fixed direction such as true north

2.37
taut-line mooring
mooring system where the restoring action is provided by elastic deformation of mooring lines

2.38
topsides
structures and equipment placed on a supporting structure (fixed or floating) to provide some or all of a platform's functions

NOTE 1 For a ship-shaped floating structure, the deck is not part of the topsides.

NOTE 2 For a jack-up, the hull is not part of the topsides.

NOTE 3 A separate fabricated deck or module support frame is part of the topsides.