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Petroleum and natural gas industries — Floating offshore structures —

Part 1: Ship-shaped, semi-submersible, spar and shallow-draught cylindrical structures

Industries du pétrole et du gaz naturel — Structures en mer flottantes —

Partie 1: Unités monocoques, unités semi-submersibles et unités spars

Reference number
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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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document 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 19904-1:2006), which has been technically revised. The main changes compared to the previous edition are as follows:

— title has been modified by replacing 'monohulls' with 'ship-shaped' and adding 'shallow-draft cylindrical structures';

— list of normative references (Clause 2) has been expanded;

— some definitions have changed and some new terms and definitions (Clause 3) have been added;

— subclause on planning requirements (5.3) has been expanded by addressing inspection and maintenance philosophy (5.3.5), documentation (5.3.6), extreme weather preparedness (5.3.7), and disconnectible floating platforms (5.3.8);

— subclause on use for project application (5.4.2) has been expanded with a paragraph regarding documentation for disconnectable floating platforms;

— new subclause on topsides arrangement and layout (5.5.9) has been added;

— subclause on air gap (8.10) has been renamed to air gap and wave crest assessment, and a new subclause addressing wave crest effects (8.10.2) has been added;

— subclause on material (9.9) has been expanded by addressing cement grout (9.9.5) and elastomeric materials (9.9.6);

— subclause on corrosion protection of steel (9.10) has been rewritten substantially;

— subclause on fabrication and constructions (9.11) has been expanded by addressing fabrication details (9.11.3) and welding (9.11.4);

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— subclause on general aspects of fatigue analysis and design (10.1) has been expanded by adding a discussion on fatigue strength and actions;

— subclause on general aspects of ship-shaped structures (11.1) has been expanded;

— subclause on sloshing (11.2.3) has been expanded by addressing general configuration of tanks and resonance due to sloshing;

— subclause on green water (11.2.4) has been expanded;

— subclause on structural strength (11.3) has been expanded by elaborating on the evaluation of hull girder strength (11.3.1) and local strength and details (11.3.4);

— subclause on general design critera for semi-submersibles (12.2) has been expanded;

— new clause addressing shallow-draft cylindrical structures (Clause 14) has been added;

— subclause on watertight and weathertight appliances (16.4) has been expanded;

— subclause on hull systems (17.2) has been expanded by addressing atmospheric tanks (17.2.5.2) and water displaced tanks (17.2.5.3), elaborating on inert gas systems (17.2.6) and addressing production vent/flare system (17.2.8) and electical systems (17.2.9);

— subclause on import and export systems (17.3) has been expanded by elaborating on general aspects (17.3.1), alongside transfer (17.3.3.3.3) and tandem transfer (17.3.3.3.4) and addressing direct transfer (17.3.3.3.5);

— clause on stationkeeping systems (18) has been expanded by addressing disconnectable structures (18.4);

— subclause on structural integrity management system philosophies (19.2) has been expanded by elaborating on general aspects, including the addition of a figure (19.2.1);

— new clause addressing assessment of existing floating structures (Clause 20) has been added;

— additional information and guidance (Annex A) has been modified with additions and changes in line with modifications to the main text;

— the list of informative references (Bibliography) has been updated and expanded as needed.

A list of all parts in the ISO 19904 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The International Standards on offshore structures prepared by TC 67 (i.e., ISO 19900, the ISO 19901 series, ISO 19902, ISO 19903, the ISO 19905 series and ISO 19906) constitute a common basis covering those aspects that address design requirements and assessments of all offshore structures used by the petroleum, petrochemical 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 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 International Standards on offshore structures prepared by TC are 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 in response to the offshore industry's demand for a coherent and consistent definition of methodologies to design, analyse and assess floating offshore structures of the class described in Clause 1. Further applicable requirements are found in national and international codes and standards, and RCS rules.

Some background to, and guidance on, the use of this document is provided in informative Annex A. The clause numbering in Annex A is the same as in the normative text to facilitate cross-referencing.

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Petroleum and natural gas industries — Floating offshore structures —

Part 1: Ship-shaped, semi-submersible, spar and shallow-draught cylindrical structures

1 Scope

This document provides requirements and guidance for the structural design and/or assessment of floating offshore platforms used by the petroleum and natural gas industries to support the following functions:

— production;

— storage and/or offloading;

— drilling and production;

— production, storage and offloading;

— drilling, production, storage and offloading.

NOTE 1 Floating offshore platforms are often referred to using a variety of abbreviations, e.g. FPS, FSU, FPSO (see Clauses 3 and 4), in accordance with their intended mission.

NOTE 2 In this document, the term “floating structure”, sometimes shortened to “structure”, is used as a generic term to indicate the structural systems of any member of the classes of platforms defined above.

NOTE 3 In some cases, floating platforms are designated as “early production platforms”. This term relates merely to an asset development strategy. For the purposes of this document, the term “production” includes “early production”.

This document is not applicable to the structural systems of mobile offshore units (MOUs). These include, among others, the following:

— floating structures intended primarily to perform drilling and/or well intervention operations (often referred to as MODUs), even when used for extended well test operations;

— floating structures used for offshore construction operations (e.g. crane barges or pipelay barges), for temporary or permanent offshore living quarters (floatels), or for transport of equipment or products (e.g. transportation barges, cargo barges), for which structures reference is made to relevant recognized classification society (RCS) rules.

This document is applicable to all possible life-cycle stages of the structures defined above, such as:

— design, construction and installation of new structures, including requirements for inspection, integrity management and future removal,

— structural integrity management covering inspection and assessment of structures in-service, and

— conversion of structures for different use (e.g. a tanker converted to a production platform) or re-use at different locations.

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The following types of floating structure are explicitly considered within the context of this document:

a) ship-shaped structures and barges;

b) semi-submersibles;

c) spars;

d) shallow-draught cylindrical structures.

In addition to the structural types listed above, this document covers other floating platforms intended to perform the above functions, consisting of partially submerged buoyant hulls made up of any combination of plated and space frame components. These other structures can have a great range of variability in geometry and structural forms (e.g. tension leg platforms) and, therefore, can be only partly covered by the requirements of this document. In other cases, specific requirements stated in this document can be found not to apply to all or part of a structure under consideration.

NOTE 4 Requirements for topsides structures are presented in ISO 19901-3.

In the above cases, conformity with this document requires the design to be based upon its underpinning principles and to achieve a level of safety equivalent, or superior, to the level implicit in it.

NOTE 5 The speed of evolution of offshore technology often far exceeds the pace at which the industry achieves substantial agreement on innovation in structural concepts, structural shapes or forms, structural components and associated analysis and design practices, which are continuously refined and enhanced. On the other hand, International Standards can only capture explicit industry consensus, which requires maturation and acceptance of new ideas. Consequently, advanced structural concepts can, in some cases, only be partly covered by the requirements of this document.

This document is applicable to steel floating structures. The principles documented herein are, however, considered to be generally applicable to structures fabricated in materials other than steel.

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 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 19901-3, *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 19901-7, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 7: Stationkeeping systems for floating offshore structures and mobile offshore units*

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

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

International Maritime Organization. IMO MARPOL, International Convention for the Prevention of Pollution from Ships

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International Maritime Organization. IMO International Code on Intact Stability

International Maritime Organization. IMO International Convention on Load Lines

International Maritime Organization. IMO Crude Oil Washing Systems

IMO MEPC/Circ. 406, Guidelines for application of MARPOL Annex 1 requirements to FPSOs and FSUs as modified by Resolutions MEPC.139(53) and MEPC.142(54)

3 Terms and definitions

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

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

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
abnormal value
value of an environmental parameter used in accidental limit state verification in which a *structure* (3.59) is not expected to suffer significant loss of integrity

Note 1 to entry: Abnormal situations are used to provide robustness against events with an annual probability of exceedance typically between 10^{-3} and 10^{-4} to avoid, for example, excessive deformations.

Note 2 to entry: In ALS verification, all the partial factors are set to 1,0.

[SOURCE: ISO 19901-1:2015, 3.1, modified]

3.2
accidental event
event involving exceptional conditions of the *structure* (3.59) or its exposure

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

3.3
action
external load applied to the *structure* (3.59) (direct action) or an imposed deformation or acceleration (indirect action)

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

Note 1 to entry: An earthquake typically generates imposed accelerations.

[SOURCE: ISO 19900:2013, 3.3]

3.4
action combination
values of different *actions* (3.3) considered simultaneously in *verification* (3.61) of the *structure* (3.59)

3.5
action effect
effect of *actions* (3.3) on a *structure* (3.59) or on *structural components* (3.57)

EXAMPLE Internal force, moment, stress, strain, rigid body motion or elastic deformation.

[SOURCE: ISO 19900:2013, 3.4, modified — "on a structure or" has been added to the definition and examples have been added.]

Note 1 to entry: Can be used interchangeably with the word "response".

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3.6
air gap
clearance between the highest water or ice surface that occurs during abnormal metocean or ice conditions and the lowest exposed part of the *topsides* (3.60) not designed to withstand wave or ice impingement

[SOURCE: ISO 19900:2013, 3.5, modified — Definition has been rephrased.]

Note 1 to entry: Minimum values of air gap are normally specified for ULS and ALS (abnormal) situations.

3.7
basic variable
one of a specified set of variables representing physical quantities which characterize *actions* (3.3), environmental influences, geometrical quantities, or material properties, including soil properties

[SOURCE: ISO 19900:2013, 3.7]

3.8
characteristic value
value of a *basic variable* (3.7), an *action* (3.3) or a strength model associated with a prescribed probability of not being violated by unfavourable values

Note 1 to entry: In some design situations, a variable can have two characteristic values, an upper and a lower value.

[SOURCE: ISO 19900:2013, 3.10, modified — Definition and Note 1 to entry have been rephrased.]

Note 2 to entry: In the case of actions and related properties, the characteristic value normally relates to a reference period.

3.9
classification
class
process by which a classification society defines a vessel's type and permitted use, determines necessary certification, and specifies associated inspection and survey regimes

Note 1 to entry: Vessels that have been subject to this process and that obtained the corresponding certificate are referred to as being in 'class'.

3.10
design criteria
quantitative formulations that describe the conditions to be fulfilled for each *limit state* (3.30)

[SOURCE: ISO 19900:2013, 3.15]

3.11
design format
mathematical description for *verification* (3.61) of non-exceedance of a *limit state* (3.30)

Note 1 to entry: In this document, both partial factor and working stress design (WSD) formats are permitted.

3.12
design service life
assumed period for which a *structure* (3.59) is to be used for its intended purpose with anticipated maintenance, but without substantial repair being necessary

[SOURCE: ISO 19900:2013, 3.16, modified — 'to be' has been added.]

3.13
design situation
set of *actions* (3.3) and combination of actions representing real conditions during a certain time interval, for which relevant *limit states* (3.30) are not exceeded

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3.14
design value
value of a *basic variable* (3.7), an *action* (3.3) or a strength model derived from its *representative value* (3.41) for use in *verification* (3.61)

[SOURCE: ISO 19900:2013, 3.18, modified — Definition has been rephrased.]

Note 1 to entry: For action variables, the design value is found by multiplying the representative value by a partial action factor while for strength variables, the design value is found by dividing the representative value by a partial resistance factor.

Note 2 to entry: For FLS, SLS or ALS verification in accordance with the partial factor design format, all partial factors are equal to unity so that, in these cases, a design value is equal to the representative value.

Note 3 to entry: For verification in accordance with the working stress design format, all partial factors are equal to unity so that, in these cases, a design value is equal to the representative value. Appropriate global safety or utilization factors are applied in verification.

Note 4 to entry: In the case of actions and related properties, the value can relate to a reference period.

Note 5 to entry: For yield strength, the design value is equal to the representative yield strength.

3.15
disconnectable floating structure
floating structure (3.24) capable of discontinuing production and rapidly disconnecting from its ancillary components (e.g. risers, moorings, well systems, umbilicals), in response to the occurrence of a threshold event

Note 1 to entry: Threshold event is a hazardous event that triggers the start of disconnection.

3.16
dynamic action
action (3.3) that induces acceleration of a *structure* (3.59) or a *structural component* (3.57) of a magnitude sufficient to require specific consideration

[SOURCE: ISO 19901-7:2013, 3.8]

3.17
dynamic positioning
DP
stationkeeping technique consisting primarily of a system of on-board thrusters, which generate appropriate thrust vectors to counter the mean and slowly varying induced actions

3.18
environmental action
effect of wind, wave, current, ice and seismic actions on a *structure* (3.59)

Note 1 to entry: In general terms, environmental actions include those due to seismic actions but, for historical reasons, in several places in this document, seismic actions are treated separately from other environmental effects.

3.19
exposure level
classification system used to define the requirements for a *structure* (3.59) based on consideration of life-safety and of environmental and economic consequences of *failure* (3.21)

[SOURCE: ISO 19900:2013, 3.20, modified — Definition has been rephrased.]

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3.20
extreme value
value of a parameter used in ULS verification in which a *structure's* (3.59) global behaviour is intended to stay in the elastic range

Note 1 to entry: Extreme values and events have annual probabilities of exceedance of the order of 10^{-2}.

3.21
failure
insufficient strength or inadequate serviceability of a *structure* (3.59) or *structural component* (3.57), or, in limit state verification, a condition in which a structure or component thereof does not fulfil its limit state requirement

3.22
fit-for-service
fitness-for-service
meeting the intent of a standard although not meeting specific requirements of that standard in local areas, such that *failure* (3.21) in these areas cannot cause unacceptable risk to life-safety or the environment

Note 1 to entry: "Fit-for-service" is an adjective and "fitness-for-service" is a noun.

[SOURCE: ISO 19900:2013, 3.21, modified — Definition has been rephrased.]

3.23
flag state
country under whose laws a vessel is registered or licensed

Note 1 to entry: 'Flagging' is the process by which such registration is accomplished.

3.24
floating structure
structure (3.59) where the full weight is supported by buoyancy

[SOURCE: ISO 19900:2013, 3.23]

Note 1 to entry: The full weight includes lightship weight, mooring system pre-tension, riser pre-tension and operating weight.

3.25
freeboard
distance measured vertically between the upper edge of the weathertight deck, at a given draught, and the mean water surface

3.26
green water
water that overtops a deck causing *slamming* (3.49) and pressure actions on the deck and to *structures* (3.59) on the deck

3.27
hazard
potential source of harm

EXAMPLE Large waves, strong winds, hurricanes, earthquakes, icebergs, unstable foundation, excessive topside weight, vessel collision, corrosion, and repetitive actions.

Note 1 to entry: Harm is typically differentiated between harm to personnel, harm to the environment, or harm in terms of costs to organisation(s) or society in general.

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3.28
hazardous event
instance of a *hazard* (3.27) acting on a *structure* (3.59)

EXAMPLE Wave impact, iceberg impact, excessive topside weight added to the structure, landslip near structural anchors (piles).

3.29
hull
primary structure or structural subsystem providing buoyancy for a *floating structure* (3.24)

Note 1 to entry: For semi-submersibles, the hull generally consists of columns and pontoons. For spars and shallow-draught cylindrical structures, the hull consists of a single column.

3.30
limit state
state beyond which the *structure* (3.59) or *structural component* (3.57) no longer satisfies the relevant *design criteria* (3.10)

[SOURCE: ISO 19900:2013, 3.28, modified — 'or structural component' has been added.]

3.31
marine operations manual
MOM
document that defines the operational characteristics, procedures and capabilities of an offshore platform and associated essential systems

[SOURCE: ISO 19900:2013, 3.33, modified — 'marine'has been added to the term.]

3.32
metocean action
effect of wind, wave and current on a *structure* (3.59)

Note 1 to entry: The determination of these effects includes the influence of marine growth, tide, surge, and related processes, as appropriate.

3.33
mobile offshore unit
MOU
structure (3.59) intended to be relocated to perform a particular function

3.34
nominal value
value of a *basic variable* (3.7), *action* (3.3) or strength model determined on a non-statistical basis, typically from acquired experience or physical conditions

[SOURCE: ISO 19900:2013, 3.29, modified — Definition has been rephrased.]

EXAMPLE Value published in a recognized code or standard.

Note 1 to entry: Values of yield strength specified in steel standards and specifications are nominal values

3.35
operator
representative of the company or companies leasing the site

Note 1 to entry: The operator is normally the oil company acting on behalf of co-licensees.

[SOURCE: ISO 19900:2013, 3.32]

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3.36
owner
representative of the company or companies owning or leasing a development

[SOURCE: ISO 19900:2013, 3.34]

3.37
platform
complete assembly of structural and non-structural systems for development and production of petroleum and natural gas fields

Note 1 to entry: For floating offshore structures, the structural system generally includes the hull, topsides structure, and stationkeeping system including anchors, while the non-structural systems includes topsides equipment (including accommodation), piping and risers.

Note 2 to entry: The structural system does not include soils.

3.38
recognized classification society
RCS
member of the international association of classification societies (IACS), with recognized and relevant competence and experience in *floating structures* (3.24) used in petroleum or natural gas activities, and with established rules and procedures for *classification* (3.9)/certification of *platforms* (3.37) located at a specific site for an extended period of time

[SOURCE: ISO 19901-7:2013, 3.23, modified — Definition has been rephrased, first and second preferred terms have been swapped.]

3.39
regulator
authority established by a national governmental administration to oversee the activities of the offshore petroleum and natural gas industries within its jurisdiction, with respect to safety of life and protection of the environment

Note 1 to entry: The term "regulator" can encompass more than one agency in given territorial waters.

Note 2 to entry: The regulator can appoint other agencies, such as marine classification societies, to act on its behalf, and in such cases, regulator as it is used in this document includes such agencies.

Note 3 to entry: In this document, the term "regulator" does not include any agency responsible for approval to extract hydrocarbons, unless such agency also has responsibility for safety and environmental protection.

[SOURCE: ISO 19902:2007, 3.40, modified — 'oil' has been changed to 'petroleum'.]

3.40
reliability
ability of a *structure* (3.59) or *structural component* (3.57) to fulfil the specified requirements

[SOURCE: ISO 19900:2013, 3.37]

3.41
representative value
value of a *basic variable* (3.7), *action* (3.3) or strength model, for *verification* (3.61) of a *limit state* (3.30)

[SOURCE: ISO 19900:2013, 3.38, modified — Definition has been rephrased.]

Note 1 to entry: The representative value can be a characteristic value, a nominal value, or other rationally determined value.

Note 2 to entry: For actions, this can relate to upper or lower characteristic values, dependent on which causes the more onerous condition. In combinations, it can involve multiplying the chosen value by a factor greater or less than unity.

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3.42
resistance
capacity of a *structure* (3.59), component or cross-section of a component to withstand *action effects* (3.5) without *failure* (3.21)

[SOURCE: ISO 19900:2013, 3.39, modified — 'structure' has been added.]

3.43
return period
average period between occurrences of an event or of a particular value being exceeded

Note 1 to entry: The offshore industry commonly uses a return period measured in years for environmental events. The return period in years is equal to the reciprocal of the annual probability of exceedance of the event.

[SOURCE: ISO 19900:2013, 3.40]

3.44
riser
piping connecting the process facilities or drilling equipment on the *floating structure* (3.24) with the subsea facilities or pipelines, or with a reservoir

Note 1 to entry: Possible functions include drilling and well intervention, production, injection, subsea systems control and export of produced fluids.

3.45
robustness
ability of a *structure* (3.59) to withstand accidental and abnormal events without being damaged to an extent disproportionate to the cause

[SOURCE: ISO 19900:2013, 3.42]

3.46
semi-submersible
floating structure (3.24) normally consisting of a deck structure with, typically, three or more widely spaced, large cross-section, supporting columns connected to submerged pontoons

Note 1 to entry: Pontoon/column geometry is usually chosen to minimize global motions in a broad range of wave frequencies.

3.47
shallow-draught cylindrical structure
floating structure (3.24) having a cylindrical or near cylindrical geometry with a draught comparable to the diameter

3.48
ship-shaped structure
floating structure (3.24) having a geometry similar to that of ocean-going ships or barges

3.49
slamming
impulsive action with high pressure peaks that occurs during impact between a portion of the *structure* (3.58) and water

Note 1 to entry: Slamming can, for example, be due to emergence and re-entry of a lower section of the hull into the water or to wave impact on a structural component.

3.50
sloshing
impact action on the internal surface(s) of partially filled compartments due to internal fluid motion

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3.51
spar
deep-draught, small water-plane area cylindrical *floating structure* (3.24)

[SOURCE: ISO 19901-7:2013, 3.32, modified]

3.52
special area
area identified by the designer as being of critical importance to the structural integrity and safety of the *structure* (3.59)

3.53
splash zone
part of a *structure* (3.59) that is intermittently exposed to air and to sea water

[SOURCE: ISO 19900:2013, 3.44, modified — 'immersed in the sea' has been changed to 'to sea water'.]

3.54
stability
hydrostatic stability
ability of a *floating structure* (3.24) to generate restoring moment after deviation from an equilibrium floating position

Note 1 to entry: Generally, verification of stability applies to both intact and damage conditions.

3.55
static action
action (3.3) that does not cause significant acceleration of a *structure* (3.59) or of a *structural component* (3.57)

3.56
stationkeeping system
system capable of limiting the excursions of a *floating structure* (3.24) within prescribed limits

[SOURCE: ISO 19901-7:2013, 3.34]

3.57
structural component
physically distinguishable part of a *structure* (3.59)

[SOURCE: ISO 19900:2013, 3.46, modified — Example has been omitted.]

3.58
structural system
combination of *structural components* (3.57) acting in such a manner that the components function together

3.59
structure
organized combination of connected components designed to withstand *actions* (3.3) and provide adequate rigidity and *stability* (3.54)

[SOURCE: ISO 19900:2013, 3.49, modified — 'and stability' has been added.]

3.60
topsides
structure (3.59) and equipment placed on a *hull* (3.29) to provide some or all a of *platform's* (3.37) functions

Note 1 to entry: For a ship-shaped structure, the deck is not part of the topsides.

Note 2 to entry: A separately-fabricated deck or module support frame is part of the topsides.

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[SOURCE: ISO 19900:2013, 3.52, modified — Definition has been rephrased, Note 2 to entry has been removed.]

3.61
verification
examination made to confirm that an activity, product or service is in accordance with specified requirements

[SOURCE: ISO 19901-7:2013, 3.39]

3.62
watertight
capable of preventing the penetration of water into or through the *structure* (3.59) with a water pressure head corresponding to that for which the surrounding structure is designed

3.63
weathertight
capable of preventing the penetration of water into the structure during temporary exposure to water

Note 1 to entry: A watertight closing appliance is also considered weathertight.

4 Symbols and abbreviated terms

4.1 Symbols

A accidental action

A_v area, or area per unit length, in square metres (m^2), or metres (m)

a_v vibration amplitude, in metres

B moulded breadth, in metres (m)

b width, in millimetres (mm)

C coefficient (non-dimensional unless otherwise specified)

D fatigue damage ratio throughout life cycle of platform or duration of particular operational phase

d component diameter, in metres

E material (Young's) modulus, in newtons per square metre (N/m^2)

E_e environmental action

F action per unit length, in newtons per metre (N/m)

F_d design value of action effect

f frequency, in hertz (Hz)

f distribution factor (non-dimensional)

G permanent action

K_s stability parameter for VIV

L length between perpendiculars

M bending moment or representative bending strength, in newton metres (Nm)

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