
**Oil and gas industries including
lower carbon energy — Site-specific
assessment of mobile offshore units —**

**Part 1:
Jack-ups: elevated at a site**

*Industries du pétrole et du gaz, y compris les énergies à faible teneur
en carbone — Évaluation spécifique du site d'unités mobiles en
mer —*

Partie 1: Plateformes auto-élévatrices : Surélevées sur un site

IT
(<https://standards.iteh.ai>)
Document Preview

[ISO 19905-1:2023](https://standards.iteh.ai/catalog/standards/sist/0aec3a6d-a9b7-498b-81ca-d7a6af5ea3b2/iso-19905-1-2023)

<https://standards.iteh.ai/catalog/standards/sist/0aec3a6d-a9b7-498b-81ca-d7a6af5ea3b2/iso-19905-1-2023>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO 19905-1:2023](https://standards.iteh.ai/catalog/standards/sist/0aec3a6d-a9b7-498b-81ca-d7a6af5ea3b2/iso-19905-1-2023)

<https://standards.iteh.ai/catalog/standards/sist/0aec3a6d-a9b7-498b-81ca-d7a6af5ea3b2/iso-19905-1-2023>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	viii
Introduction.....	xi
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions	2
4 Symbols and abbreviated terms	15
4.1 Symbols.....	15
4.1.1 General.....	15
4.1.2 Symbols used in A.6.....	17
4.1.3 Symbols used in A.7.....	19
4.1.4 Symbols used in A.8.....	21
4.1.5 Symbols used in A.9 and Annex E.....	22
4.1.6 Symbols used in A.10	25
4.1.7 Symbols used in A.11	26
4.1.8 Symbols used in A.12	27
4.2 Abbreviated terms.....	31
5 Overall considerations.....	32
5.1 General.....	32
5.1.2 Competency.....	33
5.1.3 Planning.....	33
5.1.4 Assessment situations and associated criteria	33
5.1.5 Reporting	33
5.1.6 Regulations.....	33
5.1.7 Classification of unit.....	34
5.2 Assessment approach.....	34
5.3 Selection of assessment situations	36
5.4 Determination of assessment situations.....	37
5.4.1 General.....	37
5.4.2 Reaction point and foundation fixity	37
5.4.3 Extreme storm event approach angle.....	37
5.4.4 Weights and centre of gravity.....	37
5.4.5 Hull elevation	37
5.4.6 Leg length reserve.....	38
5.4.7 Adjacent structures	38
5.4.8 Other	38
5.5 Exposure levels	38
5.5.1 Determination of exposure level.....	38
5.5.2 Exposure level L1	38
5.5.3 Exposure level L2	38
5.5.4 Exposure level L3	39
5.5.5 Exposure level for earthquake.....	39
5.6 Analytical tools	39
6 Data to assemble for each site	39
6.1 Applicability.....	39
6.2 Jack-up data.....	39
6.3 Site and operational data	40
6.4 Metoccean data	40

6.5	Geophysical and geotechnical data	41
6.6	Earthquake data.....	42
6.7	Ice data	42
7	Actions.....	42
7.1	Applicability	42
7.2	General	42
7.3	Metoccean actions	43
7.3.1	General	43
7.3.2	Hydrodynamic model.....	43
7.3.3	Wave and current actions.....	43
7.3.4	Wind actions.....	43
7.4	Functional actions	44
7.5	Displacement dependent effects.....	44
7.6	Dynamic effects	44
7.7	Earthquakes.....	44
7.8	Ice actions.....	44
7.9	Other actions	44
8	Structural modelling	44
8.1	Applicability	44
8.2	Overall considerations	45
8.2.1	General	45
8.2.2	Modelling philosophy.....	45
8.2.3	Levels of FE modelling	45
8.3	Modelling the leg.....	46
8.3.1	General	46
8.3.2	Detailed leg.....	46
8.3.3	Equivalent leg (stick model).....	46
8.3.4	Combination of detailed and equivalent leg.....	46
8.3.5	Stiffness adjustment	46
8.3.6	Leg inclination	46
8.4	Modelling the hull.....	46
8.4.1	General	46
8.4.2	Detailed hull model.....	46
8.4.3	Equivalent hull model.....	46
8.5	Modelling the leg-to-hull connection	47
8.5.1	General	47
8.5.2	Guide systems	47
8.5.3	Elevating system	47
8.5.4	Fixation system	47
8.5.5	Shock pad — floating jacking systems	47
8.5.6	Jackcase and associated bracing.....	47
8.6	Modelling the spudcan and foundation.....	47
8.6.1	Spudcan structure	47
8.6.2	Seabed reaction point	47
8.6.3	Foundation modelling.....	48
8.7	Mass modelling.....	48
8.8	Application of actions	49
8.8.1	Assessment actions.....	49
8.8.2	Functional actions due to fixed load and variable load.....	50
8.8.3	Hull sagging	51
8.8.4	Metoccean actions	51
8.8.5	Inertial actions	51
8.8.6	Large displacement effects.....	51
8.8.7	Conductor actions.....	51

8.8.8	Earthquake actions.....	51
8.8.9	Ice actions	51
9	Foundations	52
9.1	Applicability.....	52
9.2	General.....	52
9.3	Geotechnical analysis of independent leg foundations.....	52
9.3.1	Foundation modelling and assessment.....	52
9.3.2	Leg penetration during preloading	53
9.3.3	Yield interaction	54
9.3.4	Foundation stiffnesses	54
9.3.5	Vertical-horizontal foundation capacity envelopes	54
9.3.6	Acceptance checks	55
9.4	Other considerations	56
9.4.1	Skirted spudcans	56
9.4.2	Hard sloping strata.....	57
9.4.3	Footprint considerations	57
9.4.4	Leaning instability	57
9.4.5	Leg extraction difficulties	57
9.4.6	Cyclic mobility, liquefaction and liquefaction-induced lateral flow.....	57
9.4.7	Scour	58
9.4.8	Spudcan interaction with adjacent infrastructure	58
9.4.9	Geohazards.....	58
9.4.10	Carbonate material.....	58
10	Structural response.....	58
10.1	Applicability.....	58
10.2	General considerations.....	59
10.3	Types of analyses and associated methods	59
10.4	Common parameters	60
10.4.1	General.....	60
10.4.2	Natural periods and related considerations	60
10.4.3	Damping	61
10.4.4	Foundations	61
10.4.5	Storm excitation	61
10.5	Storm analysis.....	61
10.5.1	General.....	61
10.5.2	Two-stage deterministic storm analysis	62
10.5.3	Stochastic storm analysis.....	63
10.5.4	Initial leg inclination.....	64
10.5.5	Limit state checks	64
10.6	Fatigue analysis	64
10.7	Earthquake analysis.....	64
10.8	Ice.....	66
10.8.1	General.....	66
10.8.2	ULS.....	66
10.8.3	ALS.....	66
10.8.4	Assessments in the area types.....	67
10.8.5	Additional factors for arctic and cold regions	67
10.9	Accidental situations	67
10.10	Alternative analysis methods	67
10.10.1	Ultimate strength analysis.....	67
10.10.2	Methodology	67
11	Long-term applications.....	68
11.1	Applicability.....	68
11.2	Assessment data	68

11.3	Special requirements	68
11.3.1	Fatigue assessment	68
11.3.2	Weight control	68
11.3.3	Corrosion protection	69
11.3.4	Marine growth	69
11.3.5	Foundations	69
11.4	Survey requirements	69
12	Structural strength	69
12.1	Applicability	69
12.1.1	General	69
12.1.2	Truss type legs	70
12.1.3	Other leg types	70
12.1.4	Fixation system and/or elevating system	70
12.1.5	Spudcan strength including connection to the leg	70
12.1.6	Overview of the assessment procedure	71
12.2	Classification of member cross-sections	71
12.2.1	Member types	71
12.2.2	Material yield strength	71
12.2.3	Classification definitions	71
12.3	Section properties of non-circular prismatic members	72
12.3.1	General	72
12.3.2	Plastic and compact sections	72
12.3.3	Semi-compact sections	72
12.3.4	Slender sections	72
12.3.5	Cross-section properties for the assessment	72
12.4	Effects of axial force on bending moment	73
12.5	Strength of tubular members	73
12.6	Strength of non-circular prismatic members	73
12.7	Assessment of joints	73
13	Acceptance criteria	73
13.1	Applicability	73
13.1.1	General	73
13.1.2	Ultimate limit states	74
13.1.3	Serviceability and accidental limit states	74
13.1.4	Fatigue limit states	74
13.2	General formulation of the assessment check	74
13.3	Leg strength assessment	75
13.4	Holding system strength assessment	76
13.5	Spudcan strength assessment	76
13.6	Hull elevation assessment	76
13.7	Leg length reserve assessment	76
13.8	Overturning stability assessment	77
13.9	Foundation integrity assessment	78
13.9.1	Foundation capacity check	78
13.10	Displacement check	79
13.11	Interaction with adjacent infrastructure	79
13.12	Temperatures	79
Annex A (informative)	Additional information and guidance	80
Annex B (normative)	Summary of partial action and partial resistance factors	283
Annex C (informative)	Additional information on structural modelling and response analysis	285

Annex D (informative) Foundations — Recommendations for the acquisition of site-specific geotechnical data	295
Annex E (informative) Foundations — Additional information and alternative approaches	301
Annex F (informative) Guidance on Clause A.12 — Structural strength.....	328
Annex G (informative) Contents list for typical site-specific assessment report	342
Annex H (informative) Regional information	349
Bibliography	358

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[ISO 19905-1:2023](#)

<https://standards.itih.ai/catalog/standards/sist/0aec3a6d-a9b7-498b-81ca-d7a6af5ea3b2/iso-19905-1-2023>

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, *Oil and gas industries including lower carbon energy*, Subcommittee SC 7, *Offshore structures*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 12, *Oil and gas industries including lower carbon energy*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 19905-1:2016), which has been technically revised.

The main changes are as follows:

- updates regarding operations in arctic areas in: Scope, 5.1.4, Figure 5.2-1, 6.7, 7.2, 7.6, 7.8, 10.8, Table 10.3-1 and A.10.8, and added 8.8.9;
- need for Classification revised in Scope and expanded in 5.1.7;
- Clause 3 updated to align with 19900 and other sources. Further definitions added;
- added definitions of symbols for undrained shear strength in 4.1.2;
- added definitions of symbols for horizontal and moment capacity coefficients and cyclic degradation factors in 4.1.5;
- interaction with SSA-I explained in 5.1;

- exposure levels (in 5.5) revised to align with ISO 19900:2019;
- requirements and information on earthquake response analysis gathered in 10.7 and A.10.7 respectively and referenced from 8.6, 8.7, 8.8, A.8.6.3, A.8.7;
- 9.3, A.9.3.1.2, A.9.3.3.1 and A.9.4.1 expanded to include foundation capacities and stiffnesses based on strength parameters rather than applied preload. Clause E.4 added to address the former;
- clarifications of Step 2 foundation checks in 9.3.6;
- 9.4.6 on cyclic mobility expanded to address liquefaction and liquefaction-induced lateral flow and A.9.4.6 expanded accordingly;
- earthquake analysis requirements (in 10.7) revised; reference to 5.5.5 added and text moved from other clauses inserted;
- minor update to alternative analysis methods (see 10.10, formerly 10.9);
- minor clarifications in 13.2;
- clarified that the H_{\max} to H_{srp} relationships in A.6.4.2.2 are defaults in the absence of site-specific data; the application of kinematics reduction in A.6.4.2.3 is no longer by means of wave height reduction;
- most probable peak enhancement factor in A.6.4.2.7 now given as a range;
- default current profile in A.6.4.3 revised;
- alternative wind profiles now permitted in A.6.4.6.2;
- added references to ISO 19901-10 and ISO 19901-8 in A.6.5.1.1;
- added reference to liquefaction-induced lateral flows in Table A.6.5-1;
- the requirements for the geotechnical report in A.6.5.1.5.3 have been revised and expanded especially in respect of shear strength;
- penetration in clays in A.9.3.2.2 updated to address strain rate dependency and strain softening;
- squeezing of clay in A.9.3.2.6.2 revised;
- punch-through for sand overlying clay in A.9.3.2.6.4 clarified and formula revised;
- major updates to the ultimate vertical/horizontal/rotational capacity interaction function and parameters in A.9.3.3.2 for spudcans in sand and clay due to the inclusion of further soil profiles in clay and an approach for including the effects of cyclic loading on foundation capacities;
- the effect of cyclic loading on the yield surface has been added in A.9.3.3.7; incorporates text that was in A.9.3.4.2.2;
- revised guidance on the selection of shear modulus for clay in A.9.3.4;
- Step 2a foundation capacity and sliding checks in A.9.3.6.4 revised and the figures corrected;
- guidance on Cyclic mobility in A.9.4.6 significantly expanded, and this clause now also addresses liquefaction and liquefaction-induced lateral flow;

ISO 19905-1:2023(E)

- guidance on structural and foundation modelling expanded in A.10.7.3.2 with particular reference to modelling for earthquake response analysis;
- guidance on ice added in A.10.8;
- guidance in A.12.2.3.2 on non-circular prismatic member classification and in A.12.2.3.3 on reinforced components clarified in respect of slender components;
- sketch in Table 12.3-1 b) corrected;
- clarifications in Table A.12.4-1 and correction to formula in Figure A.12.4-1;
- guidance on strength of tubular members in A.12.5 updated to align with ISO 19902:2020 (combined axial and bending loading in A.12.5.3 of cosine interaction form instead of previous form using linear interaction) and simplified combined axial, bending, beam shear and torsion checks have been added;
- clarified calculation for e in A.12.6.2.3 on axial compressive local strength check;
- clarified F_y in A.12.6.2.5.4 on Class 4 slender-section bending moment strength;
- beam shear area formulations for chord cross sections updated in A.12.6.3.4;
- Table B-2: revised partial resistance factor for horizontal foundation capacity for total stress (clay/undrained) and added partial resistance factors for vertical-horizontal foundation bearing capacity when considering material factored representative soil strength and for calculated foundation capacities.
- corrections to formulae in Figure C.2.4-1, "The drag-inertia method including DAF scaling factor";
- Figure E.1-1 corrected;
- Figure E.3-1 b) corrected;
- added Clause E.4 on calculated foundation capacities approach;
- added Clause E.5 providing an example of a simplified free-field liquefaction assessment calculation method;
- Norway regional requirements in H.2 updated. H.2.2 Regulatory framework and H.2.4 Technical commentary deleted. Added new H.2.3 Technical requirements for jack-up rigs operating close to a permanent occupied installation.
- US Gulf of Mexico requirements (H.3) metocean data replaced by reference to hurricane data from API RP-2MET, 2019. General updates. Unoccupied post-evacuation case expanded.

A list of all parts in the ISO 19905 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.

Introduction

This document is one of the International Standards on offshore structures prepared by TC 67/SC 7 (i.e. ISO 19900, the ISO 19901 series, ISO 19902, ISO 19903, ISO 19904-1, the ISO 19905 series and ISO 19906).

NOTE 1 These are sometimes incorrectly referred to as the ISO 19900 series on offshore structures.

The International Standards on offshore structures prepared by TC 67/SC 7 address design requirements and assessments for all offshore structures used by the petroleum and natural gas industries worldwide. Through their application, the intention is to achieve reliability levels appropriate for attended and unattended offshore structures, regardless of 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 or assessment rules, safety elements, workmanship, quality control procedures and national requirements, all of which are mutually dependent. The modification of one aspect of design or assessment in isolation can disturb the balance of reliability inherent in the overall concept or structural system. The implications involved in modifications, therefore, must be considered in relation to the overall reliability of all offshore structural systems.

The International Standards on offshore structures prepared by TC 67/SC 7 are intended to provide wide latitude in the choice of structural configurations, materials and techniques without hindering innovation. Sound engineering judgment is, therefore, necessary in the use of these documents.

This document, which has been developed from the Society of Naval Architects and Marine Engineers (SNAME) Technical & Research Bulletin 5-5A (2002)^[170], states the general principles and basic requirements for the site-specific assessment of mobile jack-ups; it is intended to be used for site-specific assessment and not for jack-up design.

NOTE 2 For the exposure level 1 (L1) assessment and, where appropriate, the exposure level 2 (L2) assessment prior to evacuation being effected, this document requires the use of 50 year independent or 100 year joint probability metocean extremes, together with associated partial action factors. It is based on extensive benchmarking and best practice in the international community.

Site-specific assessment is normally carried out when it is intended to install an existing jack-up unit at a specific site. The assessment is not intended to provide a full evaluation of the jack-up; it assumes that aspects not addressed herein have been addressed using other practices and standards at the design stage. In some instances, the original design of all or part of the structure could be in accordance with other International Standards on offshore structures prepared by TC 67/SC 7, and in some cases, different practices or standards could have been applied.

The purpose of the site assessment is to demonstrate the adequacy of the jack-up and its foundations for the assessment situations and defined limit states, taking into account the consequences of failure. It is important that the results of a site-specific assessment be appropriately recorded and communicated to those persons required to know or act on the conclusions and recommendations. Alternative approaches to the site-specific assessment can be used, provided that they have been shown to give a level of structural reliability equivalent, or superior, to that implicit in this document.

Annex A provides background to and guidance on the use of this document. The clause numbering in Annex A is the same as in the main text in order to facilitate cross-referencing. ISO/TR 19905-2 provides additional background to some clauses and a detailed sample 'go-by' calculation.

ISO 19905-1:2023(E)

NOTE 3 ISO/TR 19905-2:2012 is based on ISO 19905-1:2012. The second edition of ISO/TR 19905-2 will be based on this document.

Annex B summarizes the partial factors. Supplementary information is presented in Annexes C to G. Annex H presents regional information.

NOTE 4 The site-specific assessment (SSA) of a jack-up normally comprises the two parts: an elevated SSA (SSA-E), addressed in this document, and an installation and removal SSA (SSA-I), which is planned to be addressed in an International Standard as part of the ISO 19905 series.

In this document, the following verbal forms are used:

- “shall” indicates a requirement;
- “should” indicates a recommendation;
- “can” indicates a possibility or a capability;
- “may” indicates a permission.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO 19905-1:2023](https://standards.iteh.ai/catalog/standards/sist/0aec3a6d-a9b7-498b-81ca-d7a6af5ea3b2/iso-19905-1-2023)

<https://standards.iteh.ai/catalog/standards/sist/0aec3a6d-a9b7-498b-81ca-d7a6af5ea3b2/iso-19905-1-2023>

Oil and gas industries including lower carbon energy — Site-specific assessment of mobile offshore units —

Part 1: Jack-ups: elevated at a site

1 Scope

This document specifies requirements and provides recommendation and guidance for the elevated site-specific assessment (SSA-E) of independent leg jack-up units for use in the petroleum and natural gas industries. It addresses:

- a) occupied non-evacuated, occupied evacuated and unoccupied jack-ups;
- b) the installed (or elevated) phase at a specific site.

It also addresses the requirement that the as-installed condition matches the assumptions used in the assessment.

This document does not address the site-specific assessment of installation and removal (SSA-I).

To ensure acceptable reliability, the provisions of this document form an integrated approach, which is used in its entirety for the site-specific assessment of a jack-up.

When assessing a jack-up operating in regions subject to sea ice and icebergs, it is intended that the assessor supplements the provisions of this document with the relevant provisions relating to ice actions contained in ISO 19906 and procedures for ice management contained in ISO 35104. This document does not address design, transit to and from site, or installation and removal from site.

This document is applicable only to independent leg mobile jack-up units that are structurally sound and adequately maintained, which is normally demonstrated through holding a valid recognized classification society, classification certificate. Jack-ups that do not hold a valid recognized classification society certificate are assessed according to the provisions of ISO 19902, supplemented by methodologies from this document, where applicable.

NOTE 1 Well conductors can be a safety-critical element for jack-up operations. However, the integrity of well conductors is not part of the site-specific assessment process for jack-ups and is, therefore, not addressed in this document. See A.1 for guidance on this topic.

NOTE 2 RCS rules and the IMO MODU code (International Maritime Organisation Mobile Offshore Drilling Unit code) provide guidance for the design of jack-ups.

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 19900:2019, *Petroleum and natural gas industries — General requirements for offshore structures*

ISO 19905-1:2023(E)

ISO 19901-1:2015, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 1: Metocean design and operating conditions*

ISO 19901-2, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 2: Seismic design procedures and criteria*

ISO 19901-4, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 4: Geotechnical and foundation design considerations.*

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

ISO 19906:2019, *Petroleum and natural gas industries — Arctic offshore structures*

ISO 35104, *Petroleum and natural gas industries — Arctic operations — Ice management*

ISO 35106, *Petroleum and natural gas industries — Arctic operations — Metocean, ice, and seabed data*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19901-2, ISO 19901-4, ISO 19906 and the following apply.

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

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

3.1 abnormal environmental event

environmental *hazardous event* (3.31) having probability of occurrence not greater than 10^{-3} per annum (1 in 1 000 years)

[SOURCE: ISO 19900:2019, 3.1]

<https://standards.iteh.ai/catalog/standards/sist/0a6c3a6d-a9b7-498b-81ca-d7a6af5ea3b2/iso-19905-1-2023>

3.2 abnormal wave crest

wave crest with probability of typically 10^{-3} to 10^{-4} per annum

3.3 accidental event

non-environmental *hazardous event* (3.31) having probability of occurrence not greater than 10^{-3} per annum (1 in 1 000 years)

Note 1 to entry: Accidental events, as referred to in this document, are associated with a substantial release of energy, such as vessel collisions, fires, and explosions.

Note 2 to entry: Lesser accidents that could be expected during the life of the structure, such as dropped objects and low energy vessel impact, are termed incidents and are addressed under operational design situations.

[SOURCE: ISO 19900:2019, 3.2]

3.4 action

external load applied to the *jack-up* (3.36) (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. An imposed acceleration can be caused by an earthquake.