
**Petroleum and natural gas
industries — Site-specific assessment
of mobile offshore units —**

**Part 3:
Floating unit**

*Industries du pétrole et du gaz naturel — Évaluation spécifique au
site d'unités mobiles en mer —*

Partie 3: Unité flottante



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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 on 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 the following URL: 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*.

A list of all parts in the ISO 19905 series can be found on the ISO website.

Introduction

The series of International Standards applicable to types of offshore structure, ISO 19900 to ISO 19906, addresses 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 manned and unmanned offshore structures, whatever 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 the 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, need to be considered in relation to the overall reliability of offshore structural systems.

The series of International Standards applicable to the various types of offshore structure is 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.

This document states the general principles and basic requirements for the site-specific assessment of mobile floating units. The technical information used in the assessment primarily resides in documents referenced herein. This document is intended to be used for assessment and not for design.

Site-specific assessment is normally carried out when an existing mobile floating unit is to be installed at a specific site. The assessment is not intended to provide a full evaluation of the unit; it is assumed that aspects not addressed herein have been addressed at the design stage using other practices and standards.

The purpose of the site-specific assessment is to demonstrate the adequacy of the mobile floating unit, its stationkeeping system and any connected systems for the applicable assessment situations and defined limit states, taking into account the consequences of failure. The results of a site-specific assessment should 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 reliability equivalent, or superior, to that implicit in this document.

In International Standards, the following verbal forms are used:

- “shall” and “shall not” are used to indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted;
- “should” and “should not” are used to indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited;
- “may” is used to indicate a course of action permissible within the limits of the document;
- “can” and “cannot” are used for statements of possibility and capability, whether material, physical or causal.

Petroleum and natural gas industries — Site-specific assessment of mobile offshore units —

Part 3: Floating unit

1 Scope

This document specifies requirements and gives guidance for the site-specific assessment of mobile floating units for use in the petroleum and natural gas industries. It addresses the installed phase, at a specific site, of manned non-evacuated, manned evacuated and unmanned mobile floating units.

This document addresses mobile floating units that are monohull (e.g. ship-shaped vessels or barges); column-stabilized, commonly referred to as semi-submersibles; or other hull forms (e.g. cylindrical/conical shaped). It is not applicable to tension leg platforms. Stationkeeping can be provided by a mooring system, a thruster assisted mooring system, or dynamic positioning. The function of the unit can be broad, including drilling, floatel, tender assist, etc. In situations where hydrocarbons are being produced, there can be additional requirements.

The requirements of this document apply to the hull and stationkeeping system for all types of mobile units. The activity specific operating guideline document requirements can be modified to be appropriate to the situation being assessed.

This document does not address all site considerations, and certain specific locations can require additional assessment.

This document is applicable only to mobile floating units that are structurally sound and adequately maintained, which is normally demonstrated through holding a valid RCS classification certificate.

This document does not address design, transportation to and from site, or installation and removal from site.

This document sets out the requirements for site-specific assessments, but generally relies on other documents to supply the details of how the assessments are to be undertaken. In general:

- ISO 19901-7 is referenced for the assessment of the stationkeeping system;
- ISO 19904-1 is referenced to determine the metocean actions on the unit;
- ISO 19906 is referenced for arctic and cold regions;
- the hull structure and airgap are assessed by use of a comparison between the site-specific metocean conditions and its design conditions, as set out in the RCS approved operations manual;
- ISO 13624-1 and ISO/TR 13624-2^[1] are referenced for the assessment of the marine drilling riser of mobile floating drilling units. Equivalent alternative methodologies can be used;
- IMCA M 220^[5] is referenced for developing an activity specific operating guidelines. Agreed alternative methodologies can be used.

NOTE 1 The scope of ISO 19904-1 specifically states that its requirements do not apply to mobile units, but the methodologies given for assessing metocean actions can be used.

NOTE 2 RCS rules and the IMO MODU code^[4] provide guidance for design and general operation of mobile floating units.

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 13624-1:2009, *Petroleum and natural gas industries — Drilling and production equipment — Part 1: Design and operation of marine drilling riser equipment*

ISO 19900:2013, *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 19901-7:2013, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 7: Stationkeeping systems for floating offshore structures and mobile offshore units*

ISO 19904-1, *Petroleum and natural gas industries — Floating offshore structures — Part 1: Monohulls, semi-submersibles and spars*

ISO 19906:—¹⁾, *Petroleum and natural gas industries — Arctic offshore structures*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19900, ISO 19901-1, ISO 19901-7, ISO 19904-1 and the following 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 activity specific operating guidelines ASOG

document that sets out the activity specific actions to be taken at specific *alert level thresholds* (3.3)

Note 1 to entry: The ASOG for drilling operations is often called the well specific operating guideline document.

Note 2 to entry: An example ASOG for DP and moored units is given in [Annex A](#).

3.2 alert level

condition when certain parameters are below the lower limit, or between limits, or above the upper limit

Note 1 to entry: Alert levels are often colour-coded. The colour-coding will often be green for normal, blue for advisory, yellow alert, or red alert. Parameters affecting the change of colour-coded alert levels can be, for example, limiting metocean conditions are reached, loss of equipment function, reduced power levels, offset limits are reached [*watch circles* (3.17)], vessel motions, etc. Actions that need to be taken can include, for example, discontinue drilling, disconnect riser, suspend lifts, etc.

3.3 alert level threshold

boundary between *alert levels* (3.2) which is crossed when certain parameters reach or exceed specific limits and that triggers actions

1) To be published. Stage at time of publication ISO/DIS 19906:2017.

3.4**assessment****site-specific assessment**

evaluation of a mobile floating unit and activity specific equipment to determine compliance with the requirements of this document

[SOURCE: ISO 19905-1:2016, 3.4, modified — the definition has been revised.]

3.5**assessment situation**

mobile floating unit configuration together with the metocean and ice actions to be assessed

[SOURCE: ISO 19905-1:2016, 3.5, modified — the definition has been revised.]

3.6**assessor**

entity performing the site-specific assessment

[SOURCE: ISO 19905-1:2016, 3.6]

3.7**drift-off**

unintended move of a dynamically positioned or thruster-assisted vessel off its intended location [*watch circle* (3.17)] relative to its set point, generally caused by loss of stationkeeping control or propulsion

[SOURCE: ISO 13624-1:2009, 3.1.25, modified — the definition has been revised.]

3.8**drive-off**

unintended move of a dynamically positioned or thruster-assisted vessel off its intended location [*watch circle* (3.17)] relative to its set point, driven by the vessel's main propulsion or stationkeeping thrusters

[SOURCE: ISO 13624-1:2009, 3.1.27, modified — the definition has been revised.]

3.9**extreme storm event**

extreme combination of wind, wave and current conditions to which the structure can be subjected during its deployment

Note 1 to entry: This is the metocean event used for ULS storm assessment and varies depending on what is being assessed. For example, the metocean event for the ULS assessment of the mooring system can be different from that used in the ULS assessment of the hull strength or airgap.

[SOURCE: ISO 19905-1:2016, 3.17, modified — Note 1 to entry has been revised.]

3.10**operating manual****marine operations manual**

manual that defines the operational characteristics and capabilities of the mobile floating unit

Note 1 to entry: The *assessor* (3.6) is advised to ensure that the operations manual referenced is the latest revision and that any updated weight data are provided.

[SOURCE: ISO 19905-1:2016, 3.45, modified — “jack-up” has been replaced by “mobile floating unit”.]

3.11**operator**

representative of the companies leasing the site

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

[SOURCE: ISO 19905-1:2016, 3.46]

3.12

recognized classification society

RCS

member of the International Association of Classification Societies (IACS), with recognized and relevant competence and experience in mobile floating units, and with established rules and procedures for classification/certification of such units used in petroleum-related activities

[SOURCE: ISO 19901-7:2013, 3.23, modified — the definition has been revised.]

3.13

set point position

intended location of the *unit* (3.15)

3.14

sudden hurricane

hurricane that forms locally and, due to speed of formation and proximity to infrastructure at time of formation, might not allow sufficient time to evacuate manned facilities

Note 1 to entry: The population of storms used to derive the sudden hurricane at a given site can be defined in terms of the time horizon required to evacuate the site.

3.15

unit

platform

complete assembly, including hull structure, topsides, foundations and stationkeeping systems

[SOURCE: ISO 19900:2013, 3.35, modified — the definition has been revised.]

3.16

unit owner

representative of the companies owning or chartering the *unit* (3.15)

[SOURCE: ISO 19905-1:2016, 3.29, modified — “jack-up” has been replaced by “unit”.]

3.17

watch circles

concentric group of imaginary closed curves (e.g. circles) developed from the *alert levels* (3.2) that indicate when specific actions need to be taken

Note 1 to entry: Watch circles, which are often colour coded to indicate the actions that need to be taken, are normally described in the *activity specific operating guidelines* (3.1).

4 Abbreviated terms

ALS	accidental limit state
ASOG	activity specific operating guidelines
DP	dynamic positioning
FLS	fatigue limit state
FMEA	failure mode and effects analysis
IACS	International Association of Classification Societies
IMCA	International Marine Contractors Association
IMO	International Maritime Organization

MODU	mobile offshore drilling unit
MOU	mobile offshore unit
RAO	response amplitude operators
RCS	recognized classification society
SLS	serviceability limit state
ULS	ultimate limit state

5 Overall considerations

5.1 General

5.1.1 Competency

Assessments undertaken in accordance with this document shall only be performed by persons competent through education, training and experience in the relevant disciplines.

5.1.2 Planning

Adequate planning shall be undertaken before a site-specific assessment is started. The planning shall include the determination of all assessment situations relevant for the site under consideration. The assessment criteria shall be in accordance with the general requirements for assessment of existing structures specified in ISO 19900, as far as relevant for mobile floating units.

5.1.3 Reporting

The assessor should prepare a report summarizing the inputs, assumptions and conclusions of the assessment. Previous site-specific assessments may be taken into consideration when preparing the report.

5.1.4 Regulations

Each country can have its own set of regulations concerning offshore operations. It is the responsibility of the operator and the owner of the mobile floating unit to comply with relevant rules and regulations, which can depend upon the site and type of activities to be conducted.

5.1.5 Classification of unit

This document is applicable only to mobile floating units that are structurally sound and adequately maintained. To achieve this, the unit shall either

- hold valid classification society certification from an RCS, as defined in [3.12](#), throughout the duration of the operation at the specific site subject to assessment, or
- have been verified by an independent competent body to be structurally fit for purpose for afloat operations, and are subject to periodic inspection, both to the standards of an RCS.

Mobile floating units that do not comply with this requirement shall be assessed in accordance with the provisions of ISO 19904-1, supplemented by methodologies from this document, where applicable.

5.2 Assessment

The objective of the assessment is to show that the acceptance criteria are met. [Annex B](#) provides a diagrammatic example of the process to be used in the site-specific assessment of a mobile floating

unit. Other approaches may be applied; they shall be shown to give a level of reliability equivalent, or superior, to that implicit in this document.

In situations where hydrocarbons are being produced, the requirements of this document should be supplemented with consideration of the additional risk and consequences that can result in additional requirements.

5.3 Exposure levels

The exposure level for each site-specific assessment of a mobile floating unit shall be determined by the owner and the operator and, where applicable, shall be agreed by the regulator and the operator and by the regulator and operator(s) of adjacent facilities.

NOTE Adjacent facilities (workover platform, local platforms, transport lines, subsea facilities, etc.) are those that are sufficiently close to the unit for there to be a potential for impact if the unit drifts from location.

Exposure levels for extreme storm assessments are given in [Table 1](#).

Consequence categories and life safety categories are given in ISO 19900.

Table 1 — Determination of exposure level (from ISO 19900:2013)

Life-safety category	Consequence category		
	C1 High consequence	C2 Medium consequence	C3 Low consequence
S1 Manned non-evacuated	L1	L1	L1
S2 Manned evacuated	L1	L2	L2
S3 Unmanned	L1	L2	L3

The stationkeeping system shall be assessed as per [Clause 9](#) for levels L1 and L2.

The following apply to categories L1, L2 and L3:

- L1: The extreme storm referenced in [Clause 8](#) shall be the 50 year independent extremes.
- L2: The extreme storm referenced in [Clause 8](#) for exposure level L2 shall be the 50 year independent extremes that could be reached at the site prior to evacuation being effected (e.g. 50 year 48 hour notice sudden hurricane in tropical revolving storm areas).
- L3: The assessment criteria for the hull and stationkeeping system shall be agreed between the owner and the operator.

5.4 Selection of limit states

ISO 19900 defines four limit state categories:

- a) ultimate limit states (ULS);
- b) serviceability limit states (SLS);
- c) fatigue limit states (FLS);
- d) accidental limit states (ALS).

The limit states enumerated above apply to the hull and stationkeeping system of the mobile floating unit. They can also apply to other activity critical components for which assessments are required by this document (see [10.2](#)), e.g. marine drilling riser and wellhead on drilling units.

NOTE 1 The ULS is normally based on the unit being in a survival condition with, for example, the marine drilling riser disconnected on drilling units or equivalent survival preparations being undertaken on other types of unit.

NOTE 2 The limits of the SLS are often based on, for example, the capability of the connected marine drilling riser on drilling units, or other limiting equipment on other types of unit. The ASOG specifies the circumstances under which the unit transitions from the SLS to the ULS conditions.

For moored units and thruster-assist moored units, the stationkeeping damaged case (e.g. a single line damage or loss of thruster assistance component(s) as determined through FMEA) shall be assessed (see ISO 19901-7) as part of the ULS condition. It can be acceptable to continue site-specific activities with the unit in an impaired state (e.g. with a single line damaged); in such cases, it shall be shown that

- the unit in the impaired/damaged condition meets all the requirements of this document, including the requirement for an additional stationkeeping redundancy case (e.g. another mooring line damaged), and
- the failure was not the result of a systemic defect or error that can lead to other stationkeeping components failing under non-extreme conditions.

The FLS is generally addressed at the design stage and fatigue need not be considered, unless the unit is to be operated in conditions outside the design envelope.

The ALS are generally addressed at the design stage and need not be evaluated in the site-specific assessment, unless there are unusual risks at the site under consideration that were not considered at the design stage.

NOTE 3 Changes to the grade or strength of the mooring system can affect the fatigue capacity of certain hull and equipment components, e.g. fairleads, mooring winches, etc.

5.5 Determination of assessment situations

5.5.1 General

Provisions related to metocean conditions and their application are given in ISO 19900, and these shall be complied with in conjunction with the further requirements of ISO 19901-1 and those of this document.

Assessment situations include all the service and operational requirements resulting from the intended use of the floating structure and the metocean conditions that could affect the stationkeeping system, and any activity specific requirement limitations, according to ISO 19900.

In particular, an environmental assessment situation consists of a set of actions induced by waves, wind, current and ice (if any) on the floating structure, related systems (e.g. the mooring system, if applicable), and activity specific equipment (e.g. risers), and is characterized by a given return period for one or more environmental variables or for a contour of environmental variables.

Criteria to be met in the assessment can be directly related to the specific formulation of the assessment situations. In this case, assessment situations, calculation process and assessment criteria are interrelated and should not be separated from one another.

A mobile floating unit can be used in various modes at a single site (e.g. operating or survival mode, etc.) and at a number of different alert levels. Any required restrictions on the mode of operations shall be included in the ASOG. See also ISO 19901-7:2013, Clause 6 for additional discussion that can be applicable to assessment situations.

If the deployment is to be of limited duration, applicable (seasonal) data may be used for the months under consideration, including suitable contingency.

5.5.2 Arctic operations and ice

For mobile offshore floating units stationed or operating in arctic or cold regions, the mobile unit-specific requirements of ISO 19906:—, Clauses 13 and 17 shall apply, subject to the following.

The stationkeeping system of units stationed or operating in arctic or cold regions shall comply with the requirements of ISO 19901-7 supplemented with additional requirements in cases when loss of stationkeeping can result in loss of life or threat to the environment. In the latter cases, the requirement of ISO 19906:—, 13.4.3.1 shall apply.

Ice actions and ice action factors shall be calculated in accordance with ISO 19906.

A detailed risk assessment shall be conducted to document the ice related risks to the safety of the unit and its operation. Additional site-specific data, not listed in [Clause 6](#), are required to undertake these studies.

5.5.3 Earthquake

Earthquakes do not normally affect floating structures, but there have been cases of vessels suffering severe damage from close intense seismic events. If operating close to a highly active fault (see ISO 19901-2[2]), the potential effects of earthquakes should be considered.

5.6 Models and analytical tools

Guidance is given in ISO 19900:2013, Clause 10 and A.3 on the use and validation of analytical tools and models.

6 Data to be assembled for each site

6.1 Applicability

[Clause 6](#) describes the data that are required to undertake an assessment and to ensure that the assessment is compatible with the site-specific installation. Data are required on the unit, its stationkeeping system, and the activity use limitations (see [6.5](#)). The assessor shall endeavour to ensure that the information supplied reflects the latest available, including all weight changes, upgrades, modifications, etc.

In this document, the field is the general area where the mobile floating unit is to operate; the site is the specific position/orientation within the field. The site data are normally a subset of the field data.

6.2 Mobile floating unit data

The mobile floating unit data required to perform an assessment include:

- type of unit;
- the latest revision of the drawings, relevant specifications and the operations manual, including limiting hull survival conditions;
- wind, wave, and current action coefficients for calculating metocean actions and displacements, revalidated for modifications to the unit, if applicable;
- design parameters including, where applicable, any proposed deviations for the intended operation;
- details of any modifications relevant to the stationkeeping and its current capabilities;
- assurance that all stationkeeping equipment is fully operational;
- motion RAOs used for determining dynamic loading for mooring and riser analysis (if applicable for type of stationkeeping system and specific use of the unit);
- equipment data where applicable, e.g. riser or tensioner system data, timing of emergency disconnect sequences.

NOTE There is considerable merit in ensuring that information on rig modifications is transferred between owners when the unit ownership is transferred.

6.3 Stationkeeping data

6.3.1 General

Data shall be gathered on the stationkeeping system and its capability. The history of the stationkeeping system's use should be maintained where reasonably possible. These data can be used to help assess component fatigue, integrity, and fitness for purpose against discard criteria.

6.3.2 Moored units

The data required to assess the suitability of a moored unit should include a complete description of the mooring system and all its components, e.g.:

- mooring line component details including length, size, strength, stiffness, construction, etc.;
- anchor type and size, including fluke angle of drag anchors, if it is adjustable;
- mooring winch capacity;
- documentation that the mooring system components are in compliance with relevant inspection standard.

6.3.3 Moored units with thruster assist

The data on the mooring system are required with additional information on the thruster assist system, including:

- thruster details;
- circumstances under which thrusters will be used;
- details of thruster control;
- worst single point thruster failure, for use in the damaged condition assessment (see ISO 19901-7:2013, 8.9).

6.3.4 Dynamically positioned units

The data required to assess the suitability of the DP system include:

- unit DP RCS approved classification (i.e. DP 1, DP 2 or DP 3);
- thruster details;
- position reference system details and which will be used under which circumstances;
- details of the DP control system, including the power management system;
- capability plots for DP units.

6.4 Site data

The owner and the operator shall agree on the extent of the site data required and its validity. The details of the site data required depend on the type of unit, its stationkeeping system, and the activity being undertaken. Site data can be a required input for the risk assessment (see [10.3](#)). Metocean data can be a required input to the assessment of the stationkeeping system, the marine drilling riser, airgap, and, in certain circumstances, for investigation of hull strength. Geotechnical data are required for assessing the anchoring system on moored units and can affect the results of a marine drilling riser

assessment. Existence of squalls can affect the time required to change modes of operation, so can affect the ASOG. The site-specific data should include (see also ISO 19901-7:2013, 7.2):

- water depth and bathymetry within the anchor pattern;
- geotechnical information (see also ISO 19901-4:2016, A.10 for soil–structure interaction for risers and flowlines and ISO 19901-4:2016, A.11 for geotechnical design of anchors);
- seabed hazards/infrastructure, including pipelines, umbilicals, wind farm power cable, wrecks, ammunition dumps, archaeological sites, endangered species, proximity of escarpments, etc.;
- operating metocean parameters;
- extreme metocean parameters;
- water column hazards, including requirements for minimum depth of mooring lines in a safety fairway, crossed moorings, etc.;
- water surface hazards, including buoys, etc.

NOTE This list is not inclusive of all the required data. Some special site specific details can be important, but are beyond the scope of this document to define. As an example, the presence of an escarpment can necessitate specific procedures for recovering the riser to minimum depth when abandoning the location due to severe weather. This ability to pull the riser can, in turn, be affected by prevailing metocean conditions such as loop currents.

6.5 Data on activity use limitations

6.5.1 General

The limitations of use shall be developed and documented based on suitable information supplied for that purpose.

The time needed to effect the actions required when reaching an alert level threshold shall be determined in advance and documented. It can affect how far in advance a specific action should be undertaken to ensure safe operations.

The owner and the operator shall agree on the relevant limitations, and suitable values of those limitations, to be used in the assessment (see 6.5.3). The limitations are critical inputs to the development of the activity specific operating guideline (ASOG). An ASOG shall be developed for all mobile floating unit operations (see 10.4).

6.5.2 Reassessment or modification of activity use limitations

The activity use limitations can require updating based on the results of the following:

- stationkeeping assessment (see Clause 9);
- analysis of the activity specific equipment (see 10.2);
- limitations discovered during the development of the ASOG (see 10.4).

Any changes shall be agreed between the owner and the operator.

6.5.3 Sources of data and types of activity use limitations

Activity use limitations can be developed using industry recognized standards, when such standards exist, or with input from other sources such as equipment vendor, designer, or through operator experience. The type of limitation depends on the specific use of the unit. Examples include:

- limiting motions to avoid riser tensioner stroke out;

- limiting flex joint angle for drilling or to disconnect a drilling riser to avoid overstressing the wellhead, drill pipe, etc. (see ISO 13624-1:2009, Annex A);
- limiting offset to disconnect umbilicals on a tender assist vessel;
- limiting motions at which the walkway should be disconnected on a floatel.

The specific use of the mobile floating unit determines the limitations for each mode (e.g. operating mode, survival mode, etc.) and the different alert levels. Examples of the limitations can be:

- magnitude of the motions of the unit (e.g. linear motions, maximum offsets, angular motions);
- quantity of electrical power available;
- number or type of position reference system(s) available;
- impairment of the functioning of the unit.

6.6 Post installation data

As-installed configuration data shall be collected. These shall be compared to the assumptions used in the assessment (see [Clause 11](#)).

7 Actions

Metoccean and ice actions on the unit, and motions of the unit, should be calculated by use of properly validated, unit specific coefficients, modified as necessary to account for changes to hull, draft and equipment. If properly validated coefficients do not exist for the unit, information on determining the metoccean actions on mobile floating units, and the resulting motions, can be found in ISO 19901-7 and ISO 19904-1. ISO 19906 provides information on, and assessment of, ice actions. ISO 13624-1 provides information on the actions on, and assessment of, marine drilling risers.

8 Hull of unit

8.1 Strength

8.1.1 General

The strength of the hull shall be shown to be sufficient for operations at the proposed location. For operations in arctic and cold conditions, see [5.5.2](#).

8.1.2 Monohull

The strength of a monohull unit need not be explicitly assessed if the unit is classed by its RCS for

- a) unrestricted ocean service, or
- b) wave conditions equal to or exceeding the extreme storm at the site.

If the unit is classed for restricted ocean service and the site conditions exceed the classed limits, its adequacy may be demonstrated by hull girder analysis following the methodology set out in the relevant RCS rules for wave conditions of up to and including the ULS extreme storm and FLS conditions at the site (see [5.4](#)).

DP monohull units shall be assessed to the same criteria, unless it can be shown, through a risk-based approach, that reduced metoccean conditions are suitable (e.g. through moving off location). Plans to move off location shall be documented and it shall be demonstrated that the unit can be relocated safely

within the constraints of the alert system. In tropical revolving storm areas, the reduced storm should be no less severe than the ULS sudden hurricane.

NOTE There can be an adverse influence of the mooring system on the ability of a monohull to withstand the metocean conditions for which it would normally be considered acceptable.

8.1.3 Semi-submersible

The structural strength of a semi-submersible hull need not be explicitly assessed if the unit is classed by its RCS for wave conditions equal to or exceeding the ULS extreme storm and FLS conditions at the site (see 5.4). If this condition is not fulfilled, the adequacy of the hull strength shall be demonstrated by overall structural analysis according to the requirements of the relevant RCS.

DP semi-submersible units shall be assessed to the same criteria, unless it can be shown, through a risk-based approach, that reduced metocean conditions are suitable (e.g. through moving off location). Plans to move off location shall be documented and it shall be demonstrated that the unit can be relocated safely within the constraints of the alert system. In tropical revolving storm areas, the reduced storm should be no less severe than the ULS sudden hurricane.

8.1.4 Other hull forms

For other hull forms, the requirements of 8.1.3 shall apply.

8.2 Airgap and freeboard

8.2.1 General

The structure and permanent equipment above the sea surface shall be checked for the potential of wave impact in both the operating and survival conditions.

8.2.2 Monohull

The structure and permanent equipment on a monohull unit need not be explicitly assessed for the effects of green water if the unit is classed by its RCS for unrestricted ocean service. If the unit is classed for restricted ocean service, the hull and deck equipment shall be assessed to demonstrate that there will be no significant green water damage in wave conditions of up to and including the ULS extreme storm (see 5.4).

DP monohull units shall be assessed to the same criteria, unless it can be shown, through a risk-based approach, that reduced metocean conditions are suitable (e.g. through moving off location). Plans to move off location shall be documented and it shall be demonstrated that the unit can be relocated safely within the constraints of the alert system. In tropical revolving storm areas, the reduced storm should be no less severe than the ULS sudden hurricane.

8.2.3 Semi-submersible

The airgap of a semi-submersible unit need not be explicitly assessed if the unit is classed by its RCS for wave conditions equal to or exceeding the ULS extreme storm at the site. If this condition is not fulfilled, the adequacy of the airgap shall be demonstrated by analysis following the methodology set out in the relevant RCS rules for wave conditions up to and including the ULS extreme storm (see 5.3). If negative airgap exists, the relevant structure and permanent equipment shall be assessed using appropriate hydrostatic and dynamic loading. Alternatively, a risk-based approach may be used to demonstrate that no waves conditions up to and including that of the ULS extreme storm will have significant consequences.

DP semi-submersible units shall be assessed to the same criteria, unless it can be shown, through a risk-based approach, that reduced metocean conditions are suitable (e.g. through moving off location). Plans to move off location shall be documented and it shall be demonstrated that the unit can be relocated

safely within the constraints of the alert system. In tropical revolving storm areas, the reduced storm should be no less severe than the ULS sudden hurricane.

8.2.4 Other hull forms

For other hull forms, the requirements of 8.2.3 shall apply.

8.3 Temperature

The 50 year lowest mean daily average air and water temperatures shall be in compliance with the limits given in the operating manual.

NOTE The purpose of this check is to ensure that the field temperature is compatible with the material used in the construction.

8.4 Stability

No pre-deployment stability assessment is required for vessels classed for unrestricted ocean service. Vessels classed for restricted service shall be assessed to ensure that they can be operated with sufficient stability to comply with the applicable RCS requirements in all conditions up to and including the ULS extreme storm (see 5.4).

NOTE In certain areas of the world, regulations can require reassessment of the stability of the unit to include the effects of icing, etc.

9 Stationkeeping system

9.1 General

There are two primary types of stationkeeping systems:

- moored, with or without thruster assist;
- dynamic positioning.

ISO 19901-7 gives requirements for stationkeeping systems. For operations in arctic and cold conditions, see also 5.5.2.

9.2 Moored

The mooring system should be suitable for operations at the site and shall be assessed. Methods of assessment shall follow the relevant mobile mooring requirements of ISO 19901-7.

9.3 Thruster assisted mooring

A thruster assist mooring system shall be assessed. Methods shall follow the relevant requirements of ISO 19901-7.

NOTE The efficiency of thrusters can be reduced by the presence of waves and vessel motions. This can adversely affect the stationkeeping capability of the unit.

9.4 Dynamic positioning systems

The unit shall meet the DP requirements of IMO and the RCS for its DP design metocean conditions.

NOTE 1 There are no other specific DP capability requirements within this document.

NOTE 2 DP capabilities are an integral part of the ASOG.

NOTE 3 The dynamic position stationkeeping capability is normally given in capability plots within the operating manual, although additional information can be required to develop the activity specific operating guideline document.

10 Activity specific assessments

10.1 General

The activity specific assessment entails using the data gathered on the unit, the site, and the activity use limitations to assess the suitability of the unit to undertake the proposed activities at the site, and to define the operating limitations. The steps in this process include:

- using the data gathered on activity use limitations (see 6.5.2) to determine operating envelopes;
- assessment of the site-specific activity equipment;
- completing a risk assessment of the operations;
- derivation of the alert level thresholds contained within the ASOG;
- developing the ASOG.

Site-specific equipment should remain within its operating limits under normal operating conditions. It shall be demonstrated that it is possible to change the mode or activate the alert level actions sufficiently quickly to prevent unacceptable damage.

NOTE Examples of situations that can require mode change, or bring about the crossing of an alert level threshold, include deteriorating metocean conditions, DP drift-off, excessive vessel motions, etc.

10.2 Assessment of site-specific activities and equipment

10.2.1 General

The owner and the operator shall agree on the extent of analysis required of the activity specific equipment. Limits of service, component strength, effects on vessel equipment, changes of mode, definition of emergency situations, etc. shall also be agreed between the same parties.

There can also be coastal and flag state requirements.

10.2.2 Marine drilling riser assessment

The strength of a marine drilling riser and its operational limits shall be assessed using ISO 13624-1 or other applicable standards, subject to agreement between the owner and the operator. Additional information for deep water riser operations can be found in ISO/TR 13624-2^[1].

10.3 Risk assessment

The risks associated with the stationkeeping system and its interaction with activities, infrastructure (e.g. on the seabed) or other units close to the site shall be assessed and documented.

The risks to installations or other vessels in the vicinity due to loss of stationkeeping of the MOU shall be considered. The results shall be documented and the risks mitigated down to acceptable levels.

10.4 Activity specific operating guidelines

The ASOG shall be developed following the procedures given in IMCA M 220^[5] or a similar methodology.

The document contents should be agreed between the owner and the operator.

Example activity specific operating guideline documents for a DP vessel and a moored vessel are given in [Annex A](#).

NOTE 1 Since the ASOG is to be used on the unit by operations personnel, it is important that it is both simple to use and concise.

Additional activity-specific guidance can be required when performing certain critical activities (e.g. establishing the most fault tolerant configuration for the DP system and associated plant and equipment). Examples of critical activities include

- drilling with non-shearable components across the blow out preventer (BOP),
- close proximity operations,
- well testing,
- bridge-connected operations, and
- critical lift activities.

NOTE 2 These are sometimes referred to as critical activity modes (CAMO).

For MODUs operating in arctic and cold regions (see ISO 19906), the ASOG shall be supplemented with an ice management plan.

A management of change procedure shall be developed. An example of implementation of such a procedure includes the temporary operation of other adjacent vessels that are not specifically identified within the ASOG (e.g. SIMOPS, diver support operations, pipelay, etc.).

NOTE 3 It is possible that a mobile floating unit can be in compliance with the requirements set out in this document, but is not suitable for the specific activities that it is intended to carry out (e.g. have insufficient up-time).

NOTE 4 ISO 13624-1, supplemented with additional information for deep water operations from ISO/TR 13624-2^[1], gives valuable information on developing the limits of service for risers and the methods for developing the inputs to an activity specific operating guideline document. While the documents are written for marine drilling risers, they contain useful information and techniques that can be used to assess and develop the required documents for other systems and activities (e.g. pipelay vessels, tender assist drilling vessels, etc.).

11 Confirmation of compatibility between analysis and as-installed condition

Data on the as-installed configuration shall be collected and compared to the site-specific assessment configuration to ensure that any differences do not materially change the site-specific assessment conclusions. In the case of significant differences, the site-specific assessment and ASOG shall be updated accordingly. Alternatively, the operating limits shall be reduced to a level consistent with safe operation of the unit and its equipment, and a suitable ASOG developed. This should be carried out before activity specific operations are commenced.

If necessary, and where practical, the location of the anchors, including embedment, should be verified after installation, and tensioning records maintained.

Annex A (informative)

Outline of an activity specific operating guideline document for a dynamically positioned unit and a moored unit

[Table A.1](#) is an example of the type of information that can be included in an activity specific operating guideline document for a DP unit.

Table A.1 — Example of the type of information that can be included in an ASOG for a DP unit

		Normal	Advisory	Yellow alert	Red alert
Condition	Definition	Normal operation with full redundancy	Limited operations due to deterioration in environment or equipment, but single failure will NOT result in position loss	Unable to maintain station within predefined yellow watch circle offset limits or there has been an equipment, system or component failure that when combined with another failure could result in loss of position	Unable to maintain station within predefined red watch circle offsets limits due to environmental effects beyond the rig's capabilities or equipment, system or component failure results in loss of position
	Actions	None	Limited risk or discussions	Activate yellow alert and associated activities	Activate red alert and associated activities
	Change of status notification	DP control to notify relevant personnel as per details in actual ASOG			
Environmental/service limits	Excursion				
	Offset	Exactly on location	Determined from activity assessment	Determined from activity assessment	Non-recoverable within activity limits
	Heading control	Normal excursions	To be defined	To be defined	To be defined
	Criterion 1	To be defined	To be defined	To be defined	To be defined
	Criterion 2	To be defined	To be defined	To be defined	To be defined
	Criterion 3	To be defined	To be defined	To be defined	To be defined