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

Part 3: Floating units

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

Partie 3: Unités flottantes

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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 19905-3:2017), which has been technically revised.

The main changes compared to the previous edition are as follows:

— removed definitions of drift off and drive off in Clause 3 and consolidated under loss of position;

— Table 1 in Clause 5 removed and reference made to ISO 19900;

— FLS removed from 8.1.2 and 8.1.3;

— air gap requirements modified in 8.2;

— ISO 35104 referenced in 10.4;

— editorial revision.

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

The International Standards on offshore structures prepared by TC 67 (i.e. ISO 19900, the ISO 19901 series, ISO 19902, ISO 19903, ISO 19904-1, the ISO 19905 series, ISO 19906) constitute a common basis addressing design requirements and assessments of all types of offshore structures used by the petroleum and natural gas industries worldwide.

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

Through their application, the intention is to achieve adequate structural integrity and performance based on reliability levels appropriate for manned and unmanned offshore structures, whatever the nature or combination of the materials used.

Structural integrity is an overall concept comprising: models for describing actions; structural analyses; design or assessment rules; safety elements; workmanship; quality management; and national requirements, all of which are mutually dependent. The modification of any of these elements in isolation can cause an imbalance or inconsistency, with possible impact on the reliability inherent in the offshore structure. The implications involved in modifying one element, therefore, are considered in relation to all the elements and the overall reliability of the offshore structure.

The International Standards on offshore structures prepared by TC 67 are intended to provide latitude in the choice of structural configurations, materials and techniques and to allow for innovative solutions. Sound engineering judgement is, therefore, necessary in the use of these documents.

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 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.

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

Part 3:
Floating units

1 Scope

This document specifies requirements and recommendations 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.

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 effects of the metocean actions on the unit;

— ISO 19906 is referenced for arctic and cold regions;

— the hull structure and air gap 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 is referenced for developing an activity specific operating guidelines. Agreed alternative methodologies can be used.

NOTE RCS rules and the IMO MODU code[13] 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, *Petroleum and natural gas industries — Drilling and production equipment — Part 1: Design and operation of marine drilling riser equipment*

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 19901-7, *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: Ship-shaped, semi-submersible, spar and shallow-draught cylindrical structures*

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

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

International Marine Contractors Association, "Guidance on Operational Activity Planning", IMCA M 220

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 https://www.iso.org/obp

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

3.1
activity specific operating guidelines
ASOG
document that sets out the activities that need to be undertaken at specific *alert level thresholds* (3.4) for specified changes in conditions

Note 1 to entry: These guidelines are in a document that sets out high level actions to be undertaken at specific alert level thresholds.

Note 2 to entry: The ASOG for drilling operations is often called the well specific operating guideline document (WSOG).

Note 3 to entry: An example ASOG for DP (dynamic positioning) and moored units is given in Annex A.

3.2
air gap
distance between the highest water elevation and the lowest exposed part of the primary deck structure and permanent equipment not designed to withstand associated environmental action effects

[SOURCE: ISO 19900:2019, 3.5, modified — "structure" and "action effects" not defined herein, "and permanent equipment" added and "for defined return period" deleted.]

3.3
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 for reduced status, and red alert for emergency status. Parameters affecting the change of colour-coded alert levels can be, for example, approach of limiting metocean conditions, loss of equipment function, reduced available power levels, offset limits are reached [*watch circles* (3.17)], excessive vessel motions are predicted, etc. Actions to be taken can include, for example, discontinue drilling, disconnect riser, suspend lifts, etc.

3.4
alert level threshold
boundary between *alert levels* (3.3)

3.5
assessment
site-specific assessment
evaluation of a mobile floating unit and activity specific equipment to determine conformity with specific requirements

Note 1 to entry: The specific requirements are the requirements of this document (i.e. 19905-3).

Note 2 to entry: Definition derived from ISO 19905-1:2016, 3.4.

3.6
assessment situation
mobile floating unit configuration together with the metocean and ice actions that need to be assessed

3.7
assessor
entity performing the *site-specific assessment* (3.5)

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

3.8
extreme storm event
extreme combination of wind, wave and current conditions used for the *assessment* (3.5) of the mobile floating unit

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 air gap.

3.9
loss of position
unintended move of a dynamically positioned or thruster-assisted vessel from its intended location [*watch circle* (3.17)] relative to its *set point position* (3.13), generally caused by loss of stationkeeping control or propulsion

Note 1 to entry: Loss of position can take on three main forms drift off, drive off, or force off.

3.10
operating manual
marine operations manual
latest approved document that defines the operational characteristics and capabilities of the mobile floating unit

[SOURCE: ISO 19905-1:2016, 3.45, modified — “jack-up” has been replaced by “mobile floating unit”, Note 1 to entry has been deleted, and “manual” replaced by “latest approved document”.]

3.11
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.

Note 2 to entry: The operator can be termed the owner or the duty holder.

[SOURCE: ISO 19900:2019, 3.35]

3.12
recognized classification society
RCS
member of the International Association of Classification Societies, 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 — "floating structures" has been replaced by "mobile floating units", and "installations" has been replaced by "such units".]

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

3.16
unit owner
representative of the companies owning or chartering the *unit* (3.15)

[SOURCE: ISO 19905-1:2016, 3.29, modified — Term "jack-up owner" has been replaced by "unit owner" and "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* (3.3) with respect to the *set point position* (3.13) that indicate when specific activities need to be undertaken

Note 1 to entry: Watch circles, which are often colour coded to indicate the activities that need to be undertaken, are normally described in the activity specific operating guidelines.

4 Abbreviated terms

ALS	abnormal / accidental limit state
DP	dynamic positioning
FLS	fatigue limit state
FMEA	failure mode and effects analysis

IMCA	International Marine Contractors Association
IMO	International Maritime Organization
MODU	mobile offshore drilling unit
MOU	mobile offshore unit
RAO	response amplitude operators
SLS	serviceability limit state
TAM	thruster assisted mooring
ULS	ultimate limit state
WSOG	well specific operating guideline document

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

Planning shall be undertaken before a site-specific assessment is started.

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 conform 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 by those necessary to account for any additional risk.

5.3 Exposure levels

The exposure level for each site-specific assessment of a mobile floating unit shall be

a) determined by the unit owner and the operator,

b) where applicable, agreed by the regulator and the operator, and

c) where applicable, agreed 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 are defined in ISO 19900, with the following additional criteria:

— L1: The extreme storm event used in assessment of the hull, referenced in Clause 8, shall be the 50 year independent extremes or the classed return period, where it is known and more onerous.

— L2: The extreme storm event used in assessment of the hull, 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). The unmanned post evacuation case shall be considered according to criteria to be agreed between the operator and the unit owner.

— L3: The assessment criteria shall be agreed between the unit owner and the operator.

The stationkeeping system shall be assessed as per Clause 9.

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) abnormal/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 for 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 condition.

For moored units and thruster-assist moored units, the stationkeeping damaged case (e.g. a single mooring 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 mooring 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. This document contains no specific requirements that fatigue be considered.

The ALS are generally addressed at the design stage. This document contains no specific requirements that the ALS 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 (see 10.3).

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 in ISO 19900 related to metocean conditions and their application shall be conformed with in conjunction with the further requirements of ISO 19901-1 and those of this document.

According to ISO 19900, 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.

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).

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 19906:2019, Clauses 13 and 17 shall apply, subject to the following:

a. The stationkeeping system of units stationed or operating in arctic or cold regions shall conform 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: 2019, 13.4.3.1 shall apply.

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

c. 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 19900:2019, Clauses 11 and A.11 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.

NOTE 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 shall include the following:

— 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;

— preferred rig heading.

NOTE There is considerable merit in ensuring that information on mobile floating unit 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. 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 to assess a moored unit shall include a definition of the mooring system and all its components, including the following:

— mooring line component details including length, size, strength, stiffness, construction, etc.;

— anchor type, size, including fluke angle of drag anchors, if it is adjustable, and soil type suitability;

— mooring winch type and holding capacity;

— documentation that the mooring system components are in conformity with relevant inspection standard.

6.3.3 Moored units with thruster assist

The data to assess a thruster assisted unit shall include a definition of the mooring system (see 6.3.2); the thruster assist system and controls; and their respective components, including the following:

— thruster details;

— circumstances under which thrusters will be used;

— details of thruster control;

— thruster efficiencies and interaction limits;

— worst single point failure in the thruster system, for use in the damaged condition assessment (see ISO 19901-7:2013, 8.9).

6.3.4 Dynamically positioned units

The data to assess a dynamically positioned unit, and for the DP input to the development of the ASOG, shall include the following:

— unit DP RCS approved classification (i.e. DP 1, DP 2 or DP 3);

— position reference system details and which will be used under which circumstances;

— all relevant capability plots for DP units.

— project specific procedures that may require consideration from a stationkeeping perspective.

— Details and results of FMEA, and trials.

6.4 Site data

The unit owner and the operator shall agree on the extent of the site data required and its validity.

NOTE 1 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, air gap, 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.

The site-specific data include (see also ISO 19901-7:2013, 7.2) the following:

— water depth and bathymetry within the anchor pattern;

— geotechnical information (see also ISO 19901-4:2016, Clause A.10 for soil–structure interaction for risers and flowlines, ISO 19901-4:2016, Clause A.11 for geotechnical design of anchors, and ISO ISO 19901-8 and ISO 19901-10 for the marine soil and site investigations techniques);

— seabed hazards/infrastructure, including subsea hardware, pipelines, umbilicals, wind farm power cable, wrecks, ammunition dumps, archaeological sites, endangered species, proximity of escarpments, etc.;

— operating metocean parameters;

— extreme metocean parameters (including localized events such as solitons);

— water column hazards, including requirements for minimum depth of mooring lines in a safety fairway, crossed moorings, etc.;

— water surface hazards, including buoys, etc.

— potential for ice;

— previous operational experience in the area.

NOTE 2 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 of the unit shall be developed and documented based on suitable information supplied for that purpose.

An activity specific operating guideline (ASOG) shall be developed for all mobile floating unit operations (see 10.4).

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

The unit 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 ASOG.

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);

— brownfield modifications (e.g. for changes during the planned operations, etc.).

Any changes in activity/use limitations shall be agreed between the unit 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 and guidelines, when such 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 the following:

— 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, or

— impairment of the functioning of the unit.

6.6 Post installation data

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

7 Actions

Metocean and ice actions on the unit, and motions of the unit, should be calculated by use of validated, unit specific coefficients, modified as necessary to account for changes to hull, draft and equipment. If validated coefficients do not exist for the unit, information on determining the metocean 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 (e.g. drillship) 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 structure analysis following the methodology set out in the relevant RCS rules for wave conditions of up to and including the ULS extreme storm at the site.

DP monohull units shall be assessed to the same monohull 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 DP monohull units off location shall be documented. 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 The actions that the mooring system impose on the hull can increase the internal hull loads (e.g. hull girder bending moment) beyond the original design condition.

8.1.3 Semi-submersible

This document contains no specific requirements that the structural strength of a semi-submersible hull 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 hull strength shall be demonstrated by overall structural analysis, including redundancy 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 DP semi-submersible units off location shall be documented. 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 Air gap 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

This document contains no specific requirements for freeboard or the explicit assessment of the structure and permanent equipment on a monohull unit 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 DP monohull units off location shall be documented. 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

This document contains no specific requirements that the air gap of a semi-submersible unit 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, and

— has been reviewed following the methodology set out in the latest rules and guidelines of the applicable RCS for metocean conditions up to the ULS extreme storm at the site. Both the survival and operating conditions shall be assessed.

NOTE Air gap can be affected by the wave steepness, vessel motions, draft, trim, stability, and other factors.

If this condition is not fulfilled, the adequacy of the air gap shall be assessed following the methodology set out in the latest rules and guidelines of an applicable RCS for metocean conditions up to the following:

a. the ULS extreme storm at the site in the survival condition;

b. the metocean limits for the operating conditions.

If negative air gap exists, the relevant structure and permanent equipment shall be assessed using appropriate hydrostatic and hydrodynamic loading. Alternatively, a risk-based approach may be used, as agreed between unit owner and operator, to demonstrate that no waves conditions up to and including that of the ULS extreme storm can 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 DP semi-submersible units off location shall be documented. 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 conformance 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 additional 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 conform with the applicable RCS requirements in all conditions up to and including the ULS extreme storm event (see 5.4).

NOTE In certain areas of the world, regulations can require assessment 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 5.5.2.

9.2 Moored

The mooring system shall be assessed for operations at the site in accordance with the relevant mobile mooring requirements of ISO 19901-7.

9.3 Thruster assisted mooring

A thruster assist mooring system shall be assessed in accordance with 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 conditions. Other relevant industry guidelines should be considered.

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

NOTE 2 DP capabilities, including post failure capability limits are integral to the development 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 the following:

— 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 loss of position, excessive vessel motions, etc.

10.2 Assessment of site-specific activities and equipment

10.2.1 General

The unit 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 unit owner and the operator.

Additional information for deep water riser operations can be found in ISO/TR 13624-2[1].

Consideration should also be given to limitations of the wellhead.

The weak point analysis in conjunction with the metocean conditions should be used to establish point of disconnects and red watch circles. Appropriate site-specific weather criteria and mode for the emergency disconnect sequence impact the establishment of the red watch circles. Credible red watch circles are to be achieved and associated limiting metocean conditions should be clearly and unambiguously defined in the WSOG.

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.

The risk assessment shall identify the site and activity specific risks that are to be addressed within the ASOG.

10.4 Activity specific operating guidelines

The ASOG shall be developed following the guidance given in IMCA M 220 or a similar methodology.

The document contents should be agreed between the unit owner and the operator. (Since the ASOG is to be used on the unit by operations personnel, it is good practice that it be both simple to use and concise.)

Activity specific operating guideline documents for a DP vessel and a moored vessel are given in Annex A.

Additional ASOGs 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, (e.g. unit being close to another installation, gangway connected operations, mooring lines crossing over subsea infrastructure, etc.).

— well testing,

— bridge-connected operations, and

— critical lift activities.

NOTE 1 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 developed and implemented according to ISO 35104.

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 2 It is possible that a mobile floating unit can be in conformity 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 3 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.).

NOTE 4 Installation of integrated real-time mooring line tension and weather monitoring systems can help develop better understanding and calibrate performance of the unit against mooring analysis predictions and offsets (stationkeeping).

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 between the assessed and as-installed conditions, 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. The mooring test load should satisfy ISO 19901-7:2013, 10.4.6.

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 position 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 position 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
	Activities	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

Table A.1 *(continued)*

		Normal	Advisory	Yellow alert	Red alert
DP system limitations	Control system	All systems functioning	Loss of one piece of DP control equipment	Only one piece of DP equipment or DP control equipment remaining	Complete loss of DP equipment/ control
	Power generation	All systems functioning	One generator not available, but sufficient power remains	Loss of one (additional) generator will result in loss of position	Expect loss of position even with all available power on line
	Power distribution	All systems functioning	Minor system upset	Single fault will result in loss of position	Blackout or equivalent
	Thrusters	All systems functioning	Loss of one thruster, but operations normal	Loss of (additional) thruster will result in loss of position	All available thrusters on line, but insufficient to hold position
	Position reference	All systems functioning	One unit not functioning	Only one PRS available to DP	All PRS lost
	Motion and heading sensors	All systems functioning	To be defined	To be defined	To be defined
	Wind sensors	All systems functioning	To be defined	To be defined	To be defined
	Communications networks	All systems functioning	To be defined	To be defined	To be defined
Non-station-keeping	Fire/emergency	No F&G faults	To be defined	To be defined	To be defined
	Collision	No significant threat of collision	To be defined	To be defined	To be defined
	Other emergency	To be defined	To be defined	To be defined	To be defined

Table A.2 is an outline of the type of information that can be included in an activity specific operating guideline document for a moored unit. This is not intended to show what specifically should be included. The ASOG should be developed to suit the specific operations and requirements of the operations personnel.

Table A.2 — Example of the type of information that can be included in an ASOG for a moored unit

Operating manual requirements					
Metocean	Deteriorating metocean conditions close to limits set in the operating manual — Prepare to change draft from operating to survival if metocean continues to worsen — Prepare to stop activity specific operations		Metocean conditions at the limits set in the operating manual — Change draft from operating to survival — Stop activity specific operations		
		Normal	**Advisory**	**Yellow alert**	**Red alert**
Condition	Definition	Normal operation	Limited operations due to deterioration in environment or equipment, but single mooring line failure will NOT result in progressive mooring failure	Limited operations due to deterioration in environment or equipment, and single mooring line failure will likely result in progressive mooring failure	Unable to maintain position and progressive mooring failure imminent
	Activities	None	Limited risk or discussions	Activate yellow alert and associated activities	Activate red alert and associated activities
	Notification	Relevant personnel to be informed at status change			
Limitation	Metocean limits	Good weather, good forecast	Good weather, possible deteriorating forecast	Severe weather, possible deteriorating forecast	Extreme weather
	Vessel offset	Less than x,x	x,x to y,y	y,y to z,z	More than z,z
	Non-stationkeeping events		To be defined	To be defined	To be defined
	Riser angle	Less than x,x°	x,x° to y,y°	y,y° to z,z°	More than z,z°
	Prevailing conditions	Less than criterion A	Criterion A	Criterion B	Criterion C
	Mooring management	Normal operations	Action A	Action B	Action C
	Drilling management	Normal operations	Action AA	Action BB	Action CC

Annex B
(informative)

Suggested process for completing a site-specific assessment of a mobile floating unit

Figure B.1 shows the suggested process for completing a site-specific assessment of a mobile floating unit.

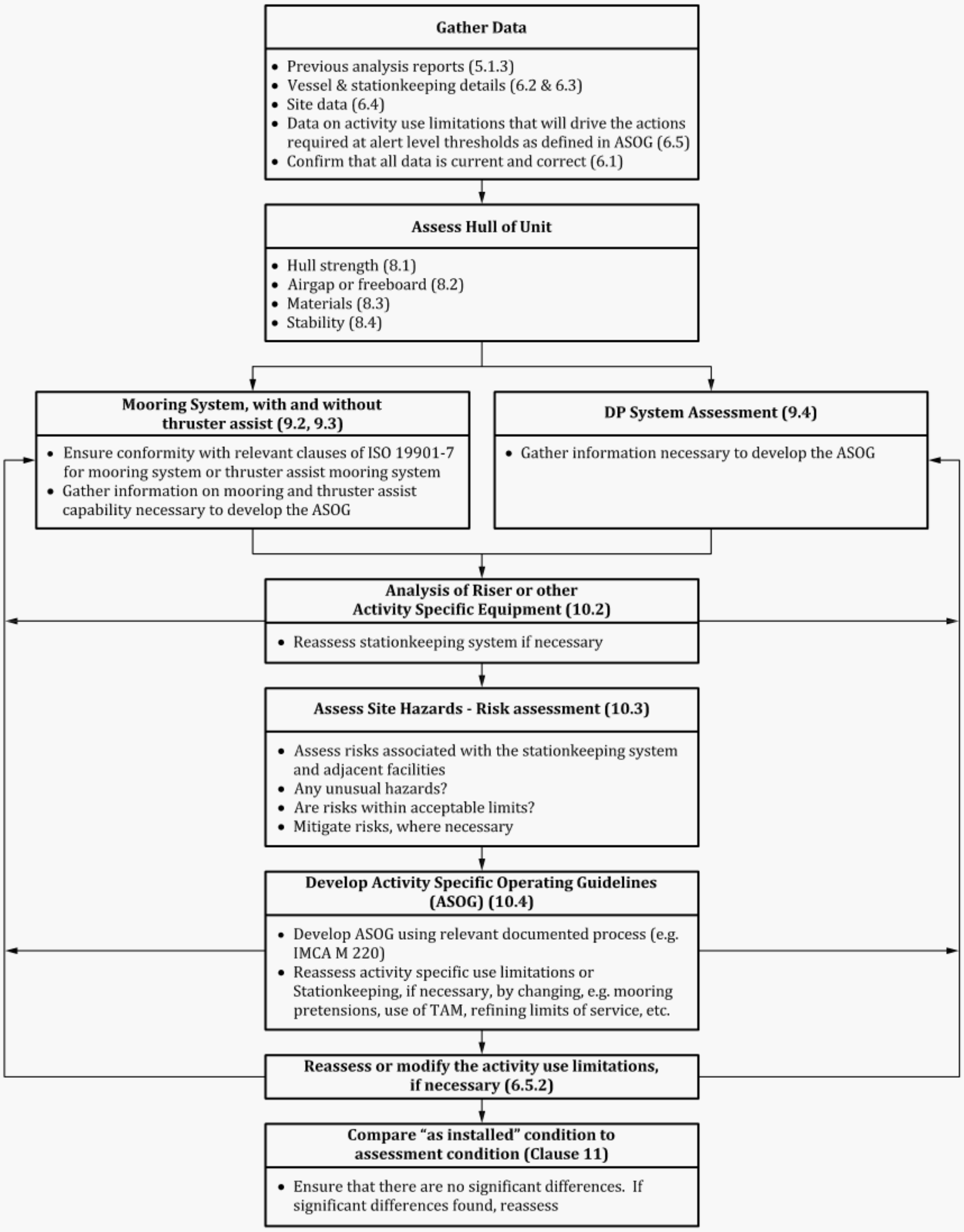

Figure B.1 — Suggested process for completing a site-specific assessment of a mobile floating unit

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