RULES FOR BUILDING AND CLASSING

MOBILE OFFSHORE DRILLING UNITS
2019

PART 7
SURVEYS

(Updated July 2019)

American Bureau of Shipping
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1701 City Plaza Drive
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PART 7

Surveys

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PART 7

CHAPTER 1 Surveys During Construction

SECTION 1 General

1 General

This Chapter pertains to surveys and testing to be carried out during construction of a mobile offshore drilling unit at the builder’s yard/facility. The requirements for design review are given in Parts 3, 4, and 5 of these Rules.

The requirements for specific surveys are included in subsequent Sections of this Chapter. Subsequent Sections are titled as follows:

- Section 2 Surveys at Builder’s Yard – Hull Structure and Outfitting
- Section 3 Surveys at Builder’s Yard – Machinery, Piping, Pressure Vessels, and Outfitting
- Section 4 Surveys at Builder’s Yard – Mechanical and Piping Systems
- Section 5 Surveys at Builder’s Yard – Electrical Cables and Equipment
- Section 6 Surveys at Builder’s Yard – Electrical Systems
- Section 7 Surveys at Builder’s Yard – Hazardous Areas
- Section 8 Surveys at Builder’s Yard – Fire and Safety
- Section 9 Surveys at Builder’s Yard – Sea Trial

Subsection ‘1’ titled “General” of every Section provides a brief explanation regarding purpose of that Section.

All Rule contents covered by subsequent Sections of this Chapter and that require visual examination, verification, testing, etc. are to be carried out in presence of and to the satisfaction of the attending Surveyor.

3 Survey at Builder’s Yard

During construction of a drilling unit, the attending Surveyor is to have access to the builder’s yard to witness construction and testing, as required by these Rules. The builder is to contact the attending Surveyor to make necessary arrangements. If the attending Surveyor finds reason to recommend repairs or additional surveys, notice will be immediately given to the builder’s representative so that appropriate action may be taken.

A Quality Control Program (QCP) is to be developed by the builder and submitted to the Surveyor for review and agreement. Required hold points on the QCP that is to form the basis for all future surveys throughout the contract period at the builder’s yard/facilities shall be agreed upon by the attending Surveyor. As a minimum, all of the items enumerated in the following applicable Sections are to be covered by the QCP. Surveyor shall assure that all tests and inspections specified in the QCP are satisfactorily carried out by a competent person, and surveys shall be considered to supplement and not replace inspections that should be carried out by the builder.
5 Certification and Classification

Conditions for Classification are defined in Part 1 of these Rules.

Upon satisfactory completion of all required design review, Surveyor’s visual examination, and confirmation/witness of applicable tests, dock-side trials, stability test, and the sea trials, an Interim Class Certificate (ICC) may be issued by the attending Surveyor, recommending the vessel be classed in accordance with the classification and certification agreement contained in the signed Request For Class (RFC) submitted to ABS and applied to the vessel’s classification.

5.1 Validity of an Interim Class Certificate (ICC)

Validity of the ICC will depend upon condition of the vessel at time of delivery, but it is not to exceed five (5) months.

An ICC issued without any outstanding item will be valid for five months and will recommend review and acceptance by the ABS Classification Committee. The classification package containing required documents/records, reports and certificates will be reviewed by ABS and processed for classification of the vessel.

An ICC issued with an outstanding item will be valid for less than five months and may be issued provided it is authorized by ABS, including conditions of classification.

5.3 Certification of Incomplete Drilling Units

In general, where the construction or trials of the drilling unit is incomplete and the unit is delivered for towage to another site for completion of all required examination and testing, and trials, an ICC will not be issued.

Issuance of the ICC will depend upon condition of the vessel at time of delivery and to be authorized by ABS. If issuance of an ICC is authorized, its validity may not exceed the period for drilling unit’s single direct voyage to the new site.

7 Onboard Drawings and Manuals

All reviewed and endorsed documents referenced in 7-2-1/17 of these Rules, required to be verified by the Surveyor during surveys after construction, are to be placed onboard the drilling unit.
PART 7

CHAPTER 1 Surveys During Construction

SECTION 2 Surveys at Builder’s Yard – Hull Structure and Outfitting

1 General

This Section pertains to surveys and testing to be carried out on hull structure and hull outfitting items during construction of a mobile offshore drilling unit at builder’s yard/facility. The requirements for design review are given Parts 3, 4, and 5 of these Rules.

For typical surveys required to be carried out, see subsequent Subsections of Section 7-1-2. All surveys and testing is to be carried out in presence of and to the satisfaction of the attending Surveyor, prior to the sea trial. Testing of the onboard computer (7-1-2/21), and hull structure testing such as hydrostatic testing (7-1-2/23.5) and hull structural testing (7-1-2/23.7) of tanks may be carried out during the sea trial as referenced in Section 7-1-9 of these Rules.

3 Survey of Hull Structure and Outfitting (2014)

All items of the hull structure and associated outfitting are to be surveyed during construction, outfitting and at sea trial. Surveys are to be carried out in accordance with the ABS approved “Hull Construction Monitoring Program” referenced in 7-1-2/4 of these Rules.

Welding and fabrication of structural components are to be in accordance with Sections 2-4-1 and 2-4-3 of the ABS Rules for Materials and Welding (Part 2), as applicable.

The Quality Control Program (QCP) for the construction of a drilling unit is to at least include the following items, as appropriate:

i) Material Quality, Suitability, and Traceability

ii) Welder Performance Qualification and associated Records

iii) Welding Procedure Specifications and Welding Procedure Qualification Records

iv) Preparation for welding including; forming, edge preparation, fit-up, alignment, cleanliness, and tack welds

v) Inspection of production welding including: environmental conditions, welding sequence, pre-heat, post-heat, back gouging, fairing, soundness of welds, and necessary repair procedure

vi) Nondestructive Testing (NDT)

vii) Corrosion Control Systems

viii) Compartment testing

Where structure is assembled in blocks or modules, the Surveyor is to inspect the fit-up, piping and electrical connections, and to witness the required tests on the completed assembly in guidance with the QCP, and in accordance with the approved plans and Rule/Guide requirements. The progress and suitability of structural fit-up and joining of constructed/fabricated blocks/modules are to be to the satisfaction of the attending Surveyor. All erection joints of hull structure are to be visually examined, proven tight, and the extent of Nondestructive Testing (NDT) carried out is to be to the satisfaction of the attending Surveyor. For further details of Surveyor attendance, see 7-1-2/5 through 7-1-2/27.
4 Hull Construction Monitoring Program (HCMP) (1 July 2019)

Hull structure of a mobile offshore drilling units to be classed using the ABS Rules for Building and Classing Mobile Offshore Drilling Units is to be constructed in presence of an ABS Surveyor using an ABS approved “Hull Construction Monitoring Program” (HCMP) as specified herein. Mobile offshore drilling units having been found in compliance with the requirements of these Rules may be distinguished in the Record with the notation OHCM.

The structural strength criteria specified in the ABS Rules are used by designers to establish acceptable scantlings in order that a vessel constructed to such standards and properly maintained will have adequate durability and capability to resist the failure modes of yielding, buckling and fatigue.

The application of the MODU Rules, associated Guides and other review techniques to assess a design for compliance with rule criteria also gives the designer and ABS the ability to identify areas that are considered critical to satisfactory in-service performance.

Knowing that the actual structural performance is also a function of construction methods and standards, it is prudent to identify “Critical Structural Areas” (CSA), particularly those approaching design limits, and use appropriate specified construction quality standards and associated construction monitoring and reporting methods to limit the risk of unsatisfactory in-service performance.

4.1 Critical Structural Area (CSA)

Critical Structural Areas are locations which have been identified from calculation to require monitoring or from the service history of the subject unit or from similar sister units to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the unit.

CSA may have a higher probability of failure during the life of the drilling unit compared to the surrounding areas, even though they may have been modified in the interest of reducing such probability. The higher probability of failure can be a result of stress concentrations, high stress levels and high stress ranges due to loading patterns, structural discontinuities or a combination of these factors. In order to provide an even greater probability of satisfactory in-service performance, the areas that are approaching the acceptance criteria can be identified so that additional attention may be paid during fabrication.

The objective of heightened scrutiny of building tolerance and monitoring in way of the critical areas is to minimize the effect of stress increases incurred as a result of the construction process. Improper alignment and fabrication tolerances may be potentially influential in creating construction-related stress.

4.3 Determination of CSA

A CSA can be determined in a number of ways, including but not limited to:

i) The results of engineering strength and fatigue analyses, such as specified in the Drillship Guide, Finite Element Analysis or a Dynamic Loading Approach analysis, particularly for areas approaching the allowable criteria.

ii) The application of the Steel Vessel Rules, such as 3-1-2/15.3.

iii) Details where fabrication is difficult, such as blind alignment, complexity of structural details and shape, limited access, etc.

iv) Input from owners, designers and/or shipyards based on previous in-service experience from similar vessels, such as corrosion, wear and tear, etc.

4.5 Details of Hull Construction Monitoring Program (2017)

A HCMP for CSAs, prepared by the shipyard and submitted for approval by ABS prior to the start of hull fabrication, is to include following data/details:

i) Structural drawings indicating the location of critical structural areas as identified by the ABS review

ii) Construction standards and QCP (see 7-1-2/3) to be applied
5 Material

5.1 Material Traceability
The builder is to maintain a system of material traceability to the satisfaction of the attending Surveyor. Data as to place of origin and results of tests for materials shall be retained and are to be readily available to the attending Surveyor upon request.

5.3 Material Selection
When selecting material grades for the classification of drilling units, minimum expected service temperature and structural element category is considered. Various parts of drilling units are grouped according to their material application categories, such as:

i) Special Application Structure, which are normally used for most critical structural areas

ii) Primary Application Structure, which are normally used for critical structural areas

iii) Secondary Application Structure, which are normally used for least critical structural areas
The structural elements falling into these categories are described in 3-1-4/5.3 through 3-1-4/5.7.

5.5 Steel Forming
When forming changes base plate properties beyond acceptable limits, appropriate heat treatments are to be carried out to reestablish required properties. Unless approved otherwise, the acceptable limits of the reestablished properties should meet the minimums specified for the original material before forming. Formed members with the forming dimensional tolerances required by the design, are to be examined.

7 Qualification of Welders and Welding Specifications
Welders, welding specifications and associated welding procedures are to be qualified in presence of and to the satisfaction of the attending Surveyor. Welders and welding techniques are to be qualified in accordance with Section 2-4-3 of the ABS Rules for Materials and Welding (Part 2).

For qualification of welders and welding procedures, only the applicable ABS Rules are to be used. Other alternative standards will be subject to special consideration and require prior review and approval by ABS.

9 Production Welding
Production welding and forming of steel is to be to the satisfaction of the Surveyor and in accordance with Section 2-4-1 of the ABS Rules for Materials and Welding (Part 2)

9.1 Thickness in Excess of 50 mm (2 in.)
Special precautions with regard to joint preparation, preheat, welding sequence, heat input and interpass temperature are to be taken for welding thick sections. Ultrasonic Testing (UT) to insure the absence of injurious laminations may be required for material used where through-thickness (Z direction) properties are important. Stress relieving, when specified, is to be carried out using an approved method.

9.3 Inspection of Welds
All welds are to be subject to visual inspection. Representative Nondestructive Testing (NDT) is to be carried out to the satisfaction of the Surveyor. Such testing is to be carried out after all forming and post weld heat treatment. Welds which are inaccessible or difficult to inspect in service may be subjected to increased levels of NDT.
9.5 Fillet Welds

Completed welds are to be to the satisfaction of the attending Surveyor. The gaps between the faying surfaces of members being joined should be kept to a minimum. Where the opening between members being joined exceeds 2.0 mm (1/16 in.) and is not greater than 5 mm (3/16 in.), the weld leg size is to be increased by the amount of the opening. Where the opening between members is greater than 5 mm (3/16 in.), corrective procedures are to be specially approved by the Surveyor.

Where small fillets are used to attach heavy plates or sections, special precautions such as the use of preheat or low-hydrogen electrodes or low-hydrogen welding processes may be required. When heavy sections are attached to relatively light plating, the weld size may be required to be modified.

11 Nondestructive Testing (NDT)

Prior to commencement of any NDT, an NDT plan is to be submitted to the attending Surveyor for review and acceptance, and is to conform to 2-4-1/5.17 of the ABS Rules for Materials and Welding (Part 2) and 7-1-2/9.3 of these Rules. NDT is to be carried out in accordance with ABS Guide for Nondestructive Inspection of Hull Welds.

All NDT procedures are to be reviewed and accepted by the Surveyor before commencement of NDT. Radiographic Testing (RT), Ultrasonic Testing (UT), Magnetic Particle Inspection (MPI), Penetrant Testing (PT), Eddy Current (EC) or Alternating Current Field Measurement (ACFM) is to be carried out to the satisfaction of the Surveyor. With the exception of RT, the Surveyor may require to witness the NDT carried out by a qualified technician.

11.1 NDT of Column-Stabilized Drilling Units

Complete Joint Penetration (CJP) butt welds, tee welds and corner welds, in following areas of a column-stabilized drilling unit are to be specifically subjected to NDT during construction:

- Fabrication/erection joints of pontoons, columns, bracings, diagonals, and upper deck structure (forming a box girder)
- Columns to pontoons or lower hulls
- Column to braces
- Columns to upper hull
- Braces to upper hull
- Brace-to-brace intersections
- Gussets and brackets in way of the above joints
- Internal continuation or back-up structure of the above joints
- Any temporary access closures or inserts in main structures

11.3 NDT of Self-Elevating Drilling Units

Complete Joint Penetration (CJP) butt welds, tee welds and corner welds, in following areas of a self-elevating drilling unit are to be specifically subjected to NDT during construction:

- Lattice-type leg structure; including chords, braces, racks and rack attachments
- Lattice-type leg gussets
- Cylindrical-type leg shell structure
- Fabrication/erection joints of spud-cans or mat
- Leg to spud-can or mat connections
- Jackcase (Jackhouse) to deck connections
- Any temporary access closures or inserts in main structures
11.5 **NDT of Surface-Type Drilling Units**

Complete Joint Penetration (CJP) butt welds, tee welds and corner welds, within the midship $0.6L$ of a surface-type drilling unit are to be specifically subjected to NDT during construction:

i) Intersections of butts and seams in the sheer strakes, bilge strakes, deck stringer plates and keel plates

ii) Intersections of butts in and about moonpool corners on main deck and bottom platings

iii) In the vicinity of breaks in the superstructure

iv) Any temporary access closures or inserts in main structures

At the discretion of the Surveyor, NDT outside the midship $0.6L$ is to be carried out at random.

11.7 **Type and Extent of NDT**

The percentage of weld joint to be subjected to NDT and type of NDT carried out (e.g., Radiographic Testing (RT), Ultrasonic Testing (UT), Magnetic Particle Inspection (MPI), Penetrant Testing (PT), Eddy Current (EC) or Alternating Current Field Measurement (ACFM)) will depend on the design of the unit and the calculated fatigue life of the joint.

Minimum extent of NDT to be carried out is shown in Table 1 of this Section. Volumetric NDT techniques include RT and UT. Surface NDT techniques include MPI, PT, EC or AFCM.

Additional NDT may be requested by the Surveyor if the quality of fabrication or welds is not in accordance with these Rules and applicable Standards.

11.9 **NDT Personnel and Records**

Builder’s NDT department is to be independent from other departments and not working for production.

All NDT records are to be reviewed by a Level 2 NDT technician and signed prior to review and endorsement by the attending Surveyor.

All NDT records are to be properly maintained at least until the delivery of the drilling unit, and be available to the Surveyor upon request anytime during construction.

11.11 **NDT Acceptance Standards**

Class A and Class B acceptance standards of the ABS Guide for Nondestructive Inspection of Hull Welds will be applicable as follows:

i) Class A acceptance criteria are to be used for NDT of welds of hull structure categorized as “Special Application Structure” or “Primary Application Structure” in accordance with 3-1-4/5.

ii) Class B acceptance criteria are to be used for NDT of welds of hull structure categorized as “Secondary Application Structure” in accordance with 3-1-4/5 and other locations where Class A acceptance criteria do not apply.

iii) Modified procedures and acceptance criteria are to be specified to reflect the application when radiographic or ultrasonic inspection is specified for other type connections such as partial penetration and groove type Tee or corner welds.
TABLE 1
Nondestructive Testing* (NDT) of Steel Structure Welds (2012)

<table>
<thead>
<tr>
<th>Structural Member</th>
<th>Extent and Type of NDT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Application Structure (Most Critical)</td>
<td>100% Volumetric NDT plus 100% Surface NDT all CJP welds, where welded plate thickness is ≥ 5/16 inch (8.0 mm); and</td>
</tr>
<tr>
<td></td>
<td>10% MPI of all fillet welds, where plate thickness is ≥ 5/16 inch (8.0 mm).</td>
</tr>
<tr>
<td>Primary Application Structure (Intermediate)</td>
<td>20% Volumetric NDT plus 100% Surface NDT of all CJP welds, where plate thickness is ≥ 5/16 inch (8.0 mm); and</td>
</tr>
<tr>
<td></td>
<td>10% Surface NDT of all fillet welds, where plate thickness is ≥ 5/16 inch (8.0 mm).</td>
</tr>
<tr>
<td>Secondary Application Structure (Least Critical)</td>
<td>Random Volumetric NDT of CJP welds and Surface NDT of fillet welds, only if</td>
</tr>
<tr>
<td></td>
<td>considered suspect by the attending Surveyor during construction.</td>
</tr>
</tbody>
</table>

* NDT procedures and acceptance criteria is to at least satisfy the ABS Guide for Nondestructive Inspection of Hull Welds.

13 Corrosion Protection

Unless otherwise approved, all steel work is to be suitably coated. Tanks or preload spaces intended for salt water ballast are to have a corrosion-resistant hard coating on all internal surfaces.

13.1 Performance Standards for Protective Coatings (PSPC)

Where requested by the Owner, a unit with protective coatings which are verified by a Surveyor to be in compliance with the ABS Guide for the Class Notation Coating Performance Standard (CPS) will be assigned and distinguished in the Record with the class notation CPS.

15 Survey of Load Line

Every drilling unit is to have marks which designate the maximum permissible draft when the unit is in the afloat condition. Such markings are to be placed at suitable visible locations on the structure, to the satisfaction of ABS. On column-stabilized units, where practical, these marks are to be visible to the person in charge of mooring, lowering or otherwise operating the unit.

The load lines are to be established under the terms of the International Convention on Load Lines. Where minimum freeboards cannot be computed by the normal methods laid down by the Convention, they are to be determined on the basis of compliance with the intact or damage stability requirements for afloat modes of operation. The requirement that the draft of the unit not exceed the assigned load line may be considered temporarily not applicable for bottom-supported units when raising, lowering or resting on the sea bed.

The requirements of the International Convention on Load Lines with respect to weathertightness and watertightness of decks, superstructures, deckhouses, doors, hatchway covers, other openings, ventilators, air pipes, scuppers, inlets and discharges, etc., are to be taken as a basis for all units in the afloat condition.

Upon satisfactory completion of the load line survey, an ABS LL-11D report is prepared by the Surveyor, which is to be maintained onboard the unit. Upon satisfactory completion of the deadweight or inclining experiment (as applicable) carried out in presence of the Surveyor, the builder’s stability report is to be submitted to ABS for review and issuance of the load line assignment. The Surveyor is to verify load line marking onboard the unit in accordance with the assignment.

17 Survey of Spaces (Damage Stability Criteria)

In assessing the damage stability of drilling units, as required by 3-3-2/1.3.2, the following extent of damage is assumed. If damage of a lesser extent results in a more severe condition, such lesser extent is to be assumed.

During the survey of spaces, all piping, ventilating systems, trunks, etc., within the assumed damage area are to be considered damaged. Positive means of closure are to be provided to preclude progressive flooding of other intact spaces. Assumed damage conditions are as follows.
17.1 Damage Conditions for Self-Elevating Units

For self-elevating units, the following extent of damage is to be assumed to occur between effective watertight bulkheads:

i) Horizontal depth of penetration 1.5 m (5 ft) from side shell

ii) Vertical extent of damage from the bottom plating upwards without limit. Where the unit is mat supported, assumed damage penetration simultaneous to both the mat and upper hull need only be considered when the lightest draft allows any part of the mat to fall within 1.5 m (5 ft) vertically of the waterline, and the difference in horizontal dimension of the upper hull and mat is less than 1.5 m (5 ft) in the area under consideration.

The recessed ends and sides of the drilling slot need not be subject to consideration of horizontal penetration, provided precautions are taken to prevent boats from entering the drilling slot when the unit is afloat (see 7-1-2/Figure 1).

![FIGURE 1](Damage Conditions for Self-Elevating Units (for details see 7-1-2/17.1) (2012)

17.3 Damage Conditions for Column-Stabilized Drilling Units

For column-stabilized units, the following assumptions apply at the designated operating drafts:

i) Only those columns on the periphery of the unit are to be assumed damaged with the damage confined to the exposed outer portions of the columns.

ii) Damage is assumed to occur for a vertical distance of 3 m (10 ft) at any level between 5.0 m (16.4 ft) above and 3.0 m (10 ft) below the draft under consideration. Where a Watertight flat is located within this zone, the damage is to be assumed to have occurred in both compartments above and below the Watertight flat in question.

iii) No vertical bulkhead is to be assumed damaged, except where bulkheads are spaced closer than a distance one-eighth of the column perimeter at the draft under consideration, measured at the periphery, in which case, one or more of the bulkheads is to be considered as damaged.

iv) Damage to the columns is to assume a horizontal depth of penetration of 1.5 m (5 ft).

v) Lower hulls or footings are to be treated as damaged when operating at a light or transit condition in the same manner as indicated in i) through iv).

If damage of a lesser extent results in a more severe final equilibrium condition, such less extent is to be assumed (see 7-1-2/Figure 2).

On certain modified existing units, the columns are exposed to collision in the full periphery outside the lines that connect the center of the main columns. In 7-1-2/Figure 2, showing a modified column-stabilized drilling unit with additional sponsons and single columns, the columns on each side are not aligned. Therefore, the line that connects the center column to the two end columns is not a straight line.
Another notable aspect is the effect of sponsons and single columns that are often added to existing units to enhance their performance. Since the sponsons and single columns are not the main columns, they do not form the boundary of the protected area and they are fully exposed to a collision (see 7-1-2/Figure 2).

**FIGURE 2**
Damage Conditions for Column-Stabilized Units
(for details see 7-1-2/17.3) (2012)

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**17.5 Surface-Type Drilling Units**

For surface-type drilling units, the following extent of damage is to be assumed to occur between effective Watertight bulkheads (see 7-1-2/Figure 3):

1. Horizontal depth of penetration of 1.5 m (5 ft)
2. Vertical extent of damage from the bottom shell upwards without limit

**FIGURE 3**
Damage Conditions for Surface-Type Units
(for details see 7-1-2/17.5) (2012)
19  **Weathertight/Watertight Integrity**

During confirmatory survey of weathertight and watertight integrity of drilling units, following requirements are to be applied and arrangements are to be to the satisfaction of the Surveyor.

19.1 **Weathertight Integrity**

Closing appliances are to be as prescribed by applicable load line requirements. Special consideration will be given to openings in the upper deck of column-stabilized units. In all cases, external openings whose lower edges are below the levels to which weathertight integrity is to be ensured, as shown by the diagrams to be submitted in accordance with 3-1-2/1, are to have weathertight closing appliances. The referenced diagrams may define different extents of weathertight integrity for each mode of operation afloat (see 3-1-1/17). Openings fitted with appliances to ensure weathertight integrity are to be tested. For further details of testing, see 7-1-2/23.

19.3 **Watertight Integrity**

All internal and external openings whose lower edges are below the levels to which watertight integrity is to be ensured, as shown by the diagrams submitted in accordance with 1-1-4/1 of the Supplement to the ABS *Rules for Conditions of Classification – Offshore Units and Structures (Part 1)*, are to be fitted with appliances to ensure watertight integrity.

19.3.1 Internal Openings Used for Access While Afloat

Internal openings fitted with appliances to ensure watertight integrity, which are used during operation of the unit while afloat, are to comply with 3-3-2/5.3.1:

All such openings together with their remote controls, warning indicators, signs and their means for closing is to be examined and tested.

19.3.2 Internal Openings Secured Closed While Afloat

Internal openings fitted with appliances to ensure watertight integrity, which are normally to be secured closed while the unit is afloat, are to comply with 3-3-2/5.3.2:

All such openings together with their signs and their means for closing are to be examined.

19.3.3 External Openings Used While Afloat

External openings which are used during operation of the unit while afloat are to comply with 3-3-2/5.3.3:

All such openings together with their warning indicators, signs and their means for closing is to be examined and tested to the satisfaction of the attending Surveyor.

19.3.4 External Openings Secured Closed While Afloat

External openings fitted with appliances to ensure watertight integrity, which are normally to be secured closed while the unit is afloat, are to comply with the requirements of 7-1-2/19.3.2 “Internal Openings Secured Closed While Afloat”.

All such openings together with their signs and their means for closing are to be examined to the satisfaction of the attending Surveyor.

19.5 **Penetrations (1 July 2013)**

19.5.1 General

All penetrations through watertight and weathertight boundaries are to comply with 3-3-2/5.5 and are to be tested in presence of and to the satisfaction of the Surveyor. For watertight closure requirements, see 4-2-2/27. For further details, see 7-1-2/5.

19.5.2 Watertight and Fire-rated Deck and Bulkhead Cable Penetrations

During installation of deck and bulkhead watertight and fire-rated cable penetrations, the attending Surveyor is to confirm that the installer is familiar with and has access to the manufacturer’s installation procedures for stuffing tubes, transit devices or pourable materials.

After installation, all watertight and fire-rated cable penetrations are to be visually examined. Watertight cable penetrations are to be tested as required by 7-1-2/Table 2.
21 Onboard Computers for Stability Calculations

The use of onboard computers for stability calculations is not a requirement of class; it is the Owner’s option. However, if stability software is installed onboard, it should cover all stability requirements applicable to the drilling unit and is to be approved by ABS for compliance with the requirements of Appendix 3-3-A2, “Onboard Computers for Stability Calculations” and satisfactory operation of the onboard computer is to be verified by the Surveyor and reported upon.

For functional requirements, operating manual, and installation testing of onboard computers, see Appendix 7-1-A2 “Survey of Computers for Stability Calculations”

23 Hull Testing During Construction

Surveyor’s attendance is required, typically for the following purposes.

23.1 General

Compartments and spaces which are designed to be watertight, gas-tight or fire-tight are to be tested in presence of a Surveyor by a procedure approved by the attending Surveyor. Any access doors, hatches, manholes or closures of such compartments and spaces as well as any type of pipe or electrical penetration pieces through such boundaries is to be completed and tested in similar manner to the satisfaction of the attending Surveyor.

23.1.1 Types and Definition of Test (2018)

The following two types of testing are specified in this requirement:

i) Structural Testing is a test to verify the structural adequacy of tank construction. This may be hydrostatic testing (see 7-1-2/23.5) or hydropneumatic testing (see 7-1-2/23.23).

ii) Leak Testing is a test to verify the tightness of a boundary. Unless specific testing is indicated, this may be hydrostatic/hydropneumatic testing or air testing as specified in 7-1-2/23.5, 7-1-2/23.23 and 7-1-2/23.9. A hose test may be considered an acceptable form of leak test for certain boundaries, as specified in 7-1-2/23.11.

23.3 Testing of Watertight Boundaries, Tanks and Sliding Doors

After all hatches and watertight doors are installed, penetrations including pipe connections are fitted, and before cement work, ceiling or special coatings are applied, all watertight bulkheads and flats, as indicated on the watertight compartmentation plan 3-1-2/1 and all tanks are to be tested and proven tight. Shop primer may be applied prior to testing.

After installation and welding of its framing, all watertight sliding doors are to be visually examined to confirm proper fit and operation. Feeler gauges are to be used to verify manufacturer’s installation tolerance for maintaining required watertight integrity. Watertight sliding doors will then be subjected to hose testing. Final examination is to include confirmation and operational testing of required warning signs and devices respectively.

23.5 Hydrostatic Testing (2017)

Tanks listed in 7-1-2/Table 2 are to be tested with a head of water to the overflow or to the highest point to which the contents may rise under service conditions, whichever is higher. This may be carried out either before or after the unit is launched. Special coating may be applied before hydrostatic testing, provided all welded connections are visually examined to the satisfaction of the Surveyor before application of the special coating.

23.7 Structural Testing of Novel Designs (2017)

In order to demonstrate structural adequacy, tank testing of new or unusual design may be required in connection with the approval of the design. ABS Engineering is to be consulted for guidance on the testing method and medium used.
23.9 Air Testing (2018)

Air Testing is a test to verify the tightness of the structure by means of air pressure difference. All boundary welds, erection joints, and penetrations, including pipe connections, are to be examined in accordance with the approved procedure and under a stabilized pressure differential not less than 0.15 bar (0.15 kgf/cm², 2.2 psi) with a leak indicating solution such as soapy water/detergent or a proprietary brand applied.

A U-tube with a height sufficient to hold a head of water corresponding to the required test pressure is to be arranged. The cross sectional area of the U-tube is to be not less than that of the pipe supplying air. In addition to the U-tube, a master gauge or other approved means is to be provided to verify the pressure. Arrangements involving the use of two calibrated pressure gauges to verify the required test pressure may be accepted instead of a U-tube where additional safety measures are in place to prevent over pressurization.

Other effective methods of testing, including compressed air fillet weld testing or vacuum testing, may be considered in accordance with 7-1-2/23.15 and 7-1-2/23.17.

A double inspection is to be made of tested welds. The first is to be immediately upon applying the leak indication solution; the second is to be after approximately four or five minutes in order to detect those smaller leaks which may take time to appear.

23.11 Hose Testing (2018)

Hose Testing is a test to verify the tightness of the joint by a jet of water with the joint visible from the opposite side. Hose testing is to be carried out with the pressure in the hose of at least 2 bar (2 kgf/cm², 30 psi) during test. The nozzle is to have minimum inside diameter of 12 mm (0.5 in.) and is to be located at a perpendicular distance from the joint not exceeding 1.5 m (5 ft). The water jet is to impinge directly upon the weld.

For structural welds, where hose testing is not practical because of possible damage to machinery, electrical equipment insulation or outfitting items, it may be replaced by a careful visual examination of welded connections, supported where necessary by means such as penetration testing, ultrasonic testing, or the equivalent.

Where hose testing may result in damage to structural outfit, machinery or electrical equipment located close to testing area, other methods of testing may be considered upon submission of full particulars to the attending Surveyor. Chalk testing is not an acceptable substitute for hose testing of watertight and weathertight doors, or other similar closures located along the outside perimeter of the hull.


Flood testing is to be carried out in tanks that are not enclosed at top. Tank is to be filled to its overflow height, with same density of liquid to be used in the tank during normal operations. Where flood testing is impractical, hose testing may be carried out as an alternative method of testing.

23.15 Compressed Air Fillet Weld Testing (2018)

Compressed Air Fillet Weld Testing is an air test of a fillet welded tee joint with a leak indicating solution applied on the fillet welds. In this air testing, compressed air is injected from one end of fillet welded joint and the pressure verified at the other end of the joint by a pressure gauge. Pressure gauges are to be arranged so that an air pressure of at least 0.15 bar (0.15 kgf/cm², 2.2 psi) can be verified at each end of all passages within the portion being tested.

For limited portions of the partial penetration or fillet welded joints forming tank boundaries, such as corners and section of the weld adjacent to the testing apparatus, the attending Surveyor may accept the use of Magnetic Particle Inspection or Dye Penetration examination as an alternative to fillet air testing.

Where a leaking test of partial penetration welding is required and the root face is sufficiently large such as 6-8 mm (0.24-0.32 inch), the compressed air test is to be applied in the same manner as for a fillet weld.
23.17 **Vacuum Box Testing (2018)**

Vacuum Box Testing is a test to detect any leaks on the structure. A box over a joint with leak indicating solution applied on the welds. A vacuum is created inside the box to detect any leaks. A box (vacuum tester) with air connections, gauges and inspection window is placed over the joint with a leak indication solution applied to the weld cap vicinity. The air within the box is removed by an ejector to create a vacuum of 0.20 bar (0.20 kgf/cm², 2.9 psi) – 0.26 bar (0.27 kgf/cm², 3.8 psi) inside the box.

23.19 **Ultrasonic Testing (2018)**

Ultrasonic Testing is a test to verify the tightness of the sealing of closing devices such as hatch covers by means of ultrasonic detection techniques. An arrangement of an ultrasonic echoes transmitter placed inside a compartment and a receiver outside. The watertight/weather tight boundaries of the compartment are scanned with the receiver in order to detect an ultrasonic leak indication. A location where sound is detectable by the receiver indicates a leakage in the sealing of the compartment.

23.21 **Penetration Testing (2018)**

Penetration Testing is a test to verify that no visual dye penetrant indications of potential leakage exist in the boundaries of a compartment by means of low surface tension liquids (i.e., dye penetrant testing). A test of butt welds or other weld joints using the application of a low surface tension liquid at one side of a compartment boundary. If no liquid is detected on the opposite sides of the boundaries after the expiration of a defined period of time, this indicates tightness of the boundaries. In certain cases, a developer solution may be painted or sprayed on the other side of the weld to aid leak detection.

23.23 **Hydropneumatic Testing (2018)**

Hydropneumatic Testing is a combined hydrostatic and air testing wherein a tank is filled by water with air pressure applied on top. When approved, the combined water level and air pressure used for hydropneumatic testing is to simulate the actual loading as far as practicable. The requirements and recommendations in 7-1-2/23.9 relative to air pressure will also apply.

All external surfaces on the tested space are to be examined for structural distortion, bulging and buckling, or related damage and leaks.

23.25 **Other Methods of Testing (2018)**

Other methods of testing may be considered upon submission of full particulars prior to the commencement of testing.

23.27 **Application of Coating (2018)**

23.27.1 Final Coating

i) **Leak Testing:** For all manual or semi-automatic erection welds and all fillet weld tank boundary connections including penetrations, the final coating is to be applied after leak testing. For other welds, the final coating may be applied prior to leak testing provided that the welds have been examined to the satisfaction of the Surveyor. The Surveyor reserves the right to require leak testing prior to the final coating of automatic erection welds and manual or automatic pre-erection welds. See 7-1-2/Table 3.

ii) **Structural Testing:** For all weld joint types, the final coating may be applied prior to the structural testing if required. See 7-1-2/Table 3.

23.27.2 Temporary Coating

Any Temporary coating which may conceal defects or leaks is to be applied as specified for the final coating. This requirement applies to shop primers, other than silicate based shop primers, such as epoxy based shop primers.

23.27.3 Safe Access to Joints

For leak testing, safe access to all joints under examination is to be provided. See 7-1-2/table 3.
23.27.4 Hydrostatic or Hydropneumatic Tightness Testing

In case where hydrostatic or hydropneumatic tests are applied instead of a specific leak test, examined boundaries are to be dew-free, otherwise small leaks are not visible.

### TABLE 2

**Testing of Boundaries, Compartments, Tanks, and Spaces (2017)**

<table>
<thead>
<tr>
<th>Compartment/Space to be Tested</th>
<th>Type of Testing</th>
<th>Hydrostatic Head or Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSDU – Bracings, Horizontals, and Diagonals (Void)</td>
<td>Air</td>
<td>To the top of the chain pipe.</td>
</tr>
<tr>
<td>CSDU – Chain Lockers &amp; Chain Pipes</td>
<td>Flood Test</td>
<td>To the top of the chain pipe.</td>
</tr>
<tr>
<td>CSDU – Watertight Column Spaces</td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td>Drill Ship – Chain Lockers &amp; Chain Pipes</td>
<td>Flood Test</td>
<td>To the top of the chain pipe.</td>
</tr>
<tr>
<td>Drill Ship – Hawse Pipes</td>
<td>Hose</td>
<td></td>
</tr>
<tr>
<td>SEDU – Mat Tanks (Buoyant)</td>
<td>Hydrostatic</td>
<td>To the height equal to deepest operational water depth of the SEDU.</td>
</tr>
<tr>
<td>(2017) SEDU – Pre-Load Tanks</td>
<td>Hydrostatic&lt;sup&gt;1&lt;/sup&gt;</td>
<td>To the height of the tank vent</td>
</tr>
<tr>
<td>(2017) SEDU – Spud-Cans (Buoyant)</td>
<td>Hydrostatic</td>
<td>To the height equal to deepest operational water depth of the SEDU.</td>
</tr>
<tr>
<td>Ballast Tanks</td>
<td>Hydrostatic&lt;sup&gt;1&lt;/sup&gt;</td>
<td>To the height of the tank vent</td>
</tr>
<tr>
<td>(2017) Base Oil Tanks</td>
<td>Hydrostatic&lt;sup&gt;1&lt;/sup&gt;</td>
<td>To the height of the tank vent.</td>
</tr>
<tr>
<td>Drill Water Tanks</td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td>(2017) Fuel Oil Tanks</td>
<td>Hydrostatic&lt;sup&gt;1&lt;/sup&gt;</td>
<td>To the height of the tank vent.</td>
</tr>
<tr>
<td>Gas-tight Doors</td>
<td>Air or Hose</td>
<td>Tightness of doors may be confirmed whilst the ventilation system is running under normal operating conditions.</td>
</tr>
<tr>
<td>(2017) Independent Tanks</td>
<td>Hydrostatic&lt;sup&gt;1&lt;/sup&gt;</td>
<td>To the height of the tank vent.</td>
</tr>
<tr>
<td>Mud Pits</td>
<td>Flood Test</td>
<td>To the top of the overflow.</td>
</tr>
<tr>
<td>(2017) Oily Water Holding Tanks</td>
<td>Hydrostatic&lt;sup&gt;1&lt;/sup&gt;</td>
<td>To the height of the tank vent.</td>
</tr>
<tr>
<td>Potable/Fresh Water Tanks</td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td>Voids</td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td>Watertight Boundary Closures/Manholes</td>
<td>Hose</td>
<td></td>
</tr>
<tr>
<td>Watertight Doors</td>
<td>Hose</td>
<td></td>
</tr>
<tr>
<td>Watertight Sliding Doors</td>
<td>Hose</td>
<td>See 7-1-2/23.3.</td>
</tr>
<tr>
<td>Weathertight Boundary Closures/Manholes</td>
<td>Hose</td>
<td></td>
</tr>
<tr>
<td>Weathertight Doors</td>
<td>Hose</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

1. <sup>(2017)</sup> Provided the structural similarity of a group of tanks is recognized by ABS and a representative tank as selected by ABS is hydrostatically tested based on the design approval, all subsequent tanks on each vessel are tested for leaks by an air testing in accordance with 7-1-2/23.9. However, where structural adequacy of a tank was verified by structural testing, the subsequent vessels of a series of identical new buildings may be exempted from such testing for other tanks which have the structural similarity to the tested tank, provided that the watertightness in all boundaries of exempted tanks is verified by leak tests and thorough inspection is to be carried out. In any case, hydrostatic testing is to be carried out for at least one tank for each vessel in order to confirm structural fabrication adequacy.
### TABLE 3

**Application of Leak Testing, Coating and Provision of Safe Access for Type of Welded Joints (2018)**

<table>
<thead>
<tr>
<th>Type of Welded Joints</th>
<th>Leak Testing</th>
<th>Coating (1)</th>
<th>Safe Access (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before Leak Testing</td>
<td>After Leak Testing &amp; Before Structural Test</td>
</tr>
<tr>
<td>Butt</td>
<td>Automatic</td>
<td>Not required</td>
<td>Allowed(3)</td>
</tr>
<tr>
<td>Manual or Semi-automatic(4)</td>
<td>Required</td>
<td>Not allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>Fillet</td>
<td>Boundary including penetrations</td>
<td>Required</td>
<td>Not allowed</td>
</tr>
</tbody>
</table>

**Notes:**

1. Coating refers to internal (tank/hold coating), where applied, and external (shell/deck) painting. It does not refer to shop primer.

2. Temporary means of access for verification of the leak testing.

3. The condition applies provided that the welds have been carefully inspected visually to the satisfaction of the Surveyor.

4. Flux Core Arc Welding (FCAW) semiautomatic butt welds need not be tested provided that careful visual inspections show continuous uniform weld profile shape, free from repairs, and the results of the Rule and Surveyor required NDE testing show no significant defects.

### 25 Construction Booklet (Construction Portfolio)

A Construction Booklet is to be prepared and be readily available onboard the drilling unit. The booklet is to be reviewed by the Surveyor for completeness, and endorsed to indicate verification.

The construction booklet is to at least contain the following information/documents:

1. ABS reviewed and stamped drawings showing the location and extent of different grades and strengths of structural materials, together with a description of the material.

2. Welding Procedure Specifications primarily employed for welding of Special Application Structures and Primary Application Structures, as defined in 3-1-4/5.

3. ABS reviewed and stamped drawings showing Special Application Structures and Primary Application Structures, as defined in 3-1-4/5. This will enable proper identification and wastage allowances of these structures, as required by 7-2-5/3, 7-2-5/5, or 7-2-5/7, during each Special Periodical Survey carried out throughout the life of the drilling unit.

4. ABS reviewed and stamped drawings showing all applicable critical structural areas. This will enable proper record keeping of the results found during close-up survey and Nondestructive Testing (NDT) of these areas, as required by 7-2-5/3, 7-2-5/5, or 7-2-5/7, during each Drydocking (or UWILD) and Special Periodical Survey carried out throughout the life of the drilling unit.

### 27 Hull Inspection and Maintenance Program (HIMP) (Optional) (2018)

The unit’s hull inspection and maintenance scheme is required to be examined as follows to maintain the optional notation HIMP in accordance with the requirements of the ABS Guide for Hull Inspection and Maintenance Program.

Initial Surveys are to be in accordance with Section 7-9-24 of the ABS Rules for Survey After Construction (Part 7).
CHAPTER 1 Surveys During Construction

SECTION 3 Surveys at Builder’s Yard – Machinery, Piping, Pressure Vessels, and Outfitting

1 General

This Section pertains to surveys and testing to be carried out on machinery, piping, pressure vessels, and mechanical outfitting items during construction, installation and testing of mobile offshore drilling units at builder’s yard/facility.

The documentation requirements for design review are given Parts 3, 4, and 5 of these Rules.

Surveys and testing of mechanical and piping systems are referenced in Section 7-1-4 of these Rules.

ABS Surveyor attendance is required, typically for the following purposes. All surveys and testing required in subsequent Subsections of this Section are to be carried out in presence of and to the satisfaction of the attending Surveyor, prior to the sea trial as referenced in Section 7-1-9 of these Rules.

3 Survey of Machinery, Piping, Pressure Vessels, and other Outfitting Items

In general, all items of machinery are to be surveyed during onboard installation and at sea trial. Welding and fabrication of piping, pressure vessels, and structural or machinery outfitting items are to be in accordance with Sections 2-4-2 and 2-4-4 of the ABS Rules for Materials and Welding (Part 2).

The quality control program for the construction of a drilling unit is to at least include the following items, as appropriate:

i) Material Quality and Traceability

ii) Welder Performance Qualification and associated Records

iii) Welding Procedure Specifications and Welding Procedure Qualification Records

iv) Preparation for welding including; forming, edge preparation, fit-up, alignment, cleanliness, and tack welds

v) Survey of production welding including; environmental conditions, welding sequence, pre-heat, post-heat, back gouging, fairing, soundness of welds, and necessary repair procedure


Note: NDT is to be carried out in accordance with ABS Guide for Nondestructive Inspection of Hull Welds. NDT for class 1 and class 2 piping systems is to be in accordance with 2-4-4/11 of the ABS Rules for Materials and Welding (Part 2). All NDT records are to be reviewed by a Level 2 NDT technician and signed prior to review and endorsement by the attending Surveyor.
5 Materials and Operational Conditions

5.1 Material Tests and Inspection
Materials are to be made in accordance with the requirements in Chapter 3 of the ABS Rules for Materials and Welding (Part 2) and 4-1-1/7.11, 4-2-1/9, 6-1-4/3 and 6-1-5/3 of these Rules, as applicable.

Copies in duplicate of the purchase orders for material requiring test and inspection at the mills or place of manufacture are to be forwarded to ABS for the information of the Surveyor.

5.3 Materials Containing Asbestos
Installation of materials, which contain asbestos, is prohibited.

5.5 Minimum Angle of Inclination for Machinery
All machinery, components and systems essential for propulsion or for safe operation of the unit are to be designed and fabricated to operate under the inclinations as indicated for each of the conditions listed in 4-1-1/Table 1.

Operational suitability of machinery per above requirements is to be verified by the installation Surveyor.

5.7 Ambient Temperature for Machinery
All machinery, components and systems essential for propulsion or for safe operation of the unit are to be designed and fabricated to operate under the ambient temperature as indicated in 4-1-1/Table 2.

Operational suitability of machinery per above requirements is to be reconfirmed by the Surveyor.

7 Internal Combustion Engines
Onboard installation of internal combustion engines are to be to the satisfaction of the attending Surveyor.

7.1 Foundation
Satisfactory alignment of the engine skid structure with hull back-up/foundation structure is to be confirmed before commencement of any dock-side testing of the engines.

7.3 Warning Notices
Suitable warning notices are to be attached in a conspicuous place on each engine and are to caution against the opening of a hot crankcase for a specified period of time after shutdown based upon the size of the engine, but not less than 10 minutes in any case. Such notice is also to warn against restarting an overheated engine until the cause of overheating has been remedied.

7.5 Governor Control
All engines are to be fitted with governors which will prevent the engines from exceeding the rated speed by more than 15%. Governor control is to be verified.

For generator sets, see 4-2-1/7.5.1, 4-2-3/7.5.1 and 4-2-4/7.5.1 of the Steel Vessel Rules.

7.7 Onboard Testing
Auxiliary and emergency engine/generator sets are to be tested prior to and during sea trial carried out in accordance with an agreed procedure and in compliance with these Rules.

9 Piping
All piping is to be installed and tested in accordance with the Rules or recognized standards.

Satisfactory installation and operation of the piping systems are to be verified, as far as practicable, during the sea trial.
Piping systems are divided into three classes (Class I, II and III) according to service, design pressure and temperature, as indicated in 4-2-1/Table 1 of these Rules. Each class has specific requirements for joint design, fabrication and testing.

All piping system is to be visually examined in accordance with ABS approved plans that consist of a diagrammatic drawing of each system, including piping size, wall thickness, maximum working pressure and material of piping as well as the type, size, pressure rating and material of valves and fittings.

Pipe weld details are to comply with Chapter 4 of the ABS Rules for Materials and Welding (Part 2).

Requirements for valves, fittings and flanges are based upon standards of the American National Standards Institute (ANSI).

9.1 Piping Standards
A booklet of standard piping practices and details, including such items as bulkheads, deck and shell penetrations, welding details including dimensions, pipe joining details, etc. reviewed by ABS is to be used during survey of piping systems.

11 Piping Installation Details
Installation of piping onboard is to be in compliance with 4-2-1/11 of these Rules. Following piping details are to be verified after piping system is installed:

i) Pipe bending

ii) Protection of pipes, valves and operating rods

iii) Pipes installed near switchboards or MCCs

iv) Pipe expansion joints

v) Pipe joints

vi) Mechanical joints

vii) Pipes penetrating bulkheads and decks. Penetrations are to be subjected to tests similar to the bulkhead or deck is tested to. Alternative testing of penetration welds with suitable NDT is to be to the satisfaction of the Surveyor.

viii) Pipes penetrating collision bulkhead of surface-type drilling units. Penetrations are to be subjected to tests similar to the bulkhead is tested to.

ix) Sluice valves and cocks on surface-type drilling units. Satisfactory operation of these valves or cocks together with their indicators is to be confirmed.

x) Relief valves fitted on Class I and Class II systems are to be tested. Relief valves fitted on Class III systems may be tested if required by the Surveyor.

xi) Common overboard discharge piping

xii) Remote operation of valves

xiii) Instrument wells, similar protection on fuel oil tanks, and valve arrangements allowing isolation and removal of instrument on pressure sensing devices

xiv) Hose assemblies

xv) Control of static electricity, testing of resistance between ground points along the length, across joints and from pipe to ground, and verification of bonding straps where used

xvi) Leakage containment and drain piping
11.1 Pipe Bending
Pipe bending is to be in accordance with 2-3-12/25 of the ABS Rules for Materials and Welding (Part 2). Alternatively, bending in accordance with a recognized standard (e.g. ASME B31.1 – Section 129.1 and 129.3) or other approved specification to a radius that will result in a surface free of cracks and substantially free of buckles may be acceptable.

11.3 Protection of Pipes
Pipes, valves and operating rods are to be effectively secured and adequately protected. These protective arrangements are to be fitted so that they may be removed to enable examination of the pipes, valves and operating rods protected.

11.5 Leading of Pipes near Switchboards, Motor Controllers and Control Centers, Transformers, and all other Electrical Equipment or Panels used for Essential Services
The leading of pipes in the vicinity of switchboards, motor controllers and control centers, transformers, and all other electrical equipment or panels is to be avoided as far as possible. When such leads are necessary, care is to be taken to fit no flanges or joints over or near these equipment or panels unless provision is made to prevent any leakage from injuring the equipment.

11.7 Provision for Expansion or Contraction Stresses
Ample provision is to be made to take care of expansion or contraction stresses in pipes due to temperature changes or working of the hull. Suitable provisions include, but are not limited to, piping bends, elbows, offsets, changes in direction of the pipe routing or expansion joints. See 4-2-1/11.5 of these Rules.

Where expansion joints are used, the following are to be verified:

- **Pipe support.** Adjoining pipes are to be suitably supported so that the expansion joints do not carry any significant pipe weight.

- **Alignment.** Expansion joints are not to be used to make up for piping misalignment errors. Misalignment of an expansion joint reduces the rated movements and can induce severe stresses into the joint material, thus causing reduced service life. Alignment is to be within tolerances specified by the expansion joint manufacturer.

- **Anchoring.** Expansion joints are to be installed as close as possible to an anchor point. Where an anchoring system is not used, control rods may be installed on the expansion joint to prevent excessive movements from occurring due to pressure thrust of the line.

- **Mechanical damage.** Where necessary, expansion joints are to be protected against mechanical damage.

- **Accessible location.** Expansion joints are to be installed in accessible locations to permit regular inspection and/or periodic servicing.

- **Mating flange.** Mating flanges are to be clean and usually of the flat faced type. When attaching beaded end flange expansion joints to raised face flanges, the use of a ring gasket is permitted. Rubber expansion joints with beaded end flange are not to be installed next to wafer type check or butterfly valves. Serious damage to the rubber flange bead can result due to lack of flange surface and/or bolt connection.

11.7.1 Molded Expansion Joints
Where molded expansion joints are fitted, compliance with 4-2-1/11.7 is to be verified.

11.7.2 Metallic Bellow Type Expansion Joints
Where metallic bellow type expansion joints are fitted, compliance with 4-2-1/11.9 is to be verified.

11.9 Pipe Joints
Where pipe joints are used, compliance with 4-2-1/11.11 is to be verified.
11.11 Mechanical Joints
Where mechanical joints are used, compliance with 4-2-1/11.13 is to be verified.

11.13 Bulkhead, Deck or Tank-Top Penetrations
Where pipes pass through bulkheads, decks or tank tops, the penetrations are to be made by approved methods which will maintain the watertight, firetight or smoketight integrity of the bulkhead, deck or tank top. Bolted connections are to have the bolts threaded through the plating and welded connections are to be welded on both sides or with full-strength welds from one side.

All pipe penetrations are to be verified and tested as necessary.

11.15 Collision-Bulkhead Penetrations
Pipes piercing the collision bulkhead on ship type units are to be fitted with suitable valves operable from above the bulkhead deck and the valve chest is to be secured at the bulkhead generally inside the forepeak. Cast iron is not to be used for these valves. The use of nodular iron, also known as ductile iron or spheroidal-graphite iron will be accepted, provided the material has an elongation not less than 12%.

Tanks forward of the collision bulkhead on surface-type units are not to be arranged for the carriage of oil or other liquid substances that are flammable.

All pipe penetrations are to be verified and tested as necessary.

11.17 Sluice Valves and Cocks
No valve or cock for sluicing purposes is to be fitted on a collision bulkhead on ship type units. Sluice valves or cocks may be fitted only on other watertight bulkheads when they are at all times accessible for examination.

Where sluice valves or cocks are fitted per approved drawings, compliance with 4-2-1/11.19 is to be verified.

11.19 Relief Valves
All systems which may be exposed to pressures greater than that for which they are designed are to be safeguarded by suitable relief valves or the equivalent, and pressure containers such as evaporators, heaters, etc., which may be isolated from a protective device in the line are to have such devices either directly on the shell or between the shell and the cut-off valve.

In pumping systems such as boiler feed, oil piping and fire main, where ordinarily relief valves are required at the pump, such valves need not be fitted when the system is served only by centrifugal pumps so designed that the pressure delivered cannot exceed that for which the piping is designed.

All relief valves are to be confirmed to have been tested prior to installation and marked/tagged accordingly.

11.21 Common Overboard Discharge
In general, various types of systems which discharge overboard are to be verified not to be interconnected without special approval; that is, closed pumping systems, deck scuppers, soil lines or sanitary drains are not to have a common overboard discharge.

11.23 Remote Operation
Where valves of piping systems are arranged for remote control and are power operated, a secondary means for either local or remote-manual control is to be provided.

Remote operation function testing is to be carried out, preferably before sea trial.

11.25 Instruments
Where instruments fitted to measure temperature or pressure of the piping system, compliance with 4-2-1/11.27 is to be verified.

Proper calibration of all instruments is to be verified.
11.27 Flexible Hoses

Hose assemblies may be installed between two points where flexibility is required, but are not to be subject to torsional deflection (twisting) under normal operating conditions.

Where flexible hoses are fitted, compliance with 4-2-1/11.29 is to be verified.

11.29 Control of Static Electricity

Piping systems that are routed through hazardous areas are to be suitably grounded either by welding or bolting the pipes or their supports directly to the hull of the unit or through the use of bonding straps.

11.29.1 Ground Resistance

In general, the resistance tested between ground points along the length, across joints and from pipe to ground is not to exceed 1 megohm.

11.29.2 Bonding Straps

Where bonding straps are used, they are to be clearly visible, protected from mechanical damage and of a type not affected by corrosive products and paint. Bonding straps are required for tanks and piping systems which are not permanently connected to the hull, including independent tanks, tanks and piping systems which are electrically separated from the hull, and pipe connections arranged for removal of spool pieces.

Components of alarms and level indicating devices located within tanks are to account for conductivity.

11.31 Leakage Containment

11.31.1 Oil Leakage

For areas where leakage may be expected such as oil burners, purifiers, drains and valves under daily service tanks, etc., means of containing the leakage are to be provided together with adequate drainage, and compliance with 4-2-1/11.33 is to be verified.

11.31.2 Boiler Flats

Where boilers are located in machinery spaces on tween decks and the boiler rooms are not separated from the machinery space by watertight bulkheads, the tween decks are to be verified to have containment coaming height of at least 200 mm (8 in.). The containment area may be drained to the bilges.

All leakage containment arrangements are to be examined and verified to satisfy above requirements of 7-1-3/11.31, as applicable.

13 Metallic and Plastic Pipes

The use of all metallic and plastic pipes in classed piping systems is to be verified to be in compliance with 4-2-2/5 of these Rules.

13.1 Steel Pipes

Pipe thicknesses referred to as Standard or Extra Heavy is the equivalent of American National Standards Institute Schedule 40 and Schedule 80 pipe up to a maximum wall thickness of 9.5 mm (0.375 in.) and 12.5 mm (0.5 in.), respectively.

Material specifications for acceptable steel pipes are referenced in Section 2-3-12 of the ABS Rules for Materials and Welding (Part 2).

Application of steel pipes is to be in compliance with 4-2-2/5.1 of these Rules.

13.3 Copper and Brass Pipes

Application of copper and brass pipes are to be in compliance with 4-2-2/5.3 of these Rules.
13.5 Plastic Pipes

For the purpose of these Rules, “plastic” means both thermoplastic and thermosetting plastic materials, with or without reinforcement, such as polyvinyl chloride (PVC) and fiber reinforced plastics (FRP).

13.5.1 Limitations

Pipes and piping components made of thermoplastic or thermosetting plastic materials, with or without reinforcement, may be used in piping systems referred to in 4-2-2/Table 2, subject to compliance with requirements of 4-2-2/7.

13.5.2 Marking of Plastic Pipes and other Components

Plastic pipes and other components are to be verified to have permanent marking with identification in accordance with a recognized standard. Identification is to include pressure ratings, the design standard that the pipe or fitting is manufactured in accordance with, and the material with which the pipe or fitting is made and the date of fabrication.

13.5.3 Installation of Plastic Pipes

Installation of plastic pipes is to satisfy the following requirements:

i) Selection and spacing of pipe supports in shipboard systems are to be determined as a function of allowable stresses and maximum deflection criteria. Support spacing is not to be greater than the pipe manufacturer’s recommended spacing. Each support is to evenly distribute the load of the pipe and its contents over the full width of the support. Measures are to be taken to minimize wear of the pipes where they contact the supports. Heavy components in the piping system such as valves and expansion joints are to be independently supported. The supports are to allow for relative movement between the pipes and the unit’s structure.

ii) Pipes are to be protected from mechanical damage, where necessary.

iii) Where pipes are joined, the strength of fittings and joints is not to be less than that of the piping they connect. Pipes may be joined using adhesive-bonded, welded, flanged or other joints. Tightening of flanged or mechanically coupled joints is to be performed in accordance with manufacturer’s instructions. Adhesives, when used for joint assembly, are to be suitable for providing a permanent seal between the pipes and fittings throughout the temperature and pressure range of the intended application. Joining techniques are to be in accordance with manufacturer’s installation guidelines. Personnel performing these tasks are to be qualified to the satisfaction of ABS, and each bonding procedure is to be qualified before shipboard piping installation commences. Requirements for joint bonding procedures are in 4-2-2/7.11.

iv) Where electrically conductive pipe is required by 4-2-2/7.5.8, the resistance to earth (ground) from any point in the system is not to exceed 1 megohm. Where used, earthing wires or bonding straps are to be accessible for inspection placed in visible locations.

v) Where plastic pipes are permitted in systems connected to the shell of the unit, the valves and the pipe connection to the shell are to be metallic. The side shell valves are to be arranged for remote control from outside of the space in which the valves are located. For further details of the shell valve installation, their connections and material refer to 4-2-2/21.

vi) Integrity of watertight bulkheads and decks is to be maintained where plastic pipes pass through them. Where plastic pipes pass through“A” or “B” class divisions, arrangements are to be made to ensure that the fire endurance is not impaired. If the bulkhead or deck is also a fire division and destruction by fire of plastic pipes may cause inflow for liquid from tank, a metallic shut-off valve operable from above the bulkhead deck is to be fitted at the bulkhead or deck.

vii) Fire protection coatings are to be applied on the joints, where necessary for meeting the required fire endurance criteria in 4-2-2/7.5.6. Coating is not to be applied until the piping system is satisfactorily pressure tested. The fire protection coatings are to be applied in accordance with the manufacturer’s recommendations using a procedure approved in each particular case.
15 Valves

Valves in piping systems are to satisfy the following requirements:

15.1 Material of Valves

Materials of valves are to meet 4-2-2/17 of these Rules. Manufacturer’s material certificates are to be available for verification, as deemed necessary by the Surveyor.

15.3 Standard of Valves

Valves that are in compliance with a recognized standard are acceptable to ABS, subject to compliance with 4-2-2/9.5. Valves that are not certified by the manufacturer in accordance with a recognized standard, may be accepted when valve design is reviewed by ABS and accepted.

15.5 Construction of Valves

Construction of valves is to be verified as satisfying the following requirements:

i) All valves are to close with a right hand (clockwise) motion of the hand wheel when facing the end of the stem and are to be either of the rising stem type or fitted with an indicator to show whether the valve is open or closed.

ii) All valves of Class I and Class II piping systems having nominal diameters exceeding 50 mm (2 in.) are to have bolted, pressure seal or breech lock bonnets and fanged or welding ends. Welding ends are to be butt welding type, except that socket welding ends may be used for valves having nominal diameters of 80 mm (3 in.) or less, up to and including 39.2 bar (40.0 kgf/cm²) pressure rating class (ANSI 600 Class), and for valves having nominal diameters of 65 mm (2.5 in.) or less, up to and including 98.1 bar (100 kgf/cm²) pressure rating class (ANSI 1500 Class).

iii) All cast iron valves are to have bolted bonnets or are to be of the union bonnet type. For cast iron valves of union bonnet type, the bonnet ring is to be of steel, bronze or malleable iron.

iv) Stems, discs or disc faces, seats, and other wearing parts of valves are to be of corrosion-resistant materials suitable for intended service.

v) Valves are to be designed for the maximum pressure to which they will be subjected. The design pressure is to be at least 3.4 bar (3.5 kgf/cm², 50 psi), except that valves used in open systems, such as vent and drain lines, and valves mounted on atmospheric tanks which are not part of the tank suction or discharge piping (for example, level gauge and drain cocks and valves in inert gas and vapor emission control systems) may be designed for a pressure below 3.4 bar (3.5 kgf/cm², 50 psi), subject to the requirements of 4-2-2/9.1. Large fabricated ballast manifolds which connect lines exceeding 200 mm (8 in.) nominal pipe size may be specially considered when the maximum pressure to which they will be subjected does not exceed 1.7 bar (1.75 kgf/cm², 25 psi).

vi) All valves for Class I and Class II piping systems and valves intended for use in steam or oil lines are to be constructed so that the stem is positively restrained from being screwed out of the body (bonnet). Plug cocks, butterfly valves and valves employing resilient material will be subject to special consideration.

vii) Valve operating systems for all valves which cannot be manually operated are to be submitted to ABS engineering for approval.

15.7 Rating and Identification of Valves

All valves are to be subjected by the manufacturer to a hydrostatic test at a pressure equal to that stipulated by the American National Standards Institute (ANSI) or other recognized standard. They are to bear the trademark of the manufacturer legibly stamped or cast on the exterior of the valve and also the primary pressure rating at which the manufacturer guarantees the valve to meet the requirements of the standards. This is to be verified during installation.
17 **Pipe Fittings**

All fittings in Class I and Class II piping are to have flanged or welded ends in sizes over 89 mm O.D. (3 in. N.P.S.). Screwed fittings may be used in Class I and Class II piping systems, provided the temperature does not exceed 496°C (925°F) and the pressure does not exceed the maximum pressure indicated in 4-2-2/11.1. The type of fittings used on Class I, Class II and Class III piping systems are to satisfy 4-2-2/11. See 4-2-2/19 for fluid power cylinders.

17.1 **Material of Fittings**

Materials of fittings are to meet 4-2-2/17 of these Rules. Manufacturer’s material certificates are to be available for verification, as deemed necessary by the Surveyor.

17.3 **Manufacturer’s Testing, Marking, and Certification of Pipe Fittings**

All fittings are to be subjected by the manufacturer to a hydrostatic test at a pressure equal to that stipulated by the American National Standards Institute (ANSI) or other recognized standard. They are to bear the trademark of the manufacturer legibly stamped or cast on the exterior of the fitting and also the primary pressure rating at which the manufacturer guarantees the fitting to meet the requirements of the standards. This is to be verified during installation.

17.5 **Installation of Pipe Fittings**

The installation of mechanical pipe joints, as covered by 4-2-2/11.1 and 4-2-2/11.5, is to be in accordance with the manufacturer’s assembly instructions. Where special tools and gauges are required for installation of the joints, these are to be specified and supplied as necessary by the manufacturer. These special tools are to be kept onboard.

19 **Flanges**

Flanges are to be in compliance with a recognized national or international standard. The type of flanges and method of attachment used on Class I, Class II and Class III piping systems are to be in compliance with 4-2-2/15.

19.1 **Material of Flanges**

Materials of flanges are to meet 4-2-2/17 of these Rules. Manufacturer’s material certificates are to be available for verification, as deemed necessary by the Surveyor.

21 **Fluid Power Cylinders**

Fluid power cylinders subject to pressures or temperatures greater than those indicated in 4-2-2/19 are to be in compliance with a recognized standard for fluid power cylinders.

21.1 **Material of Fluid Power Cylinders**

Materials of fluid power cylinders are to meet 4-2-2/19 of these Rules. Manufacturer’s material certificates are to be available for verification, as deemed necessary by the Surveyor.

21.3 **Manufacturer’s Testing, Marking, and Certification of Fluid Power Cylinders**

Acceptance will be based on the manufacturer’s certification of compliance and on verification of permanent identification on each cylinder bearing the manufacturer's name or trademark, standard of compliance and maximum allowable working pressure and temperature.
23 **Sea Inlets and Overboard Discharges**

All sea inlet and discharge valves are to be examined and tested, and all shell penetration welds are to be subjected to surface (inboard and outboard) NDT and the welds hose tested, before the drilling unit is launched.

23.1 **Connections**

Piping connections bolted to the shell plating are to have the bolt heads countersunk on the outside and the bolts threaded through the plating. Where a reinforcing ring of sufficient thickness is riveted or welded to the inside of the shell, studs may be used.

Threaded connections outboard of the shell valves are not considered an acceptable method of connecting pipe to the shell.

Pipe connections fitted between the shell and the valves are to have a minimum wall thickness not less than that specified in 4-2-2/21.3 and be as short as possible.

23.3 **Valves and Fittings**

Wafer-type valves are not to be used for any connections to the unit’s shell unless specially approved.

All shell fittings and the valves required by 4-2-2/21.9 and 4-2-2/23 are to be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. The use of nodular iron, also known as ductile iron or spheroidal-graphite iron, will be accepted, provided the material has an elongation not less than 12%.

All pipes to which this subsection refers are to be of steel or other equivalent material, subject to special approval.

Overboard discharges are to have spigots extending through the shell plate. Boiler and evaporator blow-off overboard discharges are to have doubling plates or heavy inserts fitted. The spigot is to extend through the doubling and the shell and the external doubling plate, when fitted, but the spigot need not project beyond the outside surface of the unit.

Positive closing valves are to be fitted at the shell in inlet and discharging piping. The controls are to be readily accessible and are to be provided with indicators showing whether the valves are open or closed.

In order to be considered readily accessible, the controls, during normal operating conditions, are to be:

1. Located in a space normally entered without using tools,
2. Clear of or protected from obstructions, moving equipment and hot surfaces that prevent operation or servicing, and
3. Within operator’s reach.

Materials readily rendered ineffective by heat are not to be used for connection to the shell where the failure of the material in the event of a fire would give rise to danger of flooding.

23.5 **Power Operated Valves**

Arrangement and operation of all power operated valves are to be verified to be in compliance with below requirements.

Power-operated valves are to meet the requirements in 4-2-1/11.25. Position indicating systems for sea-water inlet and discharge valves are to be independent of the valves’ control systems. Additionally, sea-water valves necessary for the operation of propulsion machinery or generation of power required in 4-3-2/3.1 are to be designed to remain in the last ordered position upon loss of control power.

Valves for sea-water inlets and discharges are also to be in accordance with the following, as applicable.

1. **Column-Stabilized Units:** Sea-water inlets and discharges below the assigned load line are to be provided with valves which can be remotely operated from an accessible position outside of the space.
ii) **Self-Elevating and Surface-Type Units**: Sea-water inlets and discharges in spaces below the assigned load line which are not intended to be normally manned are to be provided with valves which can be remotely operated from an accessible position outside of the space. If the valves are readily accessible, the spaces containing the inlets and discharges may be provided with bilge alarms in lieu of remote operation of the valves.

iii) **Self-Elevating Units**: Mud pit discharges are to be provided with valves which can be operated from an accessible position. These valves are to be normally closed and a sign to this effect is to be posted near the operating position. Non-return valves need not be provided.

25 **Scuppers and Drains on Surface-Type and Self-Elevating Drilling Units**

All scuppers and drains are to be examined and tested, and all shell penetration welds are to be subjected to surface (inboard and outboard) NDT and the welds hose tested, preferably before the drilling unit is launched.

25.1 **Connections**

Discharges led through the shell either from spaces below the freeboard deck or from within superstructures and deckhouses on the freeboard deck, fitted with doors complying with the requirements of 3-2-11/5 of the Steel Vessel Rules, are to be fitted with efficient and accessible means for preventing water from passing inboard.

25.3 **Valves and Fittings**

Normally, each separate discharge is to have one automatic non-return valve with a positive means of closing it from a position above the freeboard deck, or bulkhead deck, whichever is higher. Alternatively, one non-return valve and one positive closing valve controlled from above the freeboard deck may be accepted.

Where the vertical distance from the load waterline to the inboard end of the discharge pipe exceeds $0.01L$, the discharge may have two automatic non-return valves without positive means of closing, provided that the inboard valves are always accessible for examination under service conditions. The inboard valve is to be above the deepest load waterline. If this is not practicable, then, provided a locally controlled stop valve is interposed between the two non-return valves, the inboard valve need not be fitted above the deepest load waterline.

Where that vertical distance from the summer load waterline to the inboard end of the discharge pipe exceeds $0.02L$, a single automatic non-return valve without positive means of closing may be accepted provided it is located above the deepest load waterline. If this is impracticable, a locally operated positive closing valve may be provided below the single non-return valve in which case the non-return valve need not be located above the specified deepest load waterline. The means for operating the positive-action valve is to be readily accessible and provided with an indicator showing whether the valve is open or closed.

Where sanitary discharges and scuppers lead overboard through the shell in way of machinery spaces, the fitting to shell of a locally operated positive closing valve, together with a non-return valve inboard, will be acceptable.

Scuppers and discharge pipes originating at any level and penetrating the shell either more than 450 mm (17.5 in.) below the freeboard deck or less than 600 mm (23.5 in.) above the summer load waterline is to be provided with a non-return valve at the shell. This valve, unless required by 4-2-2/23.1, may be omitted if the piping has a wall thickness at least equal to the thickness of the shell plating or extra-heavy pipe (see 4-2-1/3.9), whichever is less.

Scuppers leading from superstructures or deckhouse not fitted with doors complying with the requirements of Section 3-2-11/5 of the Steel Vessel Rules are to be led overboard.
27 **Cooler Installations External to the Hull**

Cooler installations are to be examined and tested as applicable, welds on integral cooler channels and welds on non-integral watertight enclosures are to be subjected to surface (inboard and outboard) NDT or hose tested as deemed necessary by the attending Surveyor, before the drilling unit is launched.

27.1 **Connections**

The inlet and discharge connections of external cooler installations are to be verified to be in accordance with 4-2-2/21.1, 4-2-2/21.3, 4-2-2/21.5 and 4-2-2/21.9, except that wafer type valves will be acceptable.

27.3 **Valves and Fittings**

The positive closing valves required by 4-2-2/27.1 need not be provided if the keel (skin) cooler installation is integral with the hull. To be considered integral with the hull, the installation is to be constructed such that channels are welded to the hull with the hull structure forming part of the channel. The channel material is to be at least of the same thickness and quality as that required for the hull, and the forward end of the cooler is to be faired to the hull with a slope of not greater than 4 to 1. If positive closing valves are not required at the shell, all flexible hoses or joints are to be positioned above the deepest load waterline or be provided with an isolation valve.

Where fitted, valves and fittings are to be verified.

27.5 **Not-Fully Welded Shell Penetrations of Non-Integral Keel Coolers**

Where non-integral keel coolers are used, if the shell penetrations are not fully welded, the penetration is to be encased in a watertight enclosure.

29 **Penetrations Through Watertight Boundaries**

All penetrations through watertight boundaries are to be tested to prove the integrity of the boundary. For further details of the required testing, see 7-1-2/25.

At the boundaries required to be maintained watertight for damage stability, valves or watertight closures may be required (see 3-3-2/5). Check valves and spring or gravity-actuated, non-return valves are not to be considered effective in preventing progressive flooding.

29.1 **Ventilation Systems**

Non-watertight ducts passing through subdivision bulkheads and watertight ducts servicing more than one watertight compartment or which are within the extent of damage are to be verified to be provided with valves at the subdivision boundary. Valve operators are to be fitted with position indicators. Control of valves is to be either from the ballast control room (or other normally manned spaces), or from a readily accessible location which is above the calculated immersion line in the damaged condition (see 3-3-2/1.3).

29.3 **Internal Drain Systems**

Where internal drain systems are led to a separate, watertight compartment fitted with bilge suction, positive closing valves are to be provided with position indicators. Control of valves is to be verified to be either from the ballast control room (or other normally manned spaces), or from a readily accessible location which is above the calculated immersion line in the damaged condition (see 3-3-2/1.3).

Where the installation of a remote valve operator is impractical, drain lines may be fitted with quick-acting, self-closing valves at the boundary of the space which is equipped with bilge suction.
PART 7

CHAPTER 1 Surveys During Construction

SECTION 4 Surveys at Builder’s Yard – Mechanical and Piping Systems

1 General

This Section pertains to surveys and testing to be carried out on mechanical and piping systems during construction, installation and testing of mobile offshore drilling units at builder’s yard/facility.

The documentation requirements for design review are given Parts 3, 4, and 5 of these Rules.

Installation surveys and testing of machinery, piping, pressure vessels, and outfitting items are referenced in Section 7-1-3 of these Rules.

ABS Surveyor attendance is required, typically for the following purposes. All surveys and testing is to be carried out in presence of and to the satisfaction of the attending Surveyor, prior to the sea trial as referenced in Section 7-1-9 of these Rules.

3 Jacking and Associated Systems

All jacking and associated systems of self-elevating drilling units, constructed and certified by the Surveyor at the manufacturer’s plant, are to be installed in accordance with approved plans. For further details, see 6-1-9/25 of these Rules.

Installation of the jacking or other elevating system is to be verified. Jacking trial is to be carried out in accordance with an agreed procedure. For further details of the jacking trial, see 7-1-9/9 of these Rules.

3.1 Materials

Material certificates, satisfying 6-1-9/9 of these Rules are to be made available to the attending Surveyor.

3.3 Jacking Gear Motors and Motor Controllers

Jacking gear motors and motor controllers is to satisfy 6-1-9/15 of these Rules and verified as being satisfactorily installed.

3.5 Hydraulic System

Hydraulic cylinder material is to satisfy 6-1-9/17 of these Rules. The hydraulic system is to satisfy 6-1-9/17 of these Rules and verified as being satisfactorily installed.

3.7 Instrumentation and Other Components

Instrumentation and other components of the jacking system satisfying 6-1-9/13 and 6-1-9/19 of these Rules respectively, and verified as being satisfactorily installed.

Operation of the jacking system from its control stations are to be verified after installation. This verification is to include the operation of the system by emergency controls (emergency stop) from the jack house.

Satisfactory operation of effective communication system is to be verified.
5 **Tank Vents and Overflows**

Tank vents and overflows are to be examined and tested to confirm compliance with 4-2-3/1 of these Rules. The required examination and testing is to be carried out to verify system’s compliance with below specific requirements, prior to the sea trial.

When air/hydrostatic testing of tanks, vents and overflow pipes are to be examined and subjected to air/hydrostatic testing.

5.1 **Progressive Flooding Consideration**

Tank vents and overflows are to terminate above the extent of water-tight integrity. Those terminating within the extent of weather-tight integrity are to be fitted with automatic means of closure such as a ball check valve or equivalent.

Location of tank vents and overflows are to prevent progressive flooding and to satisfy 4-2-3/1.3 of these Rules, and verified as being satisfactorily installed.

Progressive flooding through tank vents and overflows, regardless of the means of closure, is to be considered when tank vents and overflows from intact spaces terminate within a damaged compartment or vice versa (see 7-1-2/19).

5.3 **Height of Vent Pipes**

Height of tank vents and overflows are to satisfy 4-2-3/1.5 of these Rules.

5.5 **Size of Vent Pipes**

Size of tank vents and overflows are to satisfy 4-2-3/1.7 of these Rules.

5.7 **Termination of Vent Pipes**

Termination of vents pipes is to satisfy 4-2-3/1.9 of these Rules.

5.9 **Overflow Pipes**

Arrangement and installation of overflow pipes and applicable alarms of overflow tanks are to satisfy 4-2-3/1.11 of these Rules.

7 **Sounding**

Sounding arrangements are to be examined and tested to confirm compliance with 4-2-3/3 of these Rules. The required examination and testing is to be carried out to verify system’s compliance with below specific requirements, prior to the sea trial.

When air/hydrostatic testing of tanks/voids, sounding pipes are to be examined and subjected to air/hydrostatic testing.

7.1 **Sounding Pipes**

Size, installation and termination arrangements of sounding pipes are to satisfy 4-2-3/3.3 of these Rules.

7.3 **Gauge Glasses and Tank Level Indicators**

Installation and closing arrangements of gauge glasses are to satisfy 4-2-3/3.5 of these Rules.

Where a level-indicating device or system is provided for determining the level in a tank containing flammable or combustible liquid, they are also to satisfy 4-2-3/3.7 of these Rules.
9 **Bilge System**

Bilge system is to be examined and tested to confirm compliance with 4-2-4/1, 4-2-4/3, 4-2-4/5, 4-2-4/7, and 4-2-4/9 of these Rules. The required examination and testing is to be carried out to verify system’s compliance with below specific requirements, prior to the sea trial.

Bilge system, together with its fitted alarms, is to be examined and tested prior to the sea trial.

Satisfactory operation of the bilge system together with its alarms is to be re-confirmed during the sea trial (see Section 7-1-8).

9.1 **Bilge System for Surface-Type Units**

Minimum number of bilge pumps, arrangement of independent bilge suctions, and arrangement of direct bilge suction on ship-type units are to satisfy 4-2-4/1 of these Rules.

9.3 **Bilge System for Column-Stabilized Units and Self-Elevating Units**

Bilge system arrangement of void compartments, chain lockers, and the bilge alarms fitted in propulsion and pump rooms are to satisfy 4-2-4/3 of these Rules.

9.5 **Bilge Piping (All Units)**

Installation and arrangement of the piping, manifolds, cocks and valves, common-main-type bilge system, strainers, gravity drains, and bilge suction from hazardous areas are to satisfy 4-2-4/5 of these Rules.

Bilge system piping is to be examined and tested.

9.7 **Bilge Pumps (All Units)**

Installation and arrangement of the bilge system pumps are to satisfy 4-2-4/7 of these Rules.

All bilge pumps, previously surveyed and certified by ABS at vendor’s facility, are to be installed and tested prior to the sea trial.

Satisfactory operation of the bilge pumps together with bilge system alarms are to be re-confirmed during the sea trial.

9.9 **Size of Bilge Suctions**

9.9.1 **Surface-Type Units**

Sizes of main and branch lines are to be verified in accordance with ABS reviewed P&ID drawings and to comply with 4-2-4/9.1 of these Rules.

9.9.2 **Column-Stabilized Units and Self-Elevating Units**

Sizes of main and branch lines are to be verified in accordance with ABS reviewed P&ID drawings and to comply with 4-2-4/9.3 of these Rules.

11 **Ballast System**

Examination and testing of the ballast manifolds is to be carried out to confirm compliance with below specific requirements, prior to the sea trial.

Ballast control features are to be examined and tested to confirm compliance with below specific requirements, prior to the sea trial. Satisfactory operation of the ballast control features is to be re-confirmed during the sea trial.

11.1 **Ballast Piping (All Units)**

Installation and arrangement of the piping, manifolds, cocks and valves, and the controls for ballast tank valves are to satisfy 4-2-4/11 of these Rules.

The arrangement of the ballast pumping system is to be such as to prevent the possibility of water or oil passing into the machinery spaces, or from one compartment to another, whether from the sea, water ballast or oil tanks. The ballast mains are to have separate control valves at the pumps.
11.3 Ballasting Systems for Column-Stabilized Units
Installation and arrangement of the piping, manifolds, pumps, and ballast control features are to satisfy 4-2-4/13 of these Rules.

The ballast system is to be designed and arranged such that the system can take suction from and de-ballast any ballast tank under normal operating and transit conditions.

The system is to be capable of restoring the unit to a normal operating or transit draft and a level trim condition, when subject separately to each of the following:

i) The assumed damaged conditions as specified in 3-3-2/1.3.2(a) with any one pump inoperable.

ii) The flooding specified in 3-3-2/1.3.2(b).

In addition, the system is to be capable of raising the unit, starting from a level trim condition at deepest normal operating draft, either a distance of 4.6 m (15 ft) or to the severe storm draft, whichever distance is greater, within three hours (calculations are to be submitted for review).

This capability test is to be carried out during the ballast trial.

13 Fuel Oil System
Arrangement of the system, piping, valves and fittings, oil-heating arrangements, and arrangement of fuel-oil purifiers are to satisfy 4-2-5/1 of these Rules.

Examination and testing of the fuel oil system together with its tanks, valves, fittings, heaters, and purifiers (if fitted) is to be carried out to confirm compliance with below specific requirements, prior to the sea trial.

Satisfactory operation of the system is to be re-confirmed during the sea trial.

13.1 Fuel-oil Transfer and Filling
Examination and testing of the fuel oil transfer and filling system together with its tanks, valves (including their remote operation), fittings, and heaters, is to be carried out to confirm compliance with below specific requirements, prior to the sea trial.

Satisfactory operation of the system is to be re-confirmed during the sea trial.

The fuel-oil pumping arrangements are to be distinct from the other pumping systems as far as practicable, and the means provided for preventing dangerous interconnection in service are to be thoroughly effective.

Leakage detection (when heating coils are fitted), piping in oil tanks, control valves or cocks, and valves on oil tanks, are to satisfy 4-2-5/3 of these Rules.

13.3 Fuel-oil Service System for Boilers
Where boilers are located in machinery spaces, they are to be fitted with guard plates and drip pans in way of furnaces. Boilers installed for the purpose of providing power for auxiliaries are to have at least two means of feeding and two fuel-oil service pumps. The construction of all boilers is to comply with the requirements of Section 4-4-1 and Appendix 4-4-1A1 of the Steel Vessel Rules.

Examination and testing of the fuel oil service system for boilers, is to be carried out to confirm compliance with above specific requirements, prior to the sea trial.

Satisfactory operation of the service system is to be re-confirmed during the sea trial.

13.5 Fuel-oil Service System for Internal Combustion Engines
Examination and testing of the fuel oil service system for internal combustion engines, is to be carried out to confirm compliance with below specific requirements, prior to the sea trial as referenced in Section 7-1-9 of these Rules.

Satisfactory operation of the service system is to be re-confirmed during the sea trial.

Minimum number and arrangement of fuel-oil pumps, oil tanks and drains for the fuel-oil system, fuel-oil pressure piping, fuel-oil injection system, and piping between booster pump and injections pumps are to satisfy 4-2-5/7 of these Rules.
13.7 Shutdown Arrangements for Fuel Oil System Valves

Every fuel oil suction pipe from a storage, settling or daily service tank which emanates at such a level that it will be subjected to a static head of oil from the tank is to be fitted with a positive shutoff valve capable of being closed manually from a readily accessible location outside of the space in which the valve is located and tested (see 5-3-1/9).

15 Low Flash Point Fuels

Where used, examination of the low flash point fuels and associated arrangements is to be carried out to confirm compliance with 4-2-5/9 of these Rules.

17 Lubricating-Oil Systems

Examination and testing of the lube-oil system is to be carried out to confirm compliance with below specific requirements, prior to the sea trial.

The lubricating-oil piping is to be entirely separated from other piping systems. In addition, the requirements of 4-2-5/1.1.2, 4-2-5/1.3, and 4-2-5/1.5 of these Rules are applicable.

The requirements in 4-2-5/3.9 are also applicable for lubricating-oil tanks. However, arrangements for remotely closing the valve from a position outside of the compartment need not be provided if inadvertent valve closure could result in damage to the running machinery due to lack of lubricating-oil. Where the machinery is arranged for automatic shutdown upon loss of lubricating-oil, the valve required by 4-2-5/3.9 is to be provided with means to close it from a readily accessible and safe location outside of the compartment in which the valve is located.

For ship-type units, the lubricating systems are to be so arranged that they will function satisfactorily under the conditions specified in 4-1-1/7 of these Rules.

17.1 Sight Flow Glasses

Sight flow glasses may be used in lubricating systems provided they are fire-resistant.

17.3 Turbines and Reduction Gears

For turbines and their reduction gears, see 4-6-6/9.7.1 and 4-6-6/9.3.1 of the Steel Vessel Rules.

17.5 Internal Combustion Engines and Reduction Gears

Lubricating-oil systems for internal-combustion engines and their reduction gears are to satisfy 4-2-6/1.7 of these Rules.

17.7 Electrical Machinery

For electrical machinery, see 4-3-3/3.3, 4-3-3/3.5.1 and 6-1-7/5.13 of these Rules.

19 Hydraulic Systems

Examination and testing of the hydraulic systems is to be carried out to confirm compliance with below specific requirements, prior to the sea trial.

The arrangements for Class I and II hydraulic piping systems are to be in accordance with the requirements of this section, except that hydraulic systems which form part of an independent device or equipment not covered by these Rules and which does not form part of the unit’s piping system (such as a crane) are not covered by this Section, unless it is relevant to an optional notation or certification requested for the unit. The requirements for fuel oil tanks contained in 4-2-5/1.1.2 and 4-2-5/1.3 of these Rules are also applicable for tanks containing hydraulic fluid.

Arrangement and installation of valves, piping, pipe fittings, hoses, accumulators, fluid power cylinders, and the segregation of the high pressure hydraulic units, are to satisfy 4-2-6/3.
21 Fixed Oxygen-Acetylene Installations

Where fitted, examination and testing of the fixed oxygen-acetylene installations is to be carried out to confirm compliance with below specific requirements.

21.1 Application

Provisions of 4-2-6/5.3 of these Rules apply to fixed oxygen-acetylene installations that have two or more cylinders of oxygen and acetylene, respectively. Spare cylinders of gases need not be counted for this purpose. Provisions of 4-2-6/5.5 and 7-1-4/41.9, of these Rules, as applicable, are to be complied with for fixed installations regardless of the number of cylinders.

21.3 Gas Storage

Storage of gas cylinders, ventilation of storage rooms, and electrical installation in the storage rooms are to satisfy 4-2-6/5.3 of these Rules.

21.5 Piping System Components

Pipe and fittings, pressure relief devices, and system arrangement are to satisfy 4-2-6/5.5 of these Rules.

21.5.1 Gas Cylinders

Gas cylinders are to be designed, constructed and certified in accordance with the provisions of 4-4-1/1.11.4 of the Steel Vessel Rules. Each cylinder is to be fitted with a suitable pressure relief device such as a fusible plug or a rupture disc.

The area within 3 m (10 ft) of the pressure relief device discharge outlet is to be regarded as a hazardous area.

23 Fuel Storage for Helicopter Facilities

Examination of the fuel storage facilities for helicopters is to be carried out to confirm compliance with below specific requirements.

23.1 General

Isolation of fixed fuel storage and transfer facilities, construction of fuel storage tanks, fuel storage tank vents and valves, are to satisfy 4-2-6/7.1. See Section 7-1-7 of these Rules for survey of hazardous areas.

23.3 Spill Containment

Arrangements for spill containment and drainage are to satisfy 4-2-6/7.3 of these Rules.

25 Starting-air Systems

Examination and testing of the starting air system is to be carried out to confirm compliance with below specific requirements, prior to the sea trial.

25.1 Design and Construction

The design and construction of all air containers and piping systems are to be in accordance with the applicable requirements of Section 4-4-1 and Appendix 4-4-1A1 of the Steel Vessel Rules and 4-2-6/9.1 of these Rules.

25.3 Starting-air Capacity

Units having internal combustion engines arranged for air starting are to be provided with at least two starting-air containers of approximately equal size. The total capacity of the starting-air containers is to be sufficient to provide, without recharging the containers, at least the number of consecutive starts stated below. If other compressed air systems, such as control air, are supplied from starting-air containers, the aggregate capacity of the containers is to be sufficient for continued operation of these systems after the air necessary for the required number of starts has been used.
Minimum number of consecutive starts as applicable, and as required per following conditions defined in 7-1-4/25.3.1 through 7-1-4/25.3.3, is to be verified prior to the sea trial.

25.3.1 Diesel Propulsion

The minimum number of consecutive starts (total) required to be provided from the starting-air containers is to be based upon the arrangement of the engines and shafting systems as indicated in the following 7-1-4/Table 1.

### TABLE 1
Starting Air Minimum Number of Consecutive Starts (2012)

<table>
<thead>
<tr>
<th></th>
<th>Single Screw Unit</th>
<th>Multiple Screw Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One engine coupled to shaft directly or through reduction gear</td>
<td>Two or more engines coupled to shaft through clutch and reduction gear</td>
</tr>
<tr>
<td>Reversible Engines</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Non-reversible Engines</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

For arrangements of engines and shafting systems which differ from those indicated in the table, the capacity of the starting-air containers will be specially considered based on an equivalent number of starts.

25.3.2 Diesel-electric Propulsion

The minimum number of consecutive starts required to be provided from the starting-air containers is to be determined from the following equation.

\[
S = 6 + G(G - 1)
\]

where

- \(S\) = total number of consecutive starts
- \(G\) = number of engines necessary to maintain sufficient electrical load to permit vessel transit at full seagoing power and maneuvering. The value of \(G\) need not exceed 3.

25.3.3 Non Self-Propelled Units

The minimum number of consecutive starts required to be provided from the starting-air containers is three (3) per auxiliary engine, but the total capacity of the starting-air containers dedicated to the auxiliary engines need not exceed eight (8) consecutive starts.

25.3.4 Protective Devices for Starting-air Mains

Installation of protective devices is to satisfy 4-2-6/9.5.

### 27 Cooling-Water Systems for Internal Combustion Engines

Examination and testing of the cooling-water system is to be carried out to confirm compliance with below specific requirements, prior to the sea trial.

27.1 General

Means are to be provided to ascertain the temperature of the circulating water at the return from each engine and to indicate that the proper circulation is being maintained. Drain cocks are to be provided at the lowest point of all jackets. For relief valves, see 4-2-1/11.21.

27.3 Sea Suctions, Strainers and Circulating Water Pumps

Sea suctions, strainers and circulating water pumps for the cooling-water system are to satisfy 4-2-6/11.
29 **Exhaust System**
Examination of the exhaust system is to be carried out to confirm compliance with 4-2-6/13, prior to the sea trial.

31 **Valves in Atomizing Lines**
Where air or steam is used to atomize well bore fluids prior to flaring, a non-return valve is to be fitted in the line. This valve is to be part of the permanently installed piping, readily accessible and as close as possible to the burner boom. Examination of these valves is to be carried out.

33 **Helicopter Deck Drainage Arrangements**
Helicopter decks are to be arranged and provided with means to prevent collection of liquids and to prevent liquids from spreading to or falling on other parts of the unit.
Examination of the helicopter deck drainage is to be carried out.

35 **Boilers and Associated Piping**
Boilers and their associated steam, exhaust and feed systems are to be in accordance with the applicable requirements of Part 4, Chapters 4 and 6 of the *Steel Vessel Rules*.
Examination and testing of the boilers and associated piping system are to be carried out to confirm compliance with above specific requirements, prior to the sea trial.

37 **Steering Gear Piping**
Piping systems associated with steering gear systems are to be in accordance with Section 4-3-4 of the *Steel Vessel Rules*.
Examination and testing of the steering gear piping is to be carried out to confirm compliance with above specific requirements, prior to the sea trial.

39 **Gas Turbine Piping**
Piping systems associated with gas turbines are to be in accordance with 4-2-3/9 of the *Steel Vessel Rules*.
Examination and testing of the gas turbine piping is to be carried out to confirm compliance with above specific requirements, prior to the sea trial.

41 **Piping System Pressure Test**
All piping systems are to be examined and tested after installation.

41.1 **Metallic Piping System Pressure Tests**
In addition to the testing and inspection of materials, as required in Chapter 3 of the ABS Rules for Materials and Welding (Part 2), the following tests on the fabricated piping are to be carried out after satisfactory pipe bending and the attachment of flanges.
Small bore pipes and tubes of less than 15 mm outside diameter may be exempted from the required hydrostatic tests.

41.1.1 **Fuel-oil Service System**
Pressure lines are to be tested before installation to 1.5 times the design pressure of the system, but not less than 3.4 bar (3.5 kgf/cm², 50 psi).
Record of satisfactory hydrostatic testing is to be available to the Surveyor.
41.1.2 Fuel-Oil Suction and Transfer System
Transfer systems and fuel-oil suction lines are to be tested before installation to 3.4 bar (3.5 kgf/cm², 50 psi).
Record of satisfactory hydrostatic testing is to be available to the Surveyor.

41.1.3 Starting-Air System
Piping in starting-air systems is to be tested, preferably before installation, to 1.5 times the design pressure of the system.
Record of satisfactory hydrostatic testing is to be available to the Surveyor. If the piping could not be tested before installation, Surveyor’s witness of testing after installation is required.

41.1.4 Hydraulic Power System
After fabrication, the hydraulic power piping system or each piping component is to be tested to 1.5 times the design pressure.
Record of satisfactory hydrostatic testing is to be available to the Surveyor.

41.1.5 Specific Systems
The following piping systems are to be hydrostatically tested to $1.5P$, but not less than 4 bar (4.1 kgf/cm², 58 psi), after installation:
- i) Gas and liquid fuel systems
- ii) Heating coils in tanks

41.1.6 High Pressure Industrial Piping (2019)
High pressure industrial piping serving systems other than the marine systems (such as high pressure supply lines for drilling systems that are above 16 bar (16.3 kgf/cm², 232 psi), are to be hydrostatically tested in accordance with the requirements of the design standard.
Due to very high working pressure of such systems, it is preferred that an initial low pressure air leak test is carried out. Upon satisfactory completion of the leak test, the hydrostatic testing of the piping is to be carried out preferably using calibrated pressure gauges with pressure chart recording capability, and piping maintained under the hydrostatic pressure for minimum of 15 minutes.
Necessary safety precaution is to be taken by the builder during the high-pressure hydrostatic testing of these piping systems.

41.1.7 All Piping Systems
After installation, all piping is to be tested under working conditions. Where it is not possible to carry out the required hydrostatic tests for all segments of pipes and integral fittings before installation, the remaining segments, including the closing seams, may be so tested after installation. Or, where it is intended to carry out all of the required hydrostatic tests after installation, such tests may be conducted in conjunction with those required by this Paragraph. In both these respects, testing procedures are to be submitted to the Surveyor for acceptance.
Testing of the piping systems under working condition may be carried out during the sea trial, provided the piping installation was visually examined and found satisfactory prior to commencement of the sea trial.

41.3 Pneumatic Test in Lieu of Hydrostatic Test
In general, a pneumatic test in lieu of a hydrostatic test is not permitted. Where it is impracticable to carry out the required hydrostatic test, a pneumatic test may be considered. In such cases, the procedure for carrying out the pneumatic test, having regard to safety of personnel, is to be submitted to the applicable ABS Assistant Chief Surveyor for special consideration.
41.5 **Hydrostatic Tests of Shell Valves (2016)**

All valves intended for installation on the side shell at or below the load waterline, including those at the sea chests, are to be hydrostatically tested in the presence of a Surveyor before installation to a pressure of at least 5 bar (5.1 kgf/cm², 72.5 psi).

41.7 **Plastic Piping System Pressure Tests**

Plastic piping systems are to be subjected to a hydrostatic test on board after installation at a pressure of not less than 1.5 times the design pressure.

For plastic piping required to be electrically conductive, earthing is to be checked and random resistance testing is to be conducted.

41.9 **Fixed Oxygen-Acetylene Installation Test**

Piping on the oxygen high-pressure side is to be tested before installation to at least 207 bar (211 kgf/cm², 300 psi) and the piping on the acetylene high-pressure side is to be tested to 1.5 times its design pressure. Manufacturer's record of satisfactory hydrostatic testing is to be available to the Surveyor.

The entire system is to be leak-tested with nitrogen or a suitable inert gas after installation. Care is to be taken to cleanse the piping with suitable medium to remove oil, grease and dirt and to blow-through with oil-free nitrogen or other suitable medium before putting the system in service. After installation, the system is to be operationally tested under working conditions.
PART 7

CHAPTER 1 Surveys During Construction

SECTION 5 Surveys at Builder’s Yard – Electrical Cables and Equipment

1 General

This Section pertains to surveys carried out on electrical cables and equipment during construction, installation and testing of mobile offshore drilling units at builder’s yard/facility, including required onboard testing and trial. The documentation requirements for design review are given Parts 3, 4, and 5 of these Rules.

ABS Surveyor attendance is required, typically for the following purposes. All surveys and testing is to be carried out in presence of and to the satisfaction of the attending Surveyor, prior to the sea trial as referenced in Section 7-1-9 of these Rules.

1.1 Definitions

For definition of various terms, see 4-3-1/3.

3 Survey of Electrical Cables and Equipment

All electrical cables and equipment is to be installed and tested in accordance with the Rules or recognized standards.

ABS reviewed booklet of the standard wiring practices and details, including such items as cable supports, earthing details, bulkhead and deck penetrations, cable joints and sealing, cable splicing, watertight and explosion-proof connections to equipment, earthing and bonding connections, etc., as applicable, is to be available to the attending Surveyor. Where cable penetration methods for A- or B-class decks or bulkheads are shown, an evidence of approval by an Administration signatory to 1974 SOLAS as amended is also to be available.

The quality control program for the construction of a drilling unit is to at least include the following items, as appropriate:

i) Material Quality and Traceability

ii) Inspection of cable trays, electrical cables, cable supports, and cable fastenings.

iii) Inspection of electrical cable penetrations through weather-tight, water-tight, fire-tight or gas-tight boundaries. Inspection of Multi-Cable Transits (MCTs).

iv) Megger Tests.

Where cable splices need to be used, they are to be of an approved type.

Exposed metal parts of electrical machines or equipment which are not intended to be live, but which are liable under fault conditions to become live, are to be earthed (see 4-3-3/7).

Electrical equipment and wiring essential for operational purposes may be installed in hazardous areas (see 7-1-7/9). For certified safe-type equipment, see 7-1-7/9.3.
5 Cable Installation

5.1 General Considerations

Electric cables are to be installed in continuous lengths between terminations at equipment or in cable junction boxes (see 4-3-3/5.25). However, approved splices will be permitted at interfaces of new construction modules, when necessary to extend existing circuits for a drilling unit undergoing repair or alteration, and in certain cases to provide for cables of exceptional length (see 4-3-3/5.21).

The cross-sectional areas of conductors are to be confirmed to be in accordance with approved drawings.

Cables and wiring are to be installed and supported in such a manner as to avoid chafing or other damage. Cables are to be located with a view to avoiding, as far as practicable, spaces where excessive heat and gases may be encountered; also, spaces where they may be exposed to damage, such as exposed sides of deckhouses. Cables are not to be installed in the bilge area unless protected from bilge water.

Where cables are installed in a cable draw box and horizontal pipes or the equivalent is used for cable protection, means of drainage are to be verified.

Cables serving systems above 1 kV are not to be bunched with cables serving systems of 1 kV and below.

Where paint or any other coating is systematically and intentionally applied on the electric cables, it is to be established that the mechanical and fire performance properties of the cable are not adversely affected.

In this regard:

\(i)\) Fire retardant property is to be confirmed to be in compliance with 4-3-4/7.1.2.

\(ii)\) It is to be confirmed that the paint and the solvent used will not cause damages to the cable sheath (e.g., cracking).

Overspray on cables or painted exterior cables are not subject to the requirements of this section.

5.3 Insulation Resistance for New Installation

Each power and each light circuit is to have an insulation resistance between conductors and between each conductor and earth of not less than the following values.

<table>
<thead>
<tr>
<th>Current Load</th>
<th>Insulation Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 5 amperes load</td>
<td>2 megohms</td>
</tr>
<tr>
<td>10 amperes load</td>
<td>1 megohm</td>
</tr>
<tr>
<td>25 amperes load</td>
<td>400,000 ohms</td>
</tr>
<tr>
<td>50 amperes load</td>
<td>250,000 ohms</td>
</tr>
<tr>
<td>100 amperes load</td>
<td>100,000 ohms</td>
</tr>
<tr>
<td>200 amperes load</td>
<td>50,000 ohms</td>
</tr>
<tr>
<td>Over 200 amperes load</td>
<td>25,000 ohms</td>
</tr>
</tbody>
</table>

If the above values are not obtained, any or all appliances connected to the circuit may be disconnected for this test.

5.5 Protection for Electric-Magnetic Induction

Protection of cables is to be verified. The following cables are to be protected as required by 4-3-3/5.5 of these Rules:

\(i)\) Multiple conductor cables

\(ii)\) Single conductor cables

\(iii)\) Non-shielded signal cables
5.7 Joints and Sealing

Cables not having a moisture-resistant insulation are to be sealed against the admission of moisture by methods such as taping in combination with insulating compound or sealing devices. Following are to be verified during installation survey:

i) Stresses on the cable are not to be transmitted to the conductors.

ii) Terminations and joints in all conductors are to be so made as to retain the original electrical, flame retarding and, where necessary, fire resisting properties of the cable.

iii) Terminal boxes are to be secured in place and the moisture-resistant jacket is to extend through the cable clamp.

iv) Enclosures for outlets, switches and similar fittings are to be flame-resistant and moisture-resistant and of adequate mechanical strength and rigidity to protect the contents and to prevent distortion under all likely conditions of service (see 4-3-3/5.17.1 and 4-3-3/5.21).

5.9 Support and Bending

5.9.1 Support and Fixing

Where cables are fixed by means of clips, saddles or straps, they are to have a surface area so large and shaped such that the cables remain tight without their coverings being damaged. Metal clips may be screwed directly to deck or bulkhead, except on watertight bulkheads.

The support and fixation measures are to be verified to be in compliance with the following.

5.9.1(a) The distances between supports are to be suitably chosen according to the type of cable and the probability of vibration, and are not to exceed 400 mm (16 in.). For a horizontal cable run where the cables are laid on cable supports in the form of tray plates, separate support brackets or hanger ladders, the spacing between the fixing points may be up to 900 mm (36 in.), provided that there are supports with maximum spacing as specified above. This exemption does not apply to cable runs along weather decks when the cable run is arranged so that the cables can be subjected to forces by water washing over the deck.

Note: When designing a cable support system for single-core cables, consideration is also to be given to the effects of electrodynamic forces developing on the occurrence of a short-circuit.

The above-given distances between cable supports are not necessarily adequate for these cables. Further, other recognized standards for cable support and fixing will be considered.

5.9.1(b) The supports and the corresponding accessories are to be robust and are to be of corrosion-resistant material or suitably treated before erection to resist corrosion.

5.9.1(c) Cable clips or straps made from an approved material other than metal (such as polyamide, PVC) may be used.

5.9.1(d) When cables are fixed by means of clips or straps referred to in 7-1-5/5.9.1(c) above and these cables are not laid on top of horizontal cable trays or cable supports, suitable metal cable clips or saddles are to be added at regular distances not exceeding 2 m (6.5 ft) in order to prevent the release of cables during a fire. This also applies to the fixing of nonmetallic conduits or pipes.

Note: Item 7-1-5/5.9.1(d) does not necessarily apply in the case of cable runs with only one or a few cables with small diameters for the connection of a lighting fitting, alarm transducer, etc.

5.9.1(e) Non-metallic clips, saddles or straps, are to be flame retardant in accordance with IEC Publication 60092-101.

5.9.2 Bending Radius

For bending radius requirements, see 7-1-5/Table 1 of these Rules.
### TABLE 1

**Minimum Bending Radii of Cables (2012)**

<table>
<thead>
<tr>
<th>Insulation</th>
<th>Outer covering</th>
<th>Over all diameter, D</th>
<th>Minimum internal bending radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermoplastic or thermosetting with circular copper conductor</td>
<td>Unarmored or unbraided</td>
<td>$D \leq 25$ mm (1 in.)</td>
<td>$4D$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$D &gt; 25$ mm</td>
<td>$6D$</td>
</tr>
<tr>
<td></td>
<td>Metal braid screened or armored</td>
<td>Any</td>
<td>$6D$</td>
</tr>
<tr>
<td></td>
<td>Metal wire or metal-tape armored</td>
<td>Any</td>
<td>$6D$</td>
</tr>
<tr>
<td></td>
<td>Metal-tape armored</td>
<td>Any</td>
<td>$6D$</td>
</tr>
<tr>
<td>Composite polyester/metal laminate tape screened units or collective tape screening</td>
<td>Any</td>
<td></td>
<td>$8D$</td>
</tr>
<tr>
<td>Thermoplastic or thermosetting with shaped copper conductor</td>
<td>Any</td>
<td></td>
<td>$8D$</td>
</tr>
<tr>
<td>Mineral</td>
<td>Hard metal-sheathed</td>
<td>Any</td>
<td>$6D$</td>
</tr>
</tbody>
</table>

5.9.3 Plastic Cable Trays and Protective Casings

Where flame retardant plastic cable trays or protective casings are used, following details are to be verified in compliance with 4-3-3/5.9.3:

1. Installation details
2. Safe working load of the trays and covers
3. Cables passing through hazardous areas
4. Type testing record of trays and casings

Cable trays and protective casings made of plastic materials are to be supplemented by metallic fixing and straps such that, in the event of a fire, they and the cables affixed are prevented from falling and causing an injury to personnel and/or an obstruction to any escape route. See 7-1-5/5.9.1(d).

**Cable occupation ratio in protective casing.** The sum of the total cross-sectional area of all cables on the basis of their external diameter is not to exceed 40% of the internal cross-sectional area of the protective casing. This does not apply to a single cable in a protective casing.

5.11 Cable Run in Bunches

Where cables, which may be expected to operate simultaneously, are laid close together in a cable bunch in such a way that there is an absence of free air circulation around them, a reduction factor is applied to the current rating obtained from 4-3-4/Table 2. See 4-3-3/5.11 for details, which is required to be verified.

5.13 Deck and Bulkhead Penetrations

Where cables pass through watertight, fire tight or gas tight bulkheads or decks, the penetrations are to be made through the use of approved stuffing tubes, transit devices or pourable materials which will maintain the integrity of the division. Additionally, each such stuffing tube, transit device or pourable material is to be of a character so as not to damage the cable physically or through chemical action or through heat build-up.

When cables pass through (except collision bulkhead) decks and bulkheads, penetrations are to be verified in compliance with 4-3-3/5.13 of these Rules. In general, where penetrations are designed to maintain water/fire/gas tight integrity, they are to be tested by similar method how the structure is tested.

Where cables pass through deck beams or similar structural parts, all burrs are to be removed in way of the holes and care is to be taken to eliminate sharp edges.
5.15 Mechanical Protection

5.15.1 Metallic Armor
Protection of electric cables installed in locations liable to damage during normal operation of the drilling unit are to be verified during cable installation survey. Cables can either be provided with braided metallic armor or other means to protect them from mechanical injury as appropriate.

5.15.2 Conduit Pipe or Structural Shapes
Protection of electric cables installed in locations in way of hatch openings, tank tops, open decks subject to seas, and where passing through decks, are to be verified and confirmed to be protected by substantial metal shields, structural shapes, pipe or other equivalent means. When expansion bends are fitted, they are to be accessible for maintenance. The protection and its installation are to be in compliance with 4-3-3/5.15 of these Rules.

5.17 Emergency and Essential Feeders

5.17.1 Services Required to be Operable under Fire Condition
At least the following services are required to be operable under a fire condition:

i) Fire and general alarm system

ii) Fire extinguishing system including fire extinguishing medium release alarms

iii) Emergency fire pump

iv) Fire detection system

v) Control and power systems for all power operated fire doors and their status indicating systems

vi) Control and power systems for all power operated watertight doors and their status indicating systems

vii) Emergency lighting

viii) Public address system

ix) Remote emergency stop/shutdown arrangement for systems which may support the propagation of fire and/or explosion

It is to be verified that, as far as practicable, cables and wiring for emergency and essential services, including those listed above are not to pass through high fire risk areas. It is also to be verified that these cables and wiring are run in such a manner as to preclude their being rendered unserviceable by heating of the bulkheads that may be caused by a fire in an adjacent space (See 4-3-3/5.17).

5.17.2 Requirements by the Governmental Authority
Requirements (if any) of the Flag Administration for installation of emergency circuits required in various types of drilling units, is to be taken into consideration.

5.19 Mineral Insulated Cables
At all points where mineral-insulated, metal-sheathed cable terminates, an approved seal is to be provided immediately after stripping to prevent entrance of moisture into the mineral insulation. In addition, the conductors extending beyond the sheath are to be insulated with an approved insulating material. When mineral-insulated cable is connected to boxes or equipment, the fittings are to be approved for the conditions of service. The connections are to be in accordance with the manufacturer’s installation recommendation.

5.21 Fiber Optic Cables
The installation of fiber optic cables is to be in accordance with the manufacturer’s recommendations to prevent sharp bends where the fiber optic cables enter the equipment enclosure. Consideration is to be given to the use of angled stuffing tubes. The cables are to be installed so as to avoid abrading, crushing, twisting, kinking or pulling around sharp edges.
5.23 Battery Room
Where cables enter battery rooms, the holes are to be bused as required for watertight bulkheads in 7-1-5/5.13. All connections within battery rooms are to be resistant to the electrolyte. Cables are to be sealed to resist the entrance of electrolyte by spray or creepage.

5.25 Paneling and Dome Fixtures
Where cables are installed behind paneling, all connections are to be accessible and the location of concealed connection boxes is to be indicated. Where a cable strip molding is used for cable installation on the incombustible paneling, it is to be of incombustible material. Dome fixtures are to be installed so that they are vented or they are to be fitted with fire-resistant material in such a manner as to protect the insulated wiring leading to the lamps and any exposed woodwork from excessive temperature.

5.27 Sheathing and Structural Insulation
Cables may be installed behind sheathing, but they are not to be installed behind nor imbedded in structural fire insulation. They are to pass through such insulation at right angles and are to be protected by a continuous pipe with a stuffing tube at one end. For deck penetrations, this stuffing tube is to be at the upper end of the pipe and for bulkhead penetrations, it is to be on the uninsulated side of the bulkhead. For refrigerated-space insulation, the pipe is to be of phenolic or similar heat-insulating material joined to the bulkhead stuffing tube, or a section of such material is to be inserted between the bulkhead stuffing tube and the metallic pipe. Passage of cables through fire insulation and arrangement of penetration pieces are to be verified.

5.29 Splicing of Electrical Cables
In general, splicing of electrical cables is not allowed, especially in wet spaces. Where an electrical cable needs to be spliced, the approved splicing is to be examined and to satisfy the basis of approval (See 4-3-3/5.21.1) and the installation and protection of splices as follows:

5.29.1 Installation
All splices are to be made after the cable is in place and are to be accessible for inspection. The conductor splice is to be made using a pressure type butt connector by use of a one-cycle compression tool. See 4-3-3/9.1.4 for splices in hazardous area.

5.29.2 Protection
Splices may be located in protected enclosures or in open wireways. Armored cables having splices will not be required to have the armor replaced, provided that the remaining armor has been earthed in compliance with 4-3-3/7.9 or provided the armor is made electrically continuous. Splices are to be so located such that stresses (as from the weight of the cable) are not carried by the splice.

5.31 Splicing of Fiber Optic Cables
Where fiber optic cables are spliced, the splicing is to be made by means of approved mechanical or fusion methods.

5.33 Cable Junction Box
Installation of cable junction boxes throughout the vessel, except for propulsion cables, may be used. Construction, suitability, separation, and the support and connection of cables within all junction boxes are to be examined to be in compliance with 4-3-3/5.25 of these Rules and the following:
Cables are to be supported, as necessary, within junction boxes so as not to put stress (as from the weight of the cable) on the cable contact mountings. The connections are to be provided with locking type connections.
7 Equipment Installation and Arrangement

7.1 Materials
Material of all electrical equipment is to be in compliance with 4-3-1/11 of these Rules.

7.3 Grounding Arrangements
Where not obtained through normal construction, arrangements provided to effectively ground metal structures of derricks, masts and helicopter decks are to be verified. See also 4-2-6/7.1.3 for fuel storage for helicopter facilities.

All grounding arrangements are to be verified before the drilling unit commences its sea trial.

7.5 Insulation Material and Operation Temperature
A critical factor in the reduced life of electrical equipment is heat. The type of insulation used in equipment depends on the operating temperature that the equipment will experience. Average insulation life decreases rapidly with increases in internal operating temperatures of the equipment.

For definitions and requirements of cable insulation materials, see 6-1-7/1.1.

7.7 Degree of Protection for Enclosure
The designation to indicate the degree of protection consists of the characteristic letters IP followed by two numerals (the “characteristic numerals”) indicating conformity with conditions stated in 4-3-1/Table 2 and 4-3-1/Table 3. The characteristic numerals of equipment are to be verified at random as meeting the design drawings.

7.9 Temperature Ratings
Temperature ratings of all electrical equipment are to be in compliance with 4-3-1/17 of these Rules. The ratings of equipment are to be verified at random as meeting the design drawings.

7.9.1 Reduced Ambient Temperature
Where electrical equipment is installed within environmentally-controlled spaces, the ambient temperature for which the equipment is to be rated may be reduced from 45°C and maintained at a value not less than 35°C, provided all of the conditions in 4-3-1/17.3.1 are met, ratings of cables are in compliance with 4-3-1/17.3.2, and the ambient temperature control equipment is verified for its satisfactory function.

The equipment used for cooling and maintaining the lesser ambient temperature is to be classified as a secondary essential service, in accordance with 4-3-1/3.5, and the capability of cooling is to be witnessed at sea trial.

7.11 Clearances and Creepage Distances
Clearances and creepage distances of all electrical equipment are to be in compliance with 4-3-1/19 of these Rules. The distances are to be verified at random as meeting the Rules.

7.13 Equipment Location, Protection and Accessibility
Equipment location, protection and accessibility of all electrical equipment are to be in compliance with 4-3-3/3 of these Rules. The distances are to be verified at random as meeting the Rules.

7.13.1 Equipment Location
Electrical equipment is to be so placed or protected as to minimize the probability of mechanical injury or damage from the accumulation of dust, oil vapors, steam or dripping liquids. See 4-3-3/Table 1 for required degree of protection for various locations.

Where electrical and electronic equipment is located within areas protected by local fixed pressure water-spraying or water-mist fire extinguishing system and those within adjacent areas exposed to direct spray, equipment is to be verified for having a degree of protection not less than IP44.
7.13.2 Protection from Bilge Water

All generators, motors and electric couplings are to be so arranged that they cannot be damaged by bilge water; and, if necessary, a water-tight coaming is to be provided to form a well around the base of such equipment with provision for removing water from the well. Measures taken for protection are to be verified.

7.13.3 Accessibility

The design and arrangement of electrical apparatus is to provide accessibility to parts requiring inspection or adjustment. Armature and field coils, rotors and revolving fields are to be removable and where air ducts are used, there are to be means of access. Proper accessibility is to be verified.

7.15 Generators

In general, all generators on ship-type drilling units are to be located with their shafts in a fore-and-aft direction on the drilling unit and are to operate satisfactorily in accordance with the inclination requirements of 4-1-1/Table 1. Where it is not practicable to mount the generators with the armature shafts in the fore-and-aft direction, their lubrication will require special consideration, and this arrangement will be confirmed onboard.

7.17 Main Service Motors

Installation and arrangement of main service motors are to be in compliance with 4-3-3/3.5 of these Rules. The arrangement, in accordance with the reviewed plans, is to be verified at random as meeting the Rules.

7.17.1 Pump Motors

Motors for operating plunger and close-coupled pumps are to be verified to have the driving end entirely enclosed or designed to prevent leakage from entering the motor.

7.17.2 Motors on Weather Decks

Motors for use on weather decks are to be verified to have an enclosure of at least IP56 protection or are to be enclosed in watertight housings.

7.17.3 Motors Below Decks

Motors below decks are to be verified to have been installed at a location as dry as practicable and away from steam, water, and oil piping.

7.19 Accumulator Batteries

Permanently installed power, control and monitoring storage batteries of acid or alkaline types are to be so arranged that the trays are accessible and provided with not less than 254 mm (10 in.) headroom. Where a relief valve is provided for discharging excessive gas due to overcharge, arrangements are to be made for releasing the gas to the weather deck away from any source of ignition.

7.19.1 Battery Installation and Arrangements

Installation and arrangement of large storage batteries, moderate size batteries, and small batteries are to be verified in compliance with 4-3-3/3.7.2 of these Rules.

A low-hydrogen-emission battery with a battery charger having a charging rate of a large or moderate battery size installation may be treated as a moderate or small battery installation, respectively, if the following are met and verified:

i) Calculations under the worst case charging conditions are submitted and reviewed by Engineering; and

ii) A warning notice is placed to notify maintenance personnel that additional batteries are not to be installed, and batteries are only to be replaced by other batteries of the same or lower hydrogen emission rate.
7.19.2 Battery Trays
Trays for batteries are to be verified as being chocked with wood strips or equivalent to prevent movement and each tray is to be fitted with nonabsorbent insulating supports on the bottom and with similar spacer blocks at the sides or with equivalent provision to secure air-circulation space all around each tray.

7.19.3 Lead-Acid Batteries and Alkaline Batteries In Same Compartment
Lead-acid batteries and alkaline batteries, when placed in the same battery compartment, are to be verified as being effectively identified as to type and segregated.

7.19.4 Ventilation of Battery Rooms, Battery Lockers, and Deck Boxes
Where natural ventilation is employed, the ducts are to be verified as being run directly from the top of the battery room to the open air above. Where natural ventilation is impractical, and instead a mechanical exhaust ventilation is provided with fan intake at the top of the room, the fans are to be verified as being of non-sparking construction in accordance with 4-3-3/9.7 and approved by ABS to be capable of completely changing the air in the battery room substantiating that adequate ventilation is available to maintain the flammable gases within the battery room to a level below the Lower Explosive Limit (L.E.L.) at the maximum battery charging current. Where the ventilation rate is based on low hydrogen emission type batteries, a warning notice to this effect is to be verified as being placed in a visible place in the battery room. Openings for air inlet are to be provided near the floor.

7.19.5 Ventilation of Battery Lockers
Where practicable, battery lockers are to be ventilated similarly to battery rooms by a duct led from the top of the locker to the open air or to an exhaust ventilation duct. The ventilation arrangement as well as provision of louvers or equivalent near the bottom for entrance of air is to be verified.

7.19.6 Ventilation of Battery Deck Boxes
Duct from the top of the box, terminating in a goose neck, mushroom head or equivalent to prevent entrance of water, for a deck boxes is to be verified. Holes for air inlet are to be verified as being provided on at least two opposite sides of the box. The entire deck box, including openings for ventilation, is to be tested as being weathertight to prevent entrance of spray or rain. Boxes for small batteries, not requiring ducted ventilation, are to be verified for having openings near the top to permit escape of gas.

7.19.7 Corrosion Protection
Corrosion protection or alternative arrangement of battery rooms, lining of deck boxes and small batteries are to be verified to be in compliance with 4-3-3/3.7.4 of these Rules.

7.19.8 Maintenance of Batteries
Where batteries are fitted for use for essential and emergency services, a maintenance schedule of such batteries is to be provided and maintained.

The schedule and procedures put in place are to satisfy 4-3-3/3.7.5 of these Rules. Details of the schedule, procedures, and the maintenance records are to be included in the drilling unit’s maintenance system and integrated into the drilling unit’s operational maintenance routine, as appropriate, and verified.

7.19.9 Replacement of Batteries
Where a vented type battery replaces a valve-regulated, sealed type battery, the requirements in 4-3-3/3.7.6 are to be confirmed.
7.21 Switchboards

7.21.1 Location and Protection
Arrangement of switchboards are to be confirmed as providing easy access, as may be needed, to apparatus and equipment without danger to personnel. Switchboards are to be located in a dry place so as to provide a clear working space of at least 914 mm (36 in.) at the front of the switchboard and a clearance of at least 610 mm (24 in.) at the rear, which may be reduced to 457 mm (18 in.) in way of stiffeners or frames. Arrangement and location of distribution boards are to be verified to be in compliance with 4-3-3/3.9 of these Rules.

Note: Where switchboards are enclosed at the rear and are fully serviceable from the front, clearance at the rear will not be required unless necessary for cooling.

It is to be verified that switchboards are secured to a solid foundation, self-supported or braced to the bulkhead or the deck above. In case the last method is used, means of bracing is to be flexible to allow deflection of the deck without buckling the assembly structure.

Flanged connections of liquid piping are to be avoided over or near switchboards. If a connection was necessary and agreed by the Surveyor, satisfactory provision to prevent any leakage from injuring the switchboard is to be verified.

7.21.2 Notice Plate
A notice plate posted either at the entrance to the switchboard room or on the switchboard front panel to state that the floor in the room is of electrically insulated construction is to be verified.

7.23 Distribution Boards

7.23.1 Location and Protection
Distribution boards are to be located in accessible positions. Location and enclosure of distribution boards are to be verified to be in compliance with 4-3-3/3.11.1 of these Rules.

Flanged connections of liquid piping are to be avoided over or near distribution boards for essential services. If a connection was necessary and agreed by the Surveyor, satisfactory provision to prevent any leakage from injuring the boards is to be verified.

7.23.2 Switchboard-Type Distribution Boards
Distribution boards of the switchboard type, unless installed in machinery spaces or in compartments assigned exclusively to electric equipment and accessible only to authorized personnel, are to be verified as being completely enclosed or protected against accidental contact and unauthorized operation.

7.23.3 Safety-Type Panels
It is to be verified that safety type panels are used only for controlling branch lighting circuits, provided with dead front type panels where voltage to earth is in excess of 50 volts DC or 50 volts AC rms between conductors.

7.25 Motor Controllers and Control Centers

7.25.1 Location and Installation
Motor control centers are to be located in a dry place. It is to be verified that a clear working space is provided around motor control centers to enable doors to be fully opened and equipment removed for maintenance and replacement.

It is to be verified that motor control centers are secured to a solid foundation, be self-supported or be braced to the bulkhead.

Flanged connections of liquid piping are to be avoided over or near motor controllers and control centers. If a connection was necessary and agreed by the Surveyor, satisfactory provision to prevent any leakage from injuring the motor controllers and control centers is to be verified.
7.25.2 Disconnecting Arrangements
Means are to be provided for disconnecting the motor and controller from all supply conductors, except that a manually operated switch or circuit breaker may serve as both controller and disconnecting means (see 6-1-7/9.17.2).

Arrangement of disconnecting devices is to be verified to be in compliance with 4-3-3/3.13.2 of these Rules.

It is to be verified that the disconnect switch, if not adjacent to the controller, is provided with an identification plate.

It is to be verified that the disconnect device indicates by a position of the handle, or otherwise, whether it is open or closed.

7.25.3 Indicating-Light Circuits
Where indicating-light circuits are employed, they are to be verified to be in compliance with 4-3-3/3.13.3 of these Rules.

7.27 Resistors for Control Apparatus
Protection of resistors against corrosion, location and mounting of resistors are to be verified to be in compliance with 4-3-3/3.15 of these Rules. In addition, arrangement of the electrical equipment and wiring located within these spaces is to be such as to prevent their exposure to ambient temperatures in excess of that for which they have been designed.

7.29 Lighting Fixtures
Lighting fixtures are to be verified as being arranged as to prevent temperature rises which could damage the cables and wiring, and to prevent surrounding material from becoming excessively hot.

7.31 Heating Equipment
Electric radiators, if used, are to be verified as being fixed in position and be so constructed as to reduce fire risks to a minimum. It is to be confirmed that electric radiators of the exposed-element type are not used.

7.33 Magnetic Compasses
Precautions taken in connection with apparatus and wiring in the vicinity of the magnetic compass to prevent disturbance of the needle from external magnetic fields, is to be verified.

7.35 Portable Equipment and Outlets
It is to be verified that portable equipment is not used in hazardous areas, and portable lights are not used for berth lights in accommodations.

7.37 Receptacles and Plugs of Different Ratings
Receptacles and plugs of different electrical ratings are not to be interchangeable. In cases where it is necessary to use 230 volts portable equipment, the receptacles for their attachment are to be verified for being of a type which will not permit attaching 115 volts equipment.

7.39 Installation Requirements for Recovery from Dead Ship Condition
Where the emergency source of power is an emergency generator which complies with 4-3-2/5.15 and 4-3-2/3.1.4, this emergency generator may be used for restoring operation of the drilling unit’s main propulsion plant, boilers and auxiliary machinery, as applicable.

Where there is no emergency generator installed, the arrangements for bringing main and auxiliary machinery into operation are to be such that the initial charge of starting air or initial electrical power and any power supplies for engine operation can be developed onboard the drilling unit without external aid. If for this purpose an emergency air compressor or an electric generator is required, these units are to be powered by a hand-starting oil engine or a hand-operated compressor.

The arrangement for bringing the main and auxiliary machinery into operation is to be verified. It is also to be verified by testing that recovery capacity is such that the starting energy and any power supplies for propulsion engine operation are available within 30 minutes of a black out condition.
9 Earthing

9.1 General
Unless the machines or equipment are one of the type as listed in 4-3-3/7.1, the exposed metal parts of electrical machines or equipment which are not intended to be live but which are liable under fault conditions to become live are to be earthed. Earthing is to be verified.

9.3 Permanent Equipment
It is to be verified that the metal frames or cases of all permanently installed generators, motors, controllers, instruments and similar equipment are permanently earthed through a metallic contact with the drilling unit’s structure. Alternatively, they may be connected to the hull by a separate conductor in accordance with 4-3-3/7.5 of these Rules.

Where outlets, switches and similar fittings are of nonmetallic construction, all exposed metal parts are to be verified as being earthed.

9.5 Connections
It is to be verified that all earthing conductors are of copper or other corrosion-resistant material and are protected against damage. The nominal cross-sectional area of every copper earthing conductor is to be not less than that required by 4-3-3/Table 2.

Earthed distribution system and connections to vessel’s hull are to be verified to be in compliance with 4-3-3/7.5.2 and 4-3-3/7.5.3 respectively.

9.7 Portable Cords
Receptacle outlets operating at 50 volts DC or 50 volts AC rms or more are to be confirmed for having an earthing pole.

9.9 Cable Metallic Covering
It is to be verified that all metal sheaths, armor of cable and mineral-insulated, metal-sheathed cable are electrically continuous and are earthed to the metal hull at each end of the run, except that final sub-circuits may be earthed at the supply end only, and that all metallic coverings of power and lighting cables passing through hazardous area or connected to equipment in such an area are earthed at least at each end.
PART 7

CHAPTER 1 Surveys During Construction

SECTION 6 Surveys at Builder’s Yard – Electrical Systems

1 General

This Section pertains to surveys and testing to be carried out on electrical systems during construction, installation and testing of mobile offshore drilling units at builder’s yard/facility. The documentation requirements for design review are given Parts 3, 4 and 5 of these Rules.

ABS Surveyor attendance is required, typically for the following purposes. All surveys and testing is to be carried out in presence of and to the satisfaction of the attending Surveyor, prior to the sea trial as referenced in Section 7-1-9 of these Rules.

3 Main Source of Power

Units are to be provided with at least two main generator sets with combined capacity sufficient to maintain the unit in normal operations (including the drilling mode) and habitable conditions to include at least adequate services for cooking, heating, domestic refrigeration, mechanical ventilation, sanitary and fresh water.

Examination and testing of the main source of power is to be carried out to confirm compliance with below specific requirements, prior to the sea trial as referenced in Section 7-1-9 of these Rules. For further details, see 4-3-2/3.1.

3.1 Power Supply by Generators

The capacity of the generator sets, their fuel capacity and system arrangement are to satisfy 4-3-2/3.1.

3.1.1 Propulsion Capability with Multiple Generators

For drilling units having multiple generating sets providing power for both propulsion and auxiliary services, the propulsion loads considered for normal operation need only include those necessary to propel the unit at 3.6 m/s (7 kn) or one-half the design speed in calm water, whichever is the lesser. Propulsion capability under these conditions is to be verified during sea trial as referenced in Section 7-1-9 of these Rules.

3.1.2 “Blackout” and “Dead Ship” Start

The “blackout” and “dead ship” start testing is to be demonstrated prior to the sea trial. Same demonstration is to be repeated during the sea trial as referenced in Section 7-1-9 of these Rules.

Examination and testing of the main source of power is to be carried out to confirm compliance with below specific requirements. For further details, see 4-3-2/3.1.

A “Blackout” situation means the loss of the main source of electrical power resulting in the main and auxiliary machinery being out of operation.

A “Dead Ship” condition means a condition under which:

i) The main propulsion plant, boilers and auxiliary machinery are not in operation due to the loss of the main source of electrical power, and

ii) In restoring propulsion, the stored energy for starting the propulsion plant, the main source of electrical power and other essential auxiliary machinery is assumed to be not available.
For self-propelled drilling units, the generating sets are to be such that with any one generator or
its primary source of power out of operation, the remaining generating sets are capable of providing
the electrical services necessary to start the main propulsion plant from a “dead ship” condition, as
defined herein, within 30 minutes of the blackout. This is to be verified during sea trial as
referred to in Section 7-1-9 of these Rules.

In restoring the propulsion from a dead ship condition for self-propelled drilling units, no stored
energy is to be assumed available for starting the propulsion plant, the main source of electrical
power and other essential auxiliaries. It is assumed that means are available to start the emergency
generator at all times.

The emergency source of electrical power may be used to restore the propulsion, provided its
capability either alone or combined with that of any other source of electrical power is sufficient to
provide at the same time those services required to be supplied by 4-3-2/5.3.1 through 4-3-2/5.3.7.

The emergency generator and other means needed to restore the propulsion are to have a capacity such
that the necessary propulsion starting energy is available within 30 minutes of blackout. Emergency
generator stored starting energy is not to be directly used for starting the propulsion plant, the main
source of electrical power and/or other essential auxiliaries (emergency generator excluded).

3.3   Generator Driven by Propulsion Unit
Generator driven by propulsion unit is to satisfy 4-3-2/3.3.

3.5   Sizing of AC Generator
Sizing of the AC Generator is to satisfy 4-3-2/3.5.

5   Emergency Source of Power
A self-contained emergency source of electrical power together with its associated power transformer, if
any, transitional source of emergency power, emergency switchboard, and emergency lighting switchboard
is to be installed in a non-hazardous space and is to be located above the worst damage waterline (see
3-3-2/1.3.2), aft of the collision bulkhead, if any, and in a space which is not within the assumed extent of
damage defined in 3-3-2/3.5. Its location is to be readily accessible from the open deck. The arrangement is
to be such as to insure that a fire, flooding or other failure in a space containing the main source of electrical
power, or in any space containing internal combustion machinery for propulsion, any oil-fired or oil-fuel
unit, or internal combustion machinery with an aggregate total power of 375 kW (500 hp) or more, will not
interfere with the supply or distribution of emergency power.

5.1   Boundary and Alternate Arrangements
Boundaries of spaces containing emergency sources of power and associated equipment and alternate
arrangements of source of power are to satisfy 4-3-2/5.1.

5.3   Emergency Power Supply
The electrical power available is to be sufficient to supply all those services that are essential for safety in
an emergency. The emergency source of electrical power is to be capable of supplying simultaneously, at
least the following services for the period specified hereafter, if they depend upon an electrical source for
their operation.

5.3.1 Emergency Lighting
For a period of 18 hours, emergency lighting:

i)   At every embarkation station on deck and over the sides, their launching appliances and
the area of water into which they are to be launched.

ii)  In all service and accommodation alleyways, stairways and exits, personnel elevators and
their trunks.

iii) In the machinery spaces and main generating stations, including their control positions.
iv) In all control stations, machinery control rooms, and at each main and emergency switchboard.

v) In all spaces from which control of the drilling process is performed and where controls of machinery essential for the performance of this process, or devices for emergency switching-off of the power plant are located.

vi) At all stowage positions for firemen’s outfits.

vii) At the sprinkler pump, if any, at one of the fire pumps, if dependent upon emergency generator for its source of power, at the emergency bilge pump, if any, and at the starting positions of their motors.

viii) On helicopter landing deck perimeter.

5.3.2 Navigation Lights and Signals
For a period of 18 hours, navigation lights, other lights and sound signals required by the International Regulations for the Prevention of Collisions at Sea in force.

5.3.3 Marking of Offshore Structures
For a period of four days, any signaling lights or sound signals which may be required for marking of offshore structures.

5.3.4 Internal Communications
For a period of 18 hours, all internal communication systems required in an emergency (see Note 1 below).

5.3.5 Fire and Gas Detection and Alarm Systems
For a period of 18 hours, the required fire and gas detection and alarm systems (see Note 1 below).

5.3.6 Emergency Signals
For a period of 18 hours, intermittent operation of the manually operated call points and all internal signals that are required in an emergency (see Note 1 below).

5.3.7 Blow-Out Preventer (BOP) and Well Disconnection
For a period of 18 hours, blow-out preventer control systems and means for disconnecting the unit from the well-head arrangement, if electrically controlled (see Note 1 below).

5.3.8 Fire Pump and Fire Extinguishing Systems
For a period of 18 hours, one of the fire pumps and other fire extinguishing systems, if dependent upon the emergency generator for its source of power.

5.3.9 Diving Equipment
For a period of 18 hours, permanently installed diving equipment necessary for safe conduct of diving operations, if dependent on the drilling unit’s electrical power.

5.3.10 Column-Stabilized Units
On column-stabilized units, for a period of 18 hours:

i) Ballast valve control system, ballast valve position indicating system, draft level indicating system and tank level indicating system.

ii) The largest single ballast pump required by 4-2-4/13.5.1. See also 4-3-2/5.11 of these Rules.

5.3.11 Self-propelled Drilling Units
On self-propelled drilling units:

i) For a period of 18 hours, emergency lighting at the steering gear.

ii) For a period of 18 hours, navigational aids as required by Chapter V of the 1974 SOLAS Convention, as amended (see ‘Note’ below).
iii) For a period of 18 hours, intermittent operation of the daylight signaling lamp and the unit’s whistle (see Note 1 below).

iv) For a period of at least 10 minutes, continuous operation of the steering gear (see 4-3-2/11.5 of these Rules).

5.3.12 Other Emergency Services

i) For a period of 30 minutes, operation of watertight doors referred to in 3-3-2/5.3 of these Rules (but not necessarily all of them simultaneously), including their controls and indicators, unless an independent temporary source of stored energy is provided.

ii) For a period of 30 minutes, free-fall lifeboat secondary launching appliance, if the secondary launching appliance is not dependent on gravity, stored mechanical power or other manual means.

iii) For a period of 18 hours, intermittent operation of the general emergency alarm system and other manually operated alarms required in 4-3-2/17.

Note 1 Unless independent supply from an accumulator battery suitably located for use in an emergency and sufficient for the period of 18 hours is supplied.

5.5 Emergency Sources

Satisfactory operation and testing of the emergency source of electrical power and its protective devices are to be carried out prior to the sea trial as referenced in Section 7-1-9 of these Rules.

The emergency source of electrical power may be either a generator or an accumulator battery in accordance with 4-3-2/5.5.2 or 4-3-2/5.5.3. The emergency generator and its prime mover and any emergency accumulator battery are to be designed to function at full rated power when upright and when inclined in static condition up to a maximum angle of heel in the intact and damaged condition, as determined in accordance with Section 3-3-2.

In no case need the equipment be designed to operate when inclined in static condition more than:

- 25° in any direction on a column-stabilized unit;
- 15° in any direction on a self-elevating unit, and
- 22.5° about the longitudinal axis and/or when inclined 10° about the transverse axis on a surface unit.

In all cases, the emergency source of electrical power is to be designed to operate as a minimum under the angles of inclination defined in 4-1-1/7.1.

5.5.1 Generator

Where the emergency source of electrical power is a generator, it is to satisfy 4-3-2/5.5.2.

5.5.2 Accumulator Battery

Where the emergency source of electrical power is an accumulator battery, it is to satisfy 4-3-2/5.5.3.

5.5.3 Emergency Generator for Non-emergency Services

Emergency generator used for non-emergency services is to satisfy 4-3-2/5.5.4.

5.7 Transitional Source of Power

Satisfactory operation and testing of the transitional source of power is to be carried out prior to the sea trial as referenced in Section 7-1-9 of these Rules.

The transitional source of emergency electrical power, where required by 4-3-2/5.5.2ii), is to consist of an accumulator battery which is to satisfy 4-3-2/5.5.
5.9 Emergency Switchboard

The emergency switchboard is to be installed as near as is practicable to the emergency source of electrical power.

Satisfactory operation of the emergency switchboard is to be verified prior to the sea trial as referenced in Section 7-1-9 of these Rules.

Installation of the emergency switchboard for generator, installation of accumulator batteries, arrangement of inter-connector feeder between emergency and main switchboards, and arrangements made where necessary to automatically disconnect the non-emergency circuits from the emergency switchboard, are to satisfy 4-3-2/5.9.

5.11 Ballast Pumps

On column-stabilized units, arrangement of ballast pumps is to satisfy 4-3-2/5.11. It is to be possible to supply each ballast pump required by 4-2-4/13.5.1 from the emergency source of power. The arrangement is to be such that one of the pumps is connected directly to the main switchboard and the other pump is connected directly to the emergency switchboard. For systems utilizing independent pumps in each tank, all pumps are to be capable of being supplied from an emergency source of power. When sizing the emergency source of power in accordance with 4-3-2/5.3, the largest ballast pump capable of being supplied from this source is to be assumed to be operating simultaneously with the loads specified in 4-3-2/5.3, allowing for suitable load and diversity factors.

5.13 Starting Arrangements for Emergency Generator Sets

5.13.1 Cold Conditions

Emergency generating sets are to be capable of being readily started in their cold condition at a temperature of 0°C (32°F). If this is impracticable or if lower temperatures are likely to be encountered, heating arrangements are to be provided for ready starting of the generating sets.

5.13.2 Number of Starts

Each emergency generator that is arranged to be automatically started is to be equipped with approved starting devices with a stored energy capability of at least three consecutive starts. Unless a second independent means of starting is provided, the source of stored energy is to be protected to preclude critical depletion by automatic starting system, i.e., the automatic starting system is only allowable for consumption of the stored energy source to a level that would still provide the capability for starting the emergency generator upon intervention by personnel. In addition, a second source of energy is to be provided for an additional three starts within 30 minutes unless manual starting can be demonstrated to be effective.

5.13.3 Charging of Stored Energy

The stored energy is to be maintained at all times, as follows:

i) Electrical and hydraulic starting systems are to be maintained from the emergency switchboard.

ii) Compressed air starting systems may be maintained by the main or auxiliary compressed air receivers through a suitable non-return valve or by an emergency air compressor which, if electrically driven, is supplied from the emergency switchboard.

iii) All of these starting, charging and energy storing devices are to be located in the emergency generator space. These devices are not to be used for any purpose other than the operation of the emergency generating set. This does not preclude the supply to the air receiver of the emergency generating set from the main or auxiliary compressed air system through the non-return valve fitted in the emergency generator space.
5.13.4 Manual Starting

Where automatic starting is not required, manual (hand) starting is permissible, such as manual cranking, inertia starters, manually charged hydraulic accumulators or power charge cartridges, where they can be demonstrated as being effective.

When manual (hand) starting is not practicable, the requirements of 4-3-2/5.15.2 and 4-3-2/5.15.3 are to be complied with, except that starting may be manually initiated.

5.15 Alarms and Safeguards for Emergency Diesel Engines

Alarms and safeguards are to be fitted in accordance with 7-1-6/Table 1.

The safety and alarm systems are to be designed to ‘fail safe’.

Regardless of the engine output, if shutdowns additional to those specified in 7-1-6/Table 1 are provided, except for the over-speed shutdown, they are to be automatically overridden when the engine is in automatic or remote control mode.

The alarm system is to function in accordance with 4-9-2/3.1.2 and 4-9-2/7 of the Steel Vessel Rules, with additional requirements that grouped alarms are to be arranged on the bridge. For drilling units that are not self-propelled, the grouped alarms are to be arranged at an emergency control station.

In addition to the fuel oil control from outside the space, a local means of engine shutdown is to be provided.

Local indications of at least those parameters listed in 7-1-6/Table 1 are to be provided within the same space as the diesel engines and are to remain operational in the event of failure of the alarm and safety systems.

### TABLE 1

<table>
<thead>
<tr>
<th>Systems</th>
<th>Monitored Parameters</th>
<th>Alarm</th>
<th>Auto Shutdown</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Oil</td>
<td>Leakage from pressure pipes</td>
<td>x</td>
<td>–</td>
<td>[X = Required]</td>
</tr>
<tr>
<td>Lubricating Oil</td>
<td>Temperature – high</td>
<td>x</td>
<td>–</td>
<td>For engines having a power of 220 kW or more.</td>
</tr>
<tr>
<td></td>
<td>Lubricating oil pressure – low</td>
<td>x</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil mist concentration in crankcase – high</td>
<td>x</td>
<td>–</td>
<td>For engines having a power of more than 2250 kW (3000 hp) or having a cylinder bore of more than 300 mm (11.8 in.).</td>
</tr>
<tr>
<td>Cooling Medium</td>
<td>Pressure or flow – low</td>
<td>x</td>
<td>–</td>
<td>For engines having a power of 220 kW or more.</td>
</tr>
<tr>
<td></td>
<td>Temperature – high</td>
<td>x</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Engine</td>
<td>Over-speed activated</td>
<td>x</td>
<td>x</td>
<td>For engines having a power of 220 kW or more.</td>
</tr>
</tbody>
</table>

7 Distribution System

7.1 Main Service Distribution System

Current-carrying parts with potential to earth are to be protected against accidental contact.

For recognized standard distribution systems, see 4-3-1/7. Separate feeders are to be provided for essential and emergency services.

Method of the distribution system is to satisfy 4-3-2/7.1.
7.3 **Hull Return System**

The hull return system is not to be used for power, heating or lighting, except that the following systems may be used:

- **i)** Impressed Current Cathodic Protective (ICCP) system;
- **ii)** Limited and locally earthed systems, provided that any possible resulting current does not flow directly through any hazardous areas; or
- **iii)** Insulation level monitoring devices, provided the circulation current does not exceed 30 mA under all possible conditions.
- **iv)** Current-carrying parts with potential to earth are to be protected against accidental contact.

Where the hull return system is used, arrangements are to satisfy 4-3-2/7.3.2.

7.5 **Earthed Distribution Systems**

System earthing is to satisfy 4-3-2/7.5.

7.7 **External or Shore Power Supply Connection**

Where arrangements are made for the supply of electricity from a source on shore or other external source, they are to satisfy 4-3-2/7.7.

- **7.7.1 Information Plate**
  
  An information plate is to be provided at or near the connection box giving full information on the system of supply and the nominal voltage (and frequency if AC) of the drilling unit’s system and the recommended procedure for carrying out the connection.

- **7.7.2 Securing of Trailing Cable**
  
  Provision is to be made for securing the trailing cable to a framework to absorb stress on the electrical terminals by catenary tension of the cable.

7.9 **Harmonics**

The Total Harmonic Distortion (THD) is to satisfy 4-3-2/7.9.

9 **Circuit Protection System**

Examination and testing of the circuit protection system is to be carried out to confirm compliance with these Rules as referenced below, and prior to the sea trial as referenced in Section 7-1-9 of these Rules.

- **i)** Generators is to satisfy 4-3-2/9.3
- **ii)** AC generators is to satisfy 4-3-2/9.5
- **iii)** DC generators is to satisfy 4-3-2/9.7
- **iv)** Accumulator batteries is to satisfy 4-3-2/9.9
- **v)** External or shore power supply is to satisfy 4-3-2/9.11
- **vi)** Motor branch circuits to satisfy 4-3-2/9.13
- **vii)** Transformer circuits is to satisfy 4-3-2/9.15
- **viii)** Meters, pilot lamps and control circuits is to satisfy 4-3-2/9.17
11 Systems for Steering Gear Installed in Self-Propelled Units

Examination and testing of the systems for steering gear installed on self-propelled drilling units is to be carried out to confirm compliance with below specific requirements, as applicable, prior to the sea trial as referenced in Section 7-1-9 of these Rules.

11.1 Power Supply Feeder
Arrangement of power supply circuits for the electric or electro-hydraulic steering gear system is to satisfy 4-3-2/11.1.

11.3 Protection for Steering Gear Motor Circuit
Short circuit protection and under voltage release arrangements are to satisfy 4-3-2/11.3.

11.5 Emergency Power Supply
Emergency power supply is to satisfy 4-3-2/11.5.

11.7 Controls, Instrumentation, and Alarms
See 4-3-4/5.7, 4-3-4/13, 4-3-4/15 and 4-3-4/17 of the Steel Vessel Rules.

13 Lighting and Navigation Light Systems

Examination and testing of the lighting and navigation light systems is to be carried out to confirm compliance with below specific requirements, prior to the sea trial as referenced in Section 7-1-9 of these Rules.

13.1 Lighting System

13.1.1 Main Lighting System
A main electric lighting system is to provide adequate illumination throughout those parts of the drilling unit normally accessible to and used by crew. It is to be supplied from the main source of electrical power.

13.1.2 System Arrangement
The arrangement of the main electric lighting system is to be such that a fire or other casualty in spaces containing the main source of electrical power, associated transforming equipment, if any, the main switchboard and the main lighting switchboard will not render the emergency electric lighting system required by 4-3-2/5.3ii) inoperative.

The arrangement of the emergency electric lighting system is to be such that a fire or other casualty in spaces containing the emergency source of electrical power, associated transforming equipment, if any, the emergency switchboard and the emergency lighting switchboard will not render the main electric lighting system required by 4-3-2/13.1.1 inoperative.

13.1.3 Lighting Circuits
In machinery and accommodation spaces such as:

- Public spaces
- Category ‘A’ machinery spaces
- Galleys
- Corridors
- Stairways leading to boat-decks, including stair towers and escape trunks

There is to be more than one final subcircuit for lighting, one of which may be supplied from the emergency switchboard, in such a way that failure of any one circuit does not leave these spaces in darkness.
13.1.4 Protection for Lighting Circuits
Lighting circuits are to be protected against overload and short circuit. For further details, see 4-3-2/13.1.4.

13.3 Navigation Light System
Feeders, navigation light indicators, and protection of the lighting circuits are to satisfy 4-3-2/13.3

13.5 Obstruction Light System
Feeders, obstruction light indicators, and protection of the lighting circuits are to satisfy 4-3-2/13.

15 Interior Communication Systems
Examination and testing of the interior communication system is to be carried out to confirm compliance with below specific requirements, prior to the sea trial as referenced in Section 7-1-9 of these Rules.

15.1 Interior Communication Systems for All Units
15.1.1 Public Address (PA) System
For all type of units, self-propelled or not, the public address system is to comply with the following requirements and verified accordingly:

i) System Requirements. The system is to be a loud speaker installation enabling the broadcast of messages which are clearly audible in all parts of the unit. The system is to provide for the broadcast of messages from the navigation bridge, emergency control stations (see 7-1-8/17.7) and other strategic points with an override function so that all emergency messages may be broadcast if any loudspeaker in the locations concerned has been turned off, its volume has been turned down or the public address system is in use for other purposes.

ii) Minimum Sound Levels. With the drilling unit underway or in normal operating conditions, the minimum sound levels for broadcasting emergency announcements are to be:
   - In interior locations, 75 dB (A) and at least 20 dB (A) above the speech interference level
   - In exterior locations, 80 dB (A) and at least 15 dB (A) above the speech interference level

iii) Emergency Source of Power. The system is to be connected to the emergency source of power.

iv) Public Address System Combined with General Alarm System. Where a single system serves for the public address and general emergency alarm functions, the system is to be arranged so that a single failure is not to cause the loss of both systems and is to minimize the effect of a single failure. The major system components, such as power supply unit, amplifier, alarm tone generator, etc., are to be duplicated. The coverage provided by the arrangement of the system loops and speakers is to be such that after a single failure, the announcements and alarms are still audible in all spaces. Duplication of system loops and speakers in each room or space is not required provided the announcements and alarms are still audible in all spaces.

15.1.2 Voice Communications
Means of voice communication is to be available for transfer of information between all locations where action may be necessary in case of an emergency. Such locations include the emergency control stations required by 7-1-8/17.7, machinery spaces, SCR rooms and all locations vital to the safety of the unit. Simultaneous talking among these locations is to be possible at all times and the calling to these locations is always to be possible even if the line is busy.

Where an elevator is installed, a telephone is to be permanently installed in all cars and connected to a continuously manned area. The telephone may be sound powered, battery operated or electrically powered from the emergency source of power.

Final sub-circuit for power supply to these voice communication systems is to be independent of other electrical systems and control, monitoring and alarm systems. See 7-1-6/5.3.4 for power supply.
15.3 **Interior Communication Systems for Self-Propelled Units**

For self-propelled units, in addition to the requirements of 7-1-6/15.1, interior communication systems are to comply with the following requirements and verified accordingly:

**15.3.1 Navigation Bridge Communication**

At least two independent means are to be provided for communicating orders from the navigation bridge to the position in the machinery space or in the control room from which the speed and direction of thrust of the propellers are normally controlled. Appropriate means of communication are to be provided to any other positions from which the main propulsion machinery may be controlled. See 4-3-2/5.3.4 for power supply.

One of the communicating means between the navigation bridge and the main propulsion control position is to be an engine room telegraph which provides visual indication of the orders and responses both in the machinery space and on the navigation bridge. Communication network and power supply circuit for this may be combined with the engine order telegraph system specified in 4-3-2/15.3.

**15.3.2 Main Propulsion Control Stations**

A common talking means of voice communication and calling or engine order telegraph repeater is to be provided between the main propulsion control station and local control positions for main propulsion engines and controllable pitch propellers. Voice communication systems are to provide the capability of carrying on a conversation while the drilling unit is being navigated. Final subcircuit for power supply to these is to be independent of the other electrical system and the control, monitoring and alarm systems. Communication network and power supply circuit for the voice communication system may be combined with the system required in 4-3-2/15.5.

**15.3.3 Voice Communications**

In addition to 7-1-6/15.1.2, a common talking means of voice communication and calling is to be provided between the navigation bridge, main propulsion control station and the steering gear compartment so that the simultaneous talking among these spaces is possible at all times and the calling to these spaces is always possible even if the line is busy.

**15.3.4 Emergency and Interior-communication Switchboard**

Emergency and interior-communication switchboards, when fitted, are to comply with the applicable parts of 6-1-7/9 of these Rules, and attention is directed to the requirements of the governmental authority whose flag the drilling unit flies.

### 17 Manually Operated Alarms

Examination and testing of the following manual alarm systems are to be carried out to confirm compliance with below specific requirements, prior to the sea trial as referenced in Section 7-1-9 of these Rules.

**17.1 General Alarm (GA) System**

A general alarm system complying with requirements of 4-3-2/17.1.2 is to be provided to summon crew to muster stations and initiate actions included in the muster list. The system is to be supplemented by instructions over a public address system meeting the requirements of 4-3-2/15.9. Any entertainment sound system is to be automatically turned off when the general emergency alarm is activated.

The general emergency alarm system is to be capable of sounding the general emergency alarm signal, fire alarm signal and abandon unit signal on an electrically operated bell or klaxon or other equivalent warning system, which is to be powered from the drilling unit’s main supply and the emergency source of electrical power required by 4-3-2/5. The system is to be capable of operation from the navigation bridge, emergency control stations (see 7-1-8/17.7) and from other strategic points.

The system is to be clearly audible in all parts of the unit. The alarm is to continue to function after it has been triggered until it is manually turned off or is temporarily interrupted by a message on the public address system.
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i) **(2019)** The minimum sound levels for the emergency alarm tone in interior spaces and 1 m (3.3 ft) from the source are to be 80 dB and at least 10 dB (A) above ambient noise levels existing during normal equipment operation in moderate weather.

ii) The sound levels at the sleeping position in cabins and in cabin bathrooms are to be at least 75 dB (A) and at least 10 dB (A) above ambient noise levels.

*Note:* Refer to the Code on Alarms and Indicators adopted by IMO Resolution A.830(19).

**17.1.1 General Alarm (GA) System on Self-Propelled Units**
Self-propelled drilling units are to be capable of sounding the general emergency alarm on the drilling unit’s whistle, but which need only be capable of operation from the navigation bridge.

**17.3 Engineers’ Alarm for Self-Propelled Units**
An engineers’ alarm operable from the main propulsion control station or at the maneuvering platform, as appropriate, is to be provided. It is to be audible in each engineer’s cabin and its sound pressure level is to comply with 7-1-6/17.1. See 7-1-6/5.3.12iii) for power supply.

**17.5 Refrigerated Space Alarm**
Fan and diffuser rooms serving subfreezing compartments are to be provided with a device capable of activating an audible and visual alarm in a manned control center and operable from within the latter space for the protection of personnel. See 7-1-6/5.3.12iii) for power supply.

**17.7 Elevator Alarm**
A device which will activate an audible and visual alarm in a manned control center is to be provided in all cars. Such alarm system is to be independent of power and control systems of the elevator. See 7-1-6/5.3.12iii) for power supply.

**19 Fire Protection and Fire Detection Systems**
Examination and testing of the following systems are to be carried out to confirm compliance with below specific requirements, prior to the sea trial as referenced in Section 7-1-9 of these Rules.

**19.1 Emergency Stop**

19.1.1 **Ventilation System**
All electrical ventilation systems are to be provided with means for stopping the motors in case of fire or other emergency. These requirements do not apply to closed re-circulating systems within a single space. See also 7-1-8/9.

The main machinery-space ventilation is to be provided with means for stopping the ventilation fans, which is to be located in the passageway leading to, but outside of the space, or in the fire-fighting station, if provided.

A control station for all other ventilation systems is to be located in the fire-control room or navigation bridge, or in an accessible position leading to, but outside of the space ventilated.

19.1.2 **Other Auxiliaries**
For emergency tripping and emergency stop for other auxiliaries such as forced and induced draft fans, electric motor pressurization fans, oil fuel transfer pumps, fuel oil units, see 4-2-5/1.5 and 7-1-8/17.9.

**19.3 Fire Detection and Alarm System**
See 7-1-8/13.
21 **Electrical System Testing**

All machinery and associated equipment is to be examined and tested prior to the sea trial as referenced in Section 7-1-9 of these Rules.

21.1 **Auxiliary Systems**

All auxiliary apparatus is to be tried under working conditions.

21.3 **Generators**

Each generator is to be run for a time sufficient to show satisfactory operation, and parallel operation with all possible combinations is to be demonstrated.

Generator safety devices and shutdowns are to be confirmed operational.

The emergency generator is to be run for a time sufficient to show satisfactory operation, and its alarms and safeguard devices to be confirmed (see 4-3-2/5).

21.5 **Auxiliary Motors**

Each auxiliary motor necessary to the operation of the drilling unit is to be run for a time sufficient to show satisfactory performance at such load as can readily be obtained.

21.7 **Main Switches and Breakers**

All main switches and circuit breakers are to be operated, but not necessarily at full load.

21.9 **Lighting System**

The operation of the lighting system, heaters, etc., is to be demonstrated satisfactorily (see 7-1-6/13.1).

Satisfactory operation the emergency lights after a black-out condition is to be confirmed. Sufficient lighting in all control stations, egress routes, and embarkation stations are to be verified.

21.11 **Voltage Drop**

The entire installation is to operate and the drop in voltage on any part of the installation is not to exceed 6%. See 7-1-6/7.1.

21.13 **Public Address (PA) & General Alarm (GA) Systems**

The entire installation is to operate satisfactorily. Operation of the system with emergency source of power is to be confirmed. In areas where background noise may be high, installation of additional light probes is to be verified. (see 7-1-6/15.1 and 7-1-6/17.1)

21.15 **Fire and Gas (F&G) Detection System**

The entire installation is to operate satisfactorily. Operation of the system with emergency source of power is to be confirmed. In areas where background noise may be high, proper installation of additional light probes is to be verified. Each fire alarm call point is to be activated and proven operational, and each smoke, heat, infra-red detector is to be tested per manufacturer’s test procedure. Ventilation shutdowns and closure of fire dampers are to be verified during this test.

21.17 **Electrical Equipment in Hazardous Areas**

All electrical equipment installed in hazardous areas is to be verified in accordance with ABS approved drawings. Upon satisfactory completion of the survey, a final list of electrical equipment is to be produced by the builder, and the list is to be endorsed by the attending Surveyor. ABS endorsed electrical equipment list and hazardous area drawings are to be placed onboard the drilling unit to be used during Survey After Construction.

Where purge air system is used, the purge air system and satisfactory operation of the equipment with its associated alarm is to be confirmed.

For further details, see Section 7-1-7.
21.19 **Hazardous Area Doors, Ventilation and Alarms**

All doors, ventilators and alarms associated with hazardous areas are to be examined and tested (see Section 7-1-7).

21.21 **Mud Pit Level Alarm**

See 7-1-8/13.

21.23 **Shutdown of Ventilation Fans and Openings**

Means provided for stopping ventilating fans serving machinery spaces and for closing all doorways, ventilators, annular spaces around funnels and other openings to such spaces are to be tested. These means are to be capable of being manually operated from outside of such spaces in case of fire.

Remote means provided for stopping machinery driving forced and induced draft fans, electric motor pressurization fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps are to be tested. These means are to be situated outside of such spaces in case of a fire arising in the space in which they are located. See 7-1-6/19.1.2.

In addition to the remote shutdowns required above, a means to shut down the equipment is to be provided within the space itself and tested.

21.25 **Emergency Shutdown System**

Selective or simultaneous emergency shutdown of all electrical equipment is to be tested and the shutdown sequence is to be in accordance with recommended sequence provided in the drilling unit’s Operating Manual (see 4-3-5/7).

21.27 **Helicopter Deck Lighting**

Operation of the helicopter deck lighting is to be demonstrated. Satisfactory operation the lighting after a black-out condition is also to be confirmed.

21.29 **Navigation and Obstruction Lights**

Operation of all navigation and obstruction lights is to be confirmed. See 7-1-6/13.
CHAPTER 1 Surveys During Construction

SECTION 7 Surveys at Builder’s Yard – Hazardous Areas

1 General

This Section pertains to survey of the following items onboard mobile offshore drilling units built at builder’s yard/facility, including required onboard testing and trial. The documentation requirements for design review are given Part 4 of these Rules. Following items are to be surveyed and tested in presence of and to the satisfaction of the attending Surveyor, preferably prior to delivery of the drilling unit.

i) Arrangement of hazardous areas (zones)
ii) Openings and penetrations affecting the extent of hazardous areas
iii) Installation and function of access doors and hatches between hazardous areas and adjoining areas/spaces
iv) Installation and function of ventilation of hazardous areas and adjoining areas/spaces
v) Installation of machinery in hazardous areas
vi) Installation of cables and electrical equipment in hazardous areas
vii) Installation of cables and electrical equipment in paint stores and battery lockers
viii) Piping systems serving the hazardous areas

Aforementioned items are further referenced in subsequent Subsections of this Section.

1.1 Definitions

For definition of various terms, see 4-3-1/3 and 4-3-6/1 of these Rules.

3 Openings and Penetrations Affecting the Extent of Hazardous Zones

3.1 Openings

Where there is an opening, not fitted with any gas-tight enclosure device, at boundary decks or bulkheads between an area/space categorized as hazardous and a less hazardous or non-hazardous enclosed area/space, the entire area/space categorized as less hazardous will be considered as the same category of the higher category hazardous Zone.

Mitigation of this situation is possible only if the opening is permanently closed, fitted with a bolted gas-tight closure or provided with doors satisfying the arrangements and provisions required by 7-1-7/3.1 through 7-1-7/3.5, as applicable.

Where there is an opening, not fitted with any gas-tight enclosure device, at boundary decks or bulkheads between an area/space categorized as hazardous and a non-hazardous open space, hazardous Zone will extend into the non-hazardous open space. The extended hazardous areas will be categorized as defined in 4-3-6/5 of these Rules, and any machinery or electrical equipment within the extended hazardous area is to be verified as suitable for safe operation for that hazardous Zone.
3.3 Penetrations

Any structural, piping or electrical penetration located on a deck or a bulkhead between an area/space categorized as hazardous and a less hazardous or non-hazardous enclosed area/space, is to maintain the gas-tight integrity of the deck or bulkhead.

3.3.1 Testing of Penetrations

Completed penetrations are to be tested to prove the gas-tightness of the boundary. Testing can be carried out by one of the following method:

i) Hose test (mostly used for structural or piping penetrations)

ii) An air-flow pressure test (mostly used for Multi-Cable Transit (MCT) penetrations)

iii) Surface Nondestructive Testing (NDT), such as a dye-penetrate test, if accepted by the Surveyor

5 Access and Ventilation Conditions Affecting the Extent of Hazardous Zones

Where access is provided for operational purposes, any enclosed space not referred to under 4-3-6/3.3 or 4-3-6/3.5 and having a direct access to any Zone 1 location or Zone 2 location becomes the same zone as the location, except that:

5.1 Enclosed Zone 1 or Zone 2 Space with Direct Access to any Zone 1 Location (see 7-1-7/Figure 1)

5.1.1 Access between Enclosed Zone 1 to any Zone 1 Location

An enclosed Zone 1 space with direct access to a semi-enclosed Zone 1 location is to be fitted with a door opening into the semi-enclosed Zone 1 space.

5.1.2 Access between Enclosed Zone 2 to any Zone 1 Location

An enclosed space with direct access to any Zone 1 location is considered as Zone 2, provided all three conditions listed below are met:

i) The access is fitted with a gas-tight door opening into the Zone 2 space; and

ii) Ventilation is such that the air flow with the door open is from the Zone 2 space into the Zone 1 location; and

iii) Loss of positive (+) ventilation in Zone 2 location is alarmed at a normally manned station.
5.3 Enclosed Zone 2 or Non-Hazardous Space with Direct Access to any Zone 2 Location (see 7-1-7/Figure 2)

5.3.1 Access between Enclosed Zone 2 to any Zone 2 Location
An enclosed Zone 2 space with direct access to a semi-enclosed Zone 2 location is to be fitted with a door opening into the semi-enclosed Zone 2 space.

5.3.2 Access between Enclosed Zone 2 to any Non-Hazardous Location
An enclosed space with direct access to any Zone 2 location is considered non-hazardous, provided all three conditions listed below are met:

i) The access is fitted with self-closing gas-tight door that opens into the non-hazardous space; and

ii) Ventilation is such that the air flow with the door open is from the non-hazardous space into the Zone 2 locations; and

iii) Loss of positive (+) ventilation in Non-Hazardous location is alarmed at a normally manned station.
FIGURE 2
Access to Zone 2 (2012)

Broken lines represent open, semi-enclosed, or enclosed zone.

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5.5 Enclosed Non-Hazardous Space with Direct Access to any Zone 1 Location (see 7-1-7/Figure 3)

5.5.1 Access between Enclosed Zone 1 to any Zone 1 Location
See 7-1-7/5.1.1.

5.5.2 Access between Enclosed Non-Hazardous Space to any Zone 1 Location
An enclosed space with access to any Zone 1 location is considered non-hazardous, provided all three conditions listed below are met:

\( i) \) The access is fitted with gas-tight self-closing doors forming an air lock, or a single self-closing gas-tight door which opens toward the non-hazardous space and has no hold-back device; and

\( ii) \) Ventilation is such that the air flow with the door or air lock doors open is from the non-hazardous space into the Zone 1 location (i.e., non-hazardous space has ventilation overpressure in relation to the Zone 1 location); and

\( iii) \) Loss of ventilation overpressure is alarmed at a normally manned station.
FIGURE 3
Access from Enclosed Non-Hazardous Areas to Zone 1 (2012)

Broken lines represent open, semi-enclosed, or enclosed zone.

Zone 1 Non-Hazardous
Self-closing Gastight Door (having no hold back device)
Air Flow

Zone 1
Non-Hazardous

Note: Loss of ventilation overpressure is to be alarmed at a normally manned station

5.7 Doors and Hatches
Any gas-tight door or a hatch on a deck or a bulkhead between an area/space categorized as hazardous and a less hazardous or non-hazardous enclosed area/space, is to maintain the gas-tight integrity of the deck or bulkhead.

Gas-tight doors or hatches are to be tested to prove the gas-tightness of the boundary. Testing can be carried out by one of the following method:

i) Hose test (mostly used where there is no machinery or electrical equipment that may be affected by splashing of water)

ii) An air-flow pressure test (recommended for all gas-tight doors fitted on bulkheads providing direct access mentioned in 7-1-7/5.1 through 7-1-7/5.5 of these Rules

Note: Where a gas-tight door is tested per 7-1-7/5.7 ii) above, the applied air pressure is to be natural and provided by the ventilation system fitted in each adjoining area/space. During the test, all applicable ventilators are to be fully operational, and the loss of positive (+) and loss of overpressure is to be preferably tested simultaneously with testing of the doors.

Door alarms are to be clearly visible and audible during drilling unit’s normal operational noise level.

5.9 Ventilation
Ventilation systems for the hazardous and non-hazardous areas are to be in accordance with 4-3-6/7 of these Rules. All ventilation system ducts and associated ventilation alarms are to be examined and tested.

5.9.1 Ventilation Ducts
Gas-tight ventilation ducts fabricated to maintain either positive or negative internal pressure, as required, are to be subjected to appropriate testing of the ducts, to verify its tightness, after installation onboard the drilling unit and prior to function testing of the ventilation system and its alarms required by 7-1-7/5.1 through 7-1-7/5.5 of these Rules.

5.9.2 Non Sparking Ventilation Fans
Fans used for the ventilation of the hazardous areas are to be of non-sparking construction in accordance with 4-3-3/9.7 and 4-3-6/9.3 of these Rules.

Type tests on non-sparking fans are to be carried out using an acceptable national or international standard. Such type test reports are to be made available when requested by the Surveyor.
5.9.3 Loss of Ventilation/Overpressure Alarms
Where fitted, loss of ventilation and ventilation overpressure alarms are to be clearly visible and audible at local site and at the control stations during drilling unit’s normal operational noise level.

7 Machinery Installations
Where installed in hazardous areas, machinery installation is to comply with 4-3-6/9 of these Rules.

9 Equipment and Installation in Hazardous Area
Where installed in hazardous areas, all electrical cables and equipment are to comply with 4-3-6/9 of these Rules.

All electrical equipment installed as referenced in the drawings required by 4-3-3/1.5 of these Rules and reviewed by ABS are to be verified for its satisfactory installation, and in compliance with these Rules. Upon satisfactory completion of the survey, a final list of electrical equipment is to be produced by the builder, and the list is to be endorsed by the attending Surveyor. ABS endorsed electrical equipment list and hazardous area drawings are to be placed onboard the drilling unit to be used during Survey After Construction.

9.1 General
9.1.1 Cables Installation
Installation of electrical cables is to be in compliance with 4-3-3/9.1.4 of these Rules.

9.1.2 Lighting Circuits
Installation of lighting circuits is to be in compliance with 4-3-3/9.1.5 of these Rules. The switches and protective devices for lighting fixtures are to be suitably labeled for identification purposes.

9.1.3 Permanent Warning Plates
Permanent warning plates are to be installed in the vicinity of hazardous areas in which electrical equipment is installed, such as pump room, to advise personnel carrying out maintenance, repair or surveys of availability of the booklet/list of equipment in hazardous areas referenced in 4-3-3/1.5, if required for their use.

9.3 Certified-Safe Type and Pressurized Equipment and Systems
Where permitted by the Rules and approved for installation, all electrical equipment of certified-safe type equipment are to be type-tested and certified by a competent independent testing laboratory as suitable for hazardous areas and the product satisfies the design so tested and approved. Certificates are to be readily available to the Surveyor.

9.3.1 Intrinsically-Safe (IS) System
Intrinsically-Safe System is to be in compliance with 4-3-3/9.3.2 of these Rules.
The sub-compartment to separate intrinsically-safe components from non-intrinsically-safe systems, as required by 4-3-3/9.3.2(b), is to have an identifying nameplate indicating that the equipment within is intrinsically safe and that unauthorized modification or repairs are prohibited.

9.3.2 Pressurized Equipment
Pressurized equipment is to be in compliance with 4-3-3/9.3.3 of these Rules.
Where pressurized/purged air system is used, the purge air system and operation of the pressurized/purged equipment with its associated loss of power or the ventilation and alarms provided are to be tested for compliance with 4-3-3/9.3.3 of these Rules.
9.5 Electrical Equipment used After Rig Shutdown

As stated in 4-3-5/7.1 of these Rules, all electrical equipment in exterior locations which is capable of operation after the rig shutdown is to be verified suitable for installation in Zone 2 locations.

The equipment installed or used on exterior locations of the rig and required after a rig shutdown includes but not limited to; emergency lighting, general alarm system, blow-out preventer control system, public address system, and distress and safety radio communications.

11 Paint Stores and Battery Lockers

Arrangement of access, ventilation and electrical equipment installed in the paint stores and battery lockers are to comply with 4-3-3/9.5 and 4-3-3/3.7 of these Rules respectively.

13 Piping and Installation in Hazardous Area

Piping systems carrying non-hazardous fluids are to be segregated from piping systems which may contain hazardous fluids. Cross connection of the piping systems may be made where means for avoiding possible contamination of the non-hazardous fluid system by the hazardous medium are provided.

Piping systems such as drains and scuppers originating in a hazardous area are to be led to hazardous collection facility/tank. Hazardous drains need not be separated from non-hazardous drains, provided the connections do not create an unsafe condition where the back-up of hazardous liquids and gases into non-hazardous areas may be possible.

13.1 Installation of Loop-Seal and Non-Return Check Valve (2016)

Where an unsafe condition, due to interconnection of hazardous and non-hazardous piping is possible non-hazardous drains are to be fitted with a loop-seal to trap hazardous gases. If back-up of hazardous liquid into the non-hazardous areas is possible, a non-return check valve is to be installed. Height of the loop-seal is to be not less than 760 mm (30 inches) and the check valve is to be fitted downstream of the seal (see 7-1-7/Figure 4). Both the seal and the valve are to be accessible for maintenance by crew.

FIGURE 4
Typical Drain Connection (2016)

If a back-up of hazardous liquid into the non-hazardous areas is possible, a non-return check valve is to be installed.
13.3 Extent of Hazardous Areas

Piping systems such as sounding pipes and air vents of a non-hazardous space, originating or terminating in hazardous space will cause the safe area to become hazardous and designated as same zone as the hazardous space. Installation of all such piping is to prevent safe areas from becoming hazardous.

13.5 Electrically Conductive Plastic Piping in Hazardous Areas

Regardless of the fluid being conveyed, plastic piping passing through a hazardous area is to be electrically conductive. The resistance per unit length of the pipes and fittings is not to exceed $1 \times 10^5 \text{ ohm/m (3 } \times 10^4 \text{ ohm/ft)}$. See also 7-1-3/13.5.3iv).

If the pipes and fittings are not homogeneously conductive, the conductive layers are to be protected against the possibility of spark damage to the pipe wall.

Installation of electrically conductive plastic pipe is to be tested to confirm compliance with the following:

\( i) \) The resistance to earth (ground) from any point in the system is not to exceed 1 megohm. The resistance is to be checked in the presence of and to the satisfaction of the Surveyor.

\( ii) \) Where used, earthing wires or bonding straps are to be accessible for inspection. The Surveyor is to verify that they are in visible locations.
PART 7

CHAPTER 1 Surveys During Construction

SECTION 8 Surveys at Builder’s Yard – Fire and Safety

1 General

This Section pertains to surveys and testing to be carried out on fire and safety features during construction, installation and testing of mobile offshore drilling units at builder’s yard/facility. The documentation requirements for design review are given Part 5 of these Rules.

ABS Surveyor attendance is required, typically for the following purposes. All surveys and testing is to be carried out in presence of and to the satisfaction of the attending Surveyor, prior to the sea trial.

1.1 Administration Certification

When an Administration or its Agent other than the ABS, issues the IMO Mobile Offshore Drilling Unit Safety Certificate to a drilling unit, such certificate will be accepted as evidence that the unit is in compliance with the requirements of 7-1-8/5. In all other cases, the required information and plans are to be reviewed by ABS, and surveys completed by ABS Surveyors.

3 Surveys of Fire and Safety Features

All fire and safety features required by this Section are to be installed and tested in accordance with the Rules or recognized standards to the satisfaction of the attending Surveyor.

Structural fire protection details, materials and methods of construction are to be in accordance with the International Code for Application of Fire Test Procedures (Resolution MSC.61(67)) (FTP Code), as applicable, and SOLAS Regulations II-2/5.3 and II-2/6, as applied to cargo ships.

ABS reviewed booklet of the standard passive and active fire protection practices and details, including such items as fire insulation installation and supports, bulkhead and deck penetrations of pipes, cables and ventilation trunks, joiner details, fire damper installation, etc., as applicable, is to be available to the attending Surveyor. Where penetration methods for A- or B-class decks or bulkheads are shown, an evidence of approval by an Administration signatory to 1974 SOLAS as amended is also to be available.

The quality control program for the fire and safety features of a drilling unit is to at least include the following items, as appropriate:

i) Material quality and traceability

ii) Inspection of passive fire protection system

iii) Inspection and testing of active fire protection systems

iv) Inspection and testing of fire-extinguishing systems

v) Inspection and testing of fire and gas detection systems

vi) Inspection and testing of ventilation systems

vii) Inspection and testing of shutdown arrangements
5 Passive Fire Protection Systems

All passive fire protection systems are to be in accordance with ABS reviewed plans and in compliance with this Subsection.

All mobile offshore drilling units are to meet the requirements of this Subsection with regard to structural fire protection, protection of accommodation spaces, service spaces and control stations.

5.1 Structural Fire Protection

5.1.1 Construction Materials

All steel material used for construction is to be certified in accordance with Section 7-1-2 of these Rules. Material other than steel is to be provided with manufacturer’s certification of compliance, and be readily available to the attending Surveyor.

Installation of materials, which contain asbestos is prohibited.

5.1.2 Fire Integrity of Bulkheads and Decks

Bulkheads and decks are to be built and protected in compliance with applicable Paragraphs of 5-1-1/3 of these Rules including associated Tables defining fire integrity of bulkheads and decks, and in accordance with ABS reviewed drawings. These requirements apply to all permanent structures and temporary or portable accommodation (including workspaces).

Fire integrity of bulkheads and decks are to be confirmed only after the bulkheads and decks are satisfactorily examined and tested for structural purposes.

5.1.3 Fire Resistance of Bulkheads and Decks

Fire resistance of bulkheads and decks are to be satisfactorily maintained when:

i) “A” and “B” class divisions are penetrated for the passage of electrical cables, pipes, trunks, ducts, etc.

ii) “A” class divisions are penetrated for girders, beams or other structural members, or

iii) “B” class divisions are penetrated for the fitting of ventilation terminals, lighting fixtures and similar devices.

Pipes penetrating “A” or “B” class divisions are to be of materials approved by the Administration, having regard to the temperature that such divisions are required to withstand.

For pipe penetration details on “A” class bulkheads and decks, see 5-1-1/3.21 and 5-1-1/Figure 1 of these Rules. For pipe penetration details on “B” class bulkheads and decks, see 5-1-1/3.23 and 5-1-1/Figure 2 of these Rules.

All of the above mentioned penetrations are to be examined and tested as deemed necessary by the Surveyor. Pipe penetrations through “A” class divisions may be tested with surface NDT.

5.1.4 Structural Fire Protection Details in way of Intersections, Joints and Penetrations

Whilst examining the fire integrity of bulkheads and decks, special attention is to be paid to the structural fire protection details in way of joints and penetrations. Areas in way of intersection or terminal joints and penetrations of all types are to avoid the risk of heat transmission. Unless specifically indicated otherwise on drawings, where protection against heat transmission is required, an extension of insulation by a minimum 450 mm (18 in.) beyond the intersections or terminal points is to be installed. For further details, see 5-1-1/3.13 of these Rules.

Structural fire protection of joints and penetrations is to be applied, preferably when fire integrity is confirmed by the Surveyor and only after bulkheads and decks are satisfactorily examined and tested for structural purposes.

5.1.5 Windows and Side-scuttles

Windows and side-scuttles are to be examined for compliance with 5-1-1/3.15 of these Rules, and installation in accordance with ABS reviewed drawings.
5.1.6 Fire Doors

Fire doors are to be examined for compliance with 5-1-1/3.17 of these Rules, and installation in accordance with ABS reviewed drawings. For conditions of accepting installation of watertight doors in fire tight boundaries, see 5-1-1/3.17. Record of tests in accordance with Fire Test Procedure Code (Resolution MSC.61(67)) are to be available to the Surveyor.

Where the self-closing fire doors are allowed to be fitted with hold-back hooks that incorporate remote release fittings of the fail-safe type, the remote-release mechanism is to be tested.

5.3 Protection of Accommodation Spaces, Service Spaces and Control Stations

Protection of all accommodation spaces, service spaces, and control stations are to be examined and verified for compliance with ABS reviewed drawings. Following items are to be subjected to visual examination and testing as required:

5.3.1 Accommodation Bulkheads

All accommodation bulkheads are to be examined prior to their enclosure behind joiner work. For further details see 5-1-1/5.3 and 5-1-1/5.5 of these Rules.

5.3.2 Stairs and Stairways

All stairs and stairways are to be examined prior to their enclosure behind joiner work. For further details, see 5-1-1/5.7 and 5-1-1/5.9 of these Rules.

All self-closing doors are to be tested for proper closure without any external force.

5.3.3 Draft Stops

All draft stops required by 5-1-1/5.11 of these Rules are to be examined prior to closing behind joiner work. Structure, piping or electric cables penetrations through draft stops are to maintain the integrity of the draft stop. Fire protection drawings reviewed by the ABS is to be used as guidance for installation and penetration details.

5.3.4 Insulation and Framing Materials

All insulation and framing material are to be examined. For further details, see 5-1-1/5.13 and 5-1-1/5.15 of these Rules.

5.3.5 Low Flame-Spread Surfaces

Following surfaces are to have low flame-spread characteristics:

i) All exposed surfaces in corridors and stairway enclosures

ii) Surface in concealed or inaccessible spaces

iii) Exposed surfaces of ceilings

5.3.6 Veneers

Where bulkheads, linings and ceilings are covered with combustible veneers, they are to be in compliance with 5-1-1/5.19 of these Rules. Where veneers are used, appropriate certificates are to be available to the Surveyor.

5.3.7 Primary Deck Coverings

Primary deck coverings, if applied (see 5-1-1/5.21 of these Rules), are to be of approved materials which will not readily ignite or give rise to toxic or explosive hazards at elevated temperatures. Where deck covering is used, appropriate certificates are to be available to the Surveyor.

5.3.8 Coating of Exposed Interior Surfaces

Paints, varnishes and other finishes used on exposed interior surfaces are not to be of a nature to offer an undue fire hazard and are not to be capable of producing excessive quantities of smoke or toxic fumes (see 5-1-1/5.23 of these Rules). Where exposed interior surfaces are coated, appropriate certificates are to be available to the Surveyor.
5.3.9 Ventilation Ducts
Ventilation ducts are to be examined and tested for compliance with ABS reviewed drawings, and they are to be in compliance with 5-1-1/5.25 of these Rules.

5.3.10 Ventilation Ducts Penetrating “A” Class Divisions
Ventilation ducts penetrating “A” class divisions are to be verified for compliance with ABS reviewed drawings and 5-1-1/5.27 of these Rules, as applicable. Where provided, all ventilation dampers are to be examined and tested.

5.3.11 Ventilation Ducts for Machinery Spaces Cat. ‘A’, Hazardous Areas, and Galley
Construction and arrangement of ventilation ducts serving the machinery spaces of Cat. ‘A’, hazardous areas, and galleys are to be examined and tested for compliance with ABS reviewed drawings and 5-1-1/5.29 of these Rules.
Where provided, all ventilation dampers are to be examined and tested.

5.3.12 Ventilation Ducts for Accommodation and Service Spaces or Control Stations
Construction and arrangement of ventilation ducts for accommodation and service spaces or control stations are to be examined and tested for compliance with ABS reviewed drawings and 5-1-1/5.31 of these Rules.
Where provided, all ventilation dampers are to be examined and tested.

5.3.13 Ventilation Ducts Penetrating “B” Class Divisions
Ventilation ducts penetrating “B” class divisions are to be verified for compliance with ABS reviewed drawings and 5-1-1/5.33 of these Rules.

5.3.14 Exhaust Ducts from Galley Ranges and Galley
Construction and arrangement of exhaust ducts from galley ranges and the galleys are to be verified for compliance with ABS reviewed drawings, and 5-1-1/5.35 and 5-1-1/5.37 respectively.

5.3.15 Closure of Ventilation Systems
Closure of all main inlets and outlets of the ventilation system are to be verified as being fitted outside the space being ventilated.

5.3.16 Stopping of Power Ventilation
Power ventilation of accommodation spaces, service spaces, control stations, machinery spaces and hazardous areas are to be verified for compliance with 5-1-1/5.41 of these Rules, and their means of stopping ventilation are to be tested.

5.3.17 Windows and Sidescuttles in “A-60” Boundaries
Where windows and/or sidescuttles are fitted on “A-60” bulkheads which face the drill floor area, they are to be verified for compliance with 5-1-1/5.43 of these Rules.
Where they are fitted with shutters or water curtain, arrangements are to be function tested.

5.3.18 Arrangement of Ventilation for Accommodation Spaces and Control Stations
The ventilation for accommodation spaces and control stations are to be arranged in such a way as to prevent the ingress of flammable, toxic or noxious gases, or smoke from surrounding areas.

5.3.19 Air Balancing Ducts (Jumper Ducts)
Where air balancing ducts are fitted, compliance with 5-1-1/5.47 of these Rules is to be verified.
7  **Active Fire Protection – Fixed Systems**

All active fire protection – fixed systems are to be in accordance with ABS reviewed plans and in compliance with this Subsection.

All mobile offshore drilling units are to meet the requirements of this Subsection with regard to fire control plans, fire pumps, fire main, hydrants, fire hoses, nozzles and international shore connections.

7.1  **Fire Control Plan**

Onboard provision of an approved fire control plans in compliance with 5-2-1/3.3 is to be verified. Where last-minute minor changes are necessary and the fire control plan is submitted to ABS engineering for final approval, the Surveyor may verify the submitted plan, endorse it to signify its correctness, and the drilling unit may use this plan until the ABS reviewed copy is received onboard.

*Note:* The use of Surveyor-endorsed fire control plan per the above, is not considered to be an outstanding.

7.3  **Fire Pumps**

There are to be at least two independently-driven fire pumps. Following items affecting suitability and performance of the fire pumps installed onboard and in compliance with 5-2-2/1.1 of these Rules are to be verified:

i) Examination of all certified fire pumps

ii) Verification of location and operation of the fire pumps

iii) Where provided, examination and testing of other type pumps used for active fire protection

iv) Verification of the output pressure at hydrants

*Note:* Pressure is to be at least 3.5 bar (3.5 kgf/cm², 50 psi) at the hydrant, and the maximum pressure at any hydrant shall be such that the effective control of a fire hose can be demonstrated.

v) Testing of the fire pump capacity

*Note:* Capacity is to be demonstrated and satisfy 5-2-2/1.1.5 of these Rules.

vi) Where installed, testing of the relief valves (per 5-2-2/1.1.6 of these Rules)

vii) Where installed, installation and testing of intermediate tank water supply (per 5-2-2/1.1.7 of these Rules)

viii) Where fire pumps take suction from a pressurized water main system (i.e., a system not utilizing an intermediate tank supply as on self-elevating units), arrangement and precautions required by 5-2-2/1.1.8 are to be verified.

7.5  **Fire Main**

The fire main system is to be examined and tested for compliance 5-2-2/1.3 of these Rules and verified in accordance with approved drawings.

7.7  **Hydrants, Hoses, Nozzles and International Shore Connection**

All hydrants, hoses nozzles, and the international shore connections are to be examined and tested as necessary for compliance 5-2-2/1.5 of these Rules and verified in accordance with approved drawings.

7.7.1  **Hydrants**

The number and position of the hydrants are to be physically verified after completion and installation of structure, machinery and equipment onboard the drilling unit.

*Note:* Confirming that a single length of hose may reach any part of the unit normally accessible to the crew while the drilling unit is being operated, is to be confirmed by actual measurements, to the extent deemed necessary by the Surveyor.
7.7.2 Hoses
All fire hoses are to be in compliance with 5-2-2/1.5.2 of these Rules and provided with couplings and nozzles. Additionally, at least one complete fire hose assembly is to be carried as a spare.

Certification of fire hoses by a competent independent testing laboratory as being constructed of nonperishable material to recognized standard is to be verified.

The hoses are to be sufficient in length to project a jet of water to any of the spaces in which they may be required to be used. Fire hoses are to have a length of at least 10 m, but not more than:

i) 15 m in machinery spaces

ii) 20 m in other spaces and open decks

iii) 25 m for open decks with a maximum width in excess of 30 m

See “Note” of 7-1-8/7.7.1 for required verification.

All fire hoses may be subjected to leak test as deemed necessary by the Surveyor before they are placed onboard the drilling unit and used as part of the commissioned active fire protection system. In general, this test may be done either before trials per Section 7-1-9 of these Rules or delivery of the drilling unit.

7.7.3 Nozzles
Dual purpose combined jet spray nozzles fitted throughout the unit, and in compliance with 5-2-2/1.5.3 of these Rules, are to be verified.

7.7.4 International Shore Connection
For surface type drilling units, international shore connections fitted and in compliance with 5-2-2/1.5.4 of these Rules, are to be verified.

9 Active Fire Protection – Additional Fixed Systems
All additional active fixed fire protection systems fitted in accordance with 5-2-3/1 of these Rules are to be in accordance with ABS reviewed plans and in compliance with this Subsection.

All mobile offshore drilling units are to meet the requirements of this Subsection with regard to the additional fixed fire fighting systems, particularly gas smothering, foam system, water spraying, protection of helicopter decks, and protection of paint and flammable liquid lockers, where fitted.

9.1 Gas Smothering System
All additional active fixed fire protection systems fitted in accordance with 5-2-3/1 of these Rules are to be in accordance with ABS reviewed plans.

9.1.1 Storage of Gas Smothering Medium
Storeroom for storage of gas smothering medium is to be located and effectively ventilated in compliance with 5-2-3/3 of these Rules.

9.1.2 Fire-Extinguishing Gas Alarm
Means are to be provided for automatically giving audible warning of the release of fire extinguishing gas into any space to which personnel normally has access. The alarm is to operate for at least a 20-second period before the gas is released. Alarms may be pneumatically (by the extinguishing medium or by air) or electrically operated. Operation of alarms is to be arranged in accordance with 5-2-3/3.1.3 of these Rules and tested.

9.1.3 Controls
Arrangement of independent manual controls is to be verified, and the controls are to be tested.
9.1.4 Carbon Dioxide Systems

In addition to the applicable requirements of the Rules, fixed carbon dioxide fire extinguishing systems are to be in accordance with Chapter II-2, Regulations 10.4.2 and 10.4.3 of the International Convention for the Safety of Life at Sea (SOLAS) 1974 and Amendments in force, and with Chapter 1.4 and Chapter 5 of the International Code for Fire Safety Systems. Fixed low pressure carbon dioxide systems are to be in accordance with 4-7-3/3.5 of the Steel Vessel Rules.

Installation of the CO₂ system is to be examined in accordance with reviewed drawings and the system subjected to function testing with a gas safe for human health.

9.3 Foam System

Where fitted, installation of the foam system is to be examined in accordance with reviewed drawings and function tested.

9.3.1 Fixed High Expansion Foam Systems

In addition to the applicable requirements of the Rules, fixed high expansion foam systems are to be in accordance with Chapter 6.2.1 and 6.2.2 of the International Code for Fire Safety Systems.

Fixed foam fire-extinguishing systems using inside air are to be designed, constructed and tested in accordance with the requirements identified in MSC.1/Circ. 1271 Guidelines for the Approval of High-Expansion Foam Systems Using Inside Air for the Protection of Machinery Spaces and Cargo Pump-Rooms.

Foam concentrates are to be of an approved type.*

*Note: Reference is made to the International Maritime Organization MSC/Circular 670 “Guidelines for the Performance and Testing Criteria, and Surveys of High-Expansion Foam Concentrates for Fixed Fire-Extinguishing Systems.”

9.3.2 Low Expansion Foam System

Low expansion foam systems may be fitted in machinery spaces in addition to the required fixed fire extinguishing system.

In addition to the applicable requirements of the Rules, fixed low expansion foam systems are to be in accordance with Chapter 6.2.1 and 6.2.2 of the International Code for Fire Safety Systems.

Foam concentrates are to be of an approved type.**

**Note: Reference is made to the International Maritime Organization MSC/Circular 582 “Guidelines for the Performance and Testing Criteria, and Surveys of Low-Expansion Foam Concentrates for Fixed Fire-Extinguishing Systems.”

9.5 Fixed Pressure Water Spraying Systems

In addition to the applicable requirements of the Rules, fixed water spraying systems are to be in accordance with Chapter 7 of the International Code for Fire Safety Systems.

Installation of the fixed pressure water spraying system is to be examined in accordance with reviewed drawings and the system function tested using fresh water. Where use of water may cause physical damage to surrounding outfit, machinery or equipment, testing with an alternate test medium may be accepted by the Surveyor.

9.7 Protection of Helicopter Decks

Where areas of a unit are designated for helicopter operations, details of the facilities are to be in accordance with reviewed drawings and provision of firefighting systems referenced in 5-2-3/9.3 are to be verified as being stored near the access to those areas.

Deckhouse tops directly below helicopter decks are to be verified as to not having any opening that could allow flammable liquid from the helideck to enter the deckhouse. See 4-2-6/17 for helicopter deck drainage.

9.7.1 Helicopter Decks with No Refueling Capability

Provision and arrangement of fire fighting equipment in compliance with 5-2-3/9.3 of these Rules, are to be verified.
9.7.2 Helicopter Decks with Refueling Capability
Provision and arrangement of fire fighting system in compliance with 5-2-3/9.3 of these Rules, are to be verified.

Function of the fixed-foam system is to be demonstrated and the rate of delivery of the foam solution is to be measured.

9.9 Paint and Flammable Liquid Lockers
Fire-extinguishing systems for paint and flammable liquid lockers or any similar service spaces used for the storage of flammable liquids (such as solvents, adhesives, lubricants etc.) provided in compliance with 5-2-3/11 of these Rules and installed in accordance with reviewed drawings, are to be examined and tested.

11 Active Fire Protection – Portable Fire Fighting Systems
All portable fire fighting equipment fitted in accordance with Section 5-2-4 of these Rules are to be in accordance with ABS reviewed plans and in compliance with this Subsection.

All mobile offshore drilling units are to meet the requirements of this Subsection with regard to portable fire extinguishers and sand, and fireman’s outfit.

11.1 Portable Fire Extinguishers and Sand
11.1.1 Portable Fire Extinguishers
Installation of all portable and semi-portable extinguishers provided in the quantities and locations indicated in 5-2-4/Table 1 and 5-2-4/Table 2 are to be verified, and confirmed to be visible and readily accessible.

11.1.2 Sand
On self-propelled units fitted with main or auxiliary oil-fired boilers, each boiler space is to be provided with a receptacle containing at least 0.28 m³ (10 ft³) of sand, sawdust impregnated with soda or other dry material suitable for extinguishing oil fires. Alternatively, an approved portable extinguisher may be substituted as indicated in ABS reviewed plans.

11.3 Firefighter’s Outfit
All firefighter outfits installed as indicated on ABS reviewed plans, are to be verified for compliance with 5-2-4/3 of these Rules. Every firefighter’s outfit is to be provided with a breathing apparatus, a lifeline, a safety lamp, an axe, nonconductive boots and gloves, a rigid helmet and protective clothing as required by 5-2-4/3 of these Rules.

If provided, the apparatus for recharging air cylinders is to be confirmed to be in compliance with 5-2-4/3.5 of these Rules, and the recharging capacity is to be tested to confirm that it meets the requirements of SOLAS regulation II-2/10.10.2.6.

13 Fire Detection and Alarm Systems
Fire detection and alarm systems installed in accordance with ABS reviewed plans, are to be examined and tested for compliance with 5-2-5/1 of these Rules.

Other alarms systems, such as the general alarm system, ventilation alarms and mud tank/pit level alarms fitted onboard the drilling unit, installed in accordance with ABS reviewed plans, are to be examined and tested for compliance with 5-2-5/1 of these Rules.

13.1 Testing of Alarm Systems
Thorough examination and testing of the fire detection and other alarm systems are to be carried out, preferably before the drilling unit commences its trials per Section 7-1-9 of these Rules. This is to at least include testing of all detectors, manual fire alarm actuators, general alarms (including the public address system), fire-detection indicator boards, and ventilation alarms. Remaining alarms may be tested before delivery.
15 **Flammable Gas Detection and Alarm Systems**

Flammable gas detection and alarm systems installed in accordance with ABS reviewed plans, are to be examined and tested for compliance with 5-2-5/3 of these Rules.

Thorough examination and testing of the system and associated alarms are to be carried out, preferably before the drilling unit commences its trials per Section 7-1-9 of these Rules. This is to include testing of all detectors and gas-detection indicator boards.

15.1 **Hydrogen Sulfide (H₂S) Detection and Alarm System (2018)**

Location and alarms of the fixed automatic hydrogen sulfide gas detection and alarm system is to be verified and tested (See 5-2-5/5 and 5-3-1/7).

It is to be confirmed that if the alarm at the main control point is unanswered within 2 min, the toxic gas (hydrogen sulfide) alarm and the helideck status light are automatically activated.

In addition to the fixed automatic hydrogen sulfide gas detection, minimum of two portable hydrogen sulfide gas monitoring devices are to be provided on the unit.

17 **Outfitting**

Outfitting items fitted onboard the drilling unit, such as the systems covered by this Subsection are to be in accordance with ABS reviewed plans and in compliance with this Subsection.

Thorough examination of the means of escape, means of access and egress, and guards and rails fitted along the routes is to be carried out, before the drilling unit commences its trials per Section 7-1-9 of these Rules.

17.1 **Means of Escape**

Arrangement of escape routes from accommodation spaces, service spaces and control stations, from category ‘A’ machinery spaces, from other machinery spaces, superstructures or deckhouses, together with stairways or ladders in way of any escape route, and the accessibility and access through the routes, are to be in accordance with 5-3-1/1 of these Rules.

17.1.1 **Gratings in way of Escape Routes**

If deck gratings are used along designated escape route(s) in manned areas, category ‘A’ machinery spaces, other machinery spaces, or from the superstructure and deckhouses to the survival craft embarkation areas, material of grating is to be of steel.

Gratings made of material other than steel, such as Fiber Reinforced Plastics (FRP), may be used, provided the grating material meets the design criteria similar to requirements contained in Section 4-2-2 of these Rules.

i) Fire endurance of non-steel gratings used in way of escape routes of open decks and spaces that may be directly subjected to hydrocarbon fire, is to meet requirements of “Level 1” fire endurance standard (L1).

ii) Fire endurance of non-steel gratings used in way of escape routes of open decks and spaces that may not be directly subjected to hydrocarbon fire, is to meet requirements of “Level 2” fire endurance standard (L2).

Manufacturer’s material test reports for any L1 and L2 grating material are to be available to the attending Surveyor.

Gratings made of material other than steel may be used in spaces (e.g. walkways in service spaces, normally unmanned spaces, mud pit rooms, machinery maintenance decks/platforms, etc.) that are not along the designated escape route, provided the grating material meets the design criteria similar to requirements contained in Section 4-2-2 of these Rules and requirements of “Level 3” fire endurance standard (L3).

17.3 **Means of Access and Egress**

The means of access and egress is to be verified for compliance with 5-3-1/3 of these Rules.
17.5 **Guards and Rails**

All guards and rails provided along floor deck areas and openings, and helicopter landing deck is to be verified for compliance with 5-3-1/5 of these Rules.

17.7 **Emergency Control Stations**

Emergency control stations are to be verified for compliance with 5-3-1/7 of these Rules.

Testing of contact makers to activate the General Alarm (GA) system, communication system between the control stations and all locations vital to the safety of the unit, and emergency shut-down facilities (see 7-1-8/19 of these Rules) are to be carried out, before the drilling unit commences its trials per Section 7-1-9 of these Rules.

17.9 **Arrangements in Machinery Space**

Examination and testing, as applicable, for the following arrangements/items are to be carried out, before the drilling unit commences its trials per Section 7-1-9 of these Rules.

i) Ventilating fans and openings to be examined and tested (see 5-3-1/9.1 of these Rules)

ii) Other auxiliaries (see 5-3-1/9.3 of these Rules)

iii) Oil tank suction pipes (see 5-3-1/9.5 of these Rules)

iv) Oil fuel unit (see 5-3-1/9.7 of these Rules)

17.11 **Segregation of Fuel Oil Purifiers**

Installation of purifiers and fire and safety provisions provided for enclosed spaces containing the purifiers are to be examined for compliance with 5-3-1/11 of these Rules.

The examination and any testing required is to be carried out, before the drilling unit commences its trials per Section 7-1-9 of these Rules.

17.13 **Fire Precautions for Machinery Spaces**

Fire precautions taken in machinery spaces, as required by 5-3-1/15 of these Rules, are to be examined. The examination is to be carried out, before the drilling unit commences its trials per Section 7-1-9 of these Rules.

19 **Emergency Shutdown Arrangements**

19.1 **Arrangements and Services**

Arrangements are to be provided for the disconnection or shutdown, either selectively or simultaneously, of all electrical equipment and devices, including the emergency generator, except for the services listed under 7-1-8/19.1.2 from the emergency control station. Initiating of the above shut-downs may vary according to the nature of the emergency. A recommended sequence of shut-downs is to be provided in the unit’s operating manual.

*Note: In the case of units using Dynamic Positioning System (DPS) as the only means of position keeping, special consideration may be given to the selective disconnection or shutdown of machinery and equipment associated with maintaining the operability of the DPS in order to preserve the integrity of the well.*

19.1.1 **Operation After Shutdown**

The following services are to be operable after an emergency shutdown:

i) Emergency lighting required by 7-1-6/5.3.1i), ii) iii), and iv) for half an hour

ii) General Alarm (GA) system

iii) Blow-Out Preventer (BOP) control system

iv) Public Address (PA) system

v) Distress and safety radio communications

All equipment in exterior locations which is capable of operation after shutdown is to be suitable for installation in Zone 2 locations.
CHAPTER 1 Surveys During Construction

SECTION 9 Surveys at Builder’s Yard – Sea Trial

1 General

A sea trial procedure is to be developed by the builder and submitted to the attending Surveyor for review and comments, well in advance, prior to commencement of the trial.

A pre-planning meeting in presence of the attending Surveyor(s) is to be carried out prior to the sea trial to at least confirm the following:

- Sea trial procedure to be followed
- Sea trial schedule and estimated duration of tests to be carried out during the sea trial
- Key personnel from the builder, owner, operator, and any other representative
- Any specific test to be carried out that may be outside the scope of classification

During sea trial of a drilling unit, the operation of machinery, electrical systems and safety features required by these Rules is to be demonstrated to the satisfaction of the attending Surveyor(s). Complete function tests are to be carried out, including duration runs and tests for operation of all protective devices and stability tests for control, in presence of and to the satisfaction of the attending Surveyor(s).

If the drilling unit is self-propelled, maneuvering tests which should include a reversal of the drilling unit from full speed ahead to full speed astern, is also to be carried out in presence of and to the satisfaction of the attending Surveyor(s).

3 Stability Test

A stability test is required to be performed on every vessel. The American Society and Materials Standard (ASTM) Guide for conducting stability tests, “Standard Guide for Conducting a Stability Test (Inclining and Lightweight Survey) to Determine the Light Ship Displacement and Centers of Gravity of a Vessel” may be used for conducting stability test.

A stability test, in accordance with a procedure accepted by an ABS engineering office, is to be carried out in protected waters, and in presence of and to the satisfaction of the attending Surveyor before commencement of the sea trial. The Surveyor is then to attest to the satisfactory performance of the experiment in a report to the ABS engineering office for evaluation.

For a subsequent drilling unit, in a series built from the same set of drawings of an inclined drilling unit, the requirement for an Inclining Experiment may be waived, provided:

- A “weights and centers” calculation is prepared, indicating the differences between the subsequent and the inclined drilling unit, and
- The calculated light ship properties are subsequently confirmed by a Lightweight Survey witnessed by an ABS Surveyor and found to be within the limits specified in SOLAS Regulation II-1/B-1(5.2), unless indicated otherwise by the Flag Administration. If the limits specified are exceeded, the Flag Administration is to be contacted to determine the acceptability of such a deviation.
5 Safety

Sea trial cannot be commenced in presence of an ABS Surveyor unless the Surveyor agrees with the builder that suitable safety precautions are taken onboard the drilling unit. This may include but not limited to the verification of following items by the attending Surveyor:

- Operational preparedness of any additional portable fire extinguishing placed onboard
- Posting of temporary fire control and safety plans to be used during the sea trial
- Satisfactory condition and installation of life saving appliances for the sea trial personnel, particularly if the number of personnel exceeds the drilling unit’s Persons On Board (POB) capacity
- “Abandon Unit Drill” with entire sea trial personnel
- “Fire Drill” with designated fire fighters

An exemption to any of the above is the responsibility of the Coastal State Authority, and if an exemption is issued, the written exemption is to be made readily available to the attending Surveyor for evaluation.

7 Hull Structure Testing

As mentioned in 7-1-2/1, hull structure testing such as hydrostatic testing and hull structural testing of tanks may be carried out during the sea trial. Provided it is to be agreed upon by the attending Surveyor before the commencement of the sea trial, if the tank boundaries were previously subjected to satisfactory air test, complete filling of water ballast tanks during the ballast trial may be accepted as the hull structure test.

9 Testing on Self-Elevating Drilling Units

9.1 Initial Jacking Test (2016)

The test should include a trial jacking of the completed hull up to the limit of designed travel and then down again, to prove alignment of leg racks, pinions and guides, effectiveness of lock or brake arrangements, and proper functioning of jacking system together with electrical safety system monitoring indicators.

After the initial trial jacking test, all legs and leg to spud can or mat connections are to be visually examined and verified free from damage or permanent deformation. All leg connections to spud cans or mat are to be nondestructively tested with a suitable surface crack detection method. In addition, the climbing pinions are to be visually examined, as far as practical, to the satisfaction of the attending Surveyor.

9.3 Moveable Cantilever and Skid Beam Testing

Prior to placing the drilling unit in service, a function test of the longitudinal skidding arrangements of the moveable cantilever and skid beam as well as any transverse skidding arrangements such as the sub-base (drill floor) is to be carried out by skidding the completed drilling structures with derrick assembly to the maximum limits of travel.

This test is to be carried out after the entire marine and drilling systems have been installed on the drilling unit that affects the function load of the beams. During the testing, the cantilever and rig’s skid beams need not be overloaded to loads over and above their maximum allowable design loads.

11 Sea Trial

During the sea trial, following tests is to demonstrate that each item of plant and the system as a whole is satisfactory for drilling unit’s service after construction:

11.1 Operation of Machinery and Piping Systems

Satisfactory operation of all machinery and piping systems required by the Rules are to be confirmed throughout the sea trial period.

If any excessive vibration of piping is noted during the sea trial, it is to be rectified upon completion of the trial.
11.3 **Ballast System**

Ballast system is to operate satisfactorily throughout the sea trial period.

On column stabilized drilling units, ballast system is to be tested to demonstrate that it is capable of raising the drilling unit, starting from a level trim condition at deepest normal operating draft, either a distance of 4.6 m (15 ft) or to the severe storm draft, whichever distance is greater, within three hours. The test is to preferably follow the ballast testing procedure that is to be provided to the drilling unit’s operating personnel. In addition, all controls and indication systems in the central ballast control station are to operate satisfactorily throughout the sea trial period, particularly during the ballast test.

11.5 **Bilge System**

Bilge system is to operate satisfactorily throughout the sea trial period. Satisfactory operation of bilge alarms and suction from bilge wells is to be verified during the trial by random activation/testing of the system.

On column stabilized drilling units, two independent systems of high bilge water level detection, giving an audible and visual alarm at the central ballast control station is to be demonstrated during the sea trial, preferably when the drilling unit is operating under emergency power. High bilge water level audible and visual alarm at the central ballast control station for propulsion rooms and pump rooms in lower hulls of column-stabilized units are to be demonstrated during the trial.

11.7 **Electrical Installation for Drilling Unit Main Services**

All auxiliary apparatus is to be tried under working conditions. Each generator is to be run for a time sufficient to show satisfactory operation, and parallel operation with all possible combinations is to be demonstrated.

Each auxiliary motor necessary to the operation of the drilling unit is to be run for a time sufficient to show satisfactory performance at such load as can readily be obtained. All main switches and circuit breakers are to be operated, but not necessarily at full load. The operation of the lighting system, heaters, etc., is to be demonstrated satisfactorily. The entire installation is to operate to the satisfaction of the Surveyor and the drop in voltage on any part of the installation is not to exceed 6%. See 4-3-3/5.1.3.

11.9 **Communication Facilities**

Satisfactory operation of the interior communications system required by 4-3-2/15 is to be demonstrated to the Surveyor during sea trials. Particular attention is to be given to demonstrating that the voice communication systems required by 4-3-2/15 provide the capability of carrying on a conversation while the drilling unit is being navigated.

11.11 **Fire Extinguishing System**

Fire main system, main fire pumps, emergency fire pump, and foam pump are to operate satisfactorily throughout the sea trial period.

Satisfactory operation of the fixed fire-water extinguishing system is to be demonstrated during the sea trial with main fire pumps and the emergency fire pump. This includes confirmatory testing of the system output pressure from fire hoses coupled to two separate hydrants located as far away from each other as practicable, where one of which is to be at the drill floor. Minimum pressure measured at each fire hose nozzle is to be 3.5 bar (3.5 kgf/cm², 50 psi) and the maximum pressure shall be such that the effective control of a fire hose by crew can be demonstrated.

11.13 **Main Source of Power**

Main source of power is to operate satisfactorily throughout the sea trial period. No specific testing is required.

11.15 **Emergency Source of Power**

Automatic start of the emergency source of power is to be demonstrated during the sea trial. On Self-Propelled drilling units, this test is to be demonstrated preferably whilst the drilling unit is in motion and at least in a “dead-slow” speed.
11.17 **Distribution System**

Main distribution system, hull return system, earthed distribution systems, external or shore power supply connection, and harmonics, are to operate satisfactorily throughout the sea trial period. No specific testing is required.

11.19 **Circuit Protection System**

Protection for generators, accumulator batteries, external or shore power supply, motor branch circuits, transformer circuits, meters, pilot lamps and control circuits, are to operate satisfactorily throughout the sea trial period. No specific testing is required.

11.21 **Lighting and Navigation Light Systems**

General lighting, emergency lighting, obstruction lights, helicopter landing lights and navigation lights are to operate satisfactorily throughout the sea trial period.

The entire installation is to operate to the satisfaction of the Surveyor and the drop in voltage on any part of the installation is not to exceed 6%.

Satisfactory operation the emergency lights after a black-out condition is to be confirmed. Sufficient lighting in all control stations, egress routes, and embarkation stations are to be verified.

11.23 **Public Address (PA) and General Alarm (GA) Systems**

The PA system is to operate satisfactorily throughout the sea trial period. Satisfactory operation is to be verified during the trial by random activation/testing of the system. With the drilling unit underway or in normal operating conditions, the minimum sound levels for broadcasting emergency announcements are to be:

i) In interior locations, 75 dB (A) and at least 20 dB (A) above the speech interference level

ii) In exterior locations, 80 dB (A) and at least 15 dB (A) above the speech interference level

Particular attention is to be paid to machinery/working spaces where normal noise level is higher than other areas of the drilling unit.

The GA system is to be clearly audible in all parts of the unit. The alarm is to continue to function after it has been triggered until it is manually turned off or is temporarily interrupted by a message on the public address system. The GA system is to operate satisfactorily throughout the sea trial period. Satisfactory operation is to be verified during the trial by random activation/testing of the system. With the drilling unit underway or in normal operating conditions, the minimum sound levels of the alarm is to be:

i) The minimum sound levels for the emergency alarm tone in interior spaces are to be 80 dB and at least 10 dB (A) above ambient noise levels existing during normal equipment operation in moderate weather. In cabins without a loud speaker installation, an electrical alarm transducer is to be installed.

ii) The sound levels at the sleeping position in cabins and in cabin bathrooms are to be at least 75 dB (A) and at least 10 dB (A) above ambient noise levels.

11.25 **Fire Protection and Fire Detection Systems**

Emergency stops and emergency shutdown system is to be verified during the trial by random activation/testing.

Fire detection system is to operate satisfactorily throughout the sea trial period. Satisfactory operation of the system and its alarms is to be verified during the trial by random activation/testing of the system. Particular attention is to be paid to machinery/working spaces where normal noise level is higher than other areas of the drilling unit.

11.27 **Gas Detection System**

Gas detection system is to operate satisfactorily throughout the sea trial period. Satisfactory operation of the system and its alarms is to be verified during the trial by random activation/testing of the system. Particular attention is to be paid to machinery/working spaces where normal noise level is higher than other areas of the drilling unit.
13 Sea Trial for Self-Propelled Drilling Units

13.1 Full Power Trial
A final under-way full-power trial is to be made of all machinery required for propulsion, the steering gear and the anchor windlass.

For surface-type and self-elevating units, the trial is to be conducted at the draft corresponding to the minimum freeboard.

For column-stabilized and self-elevating drilling units, the trial is to be conducted at transit draft or as near transit draft as practicable.

13.3 Reduced Power Trial
Column-stabilized units are to conduct final under-way reduced-power trial of all machinery required for propulsion at a design operating draft to the satisfaction of the Surveyor.

13.5 Operation of Machinery, Electrical Systems and Safety Features
The operation of other machinery, electrical systems and safety features required by the Rules is to be demonstrated to the satisfaction of the Surveyor.

13.7 “Dead-Ship” Start
Restoring the propulsion system from a dead ship condition is to be demonstrated.

The emergency source of electrical power may be used to restore the propulsion, provided its capacity either alone or combined with that of any other available source of electrical power is sufficient to provide at the same time those services required to be supplied by 4-3-2/5.3.1 through 4-3-2/5.3.7.

The emergency source of electrical power and other means needed to restore the propulsion are to have a capacity such that the necessary propulsion starting energy is available within 30 minutes of blackout, as defined in 4-1-1/10.1. Emergency generator stored starting energy is not to be directly used for starting the propulsion plant, the main source of electrical power and/or other essential auxiliaries (emergency generator excluded).

13.9 Steering Gear Trial
Power supply feeder, protection for steering gear motor circuit, emergency power supply, controls, instrumentation, and alarms, are to operate satisfactorily throughout the sea trial period. Verification of the emergency power supply, controls, instrumentation, and alarms is to be to the satisfaction of the attending Surveyor.

The steering gear is to be capable of:

i) Putting the rudder from 35° on one side to 35° on the other side with the vessel running ahead at the maximum continuous rated shaft rpm and at the summer load waterline and, under the same conditions, from 35° on either side to 30° on the other side in not more than 28 seconds; and

ii) With one of the power units inoperative, putting the rudder from 15° on one side to 15° on the other side in no more than 60 seconds with the vessel running ahead at the summer load waterline at one half of the maximum ahead service speed or 7 knots, whichever is the greater.

The steering gear trial is to be performed with the rudder fully submerged. Where full rudder submergence cannot be obtained in ballast conditions, alternative procedures for trials with less than full rudder submergence are to be submitted for consideration.
13.9.1 Full Speed Trial
Satisfactory performance is to be demonstrated under the following conditions:

i) Changing the rudder position from 35° on either side to 30° on the other side in not more than 28 seconds with the vessel running ahead at the maximum continuous rated shaft rpm. For controllable pitch propellers, the propeller pitch is to be at the maximum design pitch approved for the above maximum continuous ahead rated rpm.

ii) Unless 7-1-9/13.9.2(iii) is applicable, this test is to be carried out with all power units intended for simultaneous operation for this condition under actual operating conditions.

13.9.2 Half Speed Trial
Satisfactory performance is to be demonstrated under the following conditions:

i) Changing the rudder position from 15° on either side to 15° on the other side in not more than 60 seconds while running at one-half of the maximum ahead speed or 7 knots whichever is the greater.

ii) This test is to be conducted with either one of the power units used in 7-1-9/13.9.1ii) in reserve.

iii) Half Speed Trial may be waived where the steering gear consists of two identical power units with each capable of meeting the requirements in 7-1-9/13.9.1i).

13.9.3 Steering Gears with More than Two Power Units
Where three or more power units are provided, the test procedures are to be specially considered on the basis of the specifically approved operating arrangements of the steering gear system.

13.9.4 Drilling Units Fitted with Propellers
The designed performance of the propeller at rated speed is to be demonstrated during sea trial.

13.9.5 Drilling Units Fitted with Azimuthal Thrusters
Steering systems for azimuthal thrusters are to meet the requirements of Section 4-3-4 of the Steel Vessel Rules, as applicable, and the following requirements.

i) For drilling units that are arranged with only one azimuthal thruster as the only means of propulsion and steering, the thruster is to be provided with steering systems of a redundant design such that a single failure in one system does not affect the other system.

ii) For drilling units that are arranged with two azimuthal thrusters as the only means of propulsion and steering, each thruster is to be provided with at least one steering system. The steering system for each thruster is to be independent of the steering system for the other thruster.

iii) Each azimuthal thruster is to be capable of rotating at a speed of not less than 0.4 rpm (from 35 degrees on either side to 30 degrees on the other side in not more than 28 seconds) while steering the vessel with the vessel running ahead at the maximum continuous rated shaft rpm and at the summer load waterline. Where the azimuthal thruster is arranged to rotate for the crash stop or astern maneuver, the azimuthal thruster is to be capable of rotating at the speed of not less than 2.0 rpm (180 degrees in not more than 15 seconds) to account for the crash stop or astern maneuver.

13.9.6 Additional Items
The trial is also to include the operation and verification of the following:

i) The power units, including transfer between power units

ii) The emergency power supply, if applicable

iii) The steering gear controls, including transfer of control and local control

iv) The means of communication between the navigation bridge, engine room and the steering gear compartment
v) The alarms and indicators required by 4-3-4/15 of the Steel Vessel Rules (test may be done at dockside)

vi) The storage and recharging system in 4-3-4/9.3 of the Steel Vessel Rules (test may be done at dockside)

vii) The isolation of one power actuating system and time for regaining steering capability (test may be done at dockside)

viii) Where the steering gear is designed to avoid hydraulic locking (4-3-4/9.1.3 of the Steel Vessel Rules), this feature is to be demonstrated.

ix) Where practicable, simulation of a single failure in the hydraulic system, and demonstration of the means provided to isolate it and the regaining of steering capability, as in 4-3-4/5.5 and 4-3-4/9.1.3 of the Steel Vessel Rules.

x) The stopping of the steering gear before the rudder stop is reached, as in 4-3-4/5.11 of the Steel Vessel Rules.

13.11 Interior Communication Systems for Self-Propelled Units

Interior communication between the navigation bridge and main control stations is to operate satisfactorily throughout the sea trial period. Satisfactory operation is to be verified during the propulsion trial.

The voice communication system is to be verified to provide the capability of carrying on a conversation while the drilling unit is being navigated.

15 Anchoring/Mooring Trial (1 July 2019)

Where optional ABS symbols ☞, ☟, ☠, P-PL, M-PL, TAM, or TAM (Manual) are requested, and when mooring systems are required by 3-4-1/3.3, the drilling unit is to undergo trials to prove its capability as applicable. For further details, see Appendix 7-1-A1 of these Rules.

15.1 Anchoring/Mooring System Foundations

Although the mooring system is an optional scope of classification, drilling unit’s hull back-up structure/foundations are required to be surveyed in compliance with ABS approved drawings, in presence of and to the satisfaction of the attending Surveyor.

Proper fit-up, alignment and final weldments of hull foundations for mooring winches, fairleads and other mooring system components are to be visually examined. Completed welds are to be subjected to surface NDT (preferably Magnetic Particle Inspection) to the extent deemed necessary by the attending Surveyor, before the drilling unit commences its mooring trial.

15.3 Anchor Windlass Trials

Each anchor windlass is to be tested under working conditions after installation onboard to demonstrate satisfactory operation. Each unit is to be independently tested for braking, clutch functioning, lowering and hoisting of chain cable and anchor, proper riding of the chain over the chain lifter, proper transit of the chain through the hawse pipe and the chain pipe, and effecting proper stowage of the chain and the anchor.

It is to be confirmed that anchors properly seat in the stored position and that chain stoppers function as designed if fitted.

The mean hoisting speed, as specified in 4-5-1/5.1.4 of the Steel Vessel Rules, is to be measured and verified, with each anchor and at least 82.5 m (45 fathoms) length of chain submerged and hanging free. The braking capacity is to be tested by intermittently paying out and holding the chain cable by means of the application of the brake. Where the available water depth is insufficient, the proposed test method will be specially considered.
17 Dynamic Positioning System (DPS)

Dynamic Positioning System is to be subjected to trial in presence of and to the satisfaction of the Surveyor, and the test items mentioned in 7-1-9/17.3 are to demonstrate that each item of plant and the system as a whole is satisfactory for drilling unit’s service after construction.

17.1 Failure Mode and Effect Analysis (FMEA)

The purpose of an FMEA is to give a description of the difference failure mode of the equipment referred to its function tasks. Drilling units classed with the DPS-2 or DPS-3 notations are required to have their FMEA plans and data reviewed by ABS.

17.3 DP Trials

A detailed DP trial program, that includes schedule of tests, is to be submitted for ABS review prior to the proposed date of testing. The DP trial program is to be prepared to demonstrate the level of redundancy established in FMEA, as applicable.

The test environment is to reflect the limiting design operating conditions, as far as practicable. The DP trial is to be a complete performance test of the dynamic positioning system, and to at least include the following testing/verification:

i) The complete DP system is to be tested in all operation modes, with simulation of different failure conditions to try switching modes, backup system and alarm system such as:
   - Fail each automatic control computer at main station.
   - Verified automatic changeover to stand by DP control computer without manual intervention and without any adverse effect on station keeping.
   - Fail two automatic control computers.
   - Verify manual changeover from automatic control system to back up automatic control computer at emergency DP control station.
   - Verify manual changeover from automatic control system to independent joystick.
   - Computer program verification if single fault including loss of thruster or thruster group (based on FMEA), sufficient thruster remains available in steady state and transient conditions.

ii) Manual override is to be demonstrated during normal operation and failure conditions.

iii) Resubmitted results for approval may be necessary if significant differences in expected/actual results are found.

iv) If transient excursion occurs, submit analysis of worst case not to exceed distance endangering safe operation of vessel (Operation Envelope).
PART 7

CHAPTER 1 Survey During Construction

APPENDIX 1 Mooring Systems and Equipment (2017)

1 General (1 July 2019)

On self-propelled vessels, the symbol is required as a condition of classification except as allowed by 3-4-1/3.3, and therefore it is mandatory to comply with the ABS Rules. On vessels that are not self-propelled (i.e., without the AMS notation), the is an optional symbol that may be requested by the owner.

The symbols (P-PL), (M-PL), TAM, TAM (Manual), TAM-R, TAM-PL, TAM-PL(Manual), and are not required as a condition of classification. These are optional symbols that may be requested by the owner.

All mooring equipment required by 3-4-1/3.3 and associated with class symbols (P-PL), (M-PL), TAM, TAM (Manual), TAM-R, TAM-PL, TAM-PL(Manual), , and are to be fabricated and certified in accordance with Section 6-1-10 at the manufacturer’s facility. Installation of the mooring equipment/system is to be carried out in presence of and to the satisfaction of the attending Surveyor. The mooring system is to be tested, per an agreed test procedure, during the sea trial of the unit.

3 Mooring System Foundations

The unit’s hull back-up structure/foundations are required to be surveyed in compliance with ABS approved drawings, in presence of and to the satisfaction of the attending Surveyor.

Proper fit-up, alignment and final weldments of hull foundations for mooring winches, fairleads and other mooring system components are to be visually examined. Completed welds are to be subjected to surface NDT to the extent deemed necessary by the attending Surveyor, prior to the mooring trial.

5 Mooring Trial

A mooring trial is to be carried out in accordance with ABS reviewed mooring trial test procedures, in the presence of and to the satisfaction of the attending Surveyor.

5.1 Temporary Mooring Equipment

Temporary Mooring Equipment associated with or without when required by 3-4-1/3.3 is to be tested onboard in the presence of a Surveyor. Each anchor windlass is to be tested under working conditions after installation onboard to demonstrate satisfactory operation. Each unit is to be independently tested for braking, clutch functioning, lowering and hoisting of chain cable and anchor, proper riding of the chain over the chain lifter, proper transit of the chain through the hawse pipe and the chain pipe, and effecting proper stowage of the chain and the anchor. It is to be confirmed that anchors properly seat in the stored position and that chain stoppers function as designed if fitted. The mean hoisting speed, as specified in 4-5-1/5.1.4 of the Steel Vessel Rules, is to be measured and verified, with each anchor and at least 82.5 m (45 fathoms) length of chain submerged and hanging free. The braking capacity is to be tested by intermittently paying out and holding the chain cable by means of the application of the brake. Where the available water depth is insufficient, the proposed test method will be specially considered.
5.3 **Position Mooring Equipment (P-PL and M-PL) (1 July 2019)**

The position mooring system is to be tested under working conditions after installation onboard to demonstrate satisfactory operation. It is to be confirmed that the position mooring system is in compliance with the Owner’s specification and operates within required parameters specified by the Owner.

All mooring equipment associated with class symbols (P-PL) and (M-PL) that are carried onboard the unit are to be fabricated and certified by ABS at the respective manufacturer’s facility. Survey of the pre-laid mooring equipment is not required during fabrication or installation.

5.5 **Position Mooring System (P-PL, TAM and TAM (Manual), TAM-R, TAM-PL, and TAM-PL (Manual)) (1 July 2019)**

In addition to 7-1-A1/5.3, the mooring system is to be tested under working conditions after installation onboard to demonstrate satisfactory operation. Each unit is to be independently tested for braking, clutch functioning, lowering and hoisting of chain cable and anchor, proper riding of the chain over the chain lifter, proper transit of the chain through the hawse pipe and the chain pipe, and effecting proper stowage of the chain and the anchor.

The thruster assisted (TA) system are to be inspected, tested and certified by ABS in accordance to the following requirements.

i) **TAM (Manual), TAM-PL (Manual)**: 7-1-9/17 requirements for DPS-0 for the corresponding components

ii) **TAM, TAM-PL**: 7-1-9/17 requirements for DPS-1 for the corresponding components

iii) **TAM-R**: 7-1-9/17 requirements for DPS-2 for the corresponding components

5.5.1 **Control Stations for Position Mooring Systems**

The following provisions are to be confirmed during the position mooring system trials:

i) Suitable equipment to indicate anchor line tensions, wind speed and direction at a manned central control station.

ii) Reliable means of communication between locations critical to the anchoring operation.

iii) Controls of each winch or windlass from a position which provides a good view of the operation, and suitable equipment at each winch or windlass control positions to monitor anchor line tension, winch or windlass power load, and to indicate the amount of anchor line paid out.
1 General
This Appendix pertains to surveys and testing to be carried out on onboard computers for stability calculations. As mentioned in 7-1-1/23, the use of onboard computers for stability calculations is not a requirement of class, it is optional. However, if software is installed onboard for calculating stability of the unit, it is to be surveyed and tested in presence of and to the satisfaction of the attending Surveyor.

Following subsections describe the requirements for survey of onboard computers. Satisfactory ABS design review of the computer, in accordance with Appendix 3-3-A2 of the MODU Rules, is to be completed before surveys are commenced onboard the unit.

3 Functional Requirements

3.1 Calculation Program
The calculation program is to present relevant parameters of each operating condition in order to assist the Master in his judgment on whether the drilling unit is loaded within the approval limits. The following parameters are to be presented for a given operating condition:
- Deadweight data
- Lightship data
- Trim
- Draft at the draft marks and perpendiculars
- Summary of operating condition displacement, VCG, LCG and, if applicable, TCG
- Down-flooding angle and corresponding down-flooding opening
- Compliance with stability criteria: Listing of all calculated stability criteria, the limit values, the obtained values and the conclusions (criteria fulfilled or not fulfilled)

If direct damage stability calculations are performed, the relevant damage cases according to the applicable rules are to be pre-defined for automatic check of a given operating condition.

3.3 Computer Data/Indicators
The computer is to satisfy following requirements during operating condition.

3.3.1 Warning
A clear warning is to be given on screen and in hard copy printout if any of the operating limitations are not complied with.

3.3.2 Data Printout
The data are to be presented on screen and in hard copy printout in a clear unambiguous manner.

3.3.3 Date and Time
The date and time of a saved calculation are to be part of the screen display and hard copy printout.
3.3.4 Information of Program
Each hard copy printout is to include identification of the calculation program with version number.

3.3.5 Units
Units of measurement are to be clearly identified and used consistently within an operating calculation.

5 Operation Manual
An ABS reviewed operation manual is to be placed onboard the unit and verified by the Surveyor. The operation manual is to contain descriptions and instructions, as appropriate, for at least the following:

i) Installation
ii) Function keys
iii) Menu displays
iv) Input and output data
v) Required minimum hardware to operate the software
vi) Use of the test operating conditions
vii) Computer-guided dialogue steps
viii) List of warnings

7 Installation Testing
To ensure correct working of the computer after the final or updated software has been installed, it is the responsibility of the drilling unit’s master to have test calculations carried out according to the following pattern in the presence of the Surveyor:

i) From the approved test conditions at least one load case (other than lightship) is to be calculated.
   
   Note: Actual operating condition results are not suitable for checking the correct working of the computer.

ii) Normally, the test conditions are permanently stored in the computer.

7.1 Installation Test Steps to be Performed
Following test steps are to be performed in presence of and to the satisfaction of the attending Surveyor:

i) Retrieve the test load case and start a calculation run; compare the stability results with those in the documentation.

ii) Change several items of deadweight sufficiently to change the draft or displacement by at least 10%. The results are to be reviewed to ensure that they differ in a logical way from those of the approved test condition.

iii) Revise the above modified load condition to restore the initial test condition and compare the results. The relevant input and output data of the approved test condition are to be replicated.

iv) Alternatively, one or more test conditions shall be selected and the test calculations performed by entering all deadweight data for each selected test condition into the program as if it were a proposed loading. The results shall be verified as identical to the results in the approved copy of the test conditions.
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CHAPTER 2 Surveys After Construction

SECTION 1 Conditions for Surveys After Construction

1 Application (2010)

1.1 Chapter 2 Sections 1 through 11 (2018)

The requirements for Surveys After Construction contained in Part 7, Chapter 2, Sections 1 through 10, and Appendices 1 through 3 apply to the:

• Rules for Building and Classing Mobile Offshore Drilling Units (MODU Rules)

And are referenced by the following ABS Rules and Guides:

• Guide for Building and Classing Mobile Offshore Units
• Rules for Building and Classing Floating Production Installations
• Guide for Automatic or Remote Control and Monitoring for Machinery and Systems (other than Propulsion) on Offshore Installations

Certain requirements of the MODU Rules are based on the requirements of the ABS Rules for Building and Classing Steel Vessels (Steel Vessel Rules).

The ABS Rules for Survey After Construction (Part 7) are applied to all existing vessels on the effective date of the Rule Change Notice.

3 Definitions (2010)

3.1 Ballast Tank

A Ballast Tank is a tank which is used primarily for the carriage of salt water ballast.

3.2 Coating Condition (2014)

Coating Condition of hard coatings is defined as follows:

GOOD – Condition with spot breakdown on less than 5% of the area under consideration without visible failure of the coating, or non-perforated blistering. Breakdown at edges or welds is to be less than 20% of edges or weld lines in the area under consideration.

FAIR – Condition with breakdown of coating or penetration on less than 20% of the area under consideration. Total paint failure should be less than 10% of the area under consideration. Breakdown at edges or welds is to be less than 50% of edges or weld lines in the area under consideration.

POOR – Condition with breakdown of coating or penetration on more than 20% or on total paint failure more than 10% of the area under consideration or local breakdown concentrated at edges or welds on more than 50% of edges or weld lines in the area under consideration.

Note: Reference is made to IMO MSC.1/Circ.1399 “Guidelines on Procedures for In-Service Maintenance and Repair of Coating Systems for Cargo Oil Tanks or Crude Oil Tankers”, and the IACS Recommendation No.87 “Guidelines for Coating Maintenance & Repairs for Ballast Tanks and Combined Cargo/Ballast Tanks on Oil tankers”.
3.3 Corrosion

Active Corrosion means gradual chemical or electrochemical attack on a metal resulting from a reaction with its environment and producing loose scale.

Allowable Corrosion or Wastage Limit is the acceptable corrosion limit for the MODU’s structure in a given area. Also known as Allowable Limit.

Excessive Corrosion is an extent of corrosion that exceeds the allowable limit.

Extensive Area of Corrosion is corrosion of hard and/or loose scale, including pitting, over 70% or more of the plating surface in question, accompanied by evidence of thinning.

Grooving Corrosion is a localized, linear corrosion which occurs at structural intersections where water collects or flows. This corrosion is sometimes referred to as “in line pitting attack” and can also occur on vertical members and flush sides of bulkheads in way of flexing.

Localized Corrosion is by name local in nature and may be caused by local breakdown in coating from contact damage, insufficient preparation, or at areas of stress concentration.

Overall Corrosion appears as a non-protective rust which can uniformly occur on tank internal surfaces that are uncoated, or where coating has totally deteriorated. The rust scale continues to break off, exposing fresh metal to corrosive attack. Thickness cannot be judged visually until excessive loss has occurred.

Pitting Corrosion is a localized corrosion of a metal surface that is confined to a small area and takes the form of cavities called pits.

Substantial Corrosion is an extent of corrosion such that assessment of corrosion pattern indicates wastage in excess of 75% of the allowable corrosion, but within the acceptable limits.

Weld Metal Corrosion is defined as preferential corrosion of weld deposit. The most likely reason for this attack is galvanic action with the base metal which may start as pitting and often occurs on hand welds as opposed to machine welds.

3.5 Corrosion Control System

Corrosion Control System may be achieved by application of hard protective coating (usually epoxy coating or equivalent), soft protective coating, impressed current cathodic protection (ICCP) system, sacrificial anodes, etc., provided that they are applied and maintained in compliance with the manufacturer’s specification.

3.7 Critical Structural Areas (2014)

Critical Structural Areas are locations which have been identified from calculation to have relatively low fatigue life and therefore may require monitoring or from the service history of the subject unit or from similar sister units to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the unit. The unit’s service history since last survey may also have an effect on identified critical structural areas.

3.9 Girth Belt (Transverse Section)

A Girth Belt includes the following:

- Surface-Type Units: Deck, bottom, side shell and longitudinal bulkhead plating and internal framing.
- Column-Stabilized Units: Column and bracing plating and internals as deemed necessary. Deck sides and bottom of lower hulls between columns, including internal stiffeners as deemed necessary.
- Self-Elevating Units: Deck, bottom, side shell, internal framing of preload tanks and leg well structure.

3.11 Panel

Panel is the area between adjacent main frames from stiffener to stiffener.
3.13 Survey (2014)

*Overall Survey* is a survey intended to report on the overall condition of the structure and to determine the extent of additional close-up surveys. Overall Survey may be referred by the industry as “General Visual Inspection (GVI)”.

A *Close-up Survey* is a survey where the details of structural components are within close visual inspection range of the Surveyor (i.e., normally within hand reach). Close-up Survey may be referred by the industry as “Close Visual Inspection (CVI)”. In general, a GVI carried out in spaces will be supplemented by CVI of special or primary application structures, or identified structural critical areas. CVI may be accompanied by surface or volumetric Nondestructive Testing (NDT), and/or hull thickness measurement. Areas showing corrosion may also be subjected to CVI.

3.15 Representative Spaces/Tanks

*Representative Spaces/Tanks* are those which are expected to reflect the condition of other spaces of similar type and service and with similar corrosion preventive systems. When selecting representative spaces, account should be taken of the service and repair history onboard and identifiable critical and/or Suspect Areas.

3.17 Spaces

*Spaces* are separate compartments including tanks, cofferdams, machinery spaces, voids and other internal spaces.

3.19 Suspect Areas

*Suspect Areas* are locations showing substantial corrosion and/or are considered by the Surveyor to be prone to rapid wastage.

3.21 Wind and Water Strakes

*Wind and Water Strakes* are the two (2) strakes or equivalent area located in the vicinity of the load waterline, operating draft or operating depth of the unit. For Self-elevating Units this is the area of the leg components in the vicinity of the operating water depth. For column stabilized units this will include portions of columns and bracing members in the vicinity of the operating draft of the unit.

3.21.1 Splash Zone (for Self-Elevating and Column Stabilized Units) (2012)

*Splash Zone* is the external surfaces of a self-elevating or column-stabilized unit that are periodically in and out of the water when the unit at its operating depth.

5 Notification and Availability for Survey (2012)

The Surveyors are to have access to classed units at all reasonable times. The Owners or their representatives are to notify the Surveyors on occasions when parts of the structure not ordinarily accessible can be examined. The Surveyors are to undertake all surveys on classed units upon request, with adequate notification, of the Owners or their representatives and are to report thereon to ABS. Should the Surveyors find occasion during any survey to recommend repairs or further examination, notification is to be given immediately to the Owners or their representatives in order that appropriate action may be taken. The Surveyors are to avail themselves of every convenient opportunity for carrying out periodical surveys in conjunction with surveys of damages and repairs in order to avoid duplication of work. See also 1-1-8/5 of the *ABS Rules for Conditions of Classification – Offshore Units and Structures (Part 1)*.

7 Damage, Failure and Repair (1996)

7.1 Examination and Repair

Damage, failure, deterioration or repair to hull, legs, columns or other structures, machinery or equipment, which affects or may affect classification, is to be submitted by the Owners or their representatives for examination by a Surveyor at first opportunity. All repairs found necessary by the Surveyor are to be carried out to the Surveyor’s satisfaction.
7.3 Repairs
Where repairs to hull, legs, columns or other structures, machinery or equipment, which affect or may affect classification, are planned in advance to be carried out, a complete repair procedure, including the extent of proposed repair and the need for Surveyor’s attendance, is to be submitted to and agreed upon by ABS reasonably in advance. Failure to notify ABS in advance of the repairs may result in suspension of the unit’s classification until such time as the repair is redone or evidence submitted to satisfy the Surveyor that the repair was properly carried out.

Note: The above applies also to repairs during voyage or on site.

The above is not intended to include maintenance and overhaul to hull, other structures, machinery and equipment in accordance with the recommended manufacturer’s procedures and established marine practice and which does not require ABS approval. However, any repair as a result of such maintenance and overhauls which affects or may affect classification is to be noted in the unit’s log and submitted to the Surveyor as required by 7-2-1/7.1.

7.5 Representation
Nothing contained in this section or in a rule or regulation of any government or other administration, or the issuance of any report or certificate pursuant to this section or such a rule or regulation, is to be deemed to enlarge upon the representations expressed in 1-1-1/1 through 1-1-1/7 of the ABS Rules for Conditions of Classification – Offshore Units and Structures (Part 1), and the issuance and use of any such reports or certificates are to be governed in all respects by 1-1-1/1 through 1-1-1/7 of the above-referenced Part 1.

7.7 Application of Rules (2012)
As referenced in 1-1-3/1.3 of these Rules, the Rules that is applicable to the unit’s classification is to be applied to any repair without changing the original design, carried out on the unit’s structure, machinery or equipment, that affects or may affect classification. Application of up-to-date Rules will be specially considered only when so requested by the Owner or required by these Rules.

7.9 Prompt and Thorough Repairs (1 July 2017)
Notwithstanding 7-2-1/7.1 and 7-2-1/7.3, any damage in association with wastage over the allowable limits (including buckling, detachment or fracture), or extensive areas of wastage over the allowable limits, which affects or may affect the unit’s structural, watertight or weathertight integrity, is to be promptly and thoroughly repaired. Areas to be considered include:

- Side shell frames, their end attachments and adjacent shell plating
- Deck structure and deck plating
- Bottom structure and bottom plating
- Inner bottom structure and inner bottom plating
- Watertight and oil tight bulkheads
- Hatch covers and hatch coamings, where fitted
- Weld connection between air pipes and deck plating
- Air pipe heads installed on the exposed decks
- Ventilators including closing devices, if any
- Bunker and vent piping systems
- Legs, spud can and mat connections
- Jackhouse/Jackcase to deck connections
- Columns pontoons and bracings, including their connections
- Any Special Application Structure
For instances where the unit is currently on location and drilling, special consideration may be given to allow the unit to carry out repairs on site. When this is allowed the Owner is to submit a repair plan that includes a time line for completion of the repairs and where necessary an Engineering Analysis and/or changes to the approved operating mode to justify continued operation.

Additionally, when a survey results in the identification of structural defects or corrosion, either of which, in the opinion of the Surveyor, will impair the unit’s fitness for continued service, remedial measures are to be implemented before the unit continues in service.

Where damage found on structure is isolated and of a localized nature which does not affect the unit’s structural integrity, consideration may be given by the Surveyor to allow an appropriate temporary repair to restore watertight or weather tight integrity and impose a Recommendation with a specific time limit.

9 Alterations/Modifications (2012)

No alteration or modification which affect or may affect classification or the assignment of load lines are to be made to the hull or machinery of a classed unit unless plans of the proposed alterations are submitted and approved by the ABS Technical Office before the work of alteration or modification is commenced, and such work, when approved, is to be carried out to the satisfaction of the Surveyor. Nothing contained in this Section or in a rule or regulation of any government or other administration or the issuance of any report or certificate pursuant to this section or such a rule or regulation is to be deemed to enlarge upon the representations expressed in subsections 1-1-1/1 through 1-1-1/7 ABS Rules for Conditions of Classification – Offshore Units and Structures (Part 1) and the issuance and use of any such reports or certificates are to in all respects be governed by subsections 1-1-1/1 through 1-1-1/7 of the above-referenced Part 1.

9.1 Application of Rules

As referenced in 1-1-3/1.3 of these Rules, the Rules that is applicable to the unit’s classification is to be applied to minor alteration/modification carried out on the unit, including its structure, machinery or equipment, that affects or may affect classification. Application of up-to-date Rules will be specially considered only when so requested by the Owner or required by these Rules.

The following cases may be considered as a major alteration or modification, and therefore require compliance with up-to-date Rules for the section being altered or modified:

- Changing configuration or material of structure that is defined as “Special Application Structure” or “Primary Application Structure” in accordance with these Rules.
  
  Note: A cantilever extension is not considered to be a major modification.

- Changing leg jacking system of self elevating units.

- Changing a marine piping system (such as the ballast systems, bilge system, propulsion system, etc.) with all of its components (piping, valves, pumps, etc.).

- Changing a marine electrical system (such as the main power distribution, emergency power distribution, electrical propulsion system, etc.) with all of its components (cabling, electrical motors/pumps, panels, etc.).

- Changing layout and material used in the passive fire protection system, such as more than 10% of deck area alteration or modification to the footprint of the accommodation deckhouse/superstructure or its material used for fire protection.
  
  Note: Adding another deck on top of an existing accommodation deckhouse is not considered to be a major modification of the entire deckhouse.

- Changing an active fire protection system (such as the fixed-fire fighting system, fire and gas detection system, etc.) with all of its components (piping, pumps, hoses, panels, alarms, detectors, etc.).
11  **Welding and Replacement of Materials**

11.1  **Ordinary and Higher-Strength Structural Steels**
Welding or other fabrication performed on the structural steels listed in 2-1-2/Table 5 and 2-1-3/Table 5 is to be in accordance with the requirements in Section 2-4-1 of the ABS *Rules for Materials and Welding (Part 2).*

11.3  **Special Materials**
Welding or other fabrication performed on other steels of special characteristics or repairs or renewals of such steel or adjacent to such steel is to be accomplished with procedures approved for the special materials involved. The procedures are to be in accordance with the information provided under 7-1-2/7 and Chapter 4 of the ABS *Rules for Materials and Welding (Part 2).* Substitution of steels differing from those originally installed is not to be made without approval.

13  **Incomplete Surveys (2012)**
When a survey is not completed, the Surveyor is to report immediately upon the work done in order that the Owners and ABS may be advised of the parts still to be surveyed.

15  **Lay-up and Reactivation (2010)**

15.1  **Units for Unrestricted Service**
ABS is to be notified by the Owner that a vessel has been laid-up. This status will be noted in the Record, and surveys falling due during lay-up will then be held in abeyance until the vessel is reactivated. Lay-up procedures and arrangements for maintenance of conditions during lay-up may be submitted to ABS for review and confirmation by survey (See Appendix 7-2-A1 of these Rules).

In the case of units which have been laid-up for an extended period (i.e., six months or more), the requirements for surveys on reactivation are to be specially considered in each case, with due regard being given to the status of surveys at the time of the commencement of the lay-up period, the length of the period and conditions under which the unit had been maintained during that period.

Where the lay-up preparations and procedures have been submitted to ABS for review and confirmed by Annual Lay-up Surveys, consideration may be given to deducting part or all of the time in lay-up from the progression of survey intervals.

For units returning to active service, regardless of whether ABS has been informed previously that the vessel has been in lay-up, a Reactivation Survey is required.

15.3  **Units Operating in Fresh Water (2012)**
Where the lay-up preparations and procedures have been submitted to ABS for review and verified by Annual Lay-up Surveys, consideration may be given to deducting part or all of the time in lay-up from the progression of survey intervals.

When applying for deductions, Owners are to provide details of out of service intervals since last credited surveys. For drilling units operating in the Great Lakes, this does not include the normal winter lay-up months of January, February, and March.

*Note:* The above requirements apply to drilling units operating in fresh water such as in the Great Lakes, and Lake Maracaibo.

17  **Onboard Drawings and Manuals (2012)**

(2016) The following documents are to be available onboard at all times.

7-2-1/17.1 and 7-2-1/17.3 are applicable to all drilling units built under a contract, signed between the Builder and the Owner, on or after 1 January 2012.

7-2-1/17.5 is applicable to all drilling units built under a contract, signed between the Builder and the Owner, on or after 1 January 2016.
17.1 Documents Reviewed and Stamped by ABS Engineering (2014)

As a minimum, the following documents reviewed and stamped by ABS are to be available onboard the drilling unit for Surveyor’s verification and reference during survey after construction:

i) Operating Manual.

ii) Drawings indicating locations of all “Special”, “Primary” and “Secondary” application structures as defined in 3-1-4/5 of these Rules.

iii) Drawings indicating all Critical Structural Areas as defined in 7-2-1/3.7 of these Rules.

iv) Drawings showing all watertight boundaries and access/closing devices for such boundaries.

v) Drawings showing the Fire Protection Systems, clearly indicating all fire rated boundaries and access/closing arrangements for such boundaries, including location of fire dampers for ‘A’ class divisions.

vi) Drawings showing the Fire Extinguishing Systems, clearly indicating layout of all fixed and portable fire extinguishing systems. Minor changes to these drawings may be accepted and endorsed by the attending Surveyor, however the endorsed copy of the drawings are to be submitted to ABS engineering at earliest opportunity for record purposes.

vii) Drawings showing layout of all Hazardous Areas, clearly indicating layout of different class hazardous divisions together with access/closing/ventilation arrangements for such division boundaries, the arrangement of ventilation shutdown and alarms (referenced in 7-1-6/21.19 of these Rules), and a listing of Electrical Equipment in Hazardous Areas (referenced in 7-1-6/21.17 of these Rules).

viii) Drawings showing layout of the Emergency Shutdown Systems (referenced in 7-1-6/21.25 of these Rules).

ix) Where the drilling unit is classed with a notation affecting its Automation System (such as ACC or ACCU), Automation System Operating Manual.

x) Where the drilling unit is classed with a DPS notation, the Dynamic Positioning System (DPS) Manual and the Failure Modes and Effects Analysis (FMEA).

xi) Where the drilling unit is classed with a CDS notation, drawings showing layout of the Drilling Systems and associated Equipment, and a listing of all equipment and components of the classed drilling systems.

xii) Where the drilling unit is classed with optional HIMP Notation, the Owner’s Hull Inspection and Maintenance Program (HIMP) used for hull inspection and maintenance purposes is to be available onboard the drilling unit.

Minor changes to the drawings regarding fire protection systems, fire extinguishing systems, and listing of electrical equipment in hazardous areas, may be accepted by the attending Surveyor and revised documents endorsed to show Surveyor’s verification, however the endorsed copy of the drawings are to be submitted to ABS engineering at earliest opportunity for record purposes.

17.3 Documents Issued, Reviewed, and/or Endorsed by ABS Surveyor (2019)

As a minimum, the following documents endorsed by an ABS Surveyor are to be available onboard the drilling unit for Surveyor’s verification and reference during any survey after construction:

i) Certificate of Classification issued or endorsed by Surveyor reflecting the full class designation assigned to the drilling unit.

ii) Documents issued or endorsed by the Surveyor supporting any additional class notation, such as: CRC; UWILD, etc., applicable to the unit and reflected in the ABS Record.

iii) Construction Booklet reviewed and endorsed by the Surveyor.

iv) ABS Certificates issued by Surveyor for anchoring gear such as the anchors, chains and/or wires, and associated accessories (such as shackles, links, sockets, etc.) used for self-propelled drilling units or installed on units with the symbol.

v) ABS issued documents issued or endorsed supporting verification of mooring system equipment installed on units classed with the symbol.
vi)  Record of all Nondestructive Testing (NDT) of critical structural areas carried out during each Drydocking Survey (or UWILD) or Special Periodical Survey of the Hull, reviewed and endorsed by the Surveyor.

vii) List of all electrical equipment installed in hazardous areas reviewed and endorsed by the Surveyor.

17.5 Survey Planning Document (SPD) (2016)
All units built or have completed a major modification under a contract, signed between the builder and the owner, on or after 1 January 2016, are to have an ABS approved SPD available onboard the drilling unit for Surveyor’s verification and reference.

All existing drilling units, due for an UWILD (either intermediate or associated with SPS) on or after 1 January 2019, are to have an ABS approved SPD available onboard the drilling unit for Surveyor’s verification and reference.

19 Preparations for Safe Execution of Surveys (2014)
The Owner is to provide the necessary facilities for a safe execution of the surveys to be carried out by the attending Surveyor. Tanks and spaces are to be safe for access (i.e., gas freed, well ventilated, sufficiently illuminated, etc.).

19.1 Safe Access
For surveys, means are to be provided to enable the attending Surveyor to examine the hull structure in a safe and practical way. It is to be confirmed, as far as practicable, that means of access to all spaces are in good/sound and safe condition when examining internal and external spaces.

19.1.1 Internal Examination
For surveys inside ballast tanks, deep voids, or other type deep spaces one or more of the following means for access, acceptable to the attending Surveyor, is to be provided:

i)  Permanent staging and passages through structures;

ii) Temporary staging and passages through structures;

iii) Lifts and moveable platforms;

Note: Single person hoists/lifts are not acceptable means for access.

iv)  Boats or rafts; or

v)  Other equivalent means agreed by the attending Surveyor.

19.1.2 External Examination
For external examination of spaces and the unit’s overall structure one or more of the following means for access, acceptable to the attending Surveyor, is to be provided:

i)  Permanent staging;

ii) Temporary staging;

iii) Work basket operated by unit’s deck crane;

Note: Deck crane used for handling the work basket is to be either ABS classed (CRC) or accepted by ABS to be suitable for IMO MODU Code Certification of the drilling unit.

iv)  Work boats; or

v)  Other equivalent means agreed by the attending Surveyor.
19.3 Accessing Spaces at Sea

If internal examination of a space is necessary whilst the unit is located at sea, a suitable communication system is to be arranged between the survey party inside the space and the responsible Owner’s personnel outside the space being examined. This communication system is also to include the personnel in charge of ballast pump handling, especially if boats or rafts are used for internal examination.

Explosion-meter, oxygen-meter, breathing apparatus, life line and whistles are to be at hand during the entire survey period.

19.3.1 Examination by Boats or Rafts

When boats or rafts are used for internal or external examinations, appropriate life jackets are to be available for all persons onboard. Boats or rafts are to have satisfactory residual buoyancy and stability, even if one chamber is ruptured. A safety checklist is to be provided.

Surveys of tanks or applicable internal spaces by means of boats or rafts may only be undertaken with the agreement of the Surveyor, who is to take into account the safety arrangements provided, including weather forecasting and ship response under foreseeable conditions and provided the expected rise of water within the tank does not exceed 0.25 m and the water level is stationary.

Note: Reference is made to the IACS Recommendation 39 – Guidelines for use of Boats or Rafts for Close-up Surveys.

19.5 Housekeeping (Cleanliness)

In preparation for required surveys and to allow for a thorough examination by General Visual Inspection (GVI), Close Visual Inspection (CVI), Nondestructive Testing (NDT), or Gauging, all spaces are to be cleaned including removal from surfaces of all loose accumulated corrosion scale.

Spaces are to be sufficiently clean and free from water, scale, dirt, oil residues etc. to reveal corrosion, deformation, fractures, damages or other structural deterioration. However, those areas of structure whose renewal has already been decided by the Owner need only be cleaned and descaled to the extent necessary to determine the limits of the areas to be renewed.

19.7 Illumination and Ventilation

19.7.1 Illumination

Proper illumination is to be provided to enable safe entry, access and survey at all times. Spaces are to be sufficiently illuminated to also reveal corrosion, deformation, fractures, damages or other structural deterioration.

19.7.2 Ventilation

All spaces to be entered by the attending Surveyor is to be sufficiently ventilated in advance of survey and considered satisfactory for safe entry. All spaces are to have mechanical air ventilation supplied from and exhausted to non-hazardous areas.

Conditions for entry into confined spaces are to at least satisfy ABS safety standards and are to be to the satisfaction of the attending Surveyor.

19.9 Sea Trials and/or Stability Test (2016)

Where major modification is carried out, a sea trial/a lightweight survey/an inclining experiment may need to be carried out in presence of an ABS Surveyor. In such case, it cannot be commenced unless the Surveyor agrees with the owner that suitable safety precautions are taken onboard the drilling unit. This may include but not limited to the verification of following items by the attending Surveyor:

- Operational preparedness of any additional portable fire extinguishing placed onboard
- Posting of temporary fire control and safety plans to be used during the sea trial/lightweight survey/inclining experiment
- Satisfactory condition and installation of life saving appliances for the sea trial/lightweight survey/inclining experiment personnel, particularly if the number of personnel exceeds the drilling unit’s Persons On Board (POB) capacity
• “Abandon Unit Drill” with entire personnel
• “Fire Drill” with designated fire fighters

An exemption to any of the above is the responsibility of the Flag Administration and the Coastal State Authority. If an exemption is issued, the written exemption is to be made readily available to the attending Surveyor for evaluation.
PART 7

CHAPTER 2 Surveys After Construction

SECTION 2 Survey Intervals (2010)

1 Units – Unrestricted Service

The following requirements are to be followed on units for unrestricted service.

1.1 Annual Surveys

Annual Surveys are to be made within three months before or after of each annual anniversary date of the crediting of the previous Special Survey – Hull, or original construction date. For units on Continuous Survey, all Continuous Survey requirements for those parts (items) due are generally to be completed each year. The Annual Survey will not be credited and the Certificate of Classification will not be endorsed unless Continuous Survey items which are due or overdue at the time of the Annual Survey are either completed or granted an extension.

1.3 Special Periodical Surveys (2014)

A Special Periodical Survey is to be completed within five years after the date of build or after the crediting date of the previous Special Periodical Survey. The interval between Special Periodical Surveys may be reduced by ABS. If a Special Periodical Survey is not completed at one time, it will be credited as of the completion date of the survey, but not later than five years from date of build or from the date recorded for the previous Special Periodical Survey. If the Special Periodical Survey is completed prematurely but within three months prior to the due date, the Special Periodical Survey will be credited to agree with the effective due date.

Special consideration may be given to Special Periodical Survey requirements in the case of mobile offshore drilling units of unusual design, in lay-up or in unusual circumstances. ABS reserves the right to authorize extensions of Rule-required Special Periodical Surveys under extreme circumstances.

A Special Periodical Survey may be commenced at the fourth Annual Survey and be continued with a view to completion by the due date. In connection with the preparation for the Special Periodical Survey, thickness gaugings, as required for the forthcoming Special Periodical Survey, are to be taken to the extent accessible and practical in connection with the fourth Annual Survey.

Where the Special Periodical Survey is commenced prior to the fourth Annual Survey, the entire survey is normally to be completed within 15 months if such work is to be credited to the Special Periodical Survey.

1.5 Continuous Surveys (2017)

At the request of the Owner, and upon approval of the proposed arrangements, a system of Continuous Survey may be undertaken whereby the Special Periodical Survey requirements are carried out in regular rotation to complete all requirements of the particular Special Periodical Survey within a five-year period. The completion date will be recorded to agree with the original due date of the cycle. If the Continuous Survey is completed prematurely but within three months prior to the due date, the Special Periodical Survey will be credited to agree with the effective due date.

ABS reserves the right to authorize extensions of Rule-required Special Continuous Surveys under extreme circumstances.
Each part (item) surveyed becomes due again for survey approximately five years from the date of the survey. For Continuous Surveys, a suitable notation will be entered in the Record and the date of completion of the cycle published. If any defects are found during the survey, they are to be dealt with to the satisfaction of the Surveyor.

1.7 In-line Surveys (2012)
All items required to undergo Special Periodical Surveys, including but not limited to hull, machinery, and automation, are to be carried out at the same time and interval in order that they are recorded with the same crediting date. In cases where damage has necessitated extensive repairs and examination, the survey thereon may, where approved by ABS, be accepted as equivalent to Special Periodical Survey.

1.9 Drydocking Survey or Equivalent
For units operating in salt water, a minimum of two Drydocking Surveys are to be carried out in each five-year Special Survey period. One such examination is to be carried out in conjunction with the Special Survey – Hull. In all cases, the interval between any two Drydocking Surveys is not to exceed 36 months.

For units operating in salt water for less than six months each year, the maximum interval is not to exceed three years. For units operating in fresh water the interval between Drydocking Surveys is not to exceed five years.

Consideration may be given to special circumstances which may justify an extension of the interval. An underwater inspection by a diver may be required for such extensions.

1.9.1 Self-Elevating Drilling Units – Drydocking Survey Interval Exceeding 36 Months (2012)
Where a self-elevating drilling unit operating in salt water is unable to complete its Drydocking Survey within a 36 month period, at Owner’s specific request, the Drydocking Survey due date may be extended by ABS, provided the unit is attended for examination as required.

Where a self-elevating drilling unit operating in salt water is unable to complete its Drydocking Survey within a 60 month period and remained operating in the same drilling site without any rig move, the unit will be considered a site-specific self-elevating mobile offshore unit and required to comply with 3-2-2/7.13 of the ABS Rules for Building and Classing Offshore Installations.

1.11 Tail Shaft Surveys
1.11.1 Water-Lubricated Bearings in Fresh Water Exclusively
Survey interval is five (5) years.

1.11.2 Water-Lubricated Bearings in Fresh Water and Sea Water
  1.11.2(a) Single Screw. Survey interval is three (3) years.
  1.11.2(b) Multiple Screw. Survey interval is five (5) years.
  1.11.2(c) Continuous Liner or Equivalent. Survey interval of five (5) years provided:
    i) The tail shaft is protected by a continuous metallic liner, or continuous cladding per 4-3-2/5.17.5 of the Steel Vessel Rules or fiberglass reinforced plastic coating between liners installed according to approved procedure per 4-3-2/5.17.4 of the Steel Vessel Rules which effectively prevents seawater from contacting the steel shaft, or which have shafts of corrosion-resistant materials.
    ii) In addition to the propeller hub details given in the 4-3-2/Figure 1 of the Steel Vessel Rules, the design includes other features that would further reduce stress concentration in the propeller assembly.

1.11.3 Oil-Lubricated Bearings
Survey interval is five (5) years.
1.11.4 Extensions – Water-Lubricated Bearings

1.11.4(a) Extension up to Three (3) Months. An extension up to three (3) months may be granted by the Surveyor, when requested by the Owner, provided a survey is carried out in accordance with 7-5-1/5.1.1 of the ABS Rules for Survey After Construction (Part 7).

1.11.4(b) Extension up to One (1) Year. An extension up to one (1) year may be granted by the Surveyor, when requested by the Owner, provided a survey is carried out in accordance with 7-5-1/5.1.2 of the ABS Rules for Survey After Construction (Part 7).

1.11.5 Extensions – Oil-Lubricated Bearings

1.11.5(a) Extension up to Three (3) Months. An extension up to three (3) months may be granted by the Surveyor, when requested by the Owner, provided a survey is carried out in accordance with 7-5-1/5.3.1 of the ABS Rules for Survey After Construction (Part 7).

1.11.5(b) Extension up to One (1) Year. An extension up to one (1) year may be granted by the Surveyor, when requested by the Owner, provided a survey is carried out in accordance with 7-5-1/5.3.2 of the ABS Rules for Survey After Construction (Part 7). An additional extension up to one (1) year may be considered, when requested by the Owner, provided a survey is carried out at the end of the first extension period, in accordance with 7-5-1/5.3.2 of the ABS Rules for Survey After Construction (Part 7). No more than two (2) extensions may be granted.

1.11.5(c) Extensions not Exceeding Five (5) Years. In lieu of 7-2-2/1.11.4(b), an extension not exceeding five (5) years may be granted by the Surveyor, when requested by the Owner, provided a survey is carried out at the fifth year, in accordance with 7-5-1/5.3.3 of the ABS Rules for Survey After Construction (Part 7). Consideration may be given to an additional extension not exceeding five (5) years when requested by the Owner, provided a survey is carried out at the fifth year after the first extension, in accordance with 7-5-1/5.3.3 of the ABS Rules for Survey After Construction (Part 7). No more than two (2) extensions may be granted.

1.13 Auxiliary Boiler Surveys

Waste-heat or fired auxiliary boilers intended for working pressures above 3.4 bar (3.5 kgf/cm², 50 psi), a minimum of two surveys are to be carried out during each 5-year Special Periodical Survey period. One such survey is to be carried out in conjunction with the Special Periodical Survey. In all cases, the interval between any two such surveys is not to exceed 36 months.

An extension of the survey up to three (3) months may be granted by the Surveyor in exceptional circumstances*, provided a survey is carried out in accordance with 7-7-1/11 of the ABS Rules for Survey After Construction (Part 7).

In addition, annual examinations are to be carried out in accordance with 7-7-1/13 of the ABS Rules for Survey After Construction (Part 7).

For units on continuous survey of hull, the two surveys are to be carried out during each 5-year cycle and may be aligned with the dry dock survey dates as long as the interval between surveys does not exceed 36 months.

* Note: “Exceptional circumstances” means, e.g., unavailability of repair facilities, unavailability of essential materials, equipment or spare parts, or delays incurred by action taken to avoid severe weather conditions.

3 Units Operating in Fresh Water (2012)

Applicable requirements of Section 7-2-2 of the ABS Rules for Survey After Construction (Part 7) are to be followed on units operating in fresh water such as the Great Lakes, and Lake Maracaibo.
PART 7

CHAPTER 2 Surveys After Construction

SECTION 3 Survey Pre-Planning (2012)

1 Drydocking Surveys and Special Surveys

Plans and procedures for Drydocking (or UWILD) and Special Surveys are to be made available onboard for the purpose of carrying out an on-board pre-planning of the survey with the Surveyor.

1.1 Plan for UWILD (2019)

Owner’s plan for the UWILD is to be reviewed by the attending Surveyor before the survey commences and same is to be discussed during the pre-planning meeting held onboard.

1.3 Plan for Out-of-Water Drydocking and Special Periodical Survey

Owner’s plan for the Out-of-Water Drydocking Surveys or Special Periodical Survey is to be reviewed and agreed upon by the attending Surveyor before the survey commences and same is to be discussed during the pre-planning meeting held onboard.


A Survey Planning Document (SPD), as required by 7-2-1/17.5, is intended to confirm the records kept to date in accordance with 7-2-5/1.5.1 and to verify that no changes have been made to drilling unit’s critical structural areas, and to stipulate the minimum extent, location and means of close visual inspection, extent and type of NDT, and thickness measurements, as required.

The SPD is to be prepared by the owner and to be made available to the attending Surveyor, for review and agreement, well in advance of the survey. Contents of the SPD normally cover all typical Special Surveys and Drydocking Surveys to be carried out throughout every five-year classification cycle of the vessel.

SPDs are to contain a list of all areas that require General Visual Inspection (GVI), Close Visual Inspection (CVI), Nondestructive Testing (NDT), and/or Gauging.

The SPD should typically contain at least the following information, as applicable:

- Main particulars
- Plans to include details of major brace and column connections on column-stabilized units and details of leg and leg-to-spudcan connections
- Jackhouse/jackcase-to-deck connections, on self-elevating units
- Detailed information on NDT methods and locations
- List of tanks with information on use, protection and condition of coating
- Corrosion risk of tank and other major structural members
- Design risk nomination of major structure
- Method and extent of cleaning inspection points
- Nomination of areas of structure for thickness measurement
- Nomination of critical structural areas for close-up surveys and NDT.
- For Rig/Unit designs that meet the 2008 and newer MODU Rules for spud can design:
  - Designated area of leg to can connections that require examination
1.7 Critical Structural Areas

The basis for nomination of the critical structural areas is an assessment in consideration of possible deterioration and designated fatigue prone areas where the following elements on a particular unit are taken into account:

- Design feature with relatively low fatigue life
- Former history available at Owner’s or ABS offices with respect to corrosion, cracking, buckling, indents and repairs for the particular unit as well as similar units
- Unit’s service history since last survey (e.g., area of operation, environmental data, water depth, air gap for SEDU’s, length of time at each location etc.)

The degree of criticality should be judged and decided on the basis of recognized principles and practice, and the unit’s structural fatigue analyses if deemed necessary. ABS reviewed drawing showing all applicable critical structural areas is to be available onboard, referenced during the pre-planning meeting and used during applicable visual examination and NDT.
PART 7

CHAPTER 2 Surveys After Construction

SECTION 4 Annual Surveys

1 Annual Survey – Hull

1.1 All Types of Mobile Offshore Drilling Units

At each Annual Survey – Hull, the exposed parts of the hull, the deck, deckhouses, structures attached to the deck, derrick substructure, including supporting structure, accessible internal spaces, and the applicable parts listed in 7-2-4/1.1.1 through 7-2-4/1.1.16 below are to be generally examined and placed in satisfactory condition as found necessary and reported upon.

1.1.1 Openings in Freeboard Deck and Enclosed Superstructure Decks

Hatchways, manholes, and other openings in the freeboard deck (bulkhead deck) and enclosed superstructure decks.

Machinery casings and covers, companionways, and deckhouses protecting openings in freeboard or enclosed-superstructure decks.

1.1.2 Openings below the Freeboard Deck and Enclosed Superstructures

Portlights together with deadcovers, cargo ports, bow or stern entries, chutes, and similar openings in hull sides or ends, below the freeboard deck or in way of enclosed superstructures.

1.1.3 Ventilators, Vent Pipes Overboard Discharges on or below Freeboard Deck

Ventilators, tank vent pipes together with flame screens, and overboard discharges from enclosed spaces on or below the freeboard deck.

1.1.4 Bulkheads of Enclosed Superstructures

Watertight bulkheads and end bulkheads of enclosed superstructures.

1.1.5 Closing Appliances (2017)

Closing appliances for all of the above, including hatch covers, doors, check valves together with their respective securing devices, dogs, sills, coaming, and supports.

Ventilators including closing devices where fitted, air pipes together with flame screens and weld connections to deck plating. All air pipe “closure devices” installed on the exposed decks are to be externally examined, randomly opened out and their condition verified. Scuppers, inlets and overboard discharges are to be externally examined as accessible including their attachment to shell and valves.

1.1.6 Freeing Ports

Freeing ports together with bars, shutters, and hinges.

1.1.7 Protection of Crew, Guard Rails, Lifelines, Gangways, and Deckhouses

Protection of the crew, guard rails, lifelines, gangways, and deckhouses accommodating crew.
1.1.8 Fire Dampers (2017)
Fire dampers are to be made available for internal examination. Where a fire damper is located within a ventilation coaming and cannot be examined by other means, an inspection port or opening at least 150 mm (6 in.) in diameter is to be provided in the coaming to facilitate survey of the damper without disassembling the coaming or the ventilator. The closure provided for the inspection port or opening is to maintain structural integrity of the coaming and, if appropriate, the fire integrity of the coaming.

1.1.9 Suspect Areas
Suspect areas of the hull are to be overall examined and gauged as considered necessary.

Suspect areas identified at a previous survey and which are readily accessible are to be subject to overall examination and Close-up Survey. Similarly, any areas of Substantial Corrosion identified at previous surveys and which are readily accessible are to have thickness measurements taken.

1.1.10 Corrosion
Where extensive areas of corrosion are found or when considered necessary by the Surveyor, thickness measurements are to be carried out and renewals and/or repairs made when wastage exceeds allowable margins.

Where Substantial Corrosion is found, additional thickness measurements are to be taken to confirm the extent of substantial corrosion. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

1.1.11 Corrosion Control Systems (2017)
At each Annual Survey – Hull, the Surveyors are to be satisfied that the type, location and extent of the corrosion control system as well as its continuous effectiveness is in satisfactory condition. Repairs or renewals should be reported on at each survey. Particular attention is to be given to corrosion control systems in ballast tanks, free-flooding areas and other locations subjected to sea water from both sides.

1.1.11(a) Preload, and Ballast Tanks

i) Vessels over 5 Years of Age. Examination of the following tanks is to be carried out.

a) Preload, and ballast tanks other than pontoon and column tanks, that are not accessible while in operation, and where the following conditions have been identified at previous surveys.
   - A hard protective coating was found in POOR condition, or
   - A soft or semi-hard coating has been applied, or
   - A hard protective coating has not been applied from the time of construction.

b) Pontoon and column ballast tanks where substantial corrosion was found within the tank, and the following conditions have been identified at previous surveys.
   - A hard protective coating was found in POOR condition, or
   - A soft or semi-hard coating has been applied, or
   - A hard protective coating has not been applied from the time of construction.

ii) Vessels over 15 Years of Age. In addition to the requirements of i) above, tanks other than pontoon and column tanks where FAIR coating conditions were identified at previous surveys, a minimum of three, are also to be examined.

Where extensive areas of corrosion are found or when considered necessary by the Surveyor, thickness measurements are to be carried out and renewals and/or repairs are to be made when wastage exceeds allowable margins.
Where substantial corrosion is found, additional thickness measurements in accordance with Appendix 7-A-4 of the ABS Rules for Survey After Construction (Part 7) are to be taken to confirm the extent of substantial corrosion. These extended thickness measurements are to be carried out before the survey is credited as completed.

Where reduced scantlings on the basis of effective corrosion control have been adopted, the results of any measurements are to be evaluated based on the scantlings before reduction.

1.1.11(b) Performance Standards for Protective Coatings (PSPC) (2012). For units with optional class notation CPS, survey after construction are to comply with Section 6 of the ABS Guide for the Class Notation Coating Performance Standard (CPS). See 7-1-2/13.1.

1.1.12 Alterations and Position of Load Lines
At each Annual Survey – Hull, the Surveyors are to be satisfied that no material alterations have been made to the unit, its structural arrangements, subdivision, superstructure, fittings and closing appliances upon which the load line assignment is based.

1.1.13 Construction Booklet (Construction Portfolio) (2012)
ABS reviewed and stamped Construction Booklet is to be available onboard the drilling unit for Surveyor’s verification.

ABS reviewed and stamped Operating Manual is to be available onboard the drilling unit for Surveyor’s verification.

1.1.15 HIMP Notation (2018)
Surveys of units with HIMP Notation are to be conducted in accordance with the ABS Guide for Hull Inspection and Maintenance Program.

1.1.16 Onboard Computers for Stability Calculations (2014)
This Subparagraph is applicable to Mobile Offshore Drilling Units that were contracted for construction on or after 1 July 2005 that have Stability Computers onboard the unit. This Subparagraph is not applicable to Drilling units that were fabricated prior to 1 July 2005 or to those that do not have Stability Computers.

If an onboard computer is used for stability calculations, satisfactory operation of the software with the onboard computer(s) for stability calculations is to be verified in presence of the Surveyor.

Satisfactory functional requirements (see 7-1-A2/3) are to be confirmed by the Surveyor.

A copy of the approved test conditions and the operation manual (see 7-1-A2/5) for the computer/software are to be available onboard.

1.1.16(a) Testing. It is the responsibility of the drilling unit’s master to check the accuracy of the onboard computer for stability calculations at each Annual Survey by applying at least one approved test condition.

The testing is to be carried out to verify initial installation testing conditions.

If the Surveyor is not present for the computer check, a copy of the test condition results obtained by the computer check is to be retained onboard as documentation of satisfactory testing for the Surveyor’s verification.

For further details, see Appendix 7-1-A2.

1.3 Surface-Type Units (2012)
On Surface-Type Units, in addition to the requirements of 7-2-4/1.1, following areas are to be examined.

- The hull and deck structure around the drilling well (moon pool) and in vicinity of any other structural changes in section, slots, steps or openings in the deck or hull.
- The back-up structure in way of structural members or sponsons connecting to the hull.
1.5 **Column-Stabilized Units (2012)**

On Column Stabilized Units, in addition to the requirements of 7-2-4/1.1, following areas are to be examined.

- Columns, diagonals and other parts of the upper columns, diagonals and other parts of the upper hull supporting structure as accessible above the waterline.
- The upper hull structure around the drilling well (moon pool) and in vicinity of any other structural changes-in section, slots, steps or openings in the upper hull structure.

1.7 **Self-Elevating Units (2012)**

On Self-Elevating Units, in addition to the requirements of 7-2-4/1.1, following areas are to be examined.

- Jackhouse structures and attachment to upper hull or platform.
- Jacking or other elevating systems and leg guides, externally.
- Legs as accessible above the waterline.
- Plating and supporting structure in way of leg wells.

3 **Annual Survey – Machinery and Electrical Systems (2016)**

At each Annual Survey – Machinery and Electrical Systems, the entire installation is to be generally examined so far as can be seen and placed in satisfactory condition. The survey is also to include the following items, as applicable.

3.1 **Non-Self-Propelled Units (2017)**

On non-self-propelled units, a general examination is to be made of items required for classification such as auxiliary machinery, pumps, piping, electrical installations, including those in hazardous areas, and fire-extinguishing apparatus as outlined in Part 5, Chapter 2 of these Rules. Fire mains are to undergo satisfactory pressure testing. Watertight and fire-rated cable penetrations in decks and bulkheads are to be generally examined for alterations and continued effectiveness.

3.3 **Self-Propelled Units (1996)**

On self-propelled units, a general examination in accordance with Section 7-6-2 of the ABS Rules for Survey After Construction (Part 7) should be made of engines, boilers, steering machinery, windlass, auxiliary machinery, pumps, piping, electrical installations, including those in hazardous areas, and fire-extinguishing apparatus required for classification as outlined in Part 5, Chapter 2 of these Rules.

3.4 **Drilling Units (2018)**

Air intake shut off arrangements for internal combustion engines are to be generally examined for compliance with the Rules. The examination is to take into account the Owner’s test plan and maintenance regime. If any testing is deemed necessary by the Surveyor, it is to be performed in accordance with the Owner’s test method.

3.5 **Examination during Overhaul (2010)**

On all occasions of overhaul or adjustment, access is to be provided for the Surveyor to examine the parts opened. In the event of defects being discovered, such other parts as may be considered necessary are to be opened and examined.

3.7 **Examination at Shorter Intervals (2012)**

If it is found desirable, upon examination, that any part of the machinery should be examined at shorter intervals than specified, it will be necessary for Owners to comply with ABS requirements in this respect.
5 Annual Survey – Preventative Maintenance Program (PMP) (2016)

Where the unit has enrolled into ABS Preventative Maintenance Program (PMP) and satisfactorily completed its implementation survey, and maintains the optional PMP additional notation, equipment or machinery covered under the PMP are to be surveyed on the basis of Appendix 7-2-A4 “Preventative Maintenance Program”.

7 Annual Survey – Thrusters for APS or PAS Notations (2016)

Where the unit maintains the optional APS or PAS notations, thrusters are to be surveyed on the basis of “Survey Requirements for Additional Systems and Services” in accordance with the requirements of Section 7-9-6 of the ABS Rules for Survey After Construction (Part 7).

Note: The APS notation signifies that the self-propelled vessel is fitted with athwartship thrusters intended to assist in the maneuvering of the vessel. The PAS notation signifies that the non-self-propelled vessel is fitted with thrusters intended to assist in maneuvering or propelling while under tow.

7.1 Thruster System (APS or PAS)

At each Annual Survey, thruster system associated with vessel’s APS or PAS notations are to be generally examined, so far as can be seen, and placed in satisfactory condition. The survey is also to include the following items, as applicable:

7.1.1 Thruster Controls and Alarms

Verification of effective means of control from both the Navigation Bridge and local control stations, including alarms and indicators. The following audible and visual alarms at each control station are to be visually examined, verified operational and considered satisfactory, as applicable:

i) Engine low lubricating oil pressure
ii) Engine coolant high temperature
iii) Motor overload
iv) Thruster RPM
v) Thrust direction (azimuthing type)
vi) Thruster power supply failure
vii) Controllable pitch propellers hydraulic low oil pressure
viii) Controllable pitch propellers hydraulic high oil pressure
ix) Controllable pitch propellers hydraulic oil high temperature
x) Fire extinguishing systems

7.1.2 Thruster Room Communication

Means of voice communication between the bridge control station, main propulsion control station and the thruster room are to be tested and found satisfactory.

7.1.3 Thruster Room Arrangement

Thruster room arrangements, including adequate ventilation, bilge system and alarms for enclosed modules and firefighting systems are to be examined, tested and considered satisfactory.


(2017) On drilling units built under a contract, signed between the Builder and the Owner, on or after 1 January 2016, if the unit maintains any one of the optional DPS notation, the thrusters designated for propulsion and dynamic positioning may be enrolled into ABS Preventative Maintenance Program (PMP). In such cases, thrusters are to be approved either under the Condition Monitoring (CM) plan or Reliability Centered Maintenance (RCM).
Enrollment into ABS PMP and associated Annual Confirmation Survey is to be in accordance with applicable Subsections of Appendix 7-2-A4.

In cases where testing may interfere with vessel operations, the Annual Survey of the DP System may be credited with an outstanding to complete the remaining testing with an ABS Surveyor present at the next rig move, but not later than the next Annual Survey. This can only be done based on the Surveyor witnessing satisfactory operation of the DP System and review of the DP records.

At each Annual Survey of thrusters and Dynamic Positioning System (DPS), respective system and associated machinery are to be generally examined, so far as can be seen, and placed in satisfactory condition. The survey is also to include the following items, as applicable.

### 9.1 Units classed with DPS-0, DPS-1, DPS-2, DPS-3 Notations (2019)

In addition to the requirements for PAS and APS at each Annual Survey, the thrusters are to be generally examined so far as can be seen and placed in satisfactory condition. This survey is to be in accordance with 7-2-4/7.1 and also to include following, as applicable:

#### 9.1.1 Documentation

The following accepted documents are to be confirmed onboard the vessel as applicable:

i) DP FMEA

ii) DP Trial Test Procedures/Results of Trials

iii) DP Operations Manual

iv) ESD Operations Manual

#### 9.1.2 Operation of DPS

The vessel is to be operated for duration of at least two hours to demonstrate that the dynamic positioning system has been maintained properly and is in good working order. The operational testing is to be carried out to the Surveyor’s satisfaction. The tests are to demonstrate the level of redundancy established by the FMEA (Failure Modes and Effects Analysis, see Subsection 2/11 of the ABS Guide for Dynamic Positioning Systems). The unit’s operational configuration (e.g. piping configurations, closed or open bus) is to be verified that it is included in the DP Operations Manual. Special consideration may be given, subject to the discretion of the Surveyor, when sufficient test reports are in place demonstrating that the vessel has been engaged in a DP testing program.

In addition, the following items are to be generally examined so far as can be seen and placed in satisfactory condition.

#### 9.1.3 DPS Controls and Alarms

Control system, including independent emergency shut-down facility for each thruster at the main dynamic positioning control station, position keeping redundancy, and alarms and instrumentation are to be generally examined and confirmed to be functioning satisfactorily.

#### 9.1.4 Position and Environment Sensors

All available position sensors, wind sensors(s) and gyro-compass(s) are to be generally examined and confirmed to be functioning satisfactorily.

#### 9.1.5 Vessels Classed with DPS-1 Notation

Completion of all items for DPS-1 Notation.

The operation of the automatic control system and a manual position control system including manual transfer of control between the two systems is to be confirmed to be functioning satisfactorily.

i) Verification that any DP system hardware changes that may affect the DP Class Notation for the unit have been submitted, approved, and tested as required.

ii) Confirmation that any software revisions since the time of last Survey have been tracked and tested as appropriate by Owner and suitably documented for record.
iii) Any hardware or software changes that have not been tested since the last performance test are to have functionality proven and recorded by a supplementary trials program to verify the effect of the modifications with regard to the approved redundancy arrangements for the unit.

9.1.6 Vessels Classed with DPS-2 Notation

Completion of all items for DPS-1 Notation.

The operation of two automatic control systems and a manual position control system including automatic transfer of one automatic control system to another upon failure is to be confirmed to be functioning satisfactorily. Upon failure of the two automatic control systems, it is to be verified that the manual position control is possible.

Additionally, the following to be confirmed/tested:

i) General System

- Black out recovery test is to be conducted.
- The following redundant equipment is to be disabled or disconnected in order to demonstrate operational capability after such simulated failure/condition:
  - Position reference systems
  - Worse case failure (e.g., switchboard, transformer, engine, or thruster as applicable)
  - Network arrangements
- Demonstration of open bus power management systems.
- Demonstration of closed bus power management systems where such closed bus arrangements have been reviewed and accepted/approved by the Bureau.

ii) Standby and Power Redundancy

- Test thruster supply and generator feeder automatic transfer switches
- The tests are to exercise the changeover functions as well as the redundant supplies.
- The standby and power redundancy tests may be combined with the tests of the Worst Case Failure Design Intent identified in the DP FMEA. Changeover to the standby DP Control Station is to be tested.
- Changeover to standby auxiliary services, such as seawater or freshwater cooling pumps and hydraulic pumps, is to be tested where these auxiliaries provide essential redundancy as identified in the DP FMEA.
- Test the switchover and isolation of redundant DC power supplies, such as in control power circuits. Where one DC power supply is failed or removed, voltage or current from the redundant DC power supply or any other source should not be present at the failed power supply.

9.1.7 Vessels Classed with DPS-3 Notation

Completion of all items for DPS-2 Notation.

The operation of three automatic control systems and a manual position control system including automatic transfer of one automatic control system to another upon failure is to be confirmed to be functioning satisfactorily. Manual transfer of control is to be verified possible at the third automatic control system located in the emergency back-up control station. Upon failure of the automatic control systems, it is to be verified that the manual position control is possible.

Additionally, the following are to be confirmed/tested:

i) The following redundant compartments are to be disabled or disconnected in order to prove operational capability after failure
ii) Main Control station

iii) Worst case failure compartment (e.g., engine room, switchgear room, thruster room, or other space)

iv) Verification that no changes have been made to the watertight integrity and fire subdivisions of compartments containing elements of the DP and associated systems.

9.1.8 Manual Position Control System for DPS-1, DPS-2, and DPS-3 Notations
The operation of the manual position control system using one joystick on the Navigation Bridge or DP control station in accordance with Subsection 5/7 of the ABS Guide for Dynamic Positioning Systems and supplemented by an automatic heading control is to be confirmed to be functioning satisfactorily.

9.1.9 Manual Thruster Control System
In addition to above requirements of 7-2-4/9.1.1 through 7-2-4/9.1.7, satisfactory operation of the manual thruster control system using individual levers on the navigation bridge or DP control station in accordance with 4/9.5 of the ABS Guide for Dynamic Positioning Systems is to be confirmed.

9.1.10 DPS Alarms and Instrumentation
The audible and visual alarms, including indicators at each control station, are to be examined, verified operational and confirmed to be functioning satisfactorily. For listing of alarms and instrumentation, see 7-2-4/Tables 1 through 4.

9.1.11 Uninterruptible Power Systems (UPS) for DPS
UPS is to be operated and confirmed to be functioning satisfactorily. UPS is to be operated without the normal main power input for 30 minutes to confirm that the batteries are capable of supplying the output power and are in satisfactory condition. The schedule of batteries is to be examined to verify that the batteries have been maintained. See 7-6-2/1.1.8 of the ABS Rules for Survey After Construction (Part 7).

9.1.12 DPS Communication
A means of voice communication between the DP control position (Navigation Bridge), and the thruster room(s) is to be tested and confirmed to be functioning satisfactorily.

A means of voice communication between the DP control position (Navigation Bridge), the engine control position and any operational control centers associated with DP is to be tested and confirmed to be functioning satisfactorily.

Note: No back up required.

9.1.13 Operations Manual and Positioning System
i) DPS operations manual is to be confirmed being onboard and readily available. The manual is to be up to date with any modifications performed on the vessel’s DPS installation.

ii) It is to be verified that the failure modes and effects of any modifications or upgrades have been considered and incorporated in the DPS operations manual.

iii) Fail Safe Tests for Thrusters. A single fault in the thruster system is to be such that a thruster fails to a safe mode so that the vessel’s position and heading are not affected. Fail to a safe mode could be a failure to zero thrust or motor stop.

11 Annual Survey – ABS Additional Notations (1 July 2018)
For Annual Survey requirements for Additional Notations not specified in the ABS Rules for Building and Classing Mobile Offshore Drilling Units, refer to Chapter 9 of the ABS Rules for Survey After Construction (Part 7) or the applicable ABS Guide.
### TABLE 1
**Thruster Power System (2016)**

<table>
<thead>
<tr>
<th>Alarm or Instrument</th>
<th>Alarm</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine lubricating oil pressure — low</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Engine coolant temperature — high</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>CPP hydraulic oil pressure — low and high</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>CPP hydraulic oil temperature — high</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>CPP pitch</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Thruster RPM</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Thruster direction</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Thruster motor/semiconductor converter coolant leakage</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Thruster motor/semiconductor converter temperature</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Thrust motor short circuit</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Thruster motor exciter power available</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Thruster motor supply power available</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Thruster motor overload</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Thruster motor high temperature</td>
<td>X</td>
<td>-</td>
</tr>
</tbody>
</table>

### TABLE 2
**Power Distribution System (2016)**

<table>
<thead>
<tr>
<th>Alarm or Instrument</th>
<th>Alarm</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status of automatically controlled circuit breakers</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Bus bar current and power levels</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>High power consumers – current levels</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

### TABLE 3
**System Performance (2016)**

<table>
<thead>
<tr>
<th>Alarm or Instrument</th>
<th>Alarm</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excursion outside operating envelope</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Control system fault</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Position sensor fault</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Vessel target and present position and heading</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Wind speed and direction</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Selected reference system</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

### TABLE 4
**Additional Alarms and Instruments for DPS-2 and DPS-3 (2016)**

<table>
<thead>
<tr>
<th>Alarm or Instrument</th>
<th>Alarm</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thruster location (pictorial)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Percentage thrust</td>
<td>--</td>
<td>X</td>
</tr>
<tr>
<td>Available thrusters on stand-by</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>DP alert through consequence analyzer</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Position information of individual position reference systems connected</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>
PART 7

CHAPTER 2  Surveys After Construction

SECTION 5  Special Periodical Surveys

1  All Types of Units – Special Periodical Survey – Hull (2014)

Special Periodical Survey – Hull is to include compliance with the Annual Survey and Drydocking Survey requirements and, in addition, the following requirements as listed below are to be carried out, as applicable, the parts examined by General Visual Inspection (GVI), placed in satisfactory condition and reported upon. Close Visual Inspection (CVI) and/or Nondestructive Testing (NDT) may be required of suspect areas and critical structural areas, particularly those that are located in way of special or primary application structures.

Requirements contained in 7-2-5/1.1 through 7-2-5/1.11 apply to all types of mobile offshore drilling units. Subsequent Subsections 7-2-5/3 through 7-2-5/7 are additional requirements of Special Periodical Survey, as applicable to unit types.

1.1  General Visual Inspection (GVI)

1.1.1  External and Internal Examination

The hull or platform structure, including tanks, watertight bulkheads and decks, cofferdams, void spaces, sponsons, chain lockers, duct keels, helicopter pad, machinery spaces, peak spaces, steering gear spaces, and all other internal spaces, are to be subjected to General Visual Inspection (GVI) externally and internally for damage, fractures or excessive wastage. Thickness gauging of plating and framing may be required where wastage is evident or suspected.

1.1.2  Examination for Excessive Wastage or Damage

External and internal condition of all tanks, compartments and free-flooding spaces throughout the drilling unit are to be subjected to GVI and found or placed to be free of excess wastage or damage.

1.1.3  Watertight Integrity

Watertight integrity of tanks, bulkheads, hull, bulkhead deck and other compartments is to be verified by GVI. Suspect areas may be required to be subjected to CVI, tested for tightness, nondestructive tested or thickness gauged. Tanks and other normally-closed compartments are to be ventilated, gas-freed and cleaned as necessary to expose damage and allow for a meaningful examination for excessive wastage.

1.1.4  Waiving Internal Examination and Testing

Internal examination and testing of void spaces, compartments filled with foam or corrosion inhibitors, and tanks used only for lube oil, light fuel oil, diesel oil or other noncorrosive products may be waived, provided that upon a general examination, the Surveyor considers their condition to be satisfactory.

1.1.5  Hull Attachments (1 July 2019)

Hull attachments, as applicable, are to be examined by GVI. To supplement the GVI, CVI and/or NDT may be required if deemed necessary by the attending Surveyor.

i)  Hull Attachments of Anchoring and Mooring System. Attachments of anchor racks, anchor cable fairleads, and anchor windlasses are to be examined. For drilling units with P-PL, M-PL, TAM, TAM (Manual), TAM-R, TAM-PL, TAM-PL(Manual),  or Class Symbols and when required by 3-4-1/3.3, the anchors, chains, and cables and their respective handling means are to be examined. For a mooring system with P-PL, M-PL, TAM-PL, or TAM-PL(Manual) Notation, survey of the pre-laid mooring is not required.
ii) **Hull Attachments of Drilling Apparatus.** Foundations and supporting headers, brackets and stiffeners for drilling-related apparatus, where attached to hull, deck, superstructure or deck house.

iii) **Hull Attachments of other Structures.** Structures such as derrick substructure and supporting structure, skid-base structure, jackhouses, pipe racks, deck houses, superstructures, helicopter landing areas, raw water (seawater intake) towers and their respective attachments to the deck or hull.

1.1.6 Examination of Underwater Parts

Survey of parts of the unit which are underwater and inaccessible to the Surveyor may be accepted on the basis of an examination by a qualified diver carried out in the presence of the Surveyor. Video or photo records, nondestructive testing and thickness gauging may be required in addition to the diver’s report. Refer to 7-2-6/3 of these Rules.

Where inspection of underwater joints is required, sufficient cleaning is to be carried out in way, and water clarity to be adequate, to permit meaningful visual, video, camera or NDT examination, as required. Every effort should be made to avoid cleaning damage to special coatings.

1.1.7 Anchor and Mooring Chain Cable (1 July 2019)

In addition to the requirements of 7-2-5/1.1.5i), at the first Special Periodical Survey and subsequent Special Surveys the following is to be performed:

i) For MODUs with P-PL, M-PL, TAM, TAM (Manual), TAM-R, TAM-PL, TAM-PL(Manual), or Class Symbols for Position Mooring; the Anchor and Mooring Chains are to be examined and measured in accordance with the latest edition of API RP 2I for the In-service Inspection of Mooring Hardware and Floating Structure. For a mooring system with P-PL, M-PL, TAM-PL, or TAM-PL(Manual) Notation, survey of the pre-laid mooring is not required.

ii) For MODUs with the Class Symbols and when required by 3-4-1/3.3, the Temporary Mooring Systems they are to be examined in accordance with 7-3-2/5.1.4 of the ABS Rules for Survey After Construction (Part 7).

1.1.8 Airpipes (2017)

All airpipes are to be opened out and closing arrangements and flame screens, if fitted, are to be examined both externally and internally. For designs where the inner parts cannot be properly examined from outside, this is to include removal of the head from the air pipe. Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanized steel.

1.1.9 Thruster Assisted System (1 July 2019)

In addition to the requirements in 7-2-5/1.1, where the unit maintains the optional notations of TAM, TAM(Manual), TAM-R, TAM-PL, or TAM-PL(Manual), the thruster assisted (TA) systems are to be surveyed based on following:

i) TAM(Manual), TAM-PL(Manual): Based on survey for DPS-0

ii) TAM, TAM-PL: Based on survey for DPS-1

iii) TAM-R: Based on survey for DPS-2

In cases where testing may interfere with operations, verification of all different operational modes may not be practicable. Operational status of the unit may then be taken into consideration. When any operational mode is not witnessed by the Surveyor, the TA system records are to be examined. The Surveyor is to review the TA system records and examine the performance of the systems throughout the period since the last survey to establish if there has been any abnormal functioning or failures and what corrective measures had been taken to preclude their recurrence.
1.3 **Close Visual Inspection (CVI)**

Where examination by GVI indicates suspect areas, corrosion in way of special or primary application structures, or corrosion in way of critical structural areas, additional examination by CVI is to be carried out.

Areas that were required to be examined by CVI because of indication of suspect areas, corrosion in way of special or primary application structures, or corrosion in way of critical structural areas, are to be scheduled for re-examination by CVI during Special Periodical Survey – Hull No. 2.

1.5 **Nondestructive Testing (NDT)** *(2016)*

Areas subjected to CVI may also be subjected to NDT to the extent deemed necessary by the attending Surveyor.

In general, surface type NDT techniques are to be carried out for examination of welds. NDT by Magnetic Particle Inspection (MPI), Penetrant Testing (PT), Eddy Current (EC) or Alternating Current Field Measurement (ACFM) is to be carried out to the satisfaction of the Surveyor.

Where surface NDT shows unacceptable indications in way of the welds examined, additional volumetric NDT by Ultrasonic Testing (UT) may be carried out to the satisfaction of the Surveyor.

The accuracy of the NDT equipment is to be proven to the attending Surveyor, as required.

NDT is to be carried out by a qualified technician.

The required NDT is to be witnessed by a Surveyor. The Surveyor is to be onboard to the extent necessary to control the process. Where NDT is carried out in-water, the qualified diver is to be employed by a diving firm certified by ABS and listed as “Recognized Specialists” in ABS records.

The NDT firm’s representative is to be part of the survey planning meeting to be held prior to commencing the survey.

In any kind of survey (i.e., Special Periodical, Intermediate, Annual or other surveys having the scope of the foregoing ones), NDT of structures in areas where CVI is required are to be carried out simultaneously with CVI.

Where CVI and NDT are carried out in-water, proper two-way audio and video communication lines are to be established and maintained, throughout the entire in-water inspection period, between the specialized technician(s) and the attending Surveyor.

Results of NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

1.5.1 **Record Keeping**

The following is an outline of what is expected as far as documentation of the NDT results for each survey:

- **i)** Details of the areas surveyed and type of NDT carried out (i.e., sketches showing details of joints plus any internal back-up structure that is considered part of the structural joint).

- **ii)** The Owner shall keep a detailed record of what has been previously surveyed, the type of survey carried out (Visual, MPI, etc.) (e.g., list area/quadrant of joint surveyed, nature and extent of indication found, and how it was repaired).

*Note:* Although it is not a mandatory requirement for Classification, Owner’s Inspection and Maintenance Manual could have information on the type of steel used in the construction, as built welding procedures, sketches of each joint to be surveyed and structural inspection NDT methods to be carried out, and may be used as a document maintained onboard for Record Keeping. If the Owner’s Inspection and Maintenance Manual is used for Record Keeping, it is to be reviewed and accepted by the attending Surveyor during survey pre-planning and commencement of respective UWILD.
1.7 Hull Thickness Measurement (Gauging)

Suspect areas of the hull are to be overall examined and gauged as considered necessary.

Gauging is normally carried out by means of UT equipment. The accuracy of the equipment is to be proven to the attending Surveyor, as required.

Gauging is to be carried out by a qualified employee of a firm certified by ABS and listed as “Recognized Specialists” in ABS records. Gauging firms are to be certified by ABS in accordance with Appendix 7-A-5 of the ABS Rules for Survey After Construction (Part 7).

The required gauging is to be witnessed by a Surveyor. The Surveyor is to be onboard to the extent necessary to control the process.

The gauging firm’s representative is to be part of the survey planning meeting to be held prior to commencing the survey.

In any kind of survey (i.e., Special Periodical, Intermediate, Annual or other surveys having the scope of the foregoing ones), gauging of structures in areas where CVI is required are to be carried out simultaneously with CVI.

At each Special Periodical Survey, thickness gauging is to be carried out where wastage is evident or suspected. At Special Periodical Survey – Hull No. 2 and subsequent Special Periodical Surveys, representative gauging will be required in accordance with 7-2-5/Table 1, 7-2-5/Table 2 and 7-2-5/Table 3. Special attention should be paid to splash zones on hulls, legs or related structure, and in ballast tanks, pre-load tanks, free-flooded spaces, spud cans and mats. The thickness gauging requirements indicated in the tables may be reduced or increased as deemed appropriate or necessary by the Surveyor in accordance with Notes 2 and 3 of the tables.

1.9 Corrosion Control

Where extensive areas of corrosion are found or when considered necessary by the Surveyor, thickness measurements are to be carried out and renewals and/or repairs made when wastage exceeds allowable margins.

Where Substantial Corrosion is found, additional thickness measurements are to be taken to confirm the extent of substantial corrosion. These extended thickness measurements are to be carried out before the Special Periodical Survey is credited as completed.

Suspect areas identified at a previous survey are to be subject to GVI and CVI. Similarly, any areas of Substantial Corrosion identified at previous surveys are to have thickness measurements taken.

External thickness gauging may be required to confirm corrosion control.

1.11 Onboard Computers for Stability Calculations

This Paragraph is applicable to Mobile Offshore Drilling Units that were contracted for construction on or after 1 July 2005 that have Stability Computers onboard the unit. This Paragraph is not applicable to Drilling units that were fabricated prior to 1 July 2005 or to those that do not have Stability Computers.

If an onboard computer is fitted to satisfy 3-3-2/7 and is used for stability calculations, satisfactory operation of the software with the onboard computer(s) for stability calculations is to be verified in presence of the Surveyor.

Note: Satisfactory operation of stability computer(s) fitted on drilling units contracted on or after 1 July 2005 is to be verified onboard by the attending Surveyor and reported upon.

Satisfactory functional requirements (see 7-1-A2/3) are to be confirmed by the Surveyor.

A copy of the approved test conditions and the operation manual (see 7-1-A2/5) for the computer/software are to be available onboard.

1.11.1 Testing Computers

Testing of such computers is to be carried out in accordance with the requirements stated in 7-2-4/1.1.16. At each Special Periodical Survey computer checking for all approved test operating conditions is to be done in presence of the Surveyor.
1.13 Alternatives (2016)

(2018) ABS is open to any alternative survey process as long as the standards required by class rules and applicable statutory requirements/recommendations are satisfactorily complied with.

In order to monitor structural integrity of units, alternative means of visual examination, NDT techniques, gauging techniques, verification of corrosion control programs, and proper recording of all these alternatives by the use of special equipment or machinery installed onboard, will be considered on a case-by-case basis.

All alternative survey processes used during Special Periodical Surveys are to be reviewed by the attending Surveyor and agreed upon by the respective offshore ACS Office, well in advance of the survey pre-planning meeting to be held with the attending Surveyor.

1.13.1 UWILD with ROVs

Requirements and guidance provided in 7-2-6/3.11.1 is applicable to UWILD associated with Special Survey.

1.15 HIMP Notation (2018)

Surveys of units with HIMP Notation are to be conducted in accordance with the ABS Guide for Hull Inspection and Maintenance Program.

1.17 ABS Additional Notations (1 July 2018)

For Special Survey requirements for Additional Notations not specified in the ABS Rules for Building and Classing Mobile Offshore Drilling Units, refer to Chapter 9 of the ABS Rules for Survey After Construction (Part 7) or the applicable ABS Guide.

3 Surface-Type Drilling Units (2014)

On surface-type drilling units, in addition to the general requirements of 7-2-5/1, the following vessel-specific requirements are to be carried out to the satisfaction of the attending Surveyor.

3.1 Special Periodical Survey – Hull No. 1

3.1.1 General Visual Inspection (GVI)

All spaces and tanks of the drilling unit are to be subjected to GVI. Structural appendages and ducts for positioning units are to be included in the GVI.

If found suspect or considered necessary by the Surveyor, CVI as well as NDT of special and/or primary application structures may be carried out to extent deemed necessary by the Surveyor.

3.1.2 Close Visual Inspection (CVI)

All external surfaces of special application structures located on the main deck level at corners of the moon pool opening are to be subjected to CVI.

If found suspect or considered necessary by the Surveyor, CVI of special application structures located above the waterline and within amidships 0.4L may be carried out to extent deemed necessary by the Surveyor.

3.1.3 Non-Destructive Testing (NDT)

To supplement this CVI, if suspect or considered necessary by the Surveyor, random NDT of associated welds may be carried out to extent deemed necessary by the Surveyor.

Results of NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

3.1.4 Hull Thickness Measurement

See 7-2-5/Table 1.

Gauging reports completed by the ABS approved external specialists and endorsed by the Surveyor are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.
3.1.5 Corrosion Control

If coating condition of special application structures is found to be in “Poor” condition, internal surfaces of such structures are to be subjected to CVI and gauging to the extent deemed necessary by the attending Surveyor.

Where gauging results indicate “Substantial Corrosion” and no immediate structural repair is carried out before completion of this Special Periodical Survey, the corroded areas are to be subjected to extensive GVI, CVI and Gauging, during subsequent Annual Surveys.

3.3 Special Periodical Survey – Hull No. 2

3.3.1 General Visual Inspection (GVI)

Requirements of 7-2-5/3.1.1 are to be complied with.

3.3.2 Close Visual Inspection (CVI)

All external surfaces of special application structures located above the waterline and within amidships 0.4L is to be subjected to CVI.

All four main deck moon pool corner plating is to be subjected to CVI. The CVI is to include external surfaces as well as internal support members of these structures.

If found suspect or considered necessary by the Surveyor, CVI of special or primary application structures located above the waterline and within amidships 0.4L may be carried out to extent deemed necessary by the Surveyor.

As visual guidance, 7-2-5/Figure 1 illustrates some of the typical special application structures that may be subjected to CVI and NDT required by 7-2-5/3.3.

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**FIGURE 1**

CVI and NDT during SPS Hull No. 2 of Drillships (2014)

SPS #2
CVI and NDT may also include primary application structures located above waterline and within amidships 0.4L as deemed necessary by the Surveyor.

CVI – Surfaces are to be cleaned for a meaningful examination.

NDT – To be examined by MPI or ACFM.

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**CVI**
Special application structures located above water within amidships 0.4L and including all corner structures of the moonpool should be examined.

**NDT**
Special application structures located above water within amidships 0.4L as necessary and at least one corner structure of the moonpool should be examined.
3.3.3 Nondestructive Testing (NDT)
To supplement this CVI, if suspect or considered necessary by the Surveyor, random NDT of associated welds may be carried out to extent deemed necessary by the Surveyor.

Weld joints of at least one representative corner main deck plating of such special application structure is to be subjected to surface NDT.

If any defect found during the initial NDT or considered suspect by the attending Surveyor, NDT may be extended to the internal members or other corners of the moon pool opening.

Results of all CVI and NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

3.3.4 Hull Thickness Measurement
See 7-2-5/3.1.4.

3.3.5 Corrosion Control
If coating condition of special application structures is found to be in “Poor” condition, internal surfaces of such structures are to be subjected to CVI and gauging to the extent deemed necessary by the attending Surveyor.

Where gauging results indicate “Substantial Corrosion” and no immediate structural repair is carried out before completion of this Special Periodical Survey, the corroded areas are to be subjected to extensive GVI, CVI and Gauging, during subsequent Annual Surveys.

In addition, where gauging results indicate a global “Substantial Corrosion” and no immediate structural repair is carried out before completion of this Special Periodical Survey, the Surveyor may also require global strength analysis to be verified by ABS engineering before crediting the Special Periodical Survey – Hull.

3.5 Special Periodical Survey – Hull No. 3

3.5.1 General Visual Inspection (GVI)
Requirements of 7-2-5/3.1.1 are to be complied with.

3.5.2 Close Visual Inspection (CVI)
All special and primary application structures located within amidships 0.4L are to be subjected to CVI. This CVI is to include external surfaces as well as internal support members of these structures.

If found suspect or considered necessary by the Surveyor, CVI of special or primary application structures located within amidships 0.6L may be carried out to extent deemed necessary by the Surveyor.

As a visual guidance, 7-2-5/Figure 2 illustrates some of the typical special and primary application structures in way of amidships 0.4L that may be subjected to CVI and NDT required by 7-2-5/3.5.
3.5.3 Nondestructive Testing (NDT)

To supplement this CVI, if suspect or considered necessary by the Surveyor, random NDT of associated welds may be carried out to extent deemed necessary by the Surveyor.

Weld joints of all corner main deck and bottom shell plating of such special application structure is to be subjected to surface NDT. This NDT is to include internal special and primary members of all four corners of the moon pool opening.

Results of all CVI and NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

3.5.4 Hull Thickness Measurement

See 7-2-5/3.1.4.

3.5.5 Corrosion Control

The requirements of 7-2-5/3.3.5 are to be complied with.

3.7 Special Periodical Survey – Hull No. 4 and Subsequent Special Surveys

3.7.1 General Visual Inspection (GVI)

The requirements of 7-2-5/3.1.1 are to be complied with.

3.7.2 Close Visual Inspection (CVI)

All special and primary application structures located within amidships 0.6L are to be subjected to CVI. This CVI is to include external surfaces as well as internal support members of these structures.
3.7.3 Nondestructive Testing (NDT)

To supplement this CVI, all special and primary application structures located within amidships 0.4L are to be subjected to NDT. This NDT is to include external and internal members of the special and primary structures.

Results of all CVI and NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

3.7.4 Hull Thickness Measurement

See 7-2-5/3.1.4.

3.7.5 Corrosion Control

The requirements of 7-2-5/3.3.5 are to be complied with.

5 Column-Stabilized Drilling Units (2014)

On column-stabilized drilling units, in addition to the general requirements of 7-2-5/1, the following vessel-specific requirements are to be carried out to the satisfaction of the attending Surveyor.

5.1 Special Periodical Survey – Hull No. 1

5.1.1 General Visual Inspection (GVI)

All spaces and tanks of the drilling unit are to be subjected to GVI.

Particular attention is to be paid to the following structural areas:

i) Connections of columns and diagonals to upper hull or platform

ii) Connections of columns and diagonals to lower hull or pontoons

iii) Joints of supporting structure, including diagonals, braces and horizontals, together with gussets and brackets

iv) Internal continuation or back-up structure for the above

5.1.2 Close Visual Inspection (CVI)

All suspect areas found during GVI are to be subjected to CVI.

External surfaces of randomly selected areas of special application structures are to be subjected to CVI. This random selection by the Surveyor is to at least include one typical connection of:

i) A column to a lower hull

ii) A column to the upper hull

iii) A column to a bracing

iv) A bracing to another bracing

Note: Randomly selected area for CVI is to at least cover 10% of the overall length of the connection but not less than 1 m in length.

5.1.3 Nondestructive Testing (NDT)

To supplement this CVI, if suspect or considered necessary by the Surveyor, random NDT of associated welds may be carried out to extent deemed necessary by the Surveyor.

Results of NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

5.1.4 Hull Thickness Measurement

See 7-2-5/Table 2.

Gauging reports completed by the ABS approved external specialists and endorsed by the Surveyor are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.
5.1.5 Corrosion Control

If coating condition of special application structures is found to be in “Poor” condition, internal surfaces of such structures are to be subjected to CVI and gauging to the extent deemed necessary by the attending Surveyor.

Where gauging results indicate “Substantial Corrosion” and no immediate structural repair is carried out before completion of this Special Periodical Survey, the corroded areas are to be subjected to extensive GVI, CVI and Gauging, during subsequent Annual Surveys.

5.1.6 Lightship Displacement (2018)

Effectiveness of the weight control program is to be verified throughout operational life of all column stabilized units.

This verification is done by carrying out a lightweight survey (also referred as deadweight survey), in presence of ABS, during Special Periodical Survey – Hull No. 1. The lightweight survey is to be carried out in accordance with ABS agreed survey procedure (see 3-3-1/3).

If the lightweight survey indicates a change from the calculated light ship displacement in excess of 1% of the operating displacement of the unit, an inclining experiment may have to be carried out or the difference in weight should be placed at an indisputably conservative vertical center of gravity. In such cases, ABS Engineering is to be contacted for approval.

During the lightweight survey, following verification and measurements are to be completed:

i) Review of records to verify recorded weight changes that will affect lightweight of the drilling unit;

ii) Review of tank sounding readings done by tank level gauges (random manual sounding may be done if required by ABS Surveyor to verify correctness of gauge readings);

iii) Review of records to verify amount of liquids such as fuel oil, lube oil, waste oil, drilling mud, drill water, etc. during the lightweight survey;

iv) Review of unit’s derrick loads on substructure (such as the hook load and setback loads);

v) Review of other records showing weights other than the above affecting weight measurement;

vi) Draft readings by visual sighting of draft marks from columns;

vii) Verification of operational lightweight and displacement corresponding to the mean draft; and

viii) Verification of operational displacement corresponding to the mean draft.

Results of a lightweight survey or an inclining experiment are to be maintained onboard the drilling unit and be readily available to the attending Surveyors. All such records are to have an endorsement of the rig personnel (such as the OIM). All such records are also to be endorsed by the attending ABS Surveyor to read “The lightweight survey/inclining experiment (as applicable) was witnessed by ABS”.

5.3 Special Periodical Survey – Hull No. 2

5.3.1 General Visual Inspection (GVI)

Requirements of 7-2-5/5.1.1 are to be complied with.

5.3.2 Close Visual Inspection (CVI)

Randomly selected areas of special and primary application structures are to be subjected to CVI.

This CVI is to include external surfaces as well as internal support members of these structures, and this random selection by the Surveyor is to at least include one typical connection of:

i) Horizontal and diagonal bracing to columns and upper hull, together with gussets and brackets

ii) Horizontal and diagonal bracing to pontoons, upper hull and columns, together with gussets and brackets

iii) Internal back-up structure for the above
iv) Brace-to-brace connections, together with gussets and brackets  
v) Column connection to lower and upper hulls  
vii) Fairleader connections to columns  
vii) Highly stressed areas in way of the moon pool  

Note: Randomly selected area for CVI is to at least cover 10% of the overall length of the connection but not less than 1 m in length.

5.3.3 Nondestructive Testing (NDT)  
To supplement this CVI, surface NDT of associated welds is to be carried out in way of above selected areas.  
Results of NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

5.3.4 Hull Thickness Measurement  
See 7-2-5/5.1.4.

5.3.5 Corrosion Control  
If coating condition of special application structures is found to be in “Poor” condition, internal surfaces of such structures are to be subjected to CVI and gauging to the extent deemed necessary by the attending Surveyor.

Where gauging results indicate “Substantial Corrosion” and no immediate structural repair is carried out before completion of this Special Periodical Survey, the corroded areas are to be subjected to extensive GVI, CVI and Gauging, during subsequent Annual Surveys.

In addition, where gauging results indicate a global “Substantial Corrosion” and no immediate structural repair is carried out before completion of this Special Periodical Survey, the Surveyor may also require global strength analysis to be verified by ABS engineering before crediting the Special Periodical Survey – Hull.

5.3.6 Lightship Displacement (2015)  
Effectiveness of the weight control program is to be verified throughout operational life of all column stabilized units.

If the first lightweight survey carried out during SPS – Hull No.1 demonstrated that the rig personnel were satisfactorily maintaining an effective weight control program, a comprehensive lightweight survey may be exempted during SPS – Hull No. 2 and subsequent SPS – Hull.

The above mentioned exemption may be granted by the ABS Surveyor only if a record of all changes to unit’s hull structure, machinery, outfitting and equipment that affect its light weight value were properly maintained in a light ship data alterations log, and taken into account during daily operations.

Effectiveness of the weight control program may then be accepted based on review of onboard records and observation of the unit’s operating draft. This verification is done by carrying out a weight verification survey.

Note: If the weight verification survey indicates a change from the light ship displacement shown in the Record and in excess of 1% of the operating displacement of the drilling unit, an inclining experiment may have to be carried out. In such cases, ABS Engineering shall be contacted to receive specific instructions.

During the weight verification survey, following is to be carried out by the attending Surveyor:

i) Review of records to verify recorded weight changes that will affect lightweight of the drilling unit;  
ii) Review of tank sounding readings done by tank level gauges (random manual sounding may be done if required by ABS Surveyor to verify correctness of gauge readings);  
iii) Review of records to verify amount of liquids such as fuel oil, lube oil, waste oil, drilling mud, drill water, etc. during the lightweight survey;
iv) Review of unit’s derrick loads on substructure (such as the hook load and setback loads);
v) Review of records showing weights other than the above affecting light weight measurement; and
vi) Confirm recorded light weight changes.

5.5 Special Periodical Survey – Hull No. 3

5.5.1 General Visual Inspection (GVI)
The requirements of 7-2-5/5.1.1 are to be complied with.

5.5.2 Close Visual Inspection (CVI)
All special and primary application structures are to be subjected to CVI.
This CVI is to include external surfaces as well as internal support members of these structures. Typical areas to be subjected to CVI are as follows:
i) Horizontal and diagonal bracing to columns and upper hull, together with gussets and brackets
ii) Horizontal and diagonal bracing to pontoons, upper hull and columns, together with gussets and brackets
iii) Internal back-up structure for the above
iv) Brace-to-brace connections, together with gussets and brackets
v) Column connection to lower and upper hulls
vi) Fairleader connections to columns
vii) Highly stressed areas in way of the moon pool

*Note:* This CVI is to cover 100% of all areas listed above.

As a visual guidance, 7-2-5/Figure 3 illustrates some of the typical areas in way of column-to-lower hull, column-to-brace, and brace-to-brace connections that may be subjected to CVI and NDT required by 7-2-5/5.5.
5.5.3 Nondestructive Testing (NDT) (2016)

To supplement this CVI, extensive surface NDT of associated welds is to be carried out within a 5-year period.

Note: Extensive NDT means that at least 50% weld length of each and every typical area examined by CVI is to be subjected to NDT within a 5-year period. For example; randomly chosen 25% weld length of every brace-to-brace connection examined by surface NDT twice in 5-year period will satisfy NDT of such areas.

Amount of CVI and NDT may be divided between two UWILDs carried out during each five year cycle.

The number of joints and associated internal continuation and back-up structure, plus any gussets or brackets that are to be subjected to NDT may be determined by the Owner and ABS with consultation of the records and NDT results of previous surveys.

Results of NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

5.5.4 Hull Thickness Measurement

See 7-2-5/5.1.4.

5.5.5 Corrosion Control

The requirements of 7-2-5/5.3.5 are to be complied with.

5.5.6 Lightship Displacement (2015)

The requirements of 7-2-5/5.3.6 are to be complied with.
5.7 Special Periodical Survey – Hull No. 4 and Subsequent Special Surveys

5.7.1 General Visual Inspection (GVI)
The requirements of 7-2-5/5.1.1 are to be complied with.

5.7.2 Close Visual Inspection (CVI)
The requirements of 7-2-5/5.5.2 are to be complied with.
As a visual guidance, 7-2-5/Figure 4 illustrates some of the typical areas in way of column-to-lower hull, column-to-brace, and brace-to-brace connections that may be subjected to CVI and NDT required by 7-2-5/5.7.

**FIGURE 4**
CVI and NDT during SPS Hull No. 4 of CSDUs (2014)

**SPS #4**
CVI is to include all special, primary and critical structural areas. All (100%) of the areas subjected to CVI are to be examined by NDT as well.
CVI – Surfaces are to be cleaned for a meaningful examination.
NDT – To be examined by MPI or ACFM.

5.7.3 Nondestructive Testing (NDT)
To supplement this CVI, all welds associated with areas examined by CVI are to be subjected to 100% NDT within a 5-year period.
Amount of CVI and NDT may be divided between two UWILDs carried out during each five year cycle, preferably 50% done twice in a 5-year period.
The number of joints and associated internal continuation and back-up structure, plus any gussets or brackets that are to be subjected to NDT may be determined by the Owner and ABS with consultation of the records and NDT results of previous surveys.
Results of NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.
5.7.4 Hull Thickness Measurement
See 7-2-5/5.1.4.

5.7.5 Corrosion Control
The requirements of 7-2-5/5.3.5 are to be complied with.

5.7.6 Lightship Displacement (2015)
The requirements of 7-2-5/5.3.6 are to be complied with.

7 Self-Elevating Drilling Units (2014)
On self-elevating drilling units, in addition to the general requirements of 7-2-5/1, the following vessel-specific requirements are to be carried out to the satisfaction of the attending Surveyor.

7.1 Special Periodical Survey – Hull No. 1

7.1.1 General Visual Inspection (GVI)
All spaces, tanks, and legs of the drilling unit are to be subjected to GVI. During the GVI, particular attention is to be paid to the following areas:

i) Bulkheads designated as primary application structures.

ii) Legs
- All legs, including chords, braces, diagonals, gussets, racks, joints, together with leg guides are to be examined.
- On rigs with tubular or similar type legs, the legs are to be examined externally and internally, together with internal stiffeners and pinholes, as applicable.
- The extent of GVI may be limited to legs in way of the splash zone.

iii) Jack-House and Leg Wells
- Structure in, around and under jack-houses and leg wells.

iv) Leg Jacking or other Elevating Systems
- Leg jacking or other elevating systems externally.

v) Jetting Piping System
- Jetting piping systems or other external piping, particularly where penetrating mats or spud cans.

vi) Spud Cans or Mats (1 July 2018)
- External examination of spud cans or mat. At Special Survey No.2 and subsequent Special Surveys, the Spud cans or Mats are to be internally and externally examined.

Note: Spud cans and other bottom spaces subject to contact with, or accumulation of, bottom soil should be thoroughly ventilated and carefully monitored for pocketing or emission of hazardous gases prior to, and during, internal inspection.

When the unit is elevated on location and where the spud cans or the mat is partly or entirely below the waterline when the Special Survey – Hull is otherwise being completed, consideration may be given to postponement of these examinations until the next rig move.

7.1.2 Close Visual Inspection (CVI)
If found suspect or considered necessary by the Surveyor, CVI of special or primary application structures located above the waterline may be carried out to extent deemed necessary by the Surveyor.
7.1.3 Nondestructive Testing (NDT)

To supplement this CVI, if suspect or considered necessary by the Surveyor, random NDT of associated welds may be carried out to extent deemed necessary by the Surveyor.

Results of NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

7.1.4 Hull Thickness Measurement

See 7-2-5/Table 3.

Gauging reports completed by the ABS approved external specialists and endorsed by the Surveyor are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

7.1.5 Corrosion Control

If coating condition of special or primary application structures is found to be in “Poor” condition, such structures are to be subjected to CVI and gauging to the extent deemed necessary by the attending Surveyor.

Where gauging results indicate a global “Substantial Corrosion” and no immediate structural repair is carried out before completion of this Special Periodical Survey, the corroded areas are to be subjected to extensive GVI, CVI and Gauging, during subsequent Annual Surveys.

7.3 Special Periodical Survey – Hull No. 2

7.3.1 General Visual Inspection (GVI) (1 July 2019)

The requirements of 7-2-5/7.1.1 are to be complied with.

For mat supported drilling units, an alternative means of internal examination may be specially considered on a case-by-case basis (see also 7-2-6/Table 1). The mat is to be free of structural damage and the Owner’s submitted alternative means is to be reviewed by the attending Surveyor and agreed upon by the respective offshore ACS Office before the survey commences and the same is to be discussed during the pre-planning meeting held onboard.

Spud can supported units complying with the following conditions may reduce the internal examination to one spud can if:

- The unit has no history of eccentric spud can loading or scour
- The unit has a design that meets the 2008 and newer MODU Rules for spud can design.
- The operational history of unit is clear of structural indications.
- The unit has no substantial corrosion in the spud can and leg connections

7.3.2 Close Visual Inspection (CVI)

All special and primary application structures and identified critical structural areas are to be subjected to extensive CVI.

The following is an outline of some of the areas that will be subjected to CVI:

i) Leg-to-spudcan connections plus 2 bays (to extent deemed necessary by the Surveyor) of leg above the top of the spudcan

ii) Jackhouse/jackcase-to-deck connections

iii) Brace-to-chord connection in areas of leg that have been predominately in way of the upper and lower guides

Note: Areas in way of the upper guides are to be examined and subjected to NDT to identify any damage resultant from towing the drilling unit with its legs elevated. Areas in way of the lower guides are to be examined and subjected to NDT to identify any damage as a consequence of operating in the elevated/drilling mode.
iv) Leg-to-mat connections  

Note: In general, these connections are considered to be “Special Application Structures” and are to be treated accordingly. 100% of all leg-to-mat connections are to be subjected to CVI.

As a visual guidance, 7-2-5/Figure 5 illustrates some of the typical primary application structures in way of leg-to-spudcan connections that may be subjected to CVI and NDT required by 7-2-5/7.3.

**FIGURE 5**

**CVI and NDT during SPS Hull No. 2 of SEDUs (2014)**

**SPS #2**

CVI and NDT may include areas in way of 2 bays above the leg-spudcan connection as deemed necessary by the Surveyor.

CVI – Surfaces are to be cleaned for a meaningful examination.

NDT – To be examined by MPI or ACFM.

7.3.3 Nondestructive Testing (NDT)

To supplement this CVI, if suspect or considered necessary by the Surveyor, random NDT of associated welds may be carried out to extent deemed necessary by the Surveyor.

The following is an outline of some of the areas that will be subjected to CVI:

i) Leg-to-spudcan connections plus 2 bays (to extent deemed necessary by the Surveyor) of leg above the top of the spudcan

Note: The number of leg joints and associated structure that is to be subjected to NDT is to be determined by the Owner and ABS with consultation of the records and NDT results of previous surveys and service history of the drilling unit. However, at least one such connection of each leg is to be subjected to NDT.

ii) Jackhouse/jackcase-to-deck connections

iii) Brace-to-chord connection in areas of leg that have been predominately in way of the upper and lower guides

Note: Areas in way of the upper guides are to be examined and subjected to NDT to identify any damage resultant from towing the drilling unit with its legs elevated. Areas in way of the lower guides are to be examined and subjected to NDT to identify any damage as a consequence of operating in the elevated/drilling mode.
iv) Leg-to-mat connections

Note: In general, these connections are considered to be “Special Application Structures” and are to be treated accordingly. At least 25% of every leg-to-mat connections are to be subjected to NDT.

If any defect found during the initial NDT or considered suspect by the attending Surveyor, NDT may be extended to other areas or leg joints.

Results of NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

7.3.4 Hull Thickness Measurement
See 7-2-5/7.1.4.

7.3.5 Corrosion Control

If coating condition of special application structures is found to be in “Poor” condition, internal surfaces of such structures are to be subjected to CVI and gauging to the extent deemed necessary by the attending Surveyor.

Where gauging results indicate “Substantial Corrosion” and no immediate structural repair is carried out before completion of this Special Periodical Survey, the corroded areas are to be subjected to extensive GVI, CVI and Gauging, during subsequent Annual Surveys.

In addition, where gauging results indicate a global “Substantial Corrosion” and no immediate structural repair is carried out before completion of this Special Periodical Survey, the Surveyor may also require global strength analysis to be verified by ABS engineering before crediting the Special Periodical Survey – Hull.

7.5 Special Periodical Survey – Hull No. 3

7.5.1 General Visual Inspection (GVI) (1 July 2019)
The requirements of 7-2-5/7.1.1 are to be complied with.

For mat supported units, an alternative means of internal examination may be specially considered on a case-by-case basis (see also 7-2-6/Table 1). The mat is to be free of structural damage and the Owner’s submitted alternative means is to be reviewed by the attending Surveyor and agreed upon by the respective ACS Office before the survey commences and the same is to be discussed during the pre-planning meeting held onboard.

Spud can supported units complying with the following conditions may reduce the internal examination to one spud can if:

• The unit has no history of eccentric spud can loading or scour
• The unit has a design that meets the 2008 and newer MODU Rules for spud can design.
• The operational history of unit is clear of structural indications.
• The unit has no substantial corrosion in the spud can and leg connections.

7.5.2 Close Visual Inspection (CVI)

All special and primary application structures and identified critical structural areas are to be subjected to extensive CVI.

The following is an outline of some of the areas that will be subjected to CVI:

i) Leg-to-spudcan connections plus 2 bays of leg above the top of the spudcan

Note: All leg-to-spudcan connections plus 2 bays of leg above the top of the spudcan and associated structure are to be subjected to 100% CVI.

ii) Jackhouse/jackcase-to-deck connections

iii) Brace-to-chord connection in areas of leg that have been predominately in way of the upper and lower guides
Note: Areas in way of the upper guides are to be examined and subjected to NDT to identify any damage resultant from towing the drilling unit with its legs elevated. Areas in way of the lower guides are to be examined and subjected to NDT to identify any damage as a consequence of operating in the elevated/drilling mode.

iv) Leg-to-mat connections

Note: In general, these connections are considered to be “Special Application Structures” and are to be treated accordingly. All leg-to-mat connections are to be subjected to 100% CVI.

As a visual guidance, 7-2-5/Figure 6 illustrates some of the typical primary application structures in way of leg-to-spud can connections that may be subjected to CVI and NDT required by 7-2-5/7.5.

FIGURE 6
CVI and NDT during SPS Hull No. 3 of SEDUs (2014)

SPS #3
CVI and NDT is to include areas in way of 2 bays above the leg-spudcan connections.
CVI – Surfaces are to be cleaned for a meaningful examination.
NDT – To be examined by MPI or ACFM.

7.5.3 Nondestructive Testing (NDT) (2016)
To supplement this CVI, if suspect or considered necessary by the Surveyor, random NDT of associated welds may be carried out to extent deemed necessary by the Surveyor.

The following is an outline of some of the areas that will be subjected to CVI:

i) Leg-to-spudcan connections plus 2 bays of leg above the top of the spudcan. Additional bays may be subjected to NDT as deemed necessary by the attending Surveyor.

Note: All leg-to-spudcan connections plus 2 bays of leg above the top of the spudcan and associated structure are to be subjected to 100% NDT.

ii) Jackhouse/jackcase-to-deck connections
iii) Brace-to-chord connection in areas of leg that have been predominately in way of the upper and lower guides

Note: Areas in way of the upper guides are to be examined and subjected to NDT to identify any damage resultant from towing the drilling unit with its legs elevated. Areas in way of the lower guides are to be examined and subjected to NDT to identify any damage as a consequence of operating in the elevated/drilling mode.

iv) Leg-to-mat connections

Note: In general, these connections are considered to be “Special Application Structures” and are to be treated accordingly. Entire length of (100%) every leg-to-mat connections are to be subjected to NDT.

If any defect found during the initial NDT or considered suspect by the attending Surveyor, NDT may be extended to other areas or leg joints.

Results of NDT are to be maintained as a permanent record of the drilling unit, and be readily available to the attending Surveyors during subsequent periodical surveys of the hull.

7.5.4 Hull Thickness Measurement

See 7-2-5/7.1.4.

7.5.5 Corrosion Control

The requirements of 7-2-5/7.3.5 are to be complied with.

7.7 Special Periodical Survey – Hull No. 4 and Subsequent Special Surveys

7.7.1 General Visual Inspection (GVI) (1 July 2019)

The requirements of 7-2-5/7.1.1 are to be complied with.

For mat supported units, an alternative means of internal examination may be specially considered on a case-by-case basis (see also 7-2-6/Table 1). The mat is to be free of structural damage and the Owner’s submitted alternative means is to be reviewed by the attending Surveyor and agreed upon by the respective ACS Office before the survey commences and the same is to be discussed during the pre-planning meeting held onboard.

7.7.2 Close Visual Inspection (CVI)

The requirements of 7-2-5/7.5.2 are to be complied with.

7.7.3 Nondestructive Testing (NDT)

The requirements of 7-2-5/7.5.3 are to be complied with.

7.7.4 Hull Thickness Measurement

See 7-2-5/7.1.4.

7.7.5 Corrosion Control

The requirements of 7-2-5/7.3.5 are to be complied with.
TABLE 1
Thicknes Gauging Requirements for Surface-Type Units (2017)

<table>
<thead>
<tr>
<th>Special Periodical Survey Number 1</th>
<th>Special Periodical Survey Number 2</th>
<th>Special Periodical Survey Number 3</th>
<th>Special Periodical Survey Number 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
</tr>
<tr>
<td>2) (2012) One transverse section of deck plating abreast the moon pool opening within the amidships 0.6L, together with internals in way as deemed necessary. Where unit is configured with side ballast tanks, the plating and internals of the tanks are also to be gauged in way of the section chosen.</td>
<td>2) (2012) Two girth belts of deck, bottom and side plating abreast the moon pool and one hatch opening within the amidships 0.6L, together with internals in way as deemed necessary. Where unit is configured with side ballast tanks, the plating and internals of the tanks to be gauged in way of the required belts. Remaining internals in ballast tanks to be gauged as deemed necessary.</td>
<td>2) (2012) A minimum of three girth belts of deck, bottom, side, and longitudinal-bulkhead plating in way of the moon pool and other areas within the amidships 0.6L, together with internals in way (including in perimeter ballast tanks, where fitted in way of belts).</td>
<td>2) (2012) A minimum of three girth belts of deck, bottom, side, and longitudinal-bulkhead plating in way of the moon pool and other areas within the amidships 0.6L, together with internals in way (including in perimeter ballast tanks, where fitted in way of belts).</td>
</tr>
<tr>
<td>3) Moon pool boundary bulkhead plating.</td>
<td>3) Moon pool boundary bulkhead plating.</td>
<td>3) Moon pool boundary bulkhead plating.</td>
<td>3) Moon pool boundary bulkhead plating.</td>
</tr>
<tr>
<td>3) Moon pool boundary bulkhead plating.</td>
<td>4) Internal in forepeak tank as deemed necessary.</td>
<td>4) Internals in forepeak and after peak tanks as deemed necessary.</td>
<td>4) Internals in forepeak and after peak tanks as deemed necessary.</td>
</tr>
<tr>
<td>4) Internal in forepeak tank as deemed necessary.</td>
<td>5) Lowest strake of all transverse bulkheads in hold spaces. Remaining bulkhead plating to be gauged as deemed necessary.</td>
<td>5) Lowest strake of all transverse bulkheads in hold spaces. Remaining bulkhead plating to be gauged as deemed necessary.</td>
<td>5) Lowest strake of all transverse bulkheads in hold spaces. Remaining bulkhead plating to be gauged as deemed necessary.</td>
</tr>
<tr>
<td>6) All plates in two wind and water strakes, port and starboard, full length.</td>
<td>6) All plates in two wind and water strakes, port and starboard, full length.</td>
<td>6) All plates in two wind and water strakes, port and starboard, full length.</td>
<td>6) All plates in two wind and water strakes, port and starboard, full length.</td>
</tr>
<tr>
<td>7) All exposed main deck plating full length and all exposed first-tier superstructure deck plating (poop, bridge and forecastle decks).</td>
<td>7) All exposed main deck plating full length and all exposed first-tier superstructure deck plating (poop, bridge and forecastle decks).</td>
<td>7) All exposed main deck plating full length and all exposed first-tier superstructure deck plating (poop, bridge and forecastle decks).</td>
<td>7) All exposed main deck plating full length and all exposed first-tier superstructure deck plating (poop, bridge and forecastle decks).</td>
</tr>
<tr>
<td>8) All keel plates full length plus additional bottom plating as deemed necessary by the Surveyor, particularly in way of cofferdams and machinery spaces.</td>
<td>8) All keel plates full length plus additional bottom plating as deemed necessary by the Surveyor, particularly in way of cofferdams and machinery spaces.</td>
<td>8) All keel plates full length plus additional bottom plating as deemed necessary by the Surveyor, particularly in way of cofferdams and machinery spaces.</td>
<td>8) All keel plates full length plus additional bottom plating as deemed necessary by the Surveyor, particularly in way of cofferdams and machinery spaces.</td>
</tr>
<tr>
<td>9) Duct keel or pipe tunnel plating or pipe tunnel plating and internals as deemed necessary.</td>
<td>9) Duct keel or pipe tunnel plating or pipe tunnel plating and internals as deemed necessary.</td>
<td>9) Duct keel or pipe tunnel plating or pipe tunnel plating and internals as deemed necessary.</td>
<td>9) Duct keel or pipe tunnel plating or pipe tunnel plating and internals as deemed necessary.</td>
</tr>
</tbody>
</table>

Notes:
1. With reference to ballasting history and arrangement and condition of coatings, tanks and specific thickness gauging locations should be selected which will provide the best representative sampling of areas likely to be most exposed to corrosion effect.
2. Gauging requirements noted may be modified as deemed necessary or appropriate by the Surveyor if the structure remains effectively protected against corrosion by a permanent type special coating.
3. In any case where excessive wastage is evident, additional gaugings may be required.
### TABLE 2
**Thickness Gauging Requirements for Column-Stabilized Units (2017)**

<table>
<thead>
<tr>
<th>Special Periodical Survey Number 1</th>
<th>Special Periodical Survey Number 2</th>
<th>Special Periodical Survey Number 3</th>
<th>Subsequent Special Periodical Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
</tr>
<tr>
<td>2) Columns and bracings where wastage is evident in Splash Zone.</td>
<td>2) Representative gaugings of columns and bracings in Splash Zone together with internals in way as deemed necessary.</td>
<td>2) Representative gaugings, throughout, of special and primary application structures.</td>
<td>2) Comprehensive gaugings, throughout, of special and primary application structures.</td>
</tr>
<tr>
<td>3) Special and primary application structure where wastage is evident.</td>
<td>3) 1 girth belt of each of 2 columns and 2 bracings in Splash Zone together with internals in way as deemed necessary.</td>
<td>3) 1 girth belt of each of one-half of the columns and bracings in Splash Zone and internals in way as deemed necessary (i.e., gauge half of the unit’s columns and bracings in Splash Zone).</td>
<td>3) 1 girth belt of each of one-half of the columns and bracings in Splash Zone and internals in way as deemed necessary (i.e., gauge half of the unit’s columns and bracings in Splash Zone).</td>
</tr>
<tr>
<td>4) Chain locker internals as deemed necessary.</td>
<td>4) Chain locker internals as deemed necessary.</td>
<td>4) Chain locker internals as deemed necessary.</td>
<td>4) Chain locker internals as deemed necessary.</td>
</tr>
<tr>
<td>5) Lower hulls in way of mooring lines where wastage is evident.</td>
<td>5) Lower hulls in way of mooring lines where wastage is evident.</td>
<td>5) Lower hulls in way of mooring lines where wastage is evident.</td>
<td>5) Lower hulls in way of mooring lines where wastage is evident.</td>
</tr>
<tr>
<td>6) 1 girth belt of each lower hull between one set of columns.</td>
<td>6) 1 girth belt of each lower hull between one set of columns.</td>
<td>6) 1 girth belt of each lower hull between one set of columns.</td>
<td>6) 1 girth belt of each lower hull between one set of columns.</td>
</tr>
<tr>
<td>7) Representative gaugings of substructure of drilling derrick.</td>
<td>7) Representative gaugings of substructure of drilling derrick.</td>
<td>7) Representative gaugings of substructure of drilling derrick.</td>
<td>7) Representative gaugings of substructure of drilling derrick.</td>
</tr>
</tbody>
</table>

**Notes:**

1. With reference to the ballasting history and arrangement and condition of coatings, tanks and specific thickness gauging locations should be selected which will provide the best representative sampling of areas likely to be most exposed to corrosion effect.
2. Gauging requirements noted may be modified as deemed necessary or appropriate by the Surveyor if the structure remains effectively protected against corrosion by a permanent type special coating.
3. In any case where excessive wastage is evident, additional gaugings may be required.
4. Structure application designations (special, primary, secondary) are defined in Section 3-1-4.
5. (2012) Splash Zone is to be considered as the structural area that has been periodically in and out of the water when the unit was at its operating depth, most of the time during the past five-year period. Based on operational record of the unit, additional zones may also be gauged.
TABLE 3
Thickness Gauging Requirements for Self-Elevating Units (2017)

<table>
<thead>
<tr>
<th>Special Periodical Survey Number 1</th>
<th>Special Periodical Survey Number 2</th>
<th>Special Periodical Survey Number 3</th>
<th>Special Periodical Survey Number 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
</tr>
<tr>
<td>2) Legs in way of Splash Zone.</td>
<td>2) Representative gaugings, throughout, of special and primary application structures.</td>
<td>2) Leg well structure.</td>
<td>2) Comprehensive gaugings, throughout, of special and primary application structures.</td>
</tr>
<tr>
<td>3) Primary application structures where wastage is evident.</td>
<td>4) Representative gaugings of deck, bottom, and side shell plating of hull and mat.</td>
<td>3) Leg well structure.</td>
<td>3) Leg well structure.</td>
</tr>
<tr>
<td>4) Representative gaugings of upper hull deck and bottom plating and internals of one preload (ballast) tank.</td>
<td>5) Representative gaugings of upper hull deck and bottom plating and internals of at least two preload (ballast) tanks.</td>
<td>4) Representative gaugings of deck, bottom, and side shell plating of hull and mat.</td>
<td>5) Substructure of derrick as deemed necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5) Representative gaugings of internals of all preload (ballast) tanks.</td>
<td>6) Representative gaugings of internals of all preload (ballast) tanks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6) Representative gaugings of internals of all preload (ballast) tanks.</td>
<td>7) (2017) Plating of seachests. Shell plating in way of overboard discharges as considered necessary by the attending Surveyor.</td>
</tr>
</tbody>
</table>

Notes:

1. With reference to the operating history and arrangement and condition of coatings, specific thickness gauging locations should be selected which will provide the best representative sampling of areas likely to be most exposed to corrosion effect.

2. Gauging requirements noted may be modified as deemed necessary or appropriate by the Surveyor if the structure remains effectively protected against corrosion by a permanent type special coating.

3. In any case where excessive wastage is evident, additional gaugings may be required.

4. Structural application designation (special, primary, secondary) are defined in Section 3-1-4.

5. (2012) Splash Zone is to be considered as the structural area that has been periodically in and out of the water when the unit was at its operating depth, most of the time during the past five-year period. Based on operational record of the unit, additional zones may also be gauged.

9 Special Periodical Survey – Machinery (2010)

(2018) Special Periodical Survey – Machinery is to include compliance with the Annual Survey requirements as per 7-2-4/3 and, in addition, the following requirements as listed below are to be carried out, as applicable, the parts examined, placed in satisfactory condition and reported upon.

9.1 Correlation with Special Periodical Survey – Hull
Main and auxiliary engines of all types for drilling units are to undergo Special Periodical Survey at intervals similar to those for Special Periodical Survey – Hull in order that both may be recorded at approximately the same time. In cases where damage has involved extensive repairs and examination, the survey thereon may be considered as equivalent to a Special Periodical Survey.

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9.3 Parts to be Examined – All Types of Mobile Offshore Drilling Units

(2012) In addition to the requirements for Annual Survey, at each Special Periodical Survey, special attention is to be given to the following requirements, as applicable.

9.3.1 Openings to the Sea and Fastenings
All openings to the sea, including sanitary and other overboard discharges together with the cocks and valves connected therewith, are to be examined internally and externally while the drilling unit is in drydock or at the time of underwater examination in lieu of drydocking, and the fastenings to the shell plating are to be renewed when considered necessary by the Surveyor.

9.3.2 Pumps and Pumping Arrangements
Pumps and pumping arrangements, including valves, cocks, pipes, and strainers, are to be examined.

9.3.3 Nonmetallic Expansion Pieces
Nonmetallic flexible expansion pieces in the main salt-water circulating system are to be examined internally and externally.

9.3.4 Bilge and Ballast System, and other Systems
The Surveyor is to be satisfied with the operation of the bilge and ballast systems. Other systems are to be tested as considered necessary.

9.3.5 Machinery Foundations (2012)
The foundations of machinery, particularly those categorized as “Primary Application Structure” are to be examined.

9.3.6 Pressure Vessels
Heat exchangers and other unfired pressure vessels (except those used solely for drilling operations and complying with a recognized standard) with design pressures over 6.9 bar (7 kgf/cm², 100 psi) are to be examined, opened out or thickness gauged and pressure tested as considered necessary, and associated relief valves proven operable. Evaporators that operate with a vacuum on the shell need not be opened, but may be accepted on the basis of satisfactory external examination and operational test or review of operating records.

9.3.7 Ventilation Valves (2018)
Ventilation valves required for maintaining watertight integrity are to be examined. Valves are to be functioned using remote and local controls as fitted and sealing integrity verified.

9.5 Parts to be Examined – Self-Propelled Mobile Offshore Drilling Units (2012)
On self-propelled units, in addition to the requirements for Annual Survey and the applicable requirements of 7-2-5/9.3, the main and auxiliary machinery, including pressure vessels, should be surveyed in accordance with the requirements of the latest edition of the ABS Rules for Survey After Construction (Part 7), as applicable to self-propelled vessels constructed in accordance with the Steel Vessel Rules, and the following, as applicable.

Special Periodical Survey – Electrical Equipment is to include compliance with the Annual Survey requirements and, in addition, the following requirements as listed below are to be carried out, as applicable, the parts examined, placed in satisfactory condition and reported upon.

11.1 Correlation with Special Periodical Surveys – Hull
The entire installation, including auxiliary and emergency equipment is to undergo Special Periodical Survey at intervals similar to those for Special Periodical Survey – Hull in order that both may be recorded at approximately the same time. In cases where damage has involved extensive repairs and examination, the survey thereon may be considered as equivalent to a Special Periodical Survey.
11.3 Parts to be Examined

11.3.1 Main Switchboards and Distribution Panels
Fittings and connections on main switchboards and distribution panels are to be examined, and care is to be taken to see that no circuits are over fused.

11.3.2 Cables
Cables are to be examined as far as practicable without undue disturbance of fixtures.

11.3.3 Generator Run
All generators are to be run under load, either separately or in parallel; switches and circuit breakers are to be tested.

11.3.4 Equipment and Circuits
All equipment and circuits are to be inspected for possible development of physical changes or deterioration. The insulation resistance of the circuits is to be measured between conductors and between conductors and ground and these values compared with those previously measured. Any large and abrupt decrease in insulation resistance is to be further investigated and either restored to normal or renewed as indicated by the conditions found.

11.3.5 Electrical Auxiliaries, Generators and Motors
The specified electrical auxiliaries for vital purposes, generators and motors are to be examined and their prime movers opened for inspection. The insulation resistance of each generator and motor is to be measured.

11.3.6 Accumulator Batteries (2012)
The accumulator batteries are to be examined, including their maintenance schedule and ABS reviewed procedure of maintenance.

11.3.7 Bilge Alarm (if fitted)
Bilge alarm system, if fitted, is to be tested and proven satisfactory.

11.5 Self Propelled Units – Main Propulsion Apparatus
Where the unit maintains the optional AMS Notation, the windings of generators and motors are to be thoroughly examined and found or made dry and clean. Particular attention is to be paid to the ends of the windings of stator and rotors. After the winding have been cleaned and found dry, they are to be varnished, if necessary, with a standard insulating varnish applied preferably by spraying.

11.7 Major Repairs
On the occasion of major repairs, the coils repaired or renewed are to be subjected to a dielectric strain test, as specified under the applicable parts of Part 4, Chapter 3. In addition, the circuits containing the repairs or renewals and coils which have been disturbed during repairs are to be subjected to dielectric strain tests for one minute by application of a potential of 125% of the maximum operating voltage of the circuits to which it is applied. The direct current fields of generators and motors are to be subjected for one minute to a test potential equal to 50% of the value specified under the applicable parts of Part 4, Chapter 3 and the whole apparatus operated under full-load conditions.

13 Special Periodical Survey – Special Features (All Types) (2010)
Special Periodical Survey – Special Features is to include compliance with the Annual Survey requirements and, in addition, the following requirements as listed below are to be carried out, as applicable, placed in satisfactory condition and reported upon.

Mobile offshore drilling units may have many items of machinery and electrical equipment not found on conventional cargo vessels. Certain of these items are required for classification even if the unit is without propulsion machinery. Items to be especially examined and reported upon at all Special Periodical Surveys are listed in 7-2-5/13.3 through 7-2-5/13.13 for all types of Mobile Offshore Drilling Units, and additionally 7-2-5/13.15 for Self Elevating Drilling Units.
13.1 Correlation with Special Periodical Surveys – Hull

The entire installation is to undergo Special Periodical Survey at intervals similar to those for Special Periodical Survey – Hull in order that both may be recorded at approximately the same time. In cases where damage has involved extensive repairs and examination, the survey thereon may be considered as equivalent to a Special Periodical Survey.

13.3 Hazardous Areas

Hazardous areas, delineated in accordance with the onboard copy of the ABS approved hazardous area plan, are to be examined. The onboard copy of the ABS approved listing of electrical equipment is to be used for survey of hazardous areas. The following items are to be especially examined, tested as necessary, and proven satisfactory:

- Gas-tight doors and closures in boundary bulkheads or decks of hazardous areas, including those fitted in air-lock passages.
- Drains and scuppers from hazardous areas, and associated loop-seal traps where fitted.
- Explosion-proof or intrinsically safe electric lighting, electrical fixtures and instrumentation, in particular any associated sealing arrangements.
- Purged electrical equipment, including visual and audible indication of loss of purge alarms or shutdowns.
- Electric motors, including closed-loop ventilating systems for large motors. Automatic power disconnect to motors in case of loss of ventilating air.
- Ventilating systems, including ductwork, fans, inlets and outlets for enclosed restricted areas.
- Ventilation alarm systems, including pressure differential devices, if fitted.

For Units built prior to 1996 that may not have an onboard copy of the ABS approved listing of electrical equipment in hazardous areas, the equipment in the hazardous areas are to be examined to the satisfaction of the attending Surveyor.

13.5 Remote Shutdown Arrangements (1996)

Remote shutdown arrangements for fuel-oil transfer service pumps and ventilating equipment, together with oil tank outlet valves, where capable of being remotely closed, are to be proven satisfactory. Emergency switches, where required by the Rules, for all electrical equipment, including main and emergency generators, except alarm and communication systems and lighting in vital areas such as escape routes and landing platforms, are to be proven satisfactory.

13.7 Passive Fire Protection System

A general examination of the passive fire protection system is to be made in order that the Surveyor may be satisfied as to its efficient state. The following items are to be especially examined:

- Structural fire protection system and protection of accommodation spaces, service spaces and control stations. This examination is to verify that fire integrity of bulkheads and decks, all openings and access through enclosed spaces, as well as closing devices, satisfactorily maintain original integrity of these spaces and in accordance with approved design and construction.

13.9 Active Fire Protection Systems and Equipment

A general examination of applicable active fire protection system is to be made in order that the Surveyor may be satisfied as to its efficient state. The following items are to be especially proven in compliance with the Rules:

- Fire control plans are permanently exhibited for the guidance of operating personnel, showing clearly for each deck provision, location, controls and particulars, as applicable, of the; fixed fire detection, alarm and extinguishing systems, portable fire-fighting equipment and appliances, controls of fuel-oil pumps and valves, ventilation system shut-downs and closing of openings, and locations and type of fire retarding bulkheads. Where onboard conditions are found to have been
modified, exhibited plans are to reflect the onboard conditions, and fire control plans are to be submitted for review.

- Fire main systems are to be examined and tested, as applicable, particularly to verify that; fire pumps, including their relief valves (if fitted), fire main piping together with associated hydrants, hoses and nozzles, and international shore connection remain in satisfactory condition. Pressure and operational tests of the fire main system, as required by the Rules, are to be carried out.
- Additional fixed fire fighting systems, such as those using gas smothering, foam, fixed pressure water spraying, and systems protecting helicopter decks are to be examined and tested, and to be proven satisfactory.
- Portable and semi-portable fire extinguishers and sand (where provided) are to be examined, all portable soda-acid and foam extinguishers are to be serviced, and all dry chemical and CO₂ extinguishers are to be weighed and recharged, as necessary, and proven satisfactory.
- Fireman’s outfits, consisting of a breathing apparatus, a lifeline, a safety lamp, an axe, nonconductive boots and gloves, a rigid helmet and protective clothing complying with the requirements of the Rules are to be examined, and verified as to be easily accessible and ready for use, and stored in separate positions so that a fire in one location would not block access to both outfits.
- Fire detection system and its alarms, general alarms system, mud tank level alarms, ventilation system alarms, and gas detection system and its alarms, are to be examined and tested, and proven satisfactory.

13.11 Outfitting

A general examination of following outfitting items is to be made in order that the Surveyor may be satisfied as to its efficient state. The following items are to be especially proven in compliance with the Rules:

- Means of escape
- Means of access and egress
- Guards and rails
- Emergency control stations
- Arrangements in machinery spaces
- Segregation of fuel oil purifiers
- Rotary table area
- Fire precautions in machinery spaces

13.13 Piping Systems Supporting the Drilling System

Piping systems supporting the drilling system, but outside the scope of Certified Drilling System (optional Classification) equipment and associated components and complying either with these Rules or a recognized standard as required by 4-2-1/1 are to be examined, as far as practical, operationally or hydrostatically tested to working pressure, to the satisfaction of the Surveyor.

13.15 Self-Elevating Drilling Units – Leg Jacking Systems (1 July 2017)

On self-elevating type drilling units, the following components of leg jacking and rack fixation systems are to be examined and reported on.

- Pinions, gears, bearings and brakes throughout the climbing pinion gear train of rack and pinion systems
- Racks, chocks and positioning equipment of leg rack fixation systems
- Leg pins, yokes and associated components of moving yoke type jacking systems
The extent of the examination is to consider the age of the unit, the records of previous examinations, and the usage of the jacking system. For detailed requirements of rack and pinion systems, refer to the ABS Guide for Survey and Inspection of Jacking Systems.

At Special Survey No. 1, the items listed above are to be examined as far as practicable to the Surveyor’s satisfaction. If considered necessary, any items in question are to be examined by an effective crack detection method.

At Special Periodical Survey No. 2 and subsequent Special Periodical Surveys, the leg jacking system is to be examined in the presence of the Surveyor by the original equipment manufacturer or other third party inspector mutually agreeable to the owner and the Surveyor.


Special Periodical Surveys are to be carried out in accordance with 7-2-5/15.1 or 7-2-5/15.3, as applicable.

15.1 Units Classed with APS or PAS Notations

Where the unit maintains the optional APS or PAS notations, thrusters are to be surveyed on the basis of “Survey Requirements for Additional Systems and Services” in accordance with the requirements of Section 7-9-6 of the ABS Rules for Survey After Construction (Part 7).

15.3 Units Classed with DPS-1, DPS-2, or DPS-3 Notations (2019)

Requirements of Annual Survey of thrusters and Dynamic Positioning (DP) system are explained in 7-2-4/7 and 7-2-4/9, respectively.

In addition to the requirements of the Annual Survey, complete performance tests are to be carried out to the Surveyor’s satisfaction. The schedule of these tests is to be designed to demonstrate the level of redundancy established in the FMEA (Failure Modes and Effects Analysis, see Subsection 2/11 of the ABS Guide for Dynamic Positioning Systems). For DPS-2 and DPS-3, see Subsection 7/5 of the ABS Guide for Dynamic Positioning Systems.

In those cases where a Continuous DP Testing Program has been accepted in 7-2-5/15.3.1, this may be considered by the Surveyor for acceptance in lieu of conducting the complete performance test.

i) Thrusters are to be surveyed as part of the Special Survey in accordance with 7-2-5/15.3.2.

ii) Full power tests of thrusters and generators are to be conducted

15.3.1 Annual DP Testing Program

If the vessel is on Continuous Survey Machinery, the Owner may submit a Continuous DP Testing Program to conduct the required FMEA and performance testing throughout the survey cycle. The program may schedule approximately 20% of the FMEA and performance testing, along with the requirements of 7-9-6/3.1 of the ABS Rules for Survey After Construction (Part 7) for the Annual Survey each year. This Annual DP Testing Program is to be submitted for review to ABS. The testing program is to be kept on board the vessel for reference at each Annual Survey.

15.3.2 DP Thrusters (1 July 2017)

On units with a DP system, component parts of oil-lubricated thrusters are to be opened for examination at least every five years. Internal examination of oil-lubricated thrusters may be specially considered by the Surveyor if the thrusters are maintained under an ABS approved Condition Monitoring (CM) plan and results recorded have proven satisfactory performance. As a minimum, CM plan is to include daily unit observations; periodic lubrication oil sampling; and periodic vibration analysis or alternative dynamic analysis technique as described in the ABS Guidance Notes on Equipment Condition Monitoring Techniques.

Where the thrusters are maintained under an ABS approved CM plan, the frequency for opening up thrusters for internal examination may be longer than five years, provided this is indicated in the CM plan.

No Preventative Maintenance Program with CM supersedes the judgment of the Surveyor nor does the Program waive the attendance for damage, overhaul, functional testing or verification of safety devices as required by Appendix 7-2-A4.
PART 7

CHAPTER 2  Surveys After Construction

SECTION 6  Drydock Surveys or Equivalent

1  Parts to be Examined

1.1  Surface-type Units (Ship or Barge Type Units)

External surfaces of the hull, keel stem, stern frame, rudder, nozzles, and sea strainers are to be selectively cleaned and examined together with appendages, the propeller, exposed parts of stern bearing assembly, rudder pintle and gudgeon securing arrangements, sea chests and strainers and their fastenings. Propeller shaft bearing, rudder bearing, and steering nozzle clearances are to be ascertained and reported upon.

1.3  Column-Stabilized Units

External surfaces of the upper hull or platform, footings, pontoons or lower hulls, underwater areas of columns, bracing and their connections, as applicable, are to be selectively cleaned and examined.

Nondestructive testing may be required of areas found to be suspect.

Sea chests and strainers are to be cleaned and examined.

1.5  Self-Elevating Units (2019)

External surfaces of the upper hull or platform, spud cans, mat, underwater areas of legs, together with their connections, as applicable, are to be selectively cleaned and examined.

At each Drydocking Survey (or equivalent), external examination of mat or spud cans is to be carried out.

Unless otherwise recommended by the Surveyor, internal examination of mat or spud cans is to be carried out during intermediate Drydocking Surveys, which is a requirement of Special Survey, need not be carried out during intermediate Drydocking Surveys. See 7-2-6/Table 1 for types of examination of mat or spud cans required during Drydocking Survey.

TABLE 1

<table>
<thead>
<tr>
<th>Drydock Survey</th>
<th>Type of Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intermediate Drydock before Special Survey No. 1</td>
<td>1. External</td>
</tr>
<tr>
<td>2. Drydock associate with Special Survey No. 1</td>
<td>2. External</td>
</tr>
<tr>
<td>3. Intermediate Drydock associate with Special Survey No. 1 and No. 2</td>
<td>3. External</td>
</tr>
<tr>
<td>4. Drydock associate with Special Survey No. 2, and all subsequent Drydock Surveys associated with Special Surveys</td>
<td>4. Internal(^{(1,3)}) and External</td>
</tr>
<tr>
<td>5. Intermediate Drydock between Special Survey No. 2 and No. 3, and all subsequent intermediate Drydock Surveys</td>
<td>5. External</td>
</tr>
</tbody>
</table>

Notes:

1  \((2016)\) For mat supported drilling units, alternative means of internal examination may be specially considered on a case-by-case basis (agreement by the respective ACS Office is required).

2  \((1 July 2018)\) If there is a new indication of external damage on any can or mat, internal examination is to be carried out to the extent recommended by the attending Surveyor.

3  \((1 July 2019)\) For internal examination requirements, refer to 7-2-5/7.
(1 July 2017) The following is an outline of some of the areas that will be subjected to close visual examination and extensive NDE at each Drydocking Survey/UWILD not associated with Special Surveys:

i) All leg-to-spudcan connections are to be examined in accordance with the requirements of the previous Special Survey. Units complying with the following conditions may use the alternative examination method as noted below:

a) No history of eccentric spudcan loading or scour since last spudcan examination associated with Special Survey

b) Rig/Unit designs that meet the 2008 and newer MODU Rules for spudcan design.

c) Operational history of unit is clear of structural indications

d) No substantial corrosion in the spudcan and leg connections

Alternative examination method for units meeting the conditions described above:

- General external underwater examination of the sides and bottom of all spud cans
- Designated areas of the leg to spudcan connections are to be cleaned to the extent necessary to conduct a General Visual Inspection (GVI) to confirm that there are no visual indications in accordance with the table below.

<table>
<thead>
<tr>
<th>Age of the Unit</th>
<th>Number of Spudcan(s) to have designated areas Examined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 10 Years</td>
<td>1</td>
</tr>
<tr>
<td>11 to 15 Years</td>
<td>2</td>
</tr>
<tr>
<td>16 to 20 Years</td>
<td>3</td>
</tr>
<tr>
<td>21 and above</td>
<td>All</td>
</tr>
</tbody>
</table>

A UWILD request submitted for a unit meeting the conditions above is to include confirmation of the risk items above, and include the extent of cleaning and examination proposed.

ii) Jackhouse/jackcase-to-deck connections

iii) Brace-to-chord connection in areas of leg that have been predominately in way of the upper and lower guides

*Note:* Areas in way of the upper guides are to be examined and subjected to NDT to identify any damage resultant from towing the drilling unit with its legs elevated. Areas in way of the lower guides are to be examined and subjected to NDT to identify any damage as a consequence of operating in the elevated/drilling mode.

iv) Leg-to-mat connections

*Note:* In general, these connections are considered to be “Special Application Structures” and are to be treated accordingly.

v) Suspect areas (2018)

*Note:* Spud cans and other bottom spaces subject to contact with, or accumulation of, bottom soil should be thoroughly ventilated and carefully monitored for pocketing or emission of hazardous gases prior to, and during, internal inspection. Where the unit is elevated on location and where the legs, spud cans or mat are partly or entirely below the waterline when the Drydocking Survey/UWILD is otherwise being completed, consideration will be given to postponement of the underwater examination of the unit until the next rig move.

1.7 **Ballast and Preload Spaces – All units**

In conjunction with Drydocking Surveys (or equivalent) after Special Survey No. 1 and between subsequent Special Surveys, the following ballast and preload spaces are to be internally examined and the effectiveness of coatings or corrosion control arrangements are to be verified either visually, by indicator strips or by thickness gauging (as considered necessary), placed in satisfactory condition, as found necessary, and reported upon.

1.7.1 **Surface-Type Units**

One peak tank and at least two other representative ballast tanks between the peak tank bulkheads used primarily for water ballast.

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ABS RULES FOR BUILDING AND CLASSING MOBILE OFFSHORE DRILLING UNITS • 2019
1.7.2 Column-Stabilized Units
Representative ballast tanks in footings, lower hulls or free-flooding compartments as accessible, and at least two ballast tanks in columns or upper hull, if applicable.

1.7.3 Self-Elevating Units
Representative ballast tanks or free-flooding compartments in mat or spud cans, if accessible, and at least two representative upper hull salt water tanks on mat supported units or two representative preload tanks on independent leg units.

1.9 All Units

1.9.1 Internal Examinations of Tanks and Voids
All tanks and voids which are to be internally examined are to be thoroughly ventilated and gas-freed prior to being entered and are to be carefully monitored for pocketing or emissions of hazardous gases during examination.

1.9.2 Sea Valves
For Underwater Inspection in Lieu of Drydocking Survey associated with Special Surveys, means are to be provided to permit the opening up of all sea valves for internal examination.

1.9.3 External Portions of Propulsion Units (2010)
External portions of propulsion units are to be examined, where applicable.

1.9.4 HIMP Notation (2018)
Surveys of units with HIMP Notation are to be conducted in accordance with the ABS Guide for Hull Inspection and Maintenance Program.

3 Underwater Inspection in Lieu of Drydocking (UWILD) (2010)

(2018) The underwater inspection (UWILD) is to be carried out in accordance with the ABS approved UWILD plan. The plan is to be prepared by the Owner using the current ABS Rules and Survey Planning Document (if required) and is to be submitted to the attending Surveyor for approval.

The UWILD plan is to include the following:
- Location UWILD to be performed
- Tanks to be inspected
- Extent and location of CVI and NDT to be carried out
- Method of examination to be used (diver or ROV)

3.1 Conditions

3.1.1 Limitations
UWILD may not be acceptable where there is record of abnormal deterioration or damage to the underwater structure, or where damage affecting the fitness of the unit is found during the course of the survey.

3.1.2 Thickness Gauging and Nondestructive Testing
Underwater or internal thickness gaugings of suspect areas may be required in conjunction with the underwater inspection. Means for underwater nondestructive testing may also be required for fracture detection.

3.1.3 Plans and Data (2017)
Approved plans and procedures for the survey are to be made available onboard for the purpose of carrying out an onboard preplanning of the survey with the Surveyor. These should include nomenclature of underwater parts and drawings or forms for laying out the areas to be surveyed, the extent of hull cleaning, nondestructive testing locations (including NDT methods) and for mapping
damage or deterioration found. The examination of items associated with the Special or Continuous Surveys and Tail Shaft Surveys is to be included in the plans.

For Column-Stabilized Units, Surface-Type Units or other Units with thrusters, hull markings or other means to orient the in-water survey and identifying photographs, which entail specific areas of propeller blades, are to be included in the plans.

3.1.4 Underwater Conditions

The areas to be surveyed are to be sufficiently clean and the sea water clear enough to permit meaningful examination and photography (if necessary) by the diver. Overall or spot cleaning may be required by the attending Surveyor.

3.3 Physical Features

The following physical features are to be incorporated into the unit’s design in order to facilitate the underwater inspection. When verified, they will be noted in the unit’s Classification for reference at subsequent surveys.

3.3.1 Stern Bearing

For self-propelled units, means are to be provided for ascertaining that the seal assembly on oil-lubricated bearings is intact and for verifying that the clearance or wear-down of the stern bearing is not excessive. For oil-lubricated bearings, this may only require accurate oil-loss-rate records and a check of the oil for contamination by sea water or white metal. For wood or rubber bearings, an opening in the top of the rope guard and a suitable gauge or wedge would be sufficient for checking the clearance by a diver. For oil-lubricated metal stern bearings, wear-down may be checked by external measurements between an exposed part of the seal unit and the stern tube bossing, or by use of the unit’s wear-down gauge, where the gauge wells are located outboard of the seals, or the unit can be tipped. For use of the wear-down gauges, up-to-date records of the base depths are to be maintained onboard. Whenever the stainless steel seal sleeve is renewed or machined, the base readings for the wear-down gauge are to be re-established and noted in the unit’s records and in the survey report.

3.3.2 Rudder Bearings

For self-propelled units with rudders, means and access are to be provided for determining the condition and clearance of the rudder bearings, and for verifying that all parts of the pintle and gudgeon assemblies are intact and secure. This may require bolted access plates and a measuring arrangement.

3.3.3 Sea Suctions

Means are to be provided to enable the diver to confirm that the sea suction openings are clear. Hinged sea suction grids would facilitate this operation.

3.3.4 Sea Valves

Means must be provided to examine any sea valve for the UWILD associated with the Special Survey.

3.5 Procedures

3.5.1 Exposed Areas

An examination of the outside of the structure above the waterline is to be carried out by the Surveyor. Means and access are to be provided to enable the Surveyor to accomplish visual inspection and nondestructive testing, as necessary.

3.5.2 Underwater Areas (2012)

An examination of the entire unit below the waterline is to be carried out by a suitably qualified diver using closed-circuit television with two-way communication capable of being monitored by the Surveyor, as required, or photographic documentation, or both, depending on the age and type of unit. This is to be supplemented by the diver’s report, describing and attesting to the conditions found. A copy of this diver’s report and pertinent photographs are to be submitted to the attending
Surveyor for retention at the local office for five (5) years. Copies are also to be retained onboard, together with any video recording, for reference.

3.5.3 Damage Areas
Damage areas are to be photographed. Internal examination, measurements, marking and thickness gauging of such locations may be a necessary adjunct as determined by the attending Surveyor. Means are to be provided for locating, orienting and identifying underwater surfaces in photographs or on video tapes.

3.7 Crediting UWILD on a Self-Elevating Drilling Unit without Completing the Examination of Spud Cans/Mat (2018)
As mentioned under the ‘Note’ of 7-2-5/7.1.1vi) and 7-2-6/1.5v), when the unit is elevated on location and where the legs, spud cans or mat are partly or entirely below the waterline when a Special Survey – Hull or a UWILD is otherwise being completed, consideration will be given to postponement of these examinations until the next rig move.

In such cases, where requested by the Owner, the UWILD may be credited with an outstanding to complete the remaining examination and NDT (as applicable) at the time of next rig move, but not later than next scheduled Drydocking Survey (or UWILD).

3.9 Incomplete UWILD over a Five-Year Period – Self-Elevating Drilling Units (2012)
Where a self-elevating drilling unit has been on same location without a move for a five year period, and therefore its two consecutive drydocking surveys could not be completed within that five year cycle, the drilling unit will be considered a site-specific offshore installation and compliance with the ABS Rules for Building and Classing Offshore Installation (Offshore Installation Rules) will be required.

Under the above mentioned circumstances, in order to accept the completion of the UWILD and to maintain classification of the unit as a mobile offshore drill unit, compliance with 3-2-2/7.13 of the Offshore Installation Rules will be required and necessary data is to be submitted to ABS for review.

3.11 Alternatives (2016)
ABS is prepared to consider alternatives to the above guidelines and would be pleased to consult with interested clients concerning means and details for accomplishing results no less effective.

Requirements and guidance for the use of Remotely Operated Vehicle (ROV) during a UWILD are explained in 7-2-6/3.11.1 and are considered part of a typical alternative procedure.

3.11.1 UWILD with ROVs
Provided the underwater conditions are suitable for a meaningful examination and the same is agreed upon by the attending Surveyor, the General Visual Inspection (GVI) process of the UWILD can be carried out by a ROV in lieu of divers.

However, if the attending Surveyor does not consider the visual examination by the ROV to be equivalent to that by a diver, then the examination by a diver is to be carried out prior to the crediting of the UWILD. If the ROV examination is not considered to be sufficient for determining the condition of the hull, services of a diver are to be provided.

Following are typical disadvantages to be considered for use of ROV during UWILD.

- Depending on the amount of marine growth on the hull, sufficient cleaning may not be possible when only ROV is used.
- Large size ROVs tend to have difficulty working at shallow water depths, due to swells and excessive movement.
- Not all ROVs are able to clean sea chest grids for a meaningful visual examination.
- Not all ROVs are capable of properly recording the UWILD by photographic images or video.

Where the use of ROV was allowed by the attending Surveyor and underwater examination was satisfactorily but partly carried out in way of accessible areas of the unit, remaining survey items
of the UWILD are to be carried out with a recognized diving company, in the presence of the attending Surveyor.

Where Close Visual Inspection (CVI) is required during a UWILD, the use of ROV may be allowed on a case-by-case basis.

The use of ROV for underwater Nondestructive Testing (NDT) and Gauging may be allowed only when agreed upon by ABS on a case-by-case basis. The use of ROV for underwater NDT and/or Gauging for crediting UWILD is to be also agreed upon by the attending Surveyor.
PART 7

CHAPTER 2 Surveys After Construction

SECTION 7 Specific Survey on Self-Elevating Units After Ocean Transit Tow (2012)

1 Ocean Transit Wet Tow

There is no ABS requirement to survey the drilling unit before the tow. A specific survey is to be carried out on self-elevating drilling units after the completion of an ocean transit wet tow.

This survey should be carried out prior to elevating the unit and should include a comprehensive visual examination of the structure, including helicopter support structure, as well as surface Nondestructive Testing (NDT) of critical structural areas.

If the survey is carried out by the Owner and damage is found which affects or may affect classification, ABS is to be notified and arrangements are to be made for survey. If the survey is carried out by the Owner and no damage is found which affect or may affect classification, ABS is to be advised of the details of the tow, and a confirmation survey will be made at the next periodical survey.

3 Ocean Transit Dry Tow

There is no ABS requirement to survey the drilling unit before the tow. An overall survey is to be carried out on self-elevating drilling units after the completion of an ocean transit dry tow.

This overall survey should be carried out prior to elevating the unit and should include a visual examination of the structure, including helicopter support structure, as well as surface Nondestructive Testing (NDT) of critical structural areas, as deemed necessary.

If a survey is carried out by the Owner and damage is found which affects or may affect classification, ABS is to be notified and arrangements are to be made for survey equivalent to 7-2-7/1 of these Rules.

If a survey is carried out by the Owner and no damage is found which affect or may affect classification, onboard records are to be available to the Surveyor at next periodical survey.
Surveys are to be carried out in accordance with applicable paragraphs of the latest edition of the ABS Rules for Survey After Construction (Part 7), as applicable to vessels constructed in accordance with the Steel Vessel Rules. However, due to low running hours on tail shafts of drilling units, the interval between tail shaft surveys may be extended based on the following being to the satisfaction of the Surveyor:

i) Diver’s external examination of stern bearing and outboard seal area, including weardown check as far as is possible.

ii) Internal examination of the shaft area (inboard seals) in propulsion room(s).

iii) Confirmation of lubricating oil records (satisfactory oil loss rate, no evidence of unacceptable contamination).

iv) Shaft seal elements are examined/replaced in accordance with the seal manufacturer’s recommendations.
PART 7

CHAPTER 2 Surveys After Construction

SECTION 9 Boiler Surveys

1 Parts to be Examined

1.1 Internal and External Examination
At each survey, the boilers, superheaters and economizers are to be examined internally (water-steam side) and externally (fire side).

1.3 Mountings and Safety Valves
Boiler mountings and safety valves are to be examined at each survey and opened as considered necessary by the Surveyor.

1.5 Operation of the Safety Valves
The proper operation of the safety valves is to be confirmed at each survey.

1.7 Hydrostatic Pressure Testing
When considered necessary by the Surveyors, the boilers and superheaters are to be subjected to hydrostatic pressure test.
PART 7

CHAPTER 2 Surveys After Construction

SECTION 10 Automatic and Remote-control Systems

1 Annual Survey

At twelve month intervals from the date of installation, a survey is to be carried out during which a general examination of the automatic and remote-control system is to be made. The examination is to be made with a generator in operation and the control system energized to permit random checking of function indicators, alarms and such control actuators as may be operational. The Surveyor is to examine the machinery records to check the performance of the control system throughout the period since the last survey and to establish if there has been any abnormal functioning or failures and what corrective measures had been taken to preclude their recurrence. The machinery-space fire-detecting and bilge water-level alarms are to be checked for performance.

3 Special Periodical Surveys

Special periodical surveys are to be carried out at intervals of five years from the date of installation and are to include compliance with all requirements for Annual Surveys and with those that follow.

3.1 Control Actuators

All mechanical, hydraulic, and pneumatic control actuators and their power systems are to be examined and tested as considered necessary.

3.3 Electrical

The insulation resistance of the windings of electrical control motors or actuators is to be measured, with all circuits of different voltages above ground being tested separately, and is to be on the order of one-half to one megohm.

3.5 Unattended Plants

Control systems for unattended machinery spaces are to be subjected to dock trials at reduced power on the propulsion engine to check the proper performance of all automatic functions, alarms, and safety systems.

5 Repairs or Alterations

Major repairs or alterations to the automatic and remote-control systems are to be made, in accordance with approved plans, under the supervision and to the satisfaction of the Surveyor.
2. Survey After Construction

11. Crew Habitability (2016)

1. Annual Surveys

The following information is to be reviewed by the attending ABS Surveyor for issues that could affect the MODU Habitability notation (HAB(MODU), HAB+(MODU), or HAB++(MODU)).

i) Maintenance and Operations logs since the previous Initial, Annual or Special Periodical Survey, if any

ii) Fire, repair and damage reports since the previous Initial, Annual or Special Periodical Survey, if any

iii) A list of all structural or mechanical modifications to the drilling unit since the previous Initial, Annual or Special Periodical Survey, if any

iv) Verification that equipment and facilities continue to be fit for purpose and are operating in accordance with the criteria stated within the ABS Guide for Crew Habitability on Mobile Offshore Drilling Units (referred to as “the Guide” hereinafter)

During the attending ABS Surveyor’s review of the submitted information, a determination will be made as to whether changes or alterations have taken place that could affect the MODU Habitability notation. As a result, the drilling unit may be subject to the review, ambient environmental testing, and inspection requirements of the Guide.

3. Special Periodic Surveys

3.1. Survey Requirements

The Survey is to be comprised of ABS Engineering reviews, ABS Surveyor accommodation verifications, and witnessing of ambient environmental testing. The Survey will cover all applicable habitability aspects.

The following is to be submitted to ABS three (3) months prior to carrying out the ambient environmental testing:

i) Fire, repair or damage reports since previous Annual Survey, if any

ii) A list of all structural or mechanical modifications to the drilling unit since previous Annual Survey, if any

iii) Drawings/arrangements of personnel spaces, HVAC, electrical, etc., affected by alterations, if any

iv) Copies of the approved Initial Test Plans and Test Reports

v) Copies of Test Plans and Test Reports resulting from Annual Surveys, if any

vi) Previous Special Periodical Survey Test Plans and Reports

The Special Periodical Survey data submittal serves three purposes. The first is to perform an ABS Engineering review of personnel spaces against any alterations to the drilling unit related to the criteria in Appendix 3 of the Guide since the Initial Survey, with measurements verified by an ABS Surveyor. The second purpose is to provide a history of ambient environmental testing, as well as the Special Periodical Survey ambient environmental Test Plans for review and approval by ABS Engineering. The third is to allow scheduling of measurement verifications and ambient environmental testing by ABS Surveyor.

A Special Periodical Survey Test Plan for each ambient environmental aspect of Habitability is to be submitted in accordance with the criteria stated below. The approved Initial Test Plans should be used as a basis for creating the Special Periodical Survey Test Plans.

For creation of the Special Periodical Survey Test Plans, Subsection 6, “Test Plan”, and Subsection 7, “Test Requirements”, of Section 3 through 6 of the Guide specify the requirements for each ambient environmental aspect (i.e., 3/6, 3/7, 4/6, 4/7, etc.). For specifying measurement locations for the Special Periodical Survey Test Plans, the following changes to 7.4.1, “Selection of Spaces where Measurements are to be Conducted”, of each ambient environmental aspect of Habitability is to be followed:

i) Measurements are to be taken in all areas affected by alterations, if any. Measurements are limited to the ambient environmental aspect affected by the alteration. For example, structural changes require both whole-body vibration and noise measurements. Structural changes do not necessarily require indoor climate or lighting measurements. Changes to luminaires require lighting measurements but not whole-body vibration, noise, or indoor climate measurements.

ii) For all ambient environmental aspects, measurements are to be taken in all worst case or problem area locations based on the requirements set forth in 7.4.1, “Selection of Spaces where Measurements are to be Conducted”, of the appropriate Section of the Guide. [For example, worst case for whole-body vibration is described in 3/7.4.1i].

iii) For all ambient environmental aspects, measurements are to be taken in twenty-five (25) percent of personnel cabins identified in the initial Test Plans. Any worst case locations can be considered part of the representative sample for personnel cabins, if applicable.

iv) For all ambient environmental aspects, measurements are to be taken where a single instance of one (1) type of a manned space exists within the drilling unit (e.g., bridge, radio room, officer’s mess, gymnasium, library, etc.). The worst case locations can be considered part of the single instance representative sample, if applicable.

v) Where multiple instances of the same type space exist, a representative sample of at least twenty-five (25) percent of each type is to be selected for measurement for all ambient environmental aspects. The worst case locations are to be considered part of the representative sample, if applicable.

For all ambient environmental conditions, visual/walk-through inspections are to be conducted in accordance with 7.4.2 of the appropriate Section of the Guide.

5 Requirements for Vessel Alterations

No alterations which affect or may affect the MODU Habitability notation awarded (HAB(MODU), HAB+(MODU), or HAB++(MODU)), including alterations to the structure, machinery, electrical systems, piping, furnishings or lighting systems, are to be made to the drilling unit unless plans of the proposed alterations are submitted to and approved by ABS before the work of alteration is commenced. If ABS determines that the alteration will affect the MODU Habitability notation, the altered drilling unit may be subject to the review, verification, and ambient environmental testing requirements of the Guide.
PART 7

CHAPTER 2 Surveys After Construction

APPENDIX 1 Lay-up and Reactivation of Laid-up Mobile Offshore Drilling Units (1 July 2016)

1 Lay-up of Mobile Offshore Drilling Units

Upon the owner’s written notification to ABS of a unit’s lay-up, the unit’s life cycle status and the Record will be updated to reflect the change in status. Surveys due during lay-up will be held in abeyance until the unit reactivates, at which time the surveys are to be brought up to date.

1.1 Optional Verification of Lay-up

At the Owner’s request, ABS will review, survey, and confirm the actions taken to preserve and protect a unit while in lay-up. The ABS Guide for Lay-up and Reactivation of Mobile Offshore Drilling Units contains detailed guidance for Lay-up Procedures, along with the requirements for Initial Verification Surveys and Annual Surveys.

3 Reactivation of Mobile Offshore Drilling Units

For units returning to service from lay-up, regardless of whether ABS has been informed that the unit has been in lay-up or whether lay-up preparations have been reviewed by ABS, a Reactivation Survey is required. ABS is to be contacted for details of the requirements.

The Reactivation Survey requirements for the unit are subject to special considerations based on the survey status at the time of the commencement of lay-up, the length of the lay-up period, and the conditions under which the unit has been maintained during that period. Additional information relating to Reactivation Surveys can be found in the ABS Guide for Lay-up and Reactivation of Mobile Offshore Drilling Units.


PART 7

CHAPTER 2 Surveys After Construction

APPENDIX 2 Survey of Portable Modules (2016)

1 General

Where a portable module is installed onboard a drilling unit, it is to be subjected to survey in presence of and to the satisfaction of the attending Surveyor. See 6-1-2/11.

3 Survey of Portable Accommodation Modules (1 July 2017)

The Survey of portable accommodation modules is to be carried out in accordance with Section 5 of the ABS Guide for Portable Accommodation Modules to verify satisfactory condition of the structure, piping, electrical, fire-fighting and life-saving equipment.

Modules constructed on or after 15 January 2013, or existing modules installed onboard ABS classed units after 1 January 2018, are to comply with the requirements of the ABS Guide for Portable Accommodation Modules (PAM Guide). Refer to Subsection 1/5 of the PAM Guide.

5 Survey of Portable Industrial Modules

Survey of portable industrial modules is to be carried out to verify satisfactory condition of the structure, piping, and electrical equipment. The following are to be confirmed:

i) The portable industrial module is free of any physical damage that may affect its strength and effectiveness of its service.

ii) Material used for flooring, ceiling, linings, etc. that is included in the interior of the portable industrial module is in compliance with a similar standard as that applied to the main accommodation spaces on the drilling unit.

iii) The portable industrial module is secured onboard the deck by means of welding. Means of securing other than welding may be accepted provided efficiency of tie downs are design reviewed by ABS.

iv) Boundaries of the portable industrial module are constructed (and insulated where necessary) of suitable material to withstand equal level of fire protection in the area where other service spaces are installed. See Section 5-1-1.

v) Access doors to and from the portable industrial module are of self-closing type, opening to the outside, unobstructed by any means, without any hold-back device, and rated to withstand equal level of fire protection of the module.

vi) The portable industrial module is provided with suitable fire or smoke detection system.

vii) The portable industrial module is provided with suitable number of general alarms bells. If the external alarms of the general alarm and public address system are audible from inside the portable industrial module during normal operation of the unit, installation of an internal system may be waived.

viii) The portable industrial module is to be maintained at overpressure relative to external areas. Ventilation inlet(s) and outlet(s) are located in non-hazardous areas.

ix) Piping of the portable industrial module is connected to the drilling unit’s piping system(s), and cross-connections do not affect the safety of the drilling unit. Under no circumstances, are drain pipes of modules to be connected to any hazardous drain of the drill unit.
The portable industrial module is located to provide easy and protected access to all escape routes that lead to designated embarkation stations. The term “easy and protected” will be interpreted as routes that provide protection from falling objects; heat from well fire; a walk path without any structural, mechanical or electrical obstruction; and efficiently illuminated with main and emergency power system.

All connections and/or penetrations on the portable industrial module for unit supplied piping and/or electrical systems maintain the original integrity of the portable industrial module, and these connections and/or penetrations are in compliance with a recognized standard.

Where the portable industrial module is located on the open deck of a surface unit and may be subjected to wave impact loading, efficiency of the quarter is design reviewed by ABS.

(1 July 2017) For units contracted on or after 1 January 2012, and all units after 1 January 2021, where the portable industrial module is located adjacent to hazardous areas and contains spaces such as an office, service spaces, or control stations, an engineering evaluation of the fire protection and blast resistance is to be carried out. Refer to 5-1-1/5.1 of the MODU Rules.

7 Certification of Drilling Unit Fitted with Portable Industrial Modules

The drilling unit’s life-saving plan is to be amended to indicate installation and location of additional portable industrial modules. The attending Surveyor is to endorse the onboard life-saving plan to indicate ABS verification.
1 **General**

An existing self-elevating drilling unit (SEDU) may be modified to become a site-specific fixed offshore unit and used for purposes of oil/gas production, storage or both. Depending upon the requested classification, the modified unit may need to comply with one or more of the Rules/Guides listed under 7-2-A3/3.

Before ABS commences any work associated with the modification, the owner is to submit a signed request for class for ABS’s review and signing of the service agreement.

3 **Application**

One or more of the following Rules/Guides may be applicable to the modification:

3.1 **Rules for Building and Classing Offshore Installations (Offshore Installation Rules)**

This Rule is applied if the unit is modified to become a site-specific fixed offshore unit, without its hull jacking system, marine systems, safety systems and any of the production/process and/or storage system classed by ABS. Only the main hull structure is considered within ABS scope of service.

3.3 **Rules for Building and Classing Mobile Offshore Drilling Units (MODU Rules)**

This Rule is applied if the unit is modified to become a site-specific mobile offshore unit, without its marine systems, safety systems and any of the production/process and/or storage system classed by ABS. Only the main hull structure and its jacking system is considered within ABS scope of service.

3.5 **Rules for Building and Classing Floating Production Installations (FPI Rules)**

This Rule is applied if the unit’s topside production/process system is also requested to be classed by ABS. The safety systems, particularly suitability of electrical equipment in hazardous areas, fixed and portable fire extinguishing systems, fire and gas detection systems, and fire protection system is to be in compliance with this Rule.

3.7 **Rules for Building and Classing Facilities on Offshore Installations (Facilities Rules)**

This Rule is applied if the unit’s topside production/process system is also requested to be classed by ABS. The production/process systems are to be in compliance with this Rule.


This Guide is applied if the unit is modified to become a site-specific offshore LNG terminal.
5 **Modification Survey**

Modification survey is to be carried out as instructed by ABS and in accordance with ABS approved drawings. In general, following applicable surveys are to be completed during the modification:

5.1 **Hull**

The SEDU is to be placed in a dry-dock (UWILD is not allowed) to carry out following hull surveys:

i) **Annual Survey – Hull.** Annual Survey – Hull is to be carried out in accordance with 7-2-4/1 of these Rules.

ii) **Drydocking Survey.** Unit’s hull is to be subjected to visual examination and NDT, as applicable and in accordance with Section 7-2-6 of these Rules. Non-hull items associated with Annual Hull Survey are not required.

iii) **Special Periodical Survey – Hull.** Unit’s hull is to be subjected to visual examination, close-up survey, extensive NDT, and gauging, as applicable and in accordance with Section 7-2-5 of these Rules. Non-hull items associated with Special Periodical Survey are not required.

5.3 **Jacking System**

Where the unit is modified to become a fixed installation, and if none of its non-structural items are to be classed, and if the jacking system is only to be used once during the initial jacking of the unit on site, jacking system survey may be excluded from ABS’s scope of classification work. Condition of the jacking system, its capability of jacking and satisfactory operation will not be the responsibility of ABS.

5.5 **Marine and Safety Systems**

Where the unit is modified to become a fixed installation, and if its marine and safety systems serving the entire installation are requested to be classed by the Owner, ABS’s scope of classification work is to include the marine and safety systems and compliance with applicable ABS Rules and/or Guides, as referenced in 7-2-A3/3, is required.

A special note will be entered into ABS Record regarding the extent of services and the required Survey After Construction.

5.7 **Topside Systems**

Where the unit is modified to become a fixed installation, and if its topside systems serving the entire installation are requested to be classed by the Owner, ABS’s scope of classification work is to include the requested topside systems and compliance with applicable ABS Rules and/or Guides, as referenced in Subsection 7-2-A3/3, is required.

Where topside systems are classed, compliance with 7-2-A3/5.5 is a prerequisite.

Recommended class designation will be in accordance with either the ABS *Rules for Building and Classing Offshore Installations (Offshore Installation Rules)* or the ABS *Guide for Building and Classing Floating Offshore Liquefied Gas Terminals (FLGT Guide)*, as applicable.

A special note will be entered into ABS *Record* regarding the extent of services and the required Survey After Construction.
1 General

The intent of the ABS Preventative Maintenance Program (PMP) is for Owners to maintain their drilling units with updated machinery maintenance practices, which may increase a unit’s reliability and/or operational availability, hence possible reduction in operational down-time. Properly executed PMP may also show that major overhaul or replacement cycles machinery can be greater than five years, provided this is proven by design criteria and satisfactory maintenance without premature failure.

Where specifically requested by the Owner, any machinery item that has rotating or mobile components and is subjected to surveys after construction for maintenance of ABS classification of a unit, and its working condition can be periodically monitored by suitable means and properly recorded may be enrolled into ABS PMP.

Machinery components/items that have static components (not rotating or mobile components) and are usually subjected to visual examination and/or testing by suitable means, and not covered under a maintenance system, will be outside the scope of ABS PMP. Such machinery items will be subjected to surveys after construction in accordance with applicable requirements of the MODU Rules.

While ABS PMP may be applied to machinery items that are within the scope of classification, operational testing of all machinery items in accordance with applicable rules, is to be carried out during periodic class surveys in presence of and to the satisfaction of the attending Surveyor.

Requirements of ABS PMP may not be applicable to machinery that is outside the scope of classification, where specific periodic inspection and testing of such machinery is required to be carried out by ABS on behalf of the drilling unit's flag State Administration.

Few explanatory examples are noted below:

- ABS PMP will not be applicable to rule required visual examination and testing of static machinery items/parts such as piping, valves, pressure vessels of any kind, electrical cables, etc.
- Scope of ABS PMP will not be extended to the structural foundation/supports of the machinery that is enrolled into ABS PMP.
- A fire pump may be enrolled into ABS PMP, however annual operational/capacity testing of the pump, as part of the fixed fire extinguishing system, is to be carried out in presence of ABS no matter what the pump's maintenance records indicate.
- Machinery items of an oily water separating system cannot be enrolled into ABS PMP since these items are outside the scope of classification and subjected to MARPOL requirements.
- Machinery items of any life-saving appliances (such as winches for lifeboats) cannot be enrolled into ABS PMP since these items are outside the scope of classification and subjected to SOLAS and IMO MODU Code requirements.
- Rotating machinery items of lifting appliances (such as deck cranes) may be enrolled into ABS PMP only if the lifting appliance is classed with the CRC notation.
Maintenance of machinery in accordance with ABS agreed PMP, can be based either on a Preventative Maintenance (PM) plan or Condition Monitoring (CM) plan, or any combination thereof. A PM or CM plans can also be developed based upon Reliability Centered Maintenance (RCM) process.

See 7-2-A4/Figure 1, which shows a typical configuration of machinery items enrolled into PMP while remaining machinery are either not enrolled into PMP or to be surveyed without any maintenance program and in accordance with applicable ABS rules.

Example:  Not all machinery on the drilling unit named “WXYZ” is classed per the applicable ABS Rules/Guides. The owner decided to enroll some of the machinery items into PMP using PM and CM plans. PM for certain machinery items were developed using RCM process. CM for certain machinery were also developed using RCM process. The remaining classed machinery items will be surveyed either under SPS or CMS. The drilling unit will be classed with the “PMP” notation and will also have an additional “RCM” notation for applicable systems.

A unit of any age may be eligible to enroll into PMP. An existing unit applying for entrance into the program will be subject to ABS’s review of the unit’s records to ascertain the historical performance of the machinery to be enrolled into maintenance plans under PMP, and provided there is no historical problem related to the maintenance of the machinery, request for enrollment will be considered eligible.

PMP does not supersede the judgment of an ABS Surveyor, or waives attendance of ABS Surveyor(s) for damage, or where attendance is required by the MODU Rules, as explained in subsequent sections of this Appendix.

The reference to an ABS recognized condition monitoring company refers to those companies whom ABS has identified as an external Recognized Specialist.

Note:  ABS’s website “http://www.eagle.org/” contains listing of ABS approved condition monitoring firms, which is located under the “Resources / Equipment & Supplier Listings / Recognized Specialists” menu.

1.1 Definitions

Machinery – The term “machinery” used throughout this Appendix means any mechanical or electrical equipment and/or machinery item that is part of a non-structural system. All machinery items required to be surveyed to maintain classification of a drilling unit will be listed in ABS Survey Manager of each unit.

Note:  ABS Survey Manager Survey Status shows machinery items under the “Parts List”.

Preventative Maintenance Program (PMP) – A program that consists of Planned Maintenance and/or Condition Monitoring plans. PMP is only applicable to machinery that has moving/rotating parts and not to static machinery parts such as electrical cables, piping, pressure vessels, switchboards, etc. Static machinery parts that are not normally subjected to any preventative maintenance will be subjected periodic inspection,
as required by the MODU Rules, in presence of and to satisfaction of the attending Surveyor. PMP of a machinery may or may not be supported by an ABS approved Reliability Centered Maintenance process.

**Planned Maintenance (PM)** – A PMP with a maintenance plan that uses time-based inspection, part replacement and/or overhauls in an effort to prevent machinery failures. Timing can be based on calendar days, cycles counter or equipment running hours. Such schedules are generally established by the machinery manufacturer or the owner, and normally include lubrication servicing; filter, bearing and seal replacements; as well as major overhaul.

**Condition Monitoring (CM)** – A PMP with a maintenance plan that uses various technologies to determine the condition of equipment, at a specific moment in time, using minimal or non-invasive means. Common tools used in condition monitoring are vibration analysis, oil analysis, ferrography, thermography, electric current wave form analysis and boroscopic examination. Supplemental technologies, such as demodulation, ultrasonic analysis, shock-pulse, spike-energy, HFD, etc., for CM of roller bearing element, may be used in addition to vibration analysis. An advanced means of CM is Condition-based Maintenance (CbM), which is defined below.

**Condition-based Maintenance (CbM)** – This is a CM plan. However, CbM is conducted on a frequent or real-time basis, to determine when part replacement or other corrective action is required. This process involves establishing a baseline and operating parameters, then frequently monitoring the machine and comparing any changes in operating conditions to the baseline. Repairs or replacement of parts are carried out before the machinery fails based upon the use of the tools prescribed for CM.

**Reliability Centered Maintenance (RCM)** – See 7-2-A5/1.1.

### 1.3 PMP Additional Notation

The **PMP** additional notation added to the Record indicates compliance with the ABS Preventative Maintenance Program (PMP) on one or more pieces of classed machinery onboard the unit.

#### 1.3.1 PMP Surveys

All machinery items covered by either a PM and/or CM plan will be surveyed in accordance with the **MODU Rules** during Annual Surveys and Special Periodical or Special Continuous Surveys, and requirements of this Appendix. Machinery not covered by PMP are to be surveyed in accordance with Annual Survey and Special Periodical Survey requirements contained in previous sections of Part 7, Chapter 2 of these Rules.

#### 1.3.2 PMP Indicators

An individual classed machinery item listed in Survey Status of a unit that has enrolled into ABS PMP will have “PM”, “CM”, or “CbM” indicator, as applicable.

### 1.5 Cancellation of PMP

The survey arrangement for equipment or machinery under the PMP may be cancelled by ABS if the program is not being satisfactorily carried out, as a result of insufficient maintenance records, lack of knowledge by the crew of the unit’s program, the general condition of the equipment or machinery, or agreed intervals between overhauls are exceeded resulting in the annual survey not being completed within the survey window as required.

Sale, change of unit management, change of Recognized Specialists, or transfer of class is to be cause for reconsideration of the approval. If more than one occurs, the current plan will be cancelled and a new plan will be required for ABS’ approval.

The Owner may cancel the survey arrangement for equipment or machinery under the PMP by informing ABS in writing. For this case, items which have been inspected under the program since the last Annual Survey may be credited for class at the discretion of the Surveyor.

### 3 PMP Compliance Criteria

For a PMP to be accepted, the following conditions are to be complied with.
3.1 **Surveys (2018)**

Surveys related to the unit are to be up-to-date, without outstanding recommendations which would affect the implementation of PMP. Where an outstanding recommendation exists, after satisfactory repairs have been performed on the equipment or machinery, ABS attendance is required as part of the implementation survey of PMP.

A unit with its equipment or machinery enrolled in the PMP is to be on a Special Continuous Survey cycle.

3.3 **Maintenance and ABS Survey Intervals**

Maintenance is to be carried out on the basis of intervals between overhauls recommended by the manufacturer of equipment or machinery, documented owner’s experience and/or a condition monitoring system, where applied.

In general, survey intervals for the PMP are not to exceed those specified for Special Periodical Survey. However, for components where the maintenance is based on running hours or number of cycles, longer intervals may be accepted as long as the intervals are based on the manufacturer’s or owner’s recommendations. In addition, if an approved PMP is in effect, the opening of individual items of equipment or machinery may not be required during the regular five-year cycle, based on satisfactory results recorded within the applied PMP.

*Note:* For example, while ABS carries out PMP Annual Confirmation Survey and issues a class certificate valid for five years, equipment or machinery enrolled into PMP may not require intrusive surveys every five years and follow the frequency recommended in the maintenance program, which could be shorter or longer than five years.

3.5 **Computerized Maintenance Management Systems**

The activities of the PMP are to be programmed into the Computerized Maintenance Management System (CMMS) and the history of all maintenance tasks are to be recorded and stored in the CMMS by the unit’s Owner. These systems must include back-up devices, such as removable hard drives, thumb drives, CD-ROMs or remote on-line back-up systems and are updated at regular intervals. Details of the system are to be reviewed by the attending Surveyor during the implementation survey and during Annual Confirmation Surveys.

5 **Program Description**

For general requirements, implementation, and other aspects of Planned Maintenance (PM) and Condition Monitoring (CM) plans, refer to 7-2-A4/5.1 through 7-2-A4/5.7 below.

5.1 **General**

5.1.1 Enrollment into PM

To enroll equipment or machinery into PM, a comprehensive plan is to be submitted to the attending Surveyor for review prior to conducting an implementation survey onboard the unit.

5.1.2 Enrollment into CM

To enroll equipment or machinery into CM, the required documentation is to be submitted to the responsible ABS Engineering for review, preferably prior to conducting an implementation survey onboard the unit. The implementation survey can only be credited upon satisfactory completion of review by ABS Engineering.

5.3 **Implementation Surveys**

Once the implementation survey is satisfactorily completed, a survey report confirming the implementation of the PM and/or CM plan(s) will be issued by the attending ABS Surveyor, and the plan(s) may be put into service.

5.3.1 Implementation of PM

The requirements for the implementation survey are provided in 7-2-A4/9.3 of these Rules.
5.3.2 Implementation of CM

The requirements for the implementation survey are provided in 7-2-A4/11.3 of these Rules.

5.5 ABS Survey Status Indicators

The owner is to communicate with the attending Surveyor to ensure that the Survey Status for a unit shows the correct indicators for all listed equipment or machinery.

5.5.1 Indicators for PM

When the implementation survey is satisfactorily completed, the attending Surveyor will inform ABS regarding equipment or machinery items to be covered by a PM plan and to be shown by a “PM” indicator in Survey Status.

5.5.2 Indicators for CM

When the implementation survey is satisfactorily completed, the attending Surveyor will inform ABS regarding equipment or machinery items to be covered by a CM plan and to be shown by a “CM” indicator in Survey Status.

5.7 Maintenance of Onboard Documentation

The Offshore Installation Manager (OIM) or the Chief Engineer shall be ultimately responsible for maintenance of onboard documents and records associated with PMP. If a computerized system is used for updating the maintenance documentation and maintenance program, access is to be permitted only by the OIM, Chief Engineer or other authorized person(s).

Additional requirements for onboard documentation are provided in 7-2-A4/9.7 (for PM plans) or 7-2-A4/11.7 (for CM plans).

7 Overhauls and Damage Repairs

After an overhaul or a damage repair to a machinery enrolled into PMP, following requirements are to be complied with.

7.1 Overhauls

For machinery enrolled into a CM plan, following an overhaul, new baseline data is to be recorded in the presence of an ABS recognized condition monitoring company as soon as possible. Recording of the new baseline data is to be done either before the next Annual Confirmation Survey or within six months, whichever date is sooner, and is to be included in the Annual Report. Documentation on overhauls of machinery items covered by PMP is to be reported and signed by the OIM, Chief Engineer or other authorized person(s).

7.3 Damage Repairs

Any damage to equipment or machinery enrolled into ABS PMP is to be reported to ABS. If damaged equipment or machinery is replaced, the new equipment or machinery is to meet the requirements of the rules applicable to the unit. Any replacement or repair carried out due to damage is to be recorded and same verified by the attending Surveyor.

Records of all damages, replacement and/or repairs are to be readily available and verified by the attending Surveyor during Annual Surveys, unless ABS requires verification at earliest.

When there is an overdue outstanding recommendations or a record of unrepaired damage that affects PMP, relevant items are to be removed from the program until the recommendation is satisfactorily rectified or the repair carried out to the satisfaction of the attending Surveyor.

9 Planned Maintenance (PM)

PM is to comply with subsequent paragraphs of subsection 7-2-A4/9.
9.1 Machinery Items not Allowed on PM
Owners may conduct PM on any item of machinery. However, following typical items, which are normally listed under unit’s “Machinery Parts” in the Survey Status, cannot be enrolled into an ABS PM plan.

9.1.1 Marine and Safety Systems (on all types of units)
i) Operational testing of all marine and safety systems (including systems such as the ballast, bilge, active fire extinguishing, fire and gas detection, general alarm, public address, fuel oil transfer, power generation, propulsion, etc.)
ii) Visual examination and/or testing of semi-portable and portable fire-extinguishing equipment, and fire hoses.
iii) Visual examination and/or testing of components associated with fixed gas smothering system.
iv) Visual examination and/or testing of breathing apparatus, fireman’s outfits and the international shore connection.
v) Visual examination and/or testing of arrangements for remote safety shutdown system.
vi) Visual examination and/or testing of rig’s Emergency Shut-Down (ESD) system.
vii) Visual examination and/or testing of components associated with the general alarm and public address systems.
viii) Visual examination and/or testing of electrical machinery installed in hazardous areas, together with verification of associated alarms and shutdowns.
ix) Visual examination and/or testing of sea chests and ship-side valves.

9.1.2 Jacking System (on self-elevating units)
i) Visual examination and/or testing of jacking system machinery.
ii) Operational testing of jacking systems.

9.1.3 Anchoring and Mooring Systems (on units with respective ABS symbols and notations)
i) Operational testing of temporary anchoring system on units classed with \(\mathbb{C}\).
ii) Operational testing of mooring systems on units classed with \(\mathbb{M}\) or \(\mathbb{C}\), or any other assigned mooring notation (such as “TAM”).

9.1.4 Dynamic Positioning System (classed with any “DPS-” notation)
i) Thrusters (fixed or retractable)
ii) Operational testing of dynamic positioning system, including FMEA trials.

9.1.5 Drilling System
Refer to the ABS Guide for the Classification of Drilling Systems.

9.3 Implementation Survey for PM
Implementation survey for PM is to be carried out in accordance with 7-A-14/13.3 of the ABS Rules for Survey After Construction (Part 7).

9.5 Administrative Requirements for PM
The contents of the submitted PM plan and the Owner’s annual PM report requirements are to be in accordance with 7-A-14/13.5 of the ABS Rules for Survey After Construction (Part 7).

9.7 Onboard Documentation for PM
Documents required for PM are to be readily available onboard the unit and are listed in 7-A-14/13.7 of the ABS Rules for Survey After Construction (Part 7).
11 **Condition Monitoring (CM)**

CM is to comply with subsequent paragraphs of subsection 7-2-A4/11.

11.1 **Machinery Items not Allowed on CM**

Owners may conduct CM on any item of machinery. However, following typical items, which are normally listed under unit’s “Machinery Parts” in the Survey Status, cannot be enrolled into an ABS CM plan.

11.1.1 **Marine and Safety Systems (on all types of units)**

i) Operational testing of all marine and safety systems (including systems such as the ballast, bilge, active fire extinguishing, fire and gas detection, general alarm, public address, fuel oil transfer, power generation, propulsion, etc.)

ii) Visual examination and/or testing of semi-portable and portable fire-extinguishing equipment, and fire hoses.

iii) Visual examination and/or testing of components associated with fixed gas smothering system.

iv) Visual examination and/or testing of breathing apparatus, fireman’s outfits and the international shore connection.

v) Visual examination and/or testing of arrangements for remote safety shutdown system.

vi) Visual examination and/or testing of rig’s Emergency Shut-Down (ESD) system.

vii) Visual examination and/or testing of components associated with the general alarm and public address systems.

viii) Visual examination and/or testing of electrical machinery installed in hazardous areas, together with verification of associated alarms and shutdowns.

ix) Visual examination and/or testing of sea chests and ship-side valves.

11.1.2 **Jacking System (on self-elevating units)**

Operational testing of jacking systems.

11.1.3 **Anchoring and Mooring Systems (on units with respective ABS symbols and notations)**

i) Operational testing of temporary anchoring system on units classed with 

ii) Operational testing of mooring systems on units classed with or , or any other assigned mooring notation (such as “TAM”).

11.1.4 **Dynamic Positioning System (classed with any “DPS-” notation)**

Operational testing of dynamic positioning system, including FMEA trials.

11.1.5 **Drilling System**

Refer to the **ABS Guide for the Classification of Drilling Systems**.

11.3 **Implementation Survey for CM**

Implementation survey for PM is to be carried out in accordance with 7-A-14/15.3 of the ABS **Rules for Survey After Construction (Part 7)**.

11.5 **Administrative Requirements for CM**

The contents of the submitted PM plan and the Owner’s annual PM report requirements are to be in accordance with 7-A-14/15.5 of the ABS **Rules for Survey After Construction (Part 7)**.

11.7 **Onboard Documentation for CM**

Documents required for CM are to be readily available onboard the unit and are listed in 7-A-14/15.7 of the ABS **Rules for Survey After Construction (Part 7)**.
11.9 **Alternative Techniques for CM**
Application of techniques of CM other than those mentioned above will be specially considered.

13 **PMP Surveys and Reports**
The following requirements are to be followed on units having systems operating and surveyed under the ABS Preventative Maintenance Program (PMP).

13.1 **Annual Confirmation Surveys**
On units enrolled in a PMP and to maintain the PMP notation, an Annual Confirmation Survey is to be carried out by the attending Surveyor. This survey is to be carried out simultaneously with each Annual Survey of Machinery. The purpose of this survey is to verify that the program is being correctly operated and that the machinery has been functioning satisfactorily since the previous survey.

The survey is to at least include the following:

- **i)** A general examination of the machinery items enrolled into PMP is to be carried out.
- **ii)** The Surveyor is to review the owner’s annual report, and the required onboard documentation.
- **iii)** The performance and maintenance records are to be examined to verify that the machinery has functioned satisfactorily since the previous survey or action has been taken in response to machinery operating parameters which are outside acceptable tolerances and the overhaul intervals have been maintained.
- **iv)** Written details of breakdowns or malfunctions of equipment are to be made available.
- **v)** The description of repairs carried out is to be reviewed. Any machinery part, which has been replaced with a spare due to damage, is to be retained onboard, where possible, until examined by the attending Surveyor.
- **vi)** At the discretion of the Surveyor, operational function tests, testing of safety devices and/or trips, confirmatory surveys and random check readings, are to be carried out as far as practicable and reasonable.

13.3 **ABS Survey Report**
Satisfactory completion of Annual Confirmation Survey of PMP will enable attending Surveyor to credit the survey and acceptance of the ABS PMP for its continued use.

The Surveyor may credit to the current SPS or CMS cycle of any of the listed machinery item that were overhauled and tested in the presence of and to the satisfaction of the attending Surveyor. Additionally, any of the listed machinery item that have been overhauled in accordance with the ABS PMP schedule may be credited to the SPS or CMS cycle by the attending Surveyor after a satisfactory operational test.

Any machinery that has acceptable operating conditions as per the approved CM plan may also be credited to the current SPS or CMS cycle by the attending Surveyor after a satisfactory operational test.

13.3.1 **Owner's Annual Preventative Maintenance Report**
At time of the Annual Confirmation Survey, the unit’s qualified representative is to present to the attending Surveyor, an Annual PMP report via hard copy or approved alternative electronic formats containing the information detailed in 7-2-A4/9.5 (for PM plans), 7-2-A4/11.5 (for CM plans).

Owner's report is to be reviewed by the attending Surveyor for completeness and reported data/information. If the machinery included in the PMP has changed, this is to be stated in the report.

Any machinery to be added to the program is subject to the requirements of 7-2-A4/9.5 (for PM plans), 7-2-A4/11.5 (for CM plans) and approval by ABS.

While acceptance of additional machinery item(s) under PM plan can be done by the attending Surveyor, acceptance of item(s) under CM plan is to be carried out by ABS Engineering and the attending Surveyor.
Where machinery items are added to the PMP, ABS is to be advised and the unit’s Survey Status updated accordingly. When removing machinery from ABS PMP, ABS is to be advised and the unit’s Survey Status updated accordingly.

13.3.2 Alternative Electronic Formats

Owners may opt to submit their annual PMP reports in a portable electronic format (e.g., thumb drive, CD-ROM, or e-mail attachment), for review prior to or at the time of attendance onboard. Acceptable file types are those which are compatible with MS Word, MS Excel, and/or PDF. These reports are to contain all the required information. In addition, the owners are required to submit, annually, in hard copy, the following to the attending Surveyor:

i) A letter stating that the annual report is on an alternative electronic format and meets the requirements of ABS required format and file type.

ii) A summation and results of the annual vibration signatures or oil analysis (for machinery enrolled in a CM plan).

iii) A summation and analysis of all unscheduled maintenance and breakdowns of the machinery item(s) enrolled into PMP.

iv) Directions on how to retrieve the report from the alternative electronic format.
PART 7

CHAPTER 2 Surveys After Construction

APPENDIX 5 Reliability Centered Maintenance (RCM) (2016)

1 General

By using RCM principles, maintenance is evaluated and applied in a rational manner. Functional failures with the highest risk are identified and then focused on. Machinery items and their failure modes that will cause high-risk functional failures are identified for further analyses. Maintenance tasks and maintenance strategies that will reduce risk to acceptable levels are determined. Spare parts inventories are determined based on the maintenance tasks developed and a risk assessment. An RCM sustainment procedure is instituted to continually monitor and optimize maintenance. Accordingly, improved machinery and system reliability can be expected.

Note: Additional information and explanations on how to develop a RCM program can be found in the ABS Guide for Survey Based on Reliability Centered Maintenance (RCM Survey Guide), and the ABS Guidance Notes on Reliability Centered Maintenance (RCM Guidance Notes).

1.1 Definitions

Machinery – The term “machinery” used throughout this Appendix means any mechanical or electrical equipment and/or machinery item that is part of a non-structural system. All machinery items required to be surveyed to maintain classification of a drilling unit will be listed in ABS Survey Manager of each unit. Note: ABS Survey Manager Survey Status shows machinery items under the “Parts List”.

Reliability Centered Maintenance (RCM) – RCM is not defined as a PMP. RCM is a process that is used to determine the most effective approach to maintenance. It involves identifying actions that when taken will reduce the probability of failure and which actions are most cost effective. ABS has developed a maintenance program which uses RCM analysis of installed equipment to develop a PMP, a spare parts holdings list and includes a sustainment plan. Two different RCM maintenance strategies, the “reactive maintenance” and “one-time change” are explained below.

Reactive Maintenance – A RCM maintenance strategy in which machinery is run until failure before corrective action is taken. This is useful for items which are low-cost and have no impact on operational, environmental or safety concerns as a result of failure.

One-Time Change – A RCM maintenance strategy in which machinery or systems, that have been determined to present an unacceptable level of risk and have no potential mitigations, are replaced or significantly altered in order to provide an acceptable level of risk.

1.3 RCM Analysis

A RCM analysis as defined by the RCM Guidance Notes will generate additional types of maintenance tasks which are not previously defined by the Preventative Maintenance Program. In order to simplify the RCM program plan approval process, implementation survey and annual surveys, the following groupings of these tasks will be used to determine the applicable requirements:
TABLE 1
RCM Tasks (2016)

<table>
<thead>
<tr>
<th>PM Type Tasks</th>
<th>CM Type Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM</td>
<td>CM</td>
</tr>
<tr>
<td>Failure finding</td>
<td>Combination of PM and CM</td>
</tr>
<tr>
<td>Other applicable and effective tasks</td>
<td></td>
</tr>
</tbody>
</table>

3 RCM Additional Notations

Applicable RCM additional notation added to the Record indicates compliance with the ABS Reliability Centered Program on one or more pieces of equipment or machinery that have been enrolled in a PMP. Owner may select desired systems or equipment items for which a RCM analysis will be conducted and will be used to develop a PMP.

The RCM process is to be approved by an ABS engineering office. Upon completion of a satisfactory implementation survey, unit’s class certificate will be issued with an additional RCM notation, as appropriate, and this will be entered in the Record.

Where Owner elects to apply RCM to an operational subsystem of the rig, specific RCM notation will indicate the scope of ABS approved RCM. Such typical RCM notations are, but not limited to, RCM (AMS), RCM (CRC), RCM (DPS).

Note: System specific RCM additional notations are recorded similar to how other class additional notations such as "CRC", etc., are recorded by ABS. However, they will not be part of the class designation indicated on the class certificate of the vessel.

3.1 RCM for Propulsion System

On self-propelled units assigned with AMS notation, where an RCM analysis is carried out, and the resulting RCM is applied to the propulsion system, including as applicable: prime mover(s), reduction gears, shafting, propeller or other thrusting device, all auxiliary systems providing, cooling, control, electrical power, exhaust, fuel, lubrication and equipment related to the steering or other directional control system, the RCM Program will be assigned and distinguished in the Record with the class notation RCM (AMS).

3.3 RCM for Cranes

On units where deck cranes are classed with CRC notation, where an RCM analysis is carried out, and the resulting RCM is applied to the crane’s machinery, the RCM Program will be assigned and distinguished in the Record with the class notation RCM (CRC).

3.5 RCM for Dynamic Positioning System

On dynamically positioned units assigned with DPS-1, DPS-2 or DPS-3 notations, where an RCM analysis is carried out, and the resulting RCM is applied to the dynamic positioning system, including as applicable: prime mover(s), reduction gears, shafting, thrusters, all auxiliary systems providing, cooling, control, electrical power, exhaust, fuel, lubrication and equipment related to the dynamic positioning system, the RCM Program will be assigned and distinguished in the Record with the class notation RCM (DPS).

3.7 RCM Indicators

An individual classed machinery item listed in Survey Status of a unit that has enrolled into ABS PMP and used the RCM process for developing its PM or CM plan will also have an “RCM” indicator.

5 RCM Implementation Surveys

Implementation survey for RCM is to be carried out in accordance with 7-A-14/17.5 of the ABS Rules for Survey After Construction (Part 7).
7 **Administrative Requirements for RCM**

The contents of the submitted RCM and the Owner’s annual RCM report requirements are to be in accordance with 7-A-14/17.7 of the ABS *Rules for Survey After Construction (Part 7)*.

9 **Onboard Documentation for RCM**

Documents required for RCM are to be readily available onboard the unit and are listed in 7-A-14/17.9 of the ABS *Rules for Survey After Construction (Part 7)*.