NOTICE NO. 2 – December 2012

The following Rule Changes were approved by the ABS Rules Committee on 31 May 2012 and become EFFECTIVE AS OF 1 JANUARY 2013.

(See http://www.eagle.org for the consolidated version of the Rules for Building and Classing Mobile Offshore Drilling Units 2012, with all Notices and Corrigenda incorporated.)

Notes - The date in the parentheses means the date that the Rule becomes effective for new construction based on the contract date for construction. (See 1-1-4/3.3 of the ABS Rules for Conditions of Classification – Offshore Units and Structures (Part 1).)

PART 3 HULL CONSTRUCTION AND EQUIPMENT
CHAPTER 1 GENERAL
SECTION 3 ENVIRONMENTAL LOADINGS

(Revise 3-1-3/Table 1, as follows.)

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Values of $C_s$ (2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shapes or combinations of shapes which do not readily fall into the specified categories will be subject to special consideration.</td>
<td></td>
</tr>
<tr>
<td>Spherical</td>
<td>0.4</td>
</tr>
<tr>
<td>Cylindrical shapes (all sizes)</td>
<td>0.5</td>
</tr>
<tr>
<td>Hull (surface type)</td>
<td>1.0</td>
</tr>
<tr>
<td>Deck house</td>
<td>1.0</td>
</tr>
<tr>
<td>Isolated Structural shapes (cranes, angles, channels, beams, etc.)</td>
<td>1.5</td>
</tr>
<tr>
<td>Wires</td>
<td>1.2</td>
</tr>
<tr>
<td>Under deck areas (smooth surfaces)</td>
<td>1.0</td>
</tr>
<tr>
<td>Under deck areas (exposed beams and girders)</td>
<td>1.3</td>
</tr>
<tr>
<td>Small parts</td>
<td>1.4</td>
</tr>
<tr>
<td>Rig derrick (each face)</td>
<td>1.25</td>
</tr>
</tbody>
</table>
PART 3  HULL CONSTRUCTION AND EQUIPMENT
CHAPTER 1  GENERAL
APPENDIX 3  MATERIAL SELECTION FOR ABS GRADES OF HIGH STRENGTH QUENCHED AND TEMPERED STEEL (2013)

(Revise title of Appendix 3-1-A3, as shown above.)

(Revise Appendix 3-1-A3, as follows.)

1  General

Specific requirements described in this Appendix, together with the general requirements in Sections 2-1-1, 2-1-2 and 2-1-3 of the ABS Rules for Materials and Welding (Part 2), are applicable to ABS high strength quenched and tempered steel plates. Steel product shapes other than plates, such as sections and tubulars, are subject to special considerations.

For material selection, steels are grouped in six categories of 43, 47, 51, 56, 63 and 70 based on the level of yield strength (see 3-1-A3/Table 1). Each category combined with four different alphabetic indicators of AQ, DQ, EQ and FQ according to the Charpy V-notch impact test temperature (see 3-1-A3/Table 2) to designate the steel grades. For example, Grade AQ43 indicates the steel of yield strength of 420 N/mm² (43 kgf/mm², 61 ksi) given the test temperature of 0°C (32°F).

3-1-A3/Table 3 shows material selection guidelines for each structural element category for ABS Grades of Quenched and Tempered Steels.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Steel Category Based on Level of Yield Strength (2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>43</td>
</tr>
<tr>
<td>Yield Strength N/mm² (kgf/mm², ksi)</td>
<td>420</td>
</tr>
<tr>
<td></td>
<td>(43, 61)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>Steel Grade Suffix Based on Test Temperature (2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Suffix</td>
<td>AQ</td>
</tr>
<tr>
<td>Test Temperature °C (°F)</td>
<td>0 (32)</td>
</tr>
</tbody>
</table>

3  Chemical Composition (1996)

Ladle Analysis – The chemical composition is to be determined by the steel manufacturer on samples taken from each heat and is to conform to the applicable requirements of the grade of steel listed in 3-1-A3/Table 3. The steel is to be fully killed, and produced to fine grain practice.

The carbon equivalent ($C_{eq}$) or the cold cracking susceptibility ($P_{cr}$) for evaluating the weldability, unless otherwise specified by the purchaser, may be calculated from the ladle analysis in accordance with the following equation:
\[ P_{cm} = C + \frac{Si}{30} + \frac{Mn}{20} + \frac{Cu}{20} + \frac{Ni}{60} + \frac{Cr}{20} + \frac{Mo}{15} + \frac{V}{10} + 5B \% \]

\[ C_{eq} = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15} \% \]

Selection of \( C_{eq} \) or \( P_{cm} \) as well as its maximum value is a matter to be agreed between the fabricator and the steel mill when the steel is ordered.

5 Mechanical Properties

The tensile and Charpy V-notch impact properties are to be in accordance with 3-1-A3/Table 4. One tension test and one set of impact test specimens are to be obtained from each heat treated piece of material. Charpy V-notch impact test specimens may be obtained with their longitudinal axis either longitudinal or transverse to the final direction of rolling at the option of the steel manufacturer unless a specific orientation is specified.

7 Heat Treatment

These steels are to be furnished in the quenched and tempered condition. Alternatively, the following processes may be considered as substitutes for the quenching and tempering.

1. Thermomechanical controlled process.
2. Direct quenching and tempering.

| TABLE 3 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| **Chemical Composition for ABS Grades of High Strength Quenched and Tempered Steels (2013)** |
| **Grade**  | **Maximum Content of Elements %** |
|            | **C** | **Si** | **Mn** | **P** | **S** | **N** |
| AQ43 to AQ70 | 0.21  | 0.55   | 1.70   | 0.035 | 0.035 | 0.02  |
| DQ43 to DQ70 | 0.20  | 0.55   | 1.70   | 0.030 | 0.030 | 0.02  |
| EQ43 to EQ70 | 0.20  | 0.55   | 1.70   | 0.030 | 0.030 | 0.02  |
| FQ43 to FQ70 | 0.18  | 0.55   | 1.60   | 0.025 | 0.025 | 0.02  |

*Elements used for alloying and fine grain treatment are to be as detailed in the approved specification. The following elements are to be reported for each cast or ladle: Ni, Cr, Mo, Nb, V, Zr, Cu and B.*
### TABLE 4
Mechanical Properties Requirements for ABS Grades of High Strength Quenched and Tempered Steels (1996)

<table>
<thead>
<tr>
<th>Grade of Steel</th>
<th>Mechanical Properties (1)</th>
<th>Impact Test (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yield Strength N/mm² (kgf/mm², ksi)</td>
<td>Tensile Strength N/mm² (kgf/mm², ksi)</td>
</tr>
<tr>
<td>AQ43</td>
<td>420 (43, 61)</td>
<td>530/680 (54/69, 77/98)</td>
</tr>
<tr>
<td>DQ43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQ43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FQ43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AQ47</td>
<td>460 (47, 67)</td>
<td>570/720 (58/73, 83/104)</td>
</tr>
<tr>
<td>DQ47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQ47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FQ47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AQ51</td>
<td>500 (51, 73)</td>
<td>610/770 (62/78, 88/112)</td>
</tr>
<tr>
<td>DQ51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQ51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FQ51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AQ56</td>
<td>550 (56, 80)</td>
<td>670/835 (68/85, 97/120)</td>
</tr>
<tr>
<td>DQ56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQ56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FQ56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AQ63</td>
<td>620 (63, 90)</td>
<td>720/890 (73/91, 104/129)</td>
</tr>
<tr>
<td>DQ63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQ63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FQ63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AQ70</td>
<td>690 (70, 100)</td>
<td>770/940 (78/96, 112/136)</td>
</tr>
<tr>
<td>DQ70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQ70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FQ70</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1 Transverse
2 Longitudinal
3 Charpy V-notch impact tests are not required in production for AQ Grades, provided supporting data indicate compliance with this table is obtained in qualification testing.
4 $A$ equals cross-sectional area of test specimen.
5 The elongation for alternative B specimen in 2-1-1/Figure 1 of the ABS Rules for Materials and Welding (Part 2) is to be in accordance with 3-1-A3/Table 4A.
6 The indicated elongations are for specimens taken transverse to the direction of roll. Where longitudinal specimens are specially approved, the minimum elongation values are to be 2% above those shown in 3-1-A3/Table 4 and 3-1-A3/Table 4A.
TABLE 4A

Elongation Requirements for Alternative B Specimen (1996)

<table>
<thead>
<tr>
<th>Grade of Steel</th>
<th>Thickness, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤10</td>
</tr>
<tr>
<td>AQ43 to FQ43</td>
<td>11</td>
</tr>
<tr>
<td>AQ47 to FQ47</td>
<td>11</td>
</tr>
<tr>
<td>AQ51 to FQ51</td>
<td>10</td>
</tr>
<tr>
<td>AQ56 to FQ56</td>
<td>10</td>
</tr>
<tr>
<td>AQ63 to FQ63</td>
<td>9</td>
</tr>
<tr>
<td>AQ70 to FQ70</td>
<td>9</td>
</tr>
</tbody>
</table>

TABLE 5

Material Selection for ABS Quenched and Tempered Steel Grades

<table>
<thead>
<tr>
<th>Service Temperature °C (°F)</th>
<th>Secondary *</th>
<th>Primary</th>
<th>Special</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (32)</td>
<td>AQ43 to AQ70</td>
<td>DQ43 to DQ70</td>
<td>FQ43 to FQ70</td>
</tr>
<tr>
<td>−10 (14)</td>
<td>EQ43 to EQ70</td>
<td>EQ43 to EQ70</td>
<td>EQ43 to EQ70</td>
</tr>
<tr>
<td>−20 (−4)</td>
<td>EQ43 to EQ70</td>
<td>EQ43 to EQ70</td>
<td>EQ43 to EQ70</td>
</tr>
<tr>
<td>−30 (−22)</td>
<td>EQ43 to EQ70</td>
<td>EQ43 to EQ70</td>
<td>EQ43 to EQ70</td>
</tr>
<tr>
<td>−40 (−40)</td>
<td>FQ43 to FQ70</td>
<td>FQ43 to FQ70</td>
<td>FQ43 to FQ70</td>
</tr>
<tr>
<td>−50 (−58)</td>
<td>FQ43 to FQ70</td>
<td>FQ43 to FQ70</td>
<td>—</td>
</tr>
</tbody>
</table>

* For Secondary members, toughness criteria may be relaxed.

PART 3  HULL CONSTRUCTION AND EQUIPMENT

CHAPTER 2  HULL STRUCTURES AND ARRANGEMENTS

SECTION 2  COMMON STRUCTURES

1 General

(Revise Paragraph 3-2-2/1.5, as follows.)

1.5 Protection of Steel Work (2013)

Unless otherwise approved, all steel work is to be suitably coated.

Tanks or preload spaces intended for seawater ballast are to have a corrosion-resistant hard coating on all internal surfaces. Where a long retention of seawater ballast is expected due to the type of unit, special consideration for the use of inhibitors or sacrificial anodes may be given.

A corrosion protection and control system utilizing anodes and coating in accordance with the recognized industry standards such as API and NACE is to be provided for the wetted hull structure. The effectiveness of the corrosion protection and control system is to be sustainable for the design life of the unit. The use of an impressed current cathodic protection (ICCP) system may be considered as an alternative to the anodes. In the splash zone as defined in 7-2-1/3.21.1, corrosion allowance is to be added to the external shell plating.

In cases where scantlings are based on 3-2-1/1 and 3-2-1/3, and corrosion control methods are not provided, the scantlings are to be suitably increased.

(Subparagraph 3-2-2/1.5.1 remains unchanged.)
1 Application

(Revise Paragraph 3-2-A1/1.1, as follows.)

1.1 Column Stabilized Unit (2012)
Subsections 3-2-A1/3 through 3-2-A1/15 of this Appendix are intended for column-stabilized units navigating in ice. Column-stabilized units constructed in accordance with this Appendix will be distinguished in the Record by Ice Class followed by ice class A0, B0, C0 or D0 to indicate the degree of strengthening adopted.

(Remainder of Appendix 3-2-A1 is unchanged.)

1 General

(Revise Paragraph 3-2-A2/1.1, as follows.)

1.1 Introduction
Paragraph 3-1-2/1.5 requires that “Consideration is to be given to waves of less than maximum height where, due to their period, the effects on various structural elements may be greater.” For a twin-hull semi-submersible, large waves with long periods are not necessarily critical to the design of the primary structural elements. Only the waves with critical periods and headings (as characterized in 3-2-A2/3) that generate a significant amount of hydrodynamic loads are critical to the design of the primary structural elements.

In addition, the wave load distributions on the submerged hulls of a MODU are required in the global structural response analysis. Both stochastic and regular wave approaches can be utilized in the response analysis. The stochastic approach usually follows a frequency domain procedure via a spectral analysis. In the stochastic approach, the vital distribution information on simultaneous load and stress is lost. In contrast, the regular wave approach retains the flow of load and stress, and therefore is more useful in the structural design evaluation.
For each characterized load case, the response analysis determines the critical wave period that generates
the maximum hydrodynamic loads. It further finds an equivalent regular wave height which will generate
the same amount of the hydrodynamic loads as calculated in the response analysis. The found wave period
and wave height, noted as “Design Wave”, are to be used for the design of the global strength of a twin-
hull semi-submersible.

The response analysis can be performed using a stochastic or deterministic approach, depending on the wave
information available. This Appendix covers the details of the response analysis using these two approaches.

For MODU classification, ABS requires the Owner to select the wave environment for which the semi-
submersible unit will be designed.

3 Global Hydrodynamic Load Characteristics

(Revise Paragraphs 3-2-A2/3.3, 3-2-A2/3.5, and 3-2-A2/3.7, as follows.)

3.3 Split Force between Pontoons
A beam wave (90 degrees from the bow) with a length of about two times the outer breadth between the
pontoons induces the maximum design split loads, which are critical to the following joints or members:

i) Horizontal Bracings, or

ii) Main Deck Structures if no bracings,

iii) Column Connections to Upper Hull if no bracings.

3.5 Twisting Pitch Moment about Transverse Horizontal Axis
A diagonal wave (30 to 60 degrees from the bow) with a length of about the diagonal distance between pontoon
ends will induce the maximum design twisting pitch moments, which are critical to the following locations
or members:

i) Diagonal Horizontal and Vertical Bracings, or

ii) Main Deck Structure if no bracings.

Since split loads occur simultaneously with twisting moments, using only twisting moments to determine
the critical wave direction for the design of these members may not be sufficient. The split loads will not
contribute to the twisting moments but it induces additional stresses to those induced by twisting moments.
Therefore, more than one wave direction are to be considered in order to obtain the most critical combined
stress effect of these two loads for the design.

3.7 Longitudinal Shear Force between Pontoons
A diagonal wave (30 to 60 degrees from the bow) with a length of about one and half times the diagonal
distance between pontoon ends will induce the maximum design longitudinal shear force between the
pontoons. In this load case, the longitudinal forces on the two pontoons and columns are maximized and
acting in the opposite directions. Thus, the horizontal bracings will be subject to the maximum bending moment.

Since split loads occur simultaneously with longitudinal shears, using only longitudinal shear to determine
the critical wave direction for the design of these members may not be sufficient. For the same reason
indicated in 3-2-A2/3.5, more than one wave direction are to be considered in order to obtain the most
critical combined stress effect of these two loads for the design.
5 Selecting Design Waves by the Stochastic Method

5.3 Analytical Approach

(Revise Subparagraph 3-2-A2/5.3.2, as follows.)

5.3.2 Calculate Response Amplitude Operators (RAOs) (per unit wave amplitude) for each load characterized in 3-2-A2/3 and for a range of regular wave periods between 3 to 25 seconds. Finer wave period intervals (say 0.2 to 0.5 second) around $T_C$ are to be considered in order to capture the critical peak $RAO_C$. At the critical peak $RAO_C$, a more precise critical wave period, $T_C$, can be determined. For wave periods away from the critical wave period, $T_C$, larger wave period intervals (say 1.0 to 2.0 second) may be used.

(Remainder of Appendix 3-2-A2 is unchanged.)

PART 3 HULL CONSTRUCTION AND EQUIPMENT
CHAPTER 3 SUBDIVISION AND STABILITY
SECTION 2 STABILITY AND WATERTIGHT/WEATHERTIGHT INTEGRITY

1 Stability (2012)

(Revise Paragraph 3-3-2/1.1, as follows.)

1.1 General (2013)
All units are to have positive metacentric height in calm water equilibrium position for all afloat conditions, including temporary positions when raising or lowering. For the purpose of determining compliance with the stability requirements contained herein, it is to be assumed that the unit is floating free of mooring restraints. However, detrimental effects of catenary mooring systems or of the thrusters for dynamically positioned units are to be considered.

The metacentric height is to be specified for each mode of operation and guidance is to be included in the Operating Manual on the procedure to determine and satisfy the expected metacentric height. This may be accomplished by including the minimum metacentric height in the calculation of the allowable KG.

The wind speeds referenced in this Section are to be used to calculate heeling moments for intact and damage stability calculations. These wind speeds are not intended to represent actual environmental limits.

1.3 Stability Afloat

(Revise Subparagraphs 3-3-2/1.3.1 and 3-3-2/1.3.2, as follows.)

1.3.1 Intact Stability (All Units) (2013)
All units are to have sufficient stability (righting stability) to withstand the heeling moment equivalent to the one produced by a wind from any horizontal direction and speed as given below in accordance with the stability criteria given in 3-3-2/3. The wind speed for unrestricted offshore service for normal drilling and transit conditions is not to be less than 36 m/sec (70 kn). In addition, the unit is to be capable of withstanding a severe storm condition-applying a wind speed of not less than 51.5 m/s (100 kn). In all cases, the wind speed is to be specified. Units not designed to withstand the above heeling moments will be considered for classification for “Restricted Service” in association with a heeling moment equivalent to a minimum wind speed of 25.8 m/s (50 kn).
1.3.2 Damage Stability (All Units) (2013)
All units are to have sufficient buoyancy and stability to withstand a heeling moment equivalent to a
25.8 m/s (50 kn) wind superimposed from any direction with the following causes of flooding,
which are to be individually applied to the unit.

(Items 3-3-2/1.3.2(a) through 3-3-2/1.3.2(c) remain unchanged.)

3 Stability Criteria (2012)
(Revise Paragraph 3-3-2/3.1, as follows.)

3.1 General (2013)
Righting moment curves and heeling moment curves with supporting calculations are to be prepared for
the full range of anticipated operating drafts. The calculations are to be performed in a manner to reflect a
sustained wind force from any horizontal direction in order to determine the critical stability axis. For
purposes of these calculations, the configuration of the unit is to reflect the actual condition of the unit
during afloat operation, such as the location of drilling tower or skid unit, the operation of cranes and the
position of legs for self-elevating units.

3.3 Righting Moment
(Revise Subparagraph 3-3-2/3.3.1, as follows.)

3.3.1 Intact Stability Criteria (2013)
For self-elevating units and surface type units, the righting energy (area under the righting moment
curve) at or before the angle of the second intercept of the righting and the heeling moment curves
or the downflooding angle, whichever is less, is to reach a value of not less than 40% in excess of
the area under the heeling moment curve to the same limiting angle as indicated in 3-3-2/Figure 1.

For column-stabilized units, the righting energy (area under the righting moment curve) at or
before the angle of the second intercept of the righting and the heeling moment curves or the
downflooding angle, whichever is less, is to reach a value of not less than 30% in excess of the
area under the heeling moment curve to the same limiting angle as indicated in 3-3-2/Figure 1.

For all units, the righting moment curve is to be positive over the entire range of angles from
upright to the second intercept angle. Documentation demonstrating that the chosen axis of
inclination is the most critical for the unit is to be submitted.
(Revise 3-3-2/Figure 1, as follows.)

**FIGURE 1**
**Intact Stability Curve (2013)**

Area $[A+B] \geq K \times Area[B+C]$

- $K = 1.3$ for column-stabilized units
- $K = 1.4$ for all other units

(Revise Subparagraph 3-3-2/3.3.2, as follows.)

### 3.3.2 Damage Stability Criteria (2013)

The final waterline, after assuming damage under 3-3-2/1.3.2 with an a heeling moment equivalent to a 25.8 m/s (50 kn) wind superimposed from any direction (See 3-3-2/Figure 2), is not to exceed the levels to which watertight integrity has been shown on the diagrams submitted in accordance with 3-1-2/1.
(Revise 3-3-2/Figure 2, as follows.)

FIGURE 2
Damage Stability Curve (All Units) (2013)

Minimum extent of watertight integrity provided (see 3-3-2/5.3)
Heeling moment
Righting moment
First intercept
Angle of downflooding

* Righting moment \( \geq \) Heeling moment
\( \theta_D \geq \theta_1 \)

(Revise Subparagraph 3-3-2/3.3.3, as follows.)

3.3.3 Residual Stability Criteria – Self-Elevating Units (2013)
In addition to the requirements contained in 3-3-2/3.3.2, self-elevating units are to have sufficient residual stability to satisfy the following criterion after assuming the single-compartment flooding specified in 3-3-2/1.3.2(c) and with the assumption of no wind:
\[
RoS \geq 7^\circ + (1.5 \theta_s)
\]

\( RoS \) is not to be less than 10 degrees.
where
\[
RoS = \text{minimum range of stability, in degrees} = \theta_m - \theta_s
\]
\( \theta_m = \text{maximum angle of positive stability, in degrees} \)
\( \theta_s = \text{static angle of inclination after damage, in degrees} \)
The range of stability is determined without reference to the angle of downflooding.
See 3-3-2/Figure 3.
3.3.4 Residual Stability Criteria – Column-Stabilized Units (2008)
3.3.4(a) After assuming damage under 3-3-2/1.3.2(a):

(Revise Subitems 3-3-2/3.3.4(a) and 3-3-2/3.3.4(b), as follows.)

i) (2013) The righting moment curve is to have a range to the second intercept or first unprotected downflooding point, whichever comes first, of at least 7 degrees beyond its first intercept with the 25.8 m/sec (50 kn) heeling moment curve.

ii) (2013) Within the range from the first intercept with the 25.8 m/sec (50 kn) heeling moment curve to the second intercept with that curve or to the first unprotected downflooding point, whichever occurs first, the righting moment curve is to reach a value of at least twice the heeling moment curve, both measured at the same angle.

(Revise 3-3-2/Figure 4A, as follows.)

FIGURE 4A
Residual Damage Stability Requirements for Column-Stabilized Units – Collision Damage [see 3-3-2/1.3.2(a)] (2013)

3.7 Heeling Moment (2013)
Heeling moments represent an idealization of the total environmental loads on the unit. For purposes of calculations they are taken as the moments which result from wind forces on the unit at the speeds specified in 3-3-2/1.3, calculated in accordance with Section 3-1-2 or developed from wind tunnel tests.

The heeling moment is to be calculated at several angles of inclination for each mode of operation. The calculations are to be performed in a manner to reflect the range of stability about the critical axis. The lever for the heeling force is to be taken vertically from the center of lateral resistance or, if available, the center of hydrodynamic pressure of the underwater body to the center of pressure of the areas subject to wind loading.
For dynamically-positioned units, the heeling moment is to be taken as the sum of a wind force up to the aggregate thrust of the thruster system in each direction analyzed with a lever arm equal to the distance from the center of wind pressure to the center of the thruster propeller disc and the remaining wind force (if any) with a lever arm equal to the distance from the center of wind pressure to the center of lateral resistance. For this purpose, the aggregate thrust need not be taken greater than the wind force.

For self-elevating units, the heeling moment of the unit is to be investigated for any anticipated leg position relative to the hull.

In calculating heeling moments for surface type units having no independent platforms, the curve may be assumed to vary as the cosine function of the inclination angle.

(Revise Paragraph 3-3-2/3.9, as follows.)

3.9 Wind Tunnel Tests (2013)
Heeling moments derived from wind tunnel tests on a representative model of the unit may be considered as alternatives to the method given herein. Such heeling moment determination is to include both lift and drag effects at appropriate inclination angles. Testing should include the full range of possible drafts, wind direction and angles of heel, to the maximum extent possible. The testing program is to be submitted for review.

5 Watertight/Weathertight Integrity

5.3 Watertight Integrity

5.3.1 Internal Openings Used for Access While Afloat (2012)

(Revise Item 3-3-2/5.3.1(a), as follows.)

5.3.1(a) (2013) Doors and hatch covers are to be capable of being remotely controlled from a normally manned central position, such as the bridge or ballast control room, as well as being operable locally from both sides of the bulkhead. See Note 6 of 4-3-3/Table 1. Open/shut indicators are to be provided at the control station. In addition, remotely operated doors provided to ensure the watertight integrity of internal openings which are used while afloat are to be sliding watertight doors with audible alarm. The power, control and indicators are to be operable in the event of main power failure. Particular attention is to be paid to minimizing the effect of control system failure. Each power-operated sliding watertight door is to be provided with an individual hand-operated mechanism. It shall be possible to open and close the door by hand at the door itself from both sides.

5.3.3 External Openings Used While Afloat (2003)

(Revise Items 3-3-2/5.3.3(b) and 3-3-2/5.3.3(c), as follows.)

5.3.3(b) (2013) Normally closed openings fitted with appliances to ensure watertight integrity, such as non-opening side scuttles, manholes and small hatches, may be located below the level of watertight integrity. Such openings are not to be regarded as emergency exits.

5.3.3(c) (2013) Where flooding of chain lockers or other buoyant volumes may occur, the openings to these spaces should be considered as downflooding points.
1 Introduction

This Appendix has been developed based on the research findings reported on by the ABC Joint Industry Project on Mobile Offshore Drilling Unit Stability, Phase II, August 1989 and was originally published in 1990 as a separate publication titled, ABS Guide for the Application of Dynamic-Response-Based Intact Stability Criteria for Column-Stabilized Mobile Offshore Drilling Units.

An alternative intact stability criteria is given herein for column-stabilized MODUs, which provides an equivalent level of safety in a severe storm mode of operation for unrestricted service classification. A distinct advantage of these criteria is that a more rational safety margin against capsizing and downflooding is achieved since dynamic motion response characteristics are now incorporated into the stability criteria.

The dynamic-response-based stability criteria include empirical formulae to approximate motions which are then used in the criteria format. These empirical approximations are based on the motion responses predicted for a matrix of generic semi-submersible units and loading conditions which cover almost every existing semi-submersible design. In order that the criteria undergo continual scrutiny, direct analysis of dynamic motion responses is encouraged. For this purpose, Appendices are also provided describing the general concepts and procedures for performing such analyses that are acceptable to ABS. These procedures are in place to encourage advances in technology and improved analytical techniques to more accurately predict the motion responses and resulting stability margins of column-stabilized MODUs.

5 General

5.3 Conditions for Compliance

Units intended to be classed under this alternative intact stability criteria are to comply with both the Capsize Criteria and the Downflooding Criteria, given hereafter in 3-3-A1/7.1.1 and 3-3-A1/7.1.2, respectively. Compliance with these criteria is not to not be taken to obviate the need for compliance with the positive stability requirements of 3-3-2/1.1, intact stability requirements for normal drilling and transit conditions of 3-3-2/1.3.1 and damage stability requirements of 3-3-2/1.3.2. Wave clearance requirements of 3-2-4/9.1 remain applicable.

7 Dynamic-Response-Based Criteria

7.3 Conditions of Assessment

Detrimental effects of catenary mooring systems or of thrusters for dynamically positioned units are to be considered. Any beneficial effects are not to be included.
7.3.3
Wind force and moment are to be determined by calculation per 3-1-3/1.3 or by model wind tunnel tests. A mean wind speed of 100 knots and 75 knots is to be assumed under 3-3-A1/7.1.1 and 3-3-A1/7.1.2, respectively.

9 Determination of Dynamic Responses

9.3 Application Limits of Empirical Approximations

(Revise Subparagraphs 3-3-A1/9.3.1 and 3-3-A1/9.3.2, as follows.)

9.3.1 Geometric Parameters
The following ranges are applicable:

i) \( \frac{V_{PTN}}{V_{TOT}} \) 0.48 to 0.58

ii) \( A_{wp}(V_{COL})^{2.3} \) 0.72 to 1.00

iii) \( 2 \frac{I_{WP}}{V_{COL}L_{PTN}} \) 0.40 to 0.70

Application of the empirical approximations to column-stabilized units with total buoyant volumes \( (V_{TOT}) \) less than \( 2.52 \times 10^4 \text{ m}^3 \) \((8.9 \times 10^5 \text{ ft}^3)\) or greater than \( 5.04 \times 10^4 \text{ m}^3 \) \((17.79 \times 10^5 \text{ ft}^3)\) are to be carefully considered.

9.3.2 Operating Parameters
The \( GM \) values are to be taken not less than 0.0 (based on positive \( GM \) criteria) and not more than 2.44 m (8.0 ft), limited by the data base used to obtain the correlation coefficient, \( k \). The criteria apply to severe storm drafts established by design air gaps, ballast system capabilities, environment, etc.
3 Anchoring Systems

3.3 Design

(Revise Subparagraphs 3-4-A1/3.3.2 and 3-4-A1/3.3.3, as follows.)

3.3.2 The anchoring system is to be designed to prevent a failure of any single component causing progressive failure of the remaining anchoring arrangements.

3.3.3 Anchoring system components are to be designed utilizing adequate factors of safety (FOS) and a design methodology suitable to identify the most severe loading condition for each component. In particular, sufficient numbers of heading angles together with the most severe combination of wind, current and wave are to be considered, usually from the same direction, to determine the maximum tension in each mooring line.

(Revise first paragraph of Subparagraph 3-4-A1/3.3.5, as follows.)

3.3.5 (2011) Factors of safety (FOS) are dependent on the design conditions of the system (intact, damaged, or transient), as well as the level of analyses (Quasi static or dynamic analysis). The minimum Quasi Static FOS, specified in the table below, at the maximum excursion of the unit for a range of headings is to be satisfied if the quasi static method outlined in 3-4-A1/3.3.4 is applied. Otherwise, the minimum Dynamic Analysis FOS in the table below is to be satisfied, including the effects of line dynamics when these effects are considered significant.

(Remainder of Subparagraph 3-4-A1/3.3.5 is unchanged.)

(Revise Subparagraph 3-4-A1/3.3.7, as follows.)

3.3.7 In general, the maximum surge/sway excursions of the unit due to wave excitation about the steady mean offset are to be obtained by means of model tests. Analytical calculations may be acceptable, provided that the proposed method is based on methodologies validated by model tests.

5 Equipment

5.1 Winches and Windlasses

(Revise Subparagraph 3-4-A1/5.1.3, as follows.)

5.1.3 On loss of power to the winches or windlasses, the power operated braking system is to be automatically applied and be capable of holding against 50 percent of the total static braking capacity of the windlass.
5.3  Fairleads and Sheaves

(Revise Subparagraph 3-4-A1/5.3.1, as follows.)

5.3.1  Fairleads and sheaves are to be designed to prevent excessive bending and wear of the anchor lines. The attachments to the hull or structure are to be such as to withstand the stresses imposed when an anchor line is loaded to its rated breaking strength.

7  Anchor Lines

(Revise Paragraph 3-4-A1/7.1, as follows.)

7.1  Anchor lines are to be of a type that is compatible with the design conditions of the anchoring system. Details are to be submitted.

11  Quality Control

(Revise Paragraph 3-4-A1/11.1, as follows.)

11.1  Details of the quality control of the manufacturing process of the individual anchoring system components are to be submitted. Components are to be designed, manufactured and tested in accordance with recognized standards insofar as possible and practical. Equipment so tested is to, insofar as practical, be legibly and permanently marked with the Surveyor’s stamp and delivered with documentation which records the results of the tests.

13  Control Stations

(Revise Paragraph 3-4-A1/13.5, as follows.)

13.5  Each winch or windlass is to be capable of being controlled from a position which provides a good view of the operation. Means are to be provided at the individual 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.
### TABLE 1
Classes of Piping Systems (2013)

<table>
<thead>
<tr>
<th>Piping Class →</th>
<th>Piping System ↓</th>
<th>Corrosive fluids</th>
<th>Toxic fluids</th>
<th>Flammable liquids heated to above flash point or having flash point 60°C or less</th>
<th>Liquefied gas</th>
<th>Steam</th>
<th>Thermal oil</th>
<th>Fuel oil</th>
<th>Lubricating oil</th>
<th>Flammable hydraulic oil</th>
<th>Cargo oil piping in cargo area</th>
<th>Other fluids (including water, air, gases, non-flammable hydraulic oil)</th>
<th>Open ended pipes (drains, overflows, vents, exhaust gas lines, boilers escapes pipes)</th>
<th>(2013) Fixed Oxygen-acetylene System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Without special safeguards</td>
<td>All</td>
<td>Without special safeguards</td>
<td>Without special safeguards</td>
<td>16 (16.3, 232)</td>
<td>(572)</td>
<td>16 (16.3, 232)</td>
<td>(302)</td>
<td>16 (16.3, 232)</td>
<td>(302)</td>
<td>Not applicable</td>
<td>40 (40.8, 580)</td>
<td>(572)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With special safeguard</td>
<td>Not applicable</td>
<td>Open-ended piping</td>
<td>With special safeguards</td>
<td>See chart</td>
<td>See chart</td>
<td>See chart</td>
<td>See chart</td>
<td>See chart</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>All</td>
<td>Low pressure Side</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Open-ended piping</td>
<td>7 (7.1, 101.5)</td>
<td>(338)</td>
<td>7 (7.1, 101.5)</td>
<td>(302)</td>
<td>7 (7.1, 101.5)</td>
<td>(140)</td>
<td>Not applicable</td>
<td>16 (16.3, 232)</td>
<td>(392)</td>
</tr>
</tbody>
</table>

**Notes:**

1. The above requirements are not applicable to piping systems intended for liquefied gases in cargo and process areas.
2. The above requirements are also not applicable to cargo piping systems of vessels carrying chemicals in bulk.
3. Safeguards are measures undertaken to reduce leakage possibility and limiting its consequences, (e.g., double wall piping or equivalent, or protective location of piping etc.)
11 General Installation Details

(Revise Paragraph 4-2-1/11.15, as follows.)

11.15 Bulkhead, Deck or Tank-Top Penetrations (2013)

11.15.1 Watertight Integrity

Where it is necessary for pipes to penetrate watertight bulkheads, decks or tank tops, the penetrations are to be made by methods which will maintain the watertight integrity. For this purpose, bolted connections are to have bolts threaded into the plating from one side; through bolts are not to be used. Welded connections are either to be welded on both sides or to have full penetration welds from one side.

11.15.2 Firetight Integrity

Where pipes penetrate bulkheads, decks or tank-tops which are required to be firetight or smoketight, the penetrations are to be made by approved methods which will maintain the same degree of firetight or smoketight integrity.

PART 4 VESSEL SYSTEMS AND MACHINERY
CHAPTER 2 PUMPS AND PIPING SYSTEMS
SECTION 5 FUEL OIL SYSTEMS AND TANKS

(Revise 4-2-5/Figure 1, as follows.)

FIGURE 1
Acceptable Fuel Oil Tanks Arrangements Inside Category A Machinery Spaces (2013)
3  **Fuel-oil Transfer and Filling**

(Revise first paragraph of Paragraph 4-2-5/3.9, as follows.)

3.9 **Valves on Oil Tanks** *(2013)*

Where pipe lines emanate from fuel oil tanks at such a level that they will be subjected to a static head of oil from the tank, they are to be fitted with positive closing valves. The valves are to be secured at the tank. A short length of Extra Strong pipe connecting the valve to the tank is also acceptable. Where the fuel oil piping passes through adjacent tanks, the valve required above may be located where the pipe run exits the adjacent tank(s) provided the piping in the adjacent tanks is Extra-Heavy and has all welded connections. However, if the adjacent tank is a fuel oil tank, the pipe run within the fuel oil tank is to be at least Standard thickness.

*(Remainder of Paragraph 4-2-5/3.9 is unchanged.)*

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**PART 4**  VESSEL SYSTEMS AND MACHINERY

**CHAPTER 2**  PUMPS AND PIPING SYSTEMS

**SECTION 6**  OTHER PIPING SYSTEMS AND TANKS

5  **Fixed Oxygen-Acetylene Installations** *(2003)*

5.5 **Piping System Components**

5.5.1 Pipe and Fittings

(Revise Item 4-2-6/5.5.1(a), as follows.)

5.5.1(a) **General** *(2013)*. In general, all oxygen and acetylene pipes, pipe fittings, pipe joints and valves are to be in accordance with the provisions of Section 4-2-1 and Section 4-2-2, except as modified below.

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7  **Fuel Storage for Helicopter Facilities**

(Revise Paragraph 4-2-6/7.3, as follows.)

7.3 **Spill Containment** *(2013)*

To contain spillage and retain fire extinguishing agents, a coaming at least 150 mm (6 in.) in height is to be provided. The coaming is to surround the fuel storage area, which consists of the fuel tank, associated piping and any pumping unit adjacent to the storage tank. Where the pumping unit is remote from the tank, a separate coaming around the unit is to be provided. A coaming will be required only around the fuel pumping unit where the installation is such that the fuel storage tank is cantilevered from the platform and arranged to be jettisoned.

Drainage is to be provided for the area enclosed by the coaming complying with the following:

7.3.1 The area within the coaming is to be sloped toward the drain line.
7.3.2 Drainage from the area within the coaming is to be led through a valve designed for selective output (e.g., three-way valve) either to a holding tank complying with 4-2-6/7.1.2 and 4-2-6/7.1.3 or directly overboard. No other valves may be fitted in the drain line.

7.3.3 The cross sectional area of the drain line from the fuel tank coaming is to be at least twice that of the fuel storage tank outlet connection.

Fuel tank coamings not provided with drainage arrangements in accordance with the above are to be sized to contain the full volume of the fuel storage tank plus 150 mm (6 in.) of foam.

9 Starting-air Systems

(Revise Paragraphs 4-2-6/9.1 and 4-2-6/9.3, as follows.)

9.1 Design and Construction

The design and construction of all air reservoirs are to be in accordance with the applicable requirements of Section 4-4-1 and Appendix 4-4-1A1 of the Steel Vessel Rules. The piping system is to be in accordance with the applicable requirements of Section 4-2-2 of these Rules. The air reservoirs are to be so installed as to make the drain connections effective under extreme conditions of trim. Compressed-air systems are to be fitted with relief valves and each air reservoir which can be isolated from a relief valve is to be provided with its own safety valves or equivalent. Connections are also to be provided for cleaning the air reservoir and pipe lines.

All discharge pipes from starting air compressors are to be led directly to the starting air reservoirs, and all starting pipes from the air reservoirs to main or auxiliary engines are to be entirely separate from the compressor discharge piping system.

9.3 Starting-air Capacity

Units having internal combustion engines arranged for air starting are to be provided with at least two starting-air reservoirs of approximately equal size. The total capacity of the starting-air reservoirs is to be sufficient to provide, without recharging the air reservoirs, at least the number of consecutive starts stated below. If other compressed air systems, such as control air, are supplied from starting-air reservoirs, the aggregate capacity of the air reservoirs is to be sufficient for continued operation of these systems after the air necessary for the required number of starts has been used.

9.3.1 Diesel Propulsion

The minimum number of consecutive starts (total) required to be provided from the starting-air reservoirs is to be based upon the arrangement of the engines and shafting systems as indicated in the following table.

<table>
<thead>
<tr>
<th></th>
<th>Single Screw Unit</th>
<th></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>
<td>One engine coupled to each shaft directly or through reduction gear</td>
</tr>
<tr>
<td>Reversible Engines</td>
<td>12</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Non-reversible Engines</td>
<td>6</td>
<td>8</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 reservoirs will be specially considered based on an equivalent number of starts.
9.3.2 Diesel-electric Propulsion

The minimum number of consecutive starts required to be provided from the starting-air reservoirs 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.

9.3.3 Non Self-Propelled Units

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

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PART 4 VESSEL SYSTEMS AND MACHINERY

CHAPTER 3 ELECTRICAL INSTALLATIONS

SECTION 2 ELECTRICAL SYSTEMS

5 Emergency Source of Power

5.1 General

(Add new Subparagraph 4-3-2/5.1.4, as follows:)

5.1.4 Units with Dynamic Positioning Systems Notation (DPS 0, 1, 2 and 3) (2013)

For units with DPS notation, an emergency source of power is required in accordance with 4-3-2/5.1.1 and 4-3-2/5.1.2. Alternate arrangements per 4-3-2/5.1.3, will not be acceptable.

5.3 Emergency Power Supply (2009)

5.3.11 Self-propelled Drilling Units

(Add new Item 4-3-2/5.3.11(e), as follows:)

5.3.11(e) (2013) For a period of 18 hours, the radio communication equipment as required by Chapter IV of the 1974 SOLAS Convention, as amended (see Note 1 below).
15  **Interior Communication Systems**

15.9  **Public Address System** *(2007)*

*(Revise Subparagraph 4-3-2/15.9.4, as follows:)*

15.9.4  Public Address System Combined with General Alarm System *(2013)*

Where a single system serves for both 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. Power supply is to comply with 4-3-2/17.1.2(b) and 4-3-2/17.1.2(c). 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.

19  **Fire Protection and Fire Detection Systems**

19.1  **Emergency Stop**

*(Revise Subparagraph 4-8-2/19.1.1, as follows:)*

19.1.1  Ventilation System *(2013)*

19.1.1(a)  General. 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 recirculating systems within a single space. See also 5-3-1/9.1.

19.1.1(b)  Propulsion Machinery Space Ventilation. The main machinery-space ventilation is to be provided with means for stopping the ventilation fans. The means for stopping the power ventilation serving machinery spaces is to be entirely separate from the means for stopping the ventilation of spaces in 4-3-2/19.1.1(c) and 4-3-2/19.1.1(d).

19.1.1(c)  Machinery Spaces other than Propulsion Machinery Spaces. Power ventilation systems serving these spaces are to be fitted with means for stopping the ventilation fan motors in the event of fire. The means for stopping the power ventilation serving these spaces is to be entirely separate from the means for stopping the ventilation of spaces in 4-3-2/19.1.1(b) and 4-3-2/19.1.1(d). See 5-3-1/9.1.1.

19.1.1(d)  Accommodation Spaces, Service Spaces, Control Stations and Other Spaces. A control station for all other power 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.
PART 4 VESSEL SYSTEMS AND MACHINERY
CHAPTER 3 ELECTRICAL INSTALLATIONS
SECTION 3 ONBOARD INSTALLATION

3 Equipment Installation and Arrangement

(Revise Paragraph 4-3-3/3.25, as follows:)

3.25 Receptacles and Plugs of Different Ratings (2013)
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 of a type which will not permit attaching 115 volts equipment. Receptacles and plugs for a rated current in excess of 16 A are to be interlocked with a switch such that the plug cannot be inserted or withdrawn when the switch is in the “on” position.

5 Cable Installation

5.17 Emergency and Essential Feeders
(Revise Subparagraphs 4-3-3/5.17.1 through 4-3-3/5.17.3, as follows:)

5.17.1 Location (2013)
As far as practicable, cables and wiring for emergency and essential services, including those listed in 4-3-3/3.29, are not to pass through high fire risk areas (see 4-3-3/3.31). For Emergency Fire Pumps, see requirements in 4-3-3/5.17.3.

5.17.2 Services Necessary Under a Fire Condition (2013)
Where cables for services required to be operable under a fire condition (see 4-3-3/3.29) including their power supplies pass through high fire risk areas (see 4-3-3/3.31) other than those which they serve, they are to be so arranged that a fire in any of these areas does not affect the operation of the service in any other area. For Emergency Fire Pumps, see requirements in 4-3-3/5.17.3. This may be achieved by any of the following measures:

5.17.2(a) Fire resistant cables in accordance with 4-3-4/7.1.3 are installed and run continuous to keep the fire integrity within the high fire risk area. See 4-3-3/Figure 2.

FIGURE 2
Cables within High Fire Risk Areas (2008)

![Diagram of cables within high fire risk areas]

- Fire resistant cable
- Flame retardant cable
- Connection box
5.17.2(b) At least two loops/radial distributions run as widely apart as is practicable and so arranged that in the event of damage by fire at least one of the loops/radial distributions remains operational. Systems that are self-monitoring, fail safe or duplicated with cable runs separated as widely as practicable, may be exempted from the requirements in 4-3-3/5.17.2(a) and 4-3-3/5.17.2(b).

5.17.3 Electrical Cables for the Emergency Fire Pump (2013)
The electrical cables to the emergency fire pump are not to pass through the machinery spaces containing the main fire pumps and their sources of power and prime movers. They are to be of a fire resistant type, in accordance with 4-3-4/7.1.3, where they pass through other high fire risk areas.

(Subparagraph 4-3-3/5.17.4 remains unchanged.)

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**PART 4 VESSEL SYSTEMS AND MACHINERY**

**CHAPTER 3 ELECTRICAL INSTALLATIONS**

**SECTION 4 MACHINERY AND EQUIPMENT**

(Revise 4-3-4/Table 1, as follows:)

**TABLE 1**

<table>
<thead>
<tr>
<th>Insulation Type Designation</th>
<th>Insulation Materials</th>
<th>Maximum Conductor Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>R85, XLPE</td>
<td>Cross-linked Polyethylene</td>
<td>85°C (185°F) *</td>
</tr>
<tr>
<td>E85, EPR</td>
<td>Ethylene Propylene Rubber</td>
<td>85°C (185°F) *</td>
</tr>
<tr>
<td>R90, XLPE</td>
<td>Cross-linked Polyethylene</td>
<td>90°C (194°F) *</td>
</tr>
<tr>
<td>E90, EPR</td>
<td>Ethylene Propylene Rubber</td>
<td>90°C (194°F) *</td>
</tr>
<tr>
<td>M95</td>
<td>Mineral (MI)</td>
<td>95°C (203°F)*</td>
</tr>
<tr>
<td>S95</td>
<td>Silicone Rubber</td>
<td>95°C (203°F)*</td>
</tr>
</tbody>
</table>

* A maximum conductor temperature of 250°C (482°F) is permissible for special applications and standard end fittings may be used, provided the temperature does not exceed 85°C (185°F) at the end of fittings. However, when the temperature at the end of the fittings is higher than 85°C (185°F), special consideration will be given to an appropriate end fitting.
(Revise 4-3-4/Table 2, as follows:)

### TABLE 2
Maximum Current Carrying Capacity for Insulated Copper Wires and Cables
[See 4-3-4/7.1.1] (2013)

Values in amperes
45°C (113°F) Ambient
750 V and Less (AC or DC)

<table>
<thead>
<tr>
<th>Conductor Size (mm²)</th>
<th>1/C TYPE</th>
<th>2/C TYPE</th>
<th>3-4/C TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10³ cir</td>
<td>10³ cir</td>
<td>10³ cir</td>
</tr>
<tr>
<td></td>
<td>mils</td>
<td>mils</td>
<td>mils</td>
</tr>
<tr>
<td></td>
<td>V75,</td>
<td>R85,</td>
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<tr>
<td></td>
<td>Heat</td>
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<td></td>
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<td></td>
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<td>52.6</td>
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</table>

Notice No. 2 – December 2012  

ABS RULES FOR BUILDING AND CLASSING MOBILE OFFSHORE DRILLING UNITS • 2012  

26
Values in amperes
45°C (113°F) Ambient
750 V and Less (AC or DC)

<table>
<thead>
<tr>
<th>Conductor Size</th>
<th>1/C TYPE</th>
<th>2/C TYPE</th>
<th>3-4/C TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10&lt;sup&gt;3&lt;/sup&gt; Circ mils</td>
<td>V75, Heat Resist. PVC 75°C (167°F)</td>
<td>R85, XLPE, E90, EPR 85°C (185°F)</td>
<td>M95, S95 95°C (203°F)</td>
</tr>
<tr>
<td>16</td>
<td>76</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>26.3</td>
<td>68</td>
<td>65</td>
<td>64</td>
</tr>
<tr>
<td>10.8</td>
<td>59</td>
<td>57</td>
<td>55</td>
</tr>
<tr>
<td>6</td>
<td>51</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>10.4</td>
<td>38</td>
<td>35</td>
<td>34</td>
</tr>
<tr>
<td>4</td>
<td>32</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>2.5</td>
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<td>22</td>
<td>23</td>
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<tr>
<td>1.5</td>
<td>17</td>
<td>16</td>
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<tr>
<td>1.0</td>
<td>13</td>
<td>12</td>
<td>11</td>
</tr>
</tbody>
</table>

Notes:
1. The values given above have been calculated for an ambient of 45°C (113°F) and assume that a conductor temperature equal to the maximum rated temperature of the insulation is reached and maintained continuously in the case of a group of four cables bunched together and laid in free air.
2. The current rating values given in 4-3-4/Table 2 (and those derived therefrom) may be considered applicable, without correction factors, for cables double-banked on cable trays, in cable conduits or cable pipes, except as noted in Note 3.
3. For bunched cables, see 4-3-5.11.1.
4. These current ratings are applicable for both armored and unarmored cables.
5. If ambient temperature differs from 45°C (113°F), the values in 4-3-4/Table 2 are to be multiplied by the following factors.

<table>
<thead>
<tr>
<th>Maximum Conductor Temperature</th>
<th>Ambient Correction Factor</th>
</tr>
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<tbody>
<tr>
<td>75°C (167°F)</td>
<td>0.91</td>
</tr>
<tr>
<td>85°C (185°F)</td>
<td>0.94</td>
</tr>
<tr>
<td>90°C (194°F)</td>
<td>0.94</td>
</tr>
<tr>
<td>95°C (203°F)</td>
<td>0.95</td>
</tr>
</tbody>
</table>

6. Where the number of conductors in a cable exceeds four, as in control cables, the maximum current carrying capacity of each conductor is to be reduced as in the following table:

<table>
<thead>
<tr>
<th>No. of Conductors</th>
<th>% of 3-4/C TYPE Values in 4-3-4/Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5–6</td>
<td>80</td>
</tr>
<tr>
<td>7–24</td>
<td>70</td>
</tr>
<tr>
<td>25–42</td>
<td>60</td>
</tr>
<tr>
<td>43 and above</td>
<td>50</td>
</tr>
</tbody>
</table>

7. When a mineral-insulated cable is installed in such a location that its copper sheath is liable to be touched when in service, the current rating is to be multiplied by the correction factor 0.80 in order that the sheath temperature does not exceed 70°C (158°F).

8. Cables being accepted based on approved alternate standard may have current carrying capacity of that standard, provided the cables are in full compliance with that standard.
PART 4  VESSEL SYSTEMS AND MACHINERY
CHAPTER 3  ELECTRICAL INSTALLATIONS
SECTION 6  HAZARDOUS AREAS

7  Openings, Access, and Ventilation Conditions Affecting the Extent of Hazardous Zones

(Revise Paragraph 4-3-6/7.5, as follows:)

7.5  Enclosed Space with Access to any Zone 1 Location (2013)
An enclosed space with access to any Zone 1 location is not considered hazardous, provided the access is through either arrangement described below (see also 4-3-6/Figure 3):

7.5.1  Air Lock
  i) The access is fitted with two self-closing doors forming an air lock, which open toward the nonhazardous space and has no hold-back devices,
  ii) The doors are to be spaced apart at least a distance that prevents an individual from opening both doors simultaneously. A notice is to be affixed to each side of each door to the effect that only one door is to be open at a time.
  iii) An audible and visual alarm system to give a warning on both sides of the air lock is provided to indicate if more than one door is moved from the closed position,
  iv) Ventilation is such that the non-hazardous space has ventilation overpressure greater than 25 Pa (0.25 mbar) in relation to the Zone 1 location,
  v) The air lock space has independent mechanical ventilation from a gas-safe area such that, with any of the air lock doors open, the air flow is from the less hazardous space to the more hazardous space or area,
  vi) The air lock space is fitted with gas detection, and
  viii) Loss of ventilation overpressure between the non-hazardous space and the Zone 1 location and loss of ventilation in the air lock space are alarmed at a normally manned station.

7.5.2  Single Door
  i) The access is fitted with a single self-closing, gas-tight door which opens toward the nonhazardous space and has no hold-back device,
  ii) Ventilation is such that the air flow with the door open is from the non-hazardous space into the Zone 1 location with over-pressure greater than 25 Pa (i.e., non-hazardous space has ventilation overpressure greater than 25 Pa (0.25 mbar) in relation to the Zone 1 location), and
  iii) Loss of ventilation overpressure is alarmed at a normally manned station.
(Revise 4-3-6/Figure 3, as follows:)

**FIGURE 3**
Hazardous Zones (2013)

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

(Revise Subsection 4-3-6/9, as follows:)

9 **Ventilation** (2013)

9.1 **General**
Attention is to be given to ventilation inlet and outlet locations and airflow in order to minimize the possibility of cross contamination. Ventilation inlets are to be located in non-hazardous areas and as far as practicable from the boundaries of any hazardous area, but to a distance not less than 1.5 m (5 ft). Ventilation for hazardous areas is to be completely separate from that for non-hazardous areas.

9.3 **Ventilation of Hazardous Areas**
Enclosed hazardous spaces are to be provided with adequate ventilation so as to dilute a possible release of flammable gas or vapor in them and to maintain them at a lower pressure than adjacent less hazardous spaces or areas. Refer to 4-3-6/7 for adjacent spaces not separated by gastight boundaries. The arrangement of ventilation inlet and outlet openings in the space is to be such that the entire space is efficiently ventilated, giving special consideration to location of equipment which may release gas and to spaces where gas may accumulate.

Enclosed hazardous spaces containing open active mud tanks are to be ventilated with high capacity mechanical venting systems capable of changing the air every two minutes. Other enclosed hazardous spaces containing active mud processing equipment are to be ventilated at a minimum rate of 12 air changes per hour.

The outlet air from Zone 0, Zone 1 and Zone 2 spaces is to be led in separate ducts to outdoor locations which in the absence of the considered outlet are of the same or lesser hazard than the ventilated space. The internal spaces of such ducts are the same Zone as the inlet space. Ventilation ducts for hazardous areas are to be at under pressure in relation to less hazardous areas and at overpressure in relation to more hazardous areas, when passing through such areas, and are to be rigidly constructed to avoid air leaks.

Fans are to be of non-sparking construction, in accordance with 4-3-3/9.7.
9.5 Ventilation of Non-hazardous Areas
Enclosed non-hazardous spaces adjacent to hazardous spaces or areas are to be provided with adequate ventilation so as to maintain them at a higher pressure than adjacent hazardous spaces or areas. Refer to 4-3-6/7 for adjacent spaces not separated by gastight boundaries. Ventilation inlets and outlets for non-hazardous spaces are to be located in non-hazardous areas. See 4-3-6/9.1. Where passing through hazardous areas, ducts are to have overpressure in relation to the hazardous area.

PART 5 FIRE AND SAFETY – MEASURES AND FEATURES
CHAPTER 2 ACTIVE FIRE PROTECTION SYSTEMS AND EQUIPMENT
SECTION 1 GENERAL

3 Plans and Specifications

(Revise Paragraph 5-2-1/3.3, as follows:)

3.3 Fire Control Plans (2013)
Fire control plans are to be permanently exhibited for the guidance of operating personnel, showing clearly for each deck provision, location, controls and particulars, as applicable, of the following:

i) Locations of fire control stations

ii) Various fire sections enclosed by various classes of fire divisions

iii) Arrangement of fire detectors and manual fire alarm stations

iv) Arrangement of combustible gas detectors

v) Arrangement of hydrogen sulfide gas detectors

vi) Locations of respiratory protection equipment for hydrogen sulfide

vii) General alarm actuating positions

viii) Arrangement of various fire-extinguishing appliances

ix) Locations of firefighter’s outfits

x) Location of helicopter crash kit

xi) Arrangement of water spray nozzles and sprinklers (if fitted)

xii) Locations of emergency shutdown (such as oil fuel source shutdown, engine shutdown, etc.) stations

xiii) The Ventilating system including fire dampers positions, ventilating fans control positions with indication of identification numbers of ventilating fans serving each section

xiv) Arrangement of fire/watertight doors and their remote control positions

xv) Blowout preventer control positions

xvi) Escape route and means of access to different compartments, decks, etc.

xvii) Locations of Emergency Escape Breathing Devices (EEBD); and

PART 5  FIRE AND SAFETY – MEASURES AND FEATURES
CHAPTER 2  ACTIVE FIRE PROTECTION SYSTEMS AND EQUIPMENT
SECTION 2  FIXED FIRE FIGHTING SYSTEMS

1  Fire Main Systems

1.1  Fire Pumps

(Revise Subparagraph 5-2-2/1.1.7, as follows:)

1.1.7  Water Supply (2013)

1.1.7(a)  Water Supply Sources. At least two water supply sources (sea chests, valves, strainers and pipes) are to be provided and so arranged that one supply source failure will not put all supply sources out of action.

1.1.7(a)  Additional Measures. For self-elevating units, the following additional fire water supply measures are to be provided:

i)  Water is to be supplied from sea water main filled by at least two submersible pumping systems. One system failure will not put the other system(s) out of function, and

ii)  Water is to be supplied from drill water system while unit is lifting or lowering. Water stored in the drill water tank(s) is to be not less than 40 m$^3$ (10567 gallons) plus engine cooling water consumption before unit lifting or lowering. Alternatively, water may be supplied from buffer tank(s) in which sea water stored is not less than the quantity as the above mentioned.

1.3  Fire Main

(Revise Subparagraph 5-2-2/1.3.3, as follows:)

1.3.3  Isolation (2013)

Isolating valves and other arrangements, as necessary, are to be provided so that if a fire pump and its associated piping within its compartment are rendered inoperable, the fire main can be pressurized with a fire pump located in another compartment.

In addition, the fire main is to be provided with isolation valves located such that damage to any part of the system (e.g., by fire or explosion) would result in the loss of a minimum number of hydrants, water spray branches or foam water supplies, as practicable, and permit the optimum utilization of the remaining fire main.

1.5  Hydrants, Hoses and Nozzles

(Revise Subparagraph 5-2-2/1.5.3, as follows:)

1.5.3  Nozzles (2013)

Dual purpose combined jet spray nozzles are to be fitted throughout the unit with a minimum nozzle diameter of 12 mm (1/2 in.) for accommodation and service spaces and with a maximum diameter of 19 mm (3/4 in.) for machinery spaces and exterior locations. Fire hose nozzles of plastic type material such as polycarbonate may be accepted, subject to review of their capacity and serviceability as marine use fire hose nozzles.
PART 5  FIRE AND SAFETY – MEASURES AND FEATURES
CHAPTER 2  ACTIVE FIRE PROTECTION SYSTEMS AND EQUIPMENT
SECTION 3  ADDITIONAL FIXED FIRE FIGHTING SYSTEMS

(Revise Subsection 5-2-3/1, as follows:)

1 Fixed Fire Fighting Systems (2013)

1.1 Spaces Containing Specific Equipment
A fixed firefighting system complying with 5-2-3/3, 5-2-3/5 or 5-2-3/7 is to be provided in each space containing the following equipment:

i) Main or auxiliary oil-fired boilers and other processes of equivalent thermal rating.

ii) Oil fuel units (as defined by 5-3-1/9.7)

iii) Internal combustion machinery used for main propulsion

iv) Internal combustion machinery used for purposes other than main propulsion having a total power output of not less than 750 kW (1000 hp).

v) Settling tanks for boilers

Where a fixed fire extinguishing system not required by i) through v) is installed, such system is to meet the applicable requirements of 5-2-3/3, 5-2-3/5, or 5-2-3/7 and is to be submitted for approval.

1.3 Drilling and Industrial Areas

1.3.1 Fixed Fire Extinguishing Systems on Drilling Areas

i) A fixed water spray system is to be provided to protect drilling area. The minimum water application rate is not less than 20.4 l/min/m² (0.5 gpm/ft²), or

ii) At least two dual-purpose (jet/spray) fire monitors are to be installed to cover drilling. The minimum capacity of each monitor is not less than 100 m³/h (440 gpm). The monitors may be operated either remotely or locally. Monitor arranged for local operation should be sited on an accessible protected position.

1.3.2 Fixed Fire Extinguishing Systems on Mud Processing Area

A suitable fixed foam system is to be provided. The system is to be capable of delivering foam solution at a rate of not less than 6.5 l/min/m² (0.16 gpm/ft²) [(4.1 l/min/m² (0.10 gpm/ft²) for Aqueous Film Forming Foam or Film-Forming Fluoroprotein Foam)] for 15 minutes. Alternatively, a gas fixed fire extinguishing system may be used for enclosed mud processing spaces.

3 Gas Smothering

3.1 General

(Revise Subparagraphs 5-2-3/3.1.1 and 5-2-3/3.1.2, as follows:)

3.1.1 Storage (2013)

Where the gas smothering medium is stored outside of the protected space, the storeroom is to be situated in a safe and readily accessible position and is to be effectively ventilated by a ventilation system independent of all other spaces.

Spaces for storage of cylinders or tanks for extinguishing gas are not to be used for other purposes. These spaces are not to be located forward of the forward collision bulkhead, when fitted. Access to these spaces is to be possible from the open deck. Spaces situated below the deck are to be located no more than one deck below the open deck.
Spaces where entrance from the open deck is not provided or which are located below deck are to be fitted with mechanical ventilation. The exhaust duct (suction) is to be lead to the bottom of the space. Such spaces are to be ventilated with at least six air changes per hour.

### 3.1.2 Design (2013)

Containers and associated pressure components are to be designed based upon an ambient temperature of 55°C (131°F).

For CO₂ fire extinguishing systems, the wall thickness of steel piping is to be suitable for the pressure and not less than the thickness identified in 5-2-3/Table 1. Column A is for piping from storage containers to distribution station, and column B is for piping from distribution station to nozzles. For other fixed gas fire extinguishing systems, calculations showing compliance with 4-2-2/5.7 are to be submitted for approval.

Where the fire-extinguishing medium is used as the power source for the pre-discharge alarm, the piping to the alarm is to comply with Column B of 5-2-3/Table 1.

The relief valve of a CO₂ fire extinguishing system is to discharge outside of the CO₂ container storage compartment, in a safe area.

Gray cast iron piping components are not to be used for fixed gas fire extinguishing systems.

### TABLE 1

**Minimum Steel Pipe Wall Thickness for CO₂ Medium Distribution Piping (2013)**

<table>
<thead>
<tr>
<th>Nominal size, mm</th>
<th>OD mm</th>
<th>A mm</th>
<th>B mm</th>
<th>Nominal size, in.</th>
<th>OD in.</th>
<th>A in.</th>
<th>B in.</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>21.3</td>
<td>2.8</td>
<td>2.6</td>
<td>1/2</td>
<td>0.840</td>
<td>0.110</td>
<td>0.102</td>
</tr>
<tr>
<td>20</td>
<td>26.9</td>
<td>2.8</td>
<td>2.6</td>
<td>3/4</td>
<td>1.050</td>
<td>0.110</td>
<td>0.102</td>
</tr>
<tr>
<td>25</td>
<td>33.7</td>
<td>4.0</td>
<td>3.2</td>
<td>1</td>
<td>1.315</td>
<td>0.157</td>
<td>0.126</td>
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**Notes:**

1. The above minimum thicknesses are derived from those thicknesses available in ISO 4200 Series 1 (OD), JIS (N.P.S.), or ASTM (N.P.S.). Diameter and thickness according to other recognized standards will be accepted.

2. For threaded pipes, where approved, the thickness is to be measured to the bottom of the thread.

3. The internal surface of pipes outside of the engine room is to be galvanized.

4. For larger diameters the minimum wall thickness will be subject to special consideration by ABS.

5. In general, the minimum thickness is the nominal wall thickness and no allowance need be made for negative tolerance or reduction in thickness due to bending.
3.1.3 Alarm (1995)

(Revise first paragraph of Subparagraph 5-2-3/3.1.3 and add new Item 5-2-3/3.1.3(c), as follows:)

(2013) Means are to be provided for automatically giving audible and visual warning of the release of fire extinguishing gas into any space to which personnel normally have 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.

3.1.3(a) Electric. If electrically operated, the alarms are to be supplied with power from the main and an emergency source of electrical power.

3.1.3(b) Pneumatic. If pneumatically operated by air, the air supply is to be dry and clean, and the supply reservoir is to be automatically kept charged at all times and is to be fitted with a low pressure alarm. The air supply may be taken from the starting air receivers. Any stop valve fitted in the air supply line is to be locked or sealed in the open position. Any electrical components associated with the pneumatic system are to be powered from the main and an emergency source of electrical power.

3.1.3(c) Uninterruptible Power Supply (2013). For fire extinguishing systems that protect the machinery space containing the main source of power, instead of the power supply arrangements required above for electrically operated alarms and electrical components associated with pneumatic alarms, an uninterruptible power supply which is supplied with power from the emergency switchboard is to be provided.

(Revise Paragraph 5-2-3/3.3, as follows:)

3.3 Carbon Dioxide Systems (2013)

In addition to the applicable requirements of 4-7-3/3.3 of the Steel Vessel 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.

(Add new Subsection 5-2-3/8, as follows:)

8 Clean Agent Fire Extinguishing Systems (2013)

Fixed gas fire-extinguishing systems equivalent to those specified in 5-2-3/3 through 5-2-3/7 are to be submitted for approval, based on the guidelines specified in the IMO MSC/Circ. 848 as amended by MSC/Circ. 1267 and this subsection.

Fire extinguishing systems using Halon 1211, 1301, and 2402 and perfluorocarbons are prohibited. The use of a fire-extinguishing medium, which either by itself or under expected conditions of use gives off toxic gases, liquids and other substances in such quantities as to endanger persons, is not permitted.

8.1 Fire Suppression Agent

The agent is to be recognized as a fire extinguishing medium by NFPA Standard 2001 or other recognized standard. The minimum extinguishing concentration for net volume total flooding of the protected space at the lowest expected operating temperature, but not greater than 0°C (32°F), is to be determined by an acceptable cup burner test. The minimum design concentration is to be at least 30% above the minimum extinguishing concentration and is to be verified by full-scale test (see 5-2-3/8.3).

The fire extinguishing agent is to be acceptable for use in occupied spaces by U.S. EPA or other recognized organization. The concentrations for cardiac sensitization NOAEL (No Observed Adverse Effect Level), LOAEL (Lowest Observed Adverse Effect Level) and ALC (Approximate Lethal Concentration) are to be submitted.
8.3 Fire Tests
The system is to pass the fire tests in the Appendix of the IMO MSC/Circ. 848 as amended by MSC/Circ. 1267. The testing is to include the system components.

The system is to pass an additional fire test (number 1 in the Appendix of MSC/Circ. 848) with the agent storage cylinder at the lowest expected operating temperature, but not greater than 0°C (32°F).

8.5 System Components
The system is to be suitable for use in a marine environment. Major components (valves, nozzles, etc.) are to be made of brass or stainless steel, piping is to be corrosion resistant (stainless steel or galvanized) and the material is to have a melting point of not less than 927°C (1700°F).

The system and its components are to be designed, manufactured and installed in accordance with recognized standards.

Containers and associated pressure components are to be designed based upon an ambient temperature of 55°C (131°F).

Minimum wall thickness for distribution piping is to be in accordance with 5-2-3/Table 1 (Columns A or B, as applicable).

8.7 System Installation
8.7.1 Storage
As far as practicable, the fire suppression agent is to be stored outside the protected space in a dedicated storeroom. The storeroom is to be in accordance with 5-2-3/3.1.1, except that when mechanical ventilation is provided, the location of the exhaust duct (suction) is dependent on the density of the agent relative to air.

When allowed by the Flag Administration, the fire suppression agent may be stored inside the protected space. In addition to the related instructions from the Flag Administration, the installation is to be in accordance with paragraph 11 of IMO MSC/Circ. 848 as amended by MSC.1/Circ. 1267.

In the case of new installation in existing units, the storage of the fire suppression agent within a low fire risk space with a net volume at least two (2) times greater than the net volume of the protected space may be specially considered, based on the type of agent and the possible hazards for the personnel within the space.

8.7.2 Alarm
An audible and visual predischarge alarm in accordance with 5-2-3/3.1.3 and paragraph 6 of IMO MSC/Circ. 848 as amended by MSC.1/Circ. 1267 is to be provided.

8.7.3 Controls
Except as otherwise permitted herein two independent manual control arrangements are to be provided, one of them being positioned at the storage location and the other in a readily accessible position outside of the protected space.

Automatic actuation is not permitted when the protected space is normally accessed by personnel. If the protected space is permanently unmanned, except for repairs or maintenance, automatic actuation may be allowed in addition to manual actuation, provided that the following conditions are met:

i) The egress from the protected space is horizontal.

ii) Notices that the space is protected by an automatic activation system are prominently posted at the entrance to the space.
iii) A switch is provided near the entrance to disable the automatic release feature of the system. The switch is to have an indicator of its status such as red pilot light to indicate when the switch is activated (automatic release feature disabled). A sign is to be posted near the switch indicating that the automatic release feature is to be disabled when the space is occupied and that the automatic actuation is to be enabled when leaving the space. The sign is to also indicate that the manual release of the system remains enabled and the space is to be vacated immediately when the release alarm sounds.

iv) When the automatic release feature is disabled, all other controls, alarms, etc., are to remain activated.

v) An indicator at the control console is provided to indicate when the automatic release feature has been disabled.

8.7.4 Nozzles

The nozzle type, maximum nozzle spacing, maximum height and minimum nozzle pressure are to be within the limits to provide fire extinction as tested and verified in the appropriate fire test (see 5-2-3/8.3).

9 Protection of Helicopter Decks and Refueling Facilities (2011)

9.3 Firefighting Systems

(Revise Subparagraph 5-2-3/9.3.4 and add new Subparagraph 5-2-3/9.3.5, as follows:)

9.3.4 Fixed-Foam System (2013)

A fixed-foam fire-extinguishing system consisting of monitors or hose streams or both is to be installed to protect the helicopter landing area in all weather conditions in which helicopters can operate and fuel storage areas, when provided onboard. The helicopter landing area is the area contained within a circle of diameter “D” where “D” is the distance across the main rotor and tail rotor in the fore and aft line of a helicopter with a single main rotor and across both rotors for a tandem rotor helicopter or the full area of the deck, whichever is less. The system is to be capable of delivering foam solution at a rate of 6.0 liters per square meter per minute (0.15 gpm per square foot) of the areas protected for at least five minutes. The pump is to be capable of maintaining a pressure of 7 bar (7 kgf/cm², 100 psi) at the foam installation. The foam agent is to meet the performance standards for Level B foam in the International Civil Aviation Organization’s Airport Services Manual (Part 1 Chapter 8, Paragraph 8.1.5, Table 8-1) and be suitable for use with sea water. Foam delivery at the minimum application rate is to start within 30 seconds of system activation.

The operation of the foam system is not to interfere with the simultaneous operation of the fire main.

9.3.5 Deck Integrated Fire Fighting System (DIFFS) (2013)

When permitted by the flag Administration, a deck integrated fire fighting system (DIFFS) may be provided as an alternative to the fixed-foam fire-extinguishing system protecting the helicopter landing area. DIFFS typically consist of a series of 'pop-up' nozzles, with both a horizontal and vertical component, designed to provide an effective spray distribution of foam to the whole of the landing area. DIFFS is to be capable of supplying performance level B foam solution at an application rate and for a duration which at least meets the minimum requirements stated in 5-2-3/9.3.4 above.

DIFFS performance criteria need to consider several pop-up nozzles rendered ineffective by the impact of a helicopter on the landing area. The number of pop-up nozzles rendered ineffective by a crash situation will depend on the pattern (spacing) of the nozzle arrangement and the type(s) of helicopters operating to the helicopter deck, but not less than 15% of the nozzles installed. The remaining pop-up nozzles are to be capable of delivering finished foam to the landing area at or above the minimum application rate, considering the individual supply pipes to the damaged pop-up nozzles ruptured.
DIFFS activation is to be initiated manually. Activation controls are to be located in at least two positions having immediate access to the helicopter landing area and separated as far as practicable. Foam delivery at the minimum application rate is to start within 30 seconds of system activation. The operation of DIFFS is not to interfere with the simultaneous operation of the fire main.

PART 5  FIRE AND SAFETY – MEASURES AND FEATURES
CHAPTER 2  ACTIVE FIRE PROTECTION SYSTEMS AND EQUIPMENT
SECTION 5  FIRE AND GAS DETECTION

1  Other Fire Protection Requirements

(Revise Paragraphs 5-2-5/1.1 and 1.3, and add new Paragraph 5-2-5/1.5, as follows:)

1.1  Fire Detection and Alarm Systems (2013)

1.1.1  General
1.1.1(a)  Application. Spaces having a fire risk, are to be provided with an automatic fire detection and alarm system.
1.1.1(b)  Selection of Detectors. In selecting the type of detectors, the following features are to be taken into account:
   i)  Capability to detect fire at the incipient stage
   ii) Ability to avoid spurious alarm and trips, and
   iii) Suitability to the located environment
1.1.1(c)  Fire Detection Indicating Board Location. The fire detection main indicator board is to be at a manned control station and is to be clearly to indicate where fire has been detected.

1.1.2  Machinery Spaces
Fire detectors are to be fitted in normally unattended machinery spaces. Detection systems using only thermal detectors, in general, are not to be permitted.

1.1.3  Accommodation and Service Spaces
An automatic fire detection and alarm system is to be provided in all accommodation and service spaces.
Accommodation space is to be fitted with smoke detectors. Thermal detectors are to be fitted in galleys.

1.1.4  Electrical Rooms and Control Stations
Smoke detectors are to be provided in all electrical rooms and control stations.

1.1.5  Drilling and Mud Processing Areas
Flame or thermal detectors are to be installed in open drilling and/or mud processing areas.
Smoke detectors may be used in enclosed mud processing areas.
1.1.6 Manually Operated Alarm System

Sufficient manual fire alarm stations are to be installed throughout the accommodation spaces, service spaces, and control stations. One manually operated call point is to be located at each exit. Manually operated call points are to be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m (66 ft) from a manually operated call point.

Measures are to be taken to prevent inadvertent operation of the manual call alarm system.

1.3 General Alarm (2013)

1.3.1 Overview

A general alarm system is to be provided and so installed as to be clearly perceptible in all parts of the unit. Alarm signal devices are to be provided which will produce a distinctive and strong note. The signals used should be limited to: general emergency, toxic gas (hydrogen sulfide), combustible gas, fire alarm, and abandon unit signals.

The signals given over the general alarm system should be supplemented by instructions over the public address system.

1.3.2 Locations

At least in the following spaces, the general alarm is to be capable of being operated:

- Main control station
- Drilling console
- Navigating bridge (if any), and
- Fire control station (if any)

1.5 Public Address (2013)

See 4-3-2/15.9.

(Renumber existing Paragraphs 5-2-5/1.5 and 5-2-5/1.7 as 5-2-5/1.7 and 5-2-5/1.9, respectively.)

(Revise Subsection 5-2-5/3, as follows:)


Fixed automatic combustible gas detection and alarm systems are to be provided for the following areas:

- Cellar deck
- Drill floor
- Mud pit area
- Shale shaker area
- Enclosed spaces containing open components of the mud circulation system from the bell nipple to the mud pits.
- Ventilation intakes of enclosed machinery spaces contiguous to hazardous areas and containing internal combustion engines and boilers, and
- Ventilation intakes and near other openings of accommodation spaces

The gas detectors are to be connected to an audible and visual alarm system with indicators on the drill floor and at the required emergency control stations (See 5-3-1/7). The alarm system is to clearly indicate the location and concentration of the gas hazard. The combustible gas detectors are to alarm at not more than 25% and at 60% of the lower explosive limit (LEL).

In addition to the fixed automatic gas detection system, two portable combustible gas detectors are to be provided on the unit.
5 Hydrogen Sulfide Detection and Alarm (2013)

5.1 Areas for Protection
A fixed automatic hydrogen sulfide gas detection and alarm system are to be provided for the following areas:

i) Drill area

ii) Mud processing area, and

iii) Well test area

5.3 Alarms
The detectors are to be connected to an audible and visual alarm system with indicators in main control room. The system is clearly to indicate where gas has been detected.

Low level alarm set at 10 ppm and high level alarm set not higher than 300 ppm are to be provided. The high level alarm is to activate an evacuation alarm.

If the alarm at the main control point is unanswered within 2 minutes, the toxic gas (hydrogen sulfide) alarm and the helideck status light is to be automatically activated.

5.5 Portable Hydrogen Sulfide Gas Detectors
At least two portable hydrogen sulfide gas monitoring devices should be provided on the unit.

7 Respiratory Protection Equipment for Hydrogen Sulfide (2013)

7.1 Self-contained Breathing Apparatus (SCBA)
A self-contained breathing apparatus (SCBA) positive-pressure/pressure-demand breathing equipment with full-face piece and rated for a minimum of 30 minutes is to be provided for each person in working areas where hydrogen sulfide may be encountered, and each person in other areas is to be provided with a SCBA rated for a minimum of 15 minutes, or

7.3 Air Line Breathing Equipment
7.3.1 Details
Positive-pressure/pressure-demand air line breathing equipment coupled with a SCBA-equipped low pressure warning alarm and rated for a minimum of 15 minutes is to be provided for each person on board the unit.

7.3.2 Locations
Breathing air supply line stations are to be provided at least in the following areas:

i) Living quarters

ii) Muster/evacuation area

iii) Drilling areas

iv) Mud processing areas, and

v) Other working areas
PART 5 FIRE AND SAFETY – MEASURES AND FEATURES
CHAPTER 3 OUTFITTING
APPENDIX 1 FIBER REINFORCED PLASTIC (FRP) GRATINGS

(Revise Appendix 5-3-A1, as follows:)


1 General

1.1 FRP gratings are not specifically addressed in the individual vessel regulations. However, the resins typically used in the manufacture of these gratings are combustible and heat sensitive; therefore, FRP gratings use must be limited based on the requirements discussed below.

1.3 These requirements are not intended to eliminate any other design criteria or requirement pertaining to the material, construction, or performance of the FRP gratings in the non-fire condition.

3 FRP Grating Material Systems

3.1 All fire integrity, flame spread, smoke, and toxicity testing, where required, shall be conducted on each material system.

3.3 Changes in either the type, amount, and/or architecture, of either the reinforcement materials, resin matrix, coatings, or manufacturing processes shall require separate testing in accordance with the procedures below. Manufacturers should provide evidence, such as enrollment in a follow-up program, that the FRP gratings being installed are the same as those which were tested and approved.

5 Fire Test Requirements

5.1 Structural Fire Integrity*

The structural fire integrity matrix in Section E establishes the structural fire integrity characteristics that FRP gratings should possess, based on location and service. Where a specific application satisfies more than one block in the matrix, the highest level of fire integrity shall be required. The test procedures required to qualify FRP gratings to one of three levels are described in 5-3-A1/7. The ABS Surveyor shall determine the location and service of the FRP gratings, keeping in mind the following considerations for each of the three performance levels:

5.1.1 Level 1 (L1)
FRP gratings meeting the L1 performance criteria are intended to be satisfactory for use in escape routes or access for firefighting, emergency operation or rescue, after having been exposed to a significant hydrocarbon or cellulosic fire incident. In addition, they are also acceptable for the services and functions described for levels L2 and L3.

5.1.2 Level 2 (L2)
FRP gratings meeting the L2 performance criteria are intended to be satisfactory for use in open deck areas where groups of people are likely to assemble, such as temporary safe refuge or lifeboat embarkation areas. In addition, they are also acceptable for the services and functions described for level L3.
5.1.3 Level 3 (L3)
FRP gratings meeting the L3 performance criteria are intended to be satisfactory for use in egress routes and any areas that may require access for firefighting, rescue or emergency operations during exposure to or shortly after exposure to a transitory hydrocarbon or cellulosic fire.

* The structural fire integrity requirements are intended for self-supporting personnel platforms or walkways, and are not intended for grating overlaid on steel decking or used in other applications such as pipe guards, seachest screenings, safety guards, etc.

5.3 Fire Retardance
All FRP gratings should be fire retardant; this can be demonstrated by testing to ASTM E-84, Standard Test Method for the Surface Burning Characteristics of Building Materials with a flame spread rating not to exceed 25, or by meeting the requirements in 5-3-A1/5.5.1 or 5-3-A1/5.5.2 below.

5.5 Flame Spread
All FRP gratings, except those fitted on open decks and within tanks, cofferdams, void spaces, pipe tunnels and ducts, should have low flame spread characteristics as determined by one of the following test procedures:

5.5.1 Tested to ASTM E-84 with a flame spread rating not to exceed 20; or

5.5.2 Tested to IMO Resolution A.653(16), Recommendation on Improved Fire Test Procedures for Surface Flammability of Bulkhead, Ceiling and Deck Finish Materials and meeting the criteria for bulkheads, linings, or ceilings.

5.7 Smoke Generation
FRP gratings within accommodation, service and control spaces, should have low smoke characteristics as determined by one of the following test procedures:

5.7.1 Tested to ASTM E-84 with a smoke developed rating not to exceed 10; or

5.7.2 Tested in accordance with the IMO Fire Test Procedures Code (FTPC), Resolution MSC.61(67), Part 2 – Smoke and Toxicity Test, and meeting the criteria established for materials used as bulkheads, linings, or ceilings.

7 Structural Fire Integrity Test Procedures

7.1 Level 1
To be qualified as level 1 (L1), the FRP gratings shall meet the requirements for qualification as level 3 and level 2, and in addition shall be subjected to the following test procedures:

7.1.1 Three (3) FRP grating specimens, after being subjected to the level 2 testing, shall be unloaded and prepared for impact testing in the manner specified for horizontal specimens in ASTM E-695, Standard Method of Measuring Resistance of Wall, Floor, and Roof Construction to Impact Loading.

The test specimens shall be secured as required in section 8.3 of ASTM E-695 except that the span shall be 200 mm less than the specimen length. A lead shot bag of 40 kg mass shall be dropped once from a height of 2 m such that the point of impact is in the center of the span. The specimens shall then be uniformly loaded as required by the level 2 test procedures.
7.1.2

The test will be considered successful if all three (3) specimens remain intact after being subjected to the impact test and the level 2 loading test. Failure will be indicated by collapse of one or more of the gratings.

7.3 **Level 2**

To be qualified as level 2 (L2), the FRP gratings shall meet the requirements for qualification as level 3, and in addition shall be subjected to the following test procedures:

7.3.1

On the FRP grating specimen and the steel grating specimen subjected to the level 3 post-loaded testing, the specimen shall be gradually loaded in increments not to exceed 20 kg, placed in such a manner as to represent a uniformly distributed load across the span.

7.3.2

The test will be considered successful if the FRP grating remains intact at a load greater than or equal to a uniform 4.5 kN/m² (94 lbf/ft²), or greater than or equal to the steel grating failure loading, whichever is less. Failure will be indicated by collapse of the grate.

7.5 **Level 3**

To be qualified as level 3 (L3), the FRP gratings should be subjected to the following fire test procedures for both the post-loaded and pre-loaded tests and conditions:

7.5.1

A fire test will be conducted in accordance with ASTM E-119, Standard Test Method for Tests of Building Construction and Materials. Two tests shall be conducted in the ASTM E-119 furnace for each FRP grating design. The first fire test shall be conducted with the specimens under the specified load (pre-loaded) and the second fire test will be conducted on unloaded specimens (post-loaded). The time-temperature curve shall be the standard for E-119 or the ISO equivalent. The duration of the tests shall be as specified below.

7.5.2

Each test specimen shall be 300-350 mm wide to allow for the differences in the spacing of longitudinal supporting members. The length of each test specimen shall be the length of the maximum span to be seen in service, plus 200 mm. Four test specimens shall be prepared as described above: two of the proposed FRP gratings and two of a similar steel grating that would be used in the same location constructed to the applicable regulations and standards (steel gratings rated at a minimum of 4.5 kN/m² (94 lbf/ft²) uniform loading with a 1.67 factor of safety are acceptable).

7.5.3

The pre-loaded test shall consist of the following:

i) One steel grating specimen and one FRP grating specimen shall be placed adjacent to one another in the furnace, simply supported on two I-beams with a minimum flange width of 100 mm at an elevation of at least one half of the furnace height, or a minimum of 300 mm above the burners;

ii) The specimens shall be placed on the I-beams such that 100 mm of each side of the specimen rests on each of the two I-beams;

iii) A static load represented by a 40 kg mass shall be placed in the center span of the test specimens;

iv) The 40 kg mass load shall consist of a steel container filled with sand, the base of which shall be square with an area of 0.9 m²;

v) Arrangements shall be made to measure the deflection at the center of the span of each of the loaded specimens during the test, with a degree of accuracy of ±5 mm.
vi) The two specimens shall be subjected to the time-temperature curve specified in the ASTM E-119;

vii) Deflection of the two loaded test specimens shall be measured throughout the duration of the fire test, and the average furnace temperature shall be recorded when each of the two specimens has deflected a distance of L/10 (failure point) from the horizontal, where L is equal to the maximum unsupported span of the specimens; and

viii) The test will be considered successful if the difference between the average furnace temperature at the time of failure of the steel grating and the average furnace temperature at the time of failure of the FRP grating is less than 100°C (180°F).

7.5.4

The post-loaded test shall consist of the following:

i) One steel grating specimen and one FRP grating specimen shall be placed adjacent to one another in the furnace, simply supported on two I-beams with a minimum flange width of 100 mm at an elevation of at least one half of the furnace height;

ii) The specimens shall be placed on the I-beams such that 100 mm of each side of the specimen rests on each of the two I-beams;

iii) The two specimens shall be subjected to the time-temperature curve specified in the ASTM E-119 for a duration of 60 minutes;

iv) At the end of the 60 minutes, the specimens will be allowed to cool and shall then be subjected to a static load represented by the 40 kg mass specified in the pre-loaded test above, placed in the center span of the test specimens; and

v) The test will be considered successful if the FRP grating specimen is intact at the end of the test and does not collapse under the 40 kg mass load.
9    Structural Fire Integrity Matrix

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<td>Cargo Holds</td>
<td>Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue</td>
<td>L1</td>
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</tr>
<tr>
<td>Open Decks or semi-enclosed areas</td>
<td>Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue</td>
<td>L3 (4)</td>
</tr>
<tr>
<td></td>
<td>Personnel walkways, catwalks, ladders, platforms or access areas other than those described above</td>
<td>None required</td>
</tr>
</tbody>
</table>

Notes:
1. If the machinery space does not contain any internal combustion machinery, other oil-burning, oil-heating, or oil-pumping units, fuel oil filling stations, or other potential hydrocarbon fire sources, and has not more than 2.5 kg/m² of combustible storage, gratings of L3 integrity may be used in lieu of L1.
2. If these spaces are normally entered when underway, gratings of L1 integrity shall be required.
3. If these spaces are normally entered when underway, gratings of L3 integrity shall be required.
4. Vessels fitted with deck foam firefighting systems require gratings of L1 integrity for foam system operational areas and access routes.

11    Other Authorized Uses

11.1 The ABS Surveyor may authorize the use of FRP gratings without Main Office approval in applications where structural fire integrity of the FRP gratings is not a concern, provided they meet the applicable fire retardance, flame spread and smoke generation requirements set forth in 5-3-A1/5.3, 5-3-A1/5.5, and 5-3-A1/5.7. Applications where the use of FRP gratings have been authorized in the past, without any structural fire integrity requirements, include the following:

i) Sea chest coverings;

ii) Small sundeck awnings and supports;

iii) Lifeboat bilge flooring;

iv) Electrical control flooring;

v) Pipe guards on deck, in cargo holds, and in engine rooms;

vi) Removable guards over hawse holes, anchor hawse pipes, and scuppers;
vii) Personnel barriers, such as protection for electrical panels; and
viii) Ship staging and work platforms (Occupational Safety and Health Administration (OSHA) requirements may also apply).

PART 6 RULERS FOR EQUIPMENT AND MACHINERY CERTIFICATION
CHAPTER 1 MATERIAL, MARINE EQUIPMENT AND MACHINERY CERTIFICATION
SECTION 8 FIRE AND SAFETY – EQUIPMENT AND SYSTEMS

(Revise 6-1-8/Table 1, as follows:)

<table>
<thead>
<tr>
<th>TABLE 1 Certification Details – Safety Equipment and Systems (2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Equipment and Systems</td>
</tr>
<tr>
<td>Fire doors</td>
</tr>
<tr>
<td>Fire-rated windows</td>
</tr>
<tr>
<td>Fire and gas detection system alarm and control panels</td>
</tr>
<tr>
<td>Main and emergency fire pumps, other pumps used for fixed fire-extinguishing systems (see 6-1-6/7.3.2)</td>
</tr>
<tr>
<td>Fixed fire extinguishing system components</td>
</tr>
<tr>
<td>Clean agent fire extinguishing system components</td>
</tr>
<tr>
<td>Helicopter deck DIFFS components</td>
</tr>
<tr>
<td>Fireman’s outfit</td>
</tr>
<tr>
<td>Fire hoses</td>
</tr>
<tr>
<td>Portable and semi-portable fire extinguishers</td>
</tr>
</tbody>
</table>

Notes:
1 Design review by ABS is required for unit certification. Where Type Approval is allowed and requested, Product Design Assessment (PDA) by ABS is required.
2 Material tests witnessed by Surveyor.
3 Survey at the plant of manufacture including witnessing Factory Acceptance Test (FAT) on production unit.
4 Fire tests performed in recognized fire test laboratories do not need to be witnessed by the Surveyor.
5 In general, unit certification in accordance with PQA is optional. Refer to 1-1-A2/5.5 of the ABS Rules for Conditions of Classification – Offshore Units and Structures (Part 1). Column “PQA” is applicable to PQA only, and the “O” marks in the Table indicate where a product may be allowed to be unit certified in accordance with PQA. A “-” mark indicates that the product has no requirement in these Rules. An “N” mark indicates that ABS does not allow unit certification in accordance with a PQA Type Approval.

Symbols used in Table

N - Not Allowed. Unit certification by Surveyor after attending required surveys at manufacturer’s plant.
O - Optional.
X - Required.
XTA - Required only if Type Approval is requested.
- Not Applicable or Not Required.
1 Lay-up of Mobile Offshore Drilling Units

At the Owner’s request, ABS will review, survey, and confirm by issuance of a factual Lay-up Report, the actions taken to preserve and protect a unit in lay-up. Outlined below are precautions and procedures to accomplish this objective; alternative approaches to accomplish the same may be considered.

1.1 Lay-up Requirements

1.1.1 Upon the owner’s notification to ABS of a unit laid-up, the status will be noted in the unit’s survey status and in the Record. Surveys falling due during lay-up are then to be held in abeyance until the unit reactivates, at which time they are to be brought up to date.

1.1.2 In the case of a laid-up period extended six months or more, 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.

1.1.3 Where initial lay-up preparations and procedures are reviewed and surveyed by ABS, and also re-verified annually by survey, consideration may be given to deducting part or all of the time in lay-up from the progression of survey intervals, or to modifying the requirements for up-dating surveys at time of reactivation.

1.3 Safety and Protection

1.3.1 There are to be sufficient and qualified personnel available in order to maintain full-time fire, leakage, moorings and security watch of the unit. In addition, efficient independently-powered fire and bilge flooding alarms with exterior warning lights are to be fitted for the machinery spaces, bilges and for other locations as deemed appropriate. The available watchmen are to include a barge engineer and other personnel capable of operating the emergency communications equipment and taking emergency action pending arrival of outside assistance for fire extinguishing, leakage pumping, mooring adjustment or release, and general security. This includes the operation of the necessary emergency power sources, pumping units and any active fixed fire control apparatus. Qualified personnel for emergency ballasting in hurricane areas are to be considered.

1.3.2 All the unit’s fire safety equipment including emergency fire pump are to be proved in good order immediately prior to lay-up and maintained prepared for immediate use thereafter.

1.3.3 The unit’s fire lines are to be proven in good condition before draining. Drains are to be kept only sufficiently open to allow drainage of condensate. Alternatively, the fire lines may be filled with inhibited fresh water, including anti-freeze if necessary. The International Shore connection is to be loosely installed and its location prominently marked. Fire line valve stems are to be freed up and lubricated.

1.3.4 Oxygen breathing apparatus and flotation escape equipment are to be provided and maintained immediately available for the watchmen or lay-up crews.

1.3.5 All ventilators and air intake or exhaust openings are to be adequately covered. Supply and exhaust openings for necessary emergency diesel generator or fire pump engines are to be arranged for immediate or automatic opening. All fire dampers are to be freed-up and then secured in closed position. All fire division doors are to be closed.
vi) Effective and reliable means of communication such as an independently-powered radiotelephone are to be provided for all-hours contact with firefighting, tug and rescue facilities, or central security base. A secondary communication system is to be provided in the event of failure or damage to the primary means.

vii) A source of power for providing emergency lighting, fire extinguishing water, and bilge pumping throughout the unit is to be immediately available.

Where the emergency source of power is a portable diesel generator set mounted on deck, care is to be taken concerning fire safety of the fuel and exhaust systems, fire extinguishing arrangements, weather protection, proper electrical installation, and electrical protective devices for the unit.

viii) All loose flammable materials such as debris, oily rags, cotton waste, chemicals, additives, corrosives, old pyrotechnics, matches, unsealed painting oils and dregs, garbage, etc., are to be removed from the unit. Arrangements are to be made for safe containment and frequent removal of garbage produced by watch personnel.

ix) All mud and cement storage, mixing and holding tanks together with associated piping and shale shaker system are to be clean and gas-free.

x) Machinery space bilges are to be pumped dry and cleaned of all debris, oil or other flammable products.

xi) Fuel and lube oil tanks are to be wired or locked closed at the tank valve except where required for the emergency power supply engine.

xii) All valves to or from the sea on floating units are to be wired or locked closed except those actually required for use during lay-up in connection with emergency ballasting, fire extinguishing, pumping out or watch personnel service. In order to prevent excessive fouling and choking, the sea suction openings, except for emergency fire pump, are to be covered over externally and/or protected with a slow acting biocide.

xiii) On floating units, the anchor windlass is to be proven to be in good order prior to lay-up, and anchors, chains or mooring cables checked. Where used as part of the lay-up mooring arrangements, the chains or mooring cable are to be regularly checked for twists and chafing and shifted or padded as necessary. If not required for the mooring, one anchor is to be prepared for emergency release. See also 6-2-A1/1.5.7.

xiv) Hot work (i.e., welding or burning) is not to be permitted during lay-up except under specially supervised safety control. No unshielded or open-flame devices such as portable heaters are to be permitted on board. Safe smoking areas, if required, are to be clearly marked.

xv) The unit is to be readily accessible and approachable for shore-based or floating firefighting and other emergency equipment at all times and tides.

xvi) In the event of an emergency tow from lay-up while in deactivated condition, a towing pendant is to be available. If the unit is self-propelled the propeller shaft(s) are to be blocked from turning by some positive means. The turning gear is not to be used for this and is only to be engaged when in use. Rudders, if fitted, are to also be hydraulically locked or otherwise blocked amidships.

1.5 Preservation and Maintenance

1.5.1 Hull and Deck Equipment

The primary objective of lay-up is to protect the hull and deck equipment against accelerated corrosion, weathering damage and freezing.

1.5.1(a) The unit’s external coating systems are to be in good condition prior to lay-up. Consideration is to be given to supplemental sacrificial anodes on submerged areas; e.g., externally along the side shell, on lower hulls or pontoons, columns and bracing members, legs, mats, spud cans, and in ballasted areas.
1.5.1(b) Impressed-current cathodic hull protection systems where fitted, are to be maintained in operation if a continuous power source is available and readings logged weekly by watch personnel who are to be advised of proper procedures in case of abnormal readings. If the unit is moored to another unit or shore power is used, the system may need to be modified or secured due to possible electrolytic interaction. This is to be taken up with the system manufacturer.

1.5.1(c) Deck machinery is to be thoroughly lubricated and operated in all modes before securing. Also refer to “Machinery” or “Electrical Installation.

1.5.1(d) The accommodation spaces, deck, and other hull water, steam and air piping are to be drained and blown clear and dry with air. Alternatively, they may be completely filled with chemically inert anti-freeze liquids compatible with the piping or tubing material. The latter is to be carried out under the guidance of a chemical specialist. Salt water lines, including tank washing apparatus, are to be flushed out with fresh water, drained and blown dry. (Note that this will require a good supply of fresh water on arrival at the lay-up site.)

1.5.1(e) The drill floor, derrick, substructure, topdrive and rotary table are to be cleaned of all mud and grease. Drill floor and substructure drain holes and drain wells are to be cleared to insure proper draining of rain water.

1.5.1(f) Jacking units, skidding apparatus, and raw water tower jacking gear assemblies are to be cleaned and unprotected surfaces coated with a protective coating.

1.5.1(g) Air vents for water tanks and fuel oil may be left open. Flame arrestor arrangements on fuel tanks and adjacent cofferdams are to be in good order.

1.5.1(h) Empty tanks are to be ventilated as much as possible and condensate regularly removed or inhibited. Supplemental anodes and inhibitors are to be considered for ballast tanks containing water.

1.5.1(i) All doors and side scuttles are to be kept closed and deadcovers in place, except where in regular use by watch personnel. Machinery casing top openings and skylights are to be kept closed and weathertight.

1.5.1(j) Hull hydraulic systems are to be kept completely full of fluid. All hydraulic cylinders and ram assemblies are to be actuated periodically to verify the capability for proper operation.

1.5.1(k) Wire radio antennae are to be lowered and secured except for emergency communications antenna.

1.5.1(l) All loose items on deck are to be properly secured against movement by wind or other external forces.

1.5.1(m) All exposed navigation equipment, drillers’ consoles, derrickman’s console and any other exposed gauge and meter panels are to be protected with weathertight covers.

1.5.1(n) Galley exhaust grease collection apparatus are to be cleaned. If in use by watch personnel, it is to be re-cleaned monthly.

1.5.1(o) Potable water tanks not in use by watch personnel are to be drained and left open for free ventilation. Alternatively, they may be left completely filled if not subject to freezing.

1.5.1(p) All deck electrical receptacles are to be closed up weathertight. Deck mounted electrical or hydraulic controls are to be protected by a weathertight cover.

1.5.1(q) Crane booms are to be down and secured. Exposed wire rope such as for cranes, derrick falls, riser tensioner wire, lifeboat falls and mooring wires are to be slushed with preservative grease, and where possible, removed from the blocks and stowed out of the weather. Fibrous mooring ropes and other cordage not in use are to be stowed off the deck and out of the sun and weather.

1.5.1(r) Exposed deck fittings liable to corrosion seizing, such as hinges, clips, screw-dogs, roller fairleads, boom fittings and valve stems are to be coated or injected with preservative grease.
1.5.2 Machinery Spaces, Machinery, and Drilling Equipment

The machinery and related engine room equipment are to be protected against accelerated or localized corrosion, seizing and freezing. This normally requires the use of stabilized or preservative lubricants, prevention of acid concentrations, and regularly scheduled rotation or movement of machinery parts to shift contact surfaces. There is to be a means or source of power for lighting and for turning over machinery. Continuous heating for the machinery spaces, including steering gear room, to maintain a temperature a few degrees above atmospheric; or alternatively, complete dehumidification at 35% to 45% RH is normally required to prevent sweating or humidity corrosion damage.

1.5.2(a) Thrusters and all rotating machinery in the machinery spaces and in the pump rooms are to be turned over several revolutions and stopped at a new position at least once a month. Where fitted, pressure lubrication systems are to be actuated and cylinder lubricators manually operated prior to turning over the machinery. The steering gear on floating units is to be operated and moved full travel at the same intervals. Deck machinery is to be turned over at least quarterly.

1.5.2(b) Lube oil in engines is to be thoroughly separated or dehumidified prior to shutting down, after which the oil is to be periodically chemical analyzed to confirm stability and the absence of harmful acidity. Any lube oil reservoir or sump vents to the exposed atmosphere are to be closed off and opened only to a dry space. Where tube oil tanks are contiguous with the hull plating, means of coping with accumulation of condensation are to be provided for.

1.5.2(c) All other machinery is to be thoroughly lubricated with a stable grease or oil before securing and at least annually thereafter. For reciprocating machinery this is to include also some form of non-contaminating protection in the cylinders. There are various proprietary products available specifically for this purpose.

1.5.2(d) The bilges in machinery spaces are to be thoroughly cleaned and pumped dry. If the unit has a water-lubricated stern bearing, the stern gland are to be tightened up just sufficiently to stop leakage, and warning notice to this effect posted at propulsion control station.

1.5.2(e) The sea-water side of heat exchangers are to be thoroughly cleaned of all sea growth or other organic products, washed through with fresh water, then drained, dried and closed up, or left open to a dehumidified space. Drains may be left partly open but are to be clearly marked to this effect and connecting valves to the sea wired-closed. Alternatively, these heat exchangers may be kept completely filled with chemically inert liquid. This latter approach is to be carried out under the guidance of a chemical specialist.

1.5.2(f) All water system heat exchangers, reservoirs and piping are to be drained and blown dry. Alternatively, these may be protected by filling with a non-contaminating, chemically inert liquid or dry inert gas. This process is to be carried out under the guidance of a chemical specialist.

1.5.2(g) Air reservoirs are to be fully charged, water drained and air outlet valve closed off at the tank. Alternatively, they may be opened, cleaned, dried and left open for free ventilation.

1.5.2(h) The unit’s air conditioning and refrigeration systems are to be pumped down and secured. Inert Gas systems are to be completely drained, dried out, and secured with means for air circulation or dehumidification. Acidic areas may be required to be neutralized.

1.5.2(i) Drilling equipment left on the rig such as rotary, Kelly, tongs, wedges, BOP stacks, drill bits, etc., are to be cleaned, secured and weather protected where exposed. The derrick hook and block are to be secured against movement.

1.5.3 Boilers

1.5.3(a) The boiler fire-side is to be laid-up thoroughly clean in order to minimize external acidic corrosion from the absorption of atmospheric moisture by the products of combustion. Usual soot accumulation areas such as where tubes enter headers or water drum and around floor tubes require special attention. If water washing is resorted to for cleaning, the boiler is to then be fired for about 12 hours to dry the residual moisture from the insulation and brickwork. Where feasible, alkaline wash water is to be used. Final cleaning by dry method is recommended, after which the furnace openings are to be left open for free ventilation.
1.5.3(b)  The boiler water-steam side may be preserved by a wet method or a dry method. In either case the water-steam side of the entire boiler, including superheater and economizer, are to be first washed clean of all residue and existing chemical concentrates.

If the dry method is employed, after thoroughly heat drying, the water-steam side of the boiler is to be either charged with trays of desiccant and resealed, or left open top and bottom including a hand hole in each header for free ventilation to a dehumidified space or with a continuous source of heating inside the water drum. If desiccant is used, this is to be renewed or re-dried at least monthly or changed on the basis of a moisture indicator. A third alternative is to keep the boiler empty, sealed and slightly pressurized with a dry inert gas.

If the wet system is employed, the entire boiler is to be kept full under a slight head with chemically inert distilled water. The initial charging and occasional rechecks are to be carried out under the guidance of a chemical specialist. If the wet system is employed, external space heating or dehumidification may be required to control sweating and consequent poultice corrosion under insulation.

1.5.4  Boiler Stack Openings
After securing the boiler and engines, all stack outlets are to be provided with weathertight covers. If not in use, the galley stack is also to be covered weathertight.

1.5.5  Electrical Installation
The electrical system is to be protected against insulation deterioration, primarily from atmospheric moisture absorption or water ingress, and the rotating elements protected against corrosion damage in the bearings.

1.5.5(a)  Before securing, electrical motors and generators are to be thoroughly cleaned of carbon or other hygroscopic foreign matter, heat dried so as to obtain acceptable insulation resistance readings, and the bearings lubricated with a stable grease or oil. Any carbon brushes are to be lifted to prevent spot corrosion on the commutator or slip rings. Insulation readings are to be taken and recorded at least monthly thereafter and where found abnormal, immediately corrected by heating, drying or cleaning.

1.5.5(b)  All electrical apparatus are to be maintained internally a few degrees above atmospheric by means of built-in heaters, if fitted, or by other means such as a strip heaters or heat lamps. Alternatively, the humidity control may be maintained by opening the unit to the effects of a dehumidifier or by sealing the unit with desiccant inside. This latter approach would require replacement of the desiccant and re-sealing at least monthly or based on a moisture indicator.

1.5.5(c)  Electrical junction boxes are to be covered with either protective coatings or protective tape.

1.5.5(d)  Switchboards, distribution panels, SCR panels, and explosion-proof motors are to be protected against moisture absorption by use of heaters, heat lamps, dehumidifier, or by sealing with desiccant inside.

1.5.5(e)  Jacking, skidding and deck machinery motor enclosures are to be checked for watertightness and suitable driers placed inside or internal heaters provided.

1.5.5(f)  Crane controls and motors are to be provided with heaters or desiccant.

1.5.5(g)  The gyro compass, radar, loran, radio, and automation electronic apparatus are to be maintained heated and/or dehumidified in the same manner as above. The manufacturer is to be consulted regarding the maintenance during lay-up of computer systems. Such equipment may be required to be operated periodically.

1.5.5(h)  All liquid-filled storage batteries are to be fully charged and if possible, maintained on trickle charge under weekly inspection.

1.5.5(i)  All electrical switches for circuits not in regular use are to be kept in open or disconnect position.
1.5.6 Tensioning System and Heave Compensators
The tensioner rams and heave compensators are to be retracted and secured. All associated equipment is to be cleaned, secured and unprotected surfaces coated with proper preservatives. Wire rope is to be coated with preservative grease and if possible, removed from the blocks and stowed in a dry space.

1.5.7 Lay-up Site and Mooring Arrangements
The following portions of the lay-up arrangements are normally subject to approval of the local port authorities and the underwriters. However, they may be surveyed and included in the ABS Lay-up report at the option of the unit’s Owner.

1.5.7(a) Lay-up Site Considerations
i) Protection from open seas and surge
ii) Sufficient year-round water depth
iii) Good holding ground for anchors, clear of wrecks, cables or other bottom debris
iv) Clear of known cyclone or typhoon zones and tidal wave lee shore
v) Clear of open roadstead anchorages or shipping channels
vi) Clear of high-velocity or turbulent tidal currents
vii) Clear of significant amounts of moving ice
viii) Clear of hazardous shore facilities
ix) Clear of detrimental industrial waste discharges
x) Freezing or excess humidity
xi) Suitable soil conditions for self-elevating units and submersible column stabilized units, considering type of support, such as spud cans or mats

1.5.7(b) Mooring Arrangements Considerations
i) Good holding ground, non-foul bottom, and ample anchor chain scope. “Ample” scope is generally considered to be seven times the depth of the water as a minimum.

ii) Unless secured to a permanent mooring buoy, elevated or submerged in shallow water, the unit is to be moored to prevent rotating with wind or tide changes, stem or head toward the usual most severe of winds or currents. The chains are not allowed to be subjected to cross-contact or twisting or the anchors to tripping. For ship-type units, supplemental stern mooring or anchoring arrangements are normally to be provided to the ship basic anchoring equipment. Where mooring by a single anchor is necessary, provisions must be made for periodically clearing the chain of twists.

iii) The chains or mooring wire should be led and protected so as to avoid chafing against the unit. If the unit is subject to wave movement or surge, the chain is to be regularly shifted in or out a short distance to move the point of wear. When initially paying out, the locking arrangement of each connecting link on the anchor chains are to be verified.

iv) Where ship or barge type units are moored in groups or as a part of a group, the following additional items are to be considered:

a) The size and number of units or other vessels (i.e., total windage and current drag areas) of the group and the external forces to be expected are to be compatible with the capacity of the mooring arrangements.

b) Adjacent units or vessels are to be similar in size to avoid differential surging motion, and at similar freeboards to enable direct lead for breast lines.
c) Ship-type units are to be moored in alternate directions bow to stern in even numbers in order to provide equal anchor holding power at both ends of the group and to prevent swinging. The fore-and-aft direction is to be parallel to the usual most severe winds.

d) All unit-to-unit or unit-to-vessel (breast) mooring lines are to be material of similar stretch characteristics.

ev) Ample size fenders or camels are to be provided alongside at areas of possible or actual contact with other units, vessels, or fixed structures.

vi) Day and night compass bearings and or line-up markers are to be clearly established and regularly checked by the watch personnel for signs of the mooring shifting or anchor dragging.

vii) Anchor lights, aircraft warning lights and fog signals are to be in good order. Supplemental deck lighting is to be used if near shipping lanes.

viii) A tug or supply vessel with pumping-out equipment and firefighting assistance is to be available within reasonable distance and time.

ix) Ship- or barge-type units are to be ballasted to reduce windage, rolling and surge, 30% or more of the load line draft is suggested, with due regard for similar freeboards where moored to other units or vessels. Hull stresses and salvage potential are also to be established; clearly visible reference marks are to be painted at bow and stern just above the waterline as external means of checking for leakage.

x) Column-stabilized semi-submersible units are to be ballasted to a suitable draft, considering the environmental conditions at the lay-up site.

xi) Jack-up units are to be elevated and ballasted for storm conditions.

xii) Emergency towing pendants are to be secured to bitts at bow and stern of each unit and arranged for easy access from a tug.

xiii) Means are to be provided for the watch personnel to release the anchors or moorings if necessary in an emergency. Anchors are to be buoyed for locating. If steam-driven, the anchor windlass and any necessary mooring winches are to be fitted with emergency air connections. If electric, an emergency source of power is to be available for their operation.

3 Reactivation of Laid-up Mobile Offshore Drilling Units

For units returning to service from extended lay-up (six months or more), regardless of whether ABS has been informed that the unit has been in lay-up or lay-up preparations reviewed by ABS, a Reactivation Survey is required. An ABS Office is to be contacted for details of the requirements. Outlined below are guidelines on such surveys.

3.1 Reactivation Survey Status

i) In order to restore a laid-up unit to active Class status, a Reactivation Survey is to be carried out including a corresponding point-by-point coverage of the original lay-up steps. The extent of the Reactivation Survey is generally dependent on the length of time in lay-up, the lay-up procedures followed, and the maintenance conditions during lay-up; however, the equivalent of an Annual Survey for all Class items, up-dating any due surveys, and compliance with any outstanding recommendations are normally required.

ii) The primary objective of the Reactivation Survey is to verify that the unit is fit, within the scope of Classification, to transit to the drilling site and resume normal drilling operations. Where lay-up preparations and procedures were submitted to ABS for review and verified by survey at time of lay-up from the progression of survey intervals, or to modifying the requirements for up-dating surveys at time of reactivation.

iii) Applicable items of the Reactivation Survey may be credited to a forthcoming Special Survey, provided that the entire Special Survey is completed within a period of approximately twelve months, or the Special Survey is on continuous basis.
3.3 Hull and Outfit

3.3.1 Drydocking Survey
Underwater Inspection by a diver may be permitted in lieu of Drydocking for reactivation of most units except for floating-type units where lay-up has been unduly extended. Cleaning of the unit’s underwater body, including sea suction, will normally be required to enable meaningful underwater examination. Where it is intended to proceed from the lay-up site to another location for completion of reactivation work, an underwater inspection by diver (for wet tow) will normally be required prior to departing lay-up site.

3.3.2 Witnessing of Functional Testing or Verification of Fitness for Service
Witnessing of functional testing or verification of fitness for service of the following items is normally to be included in the reactivation surveys of hull and outfit:

i) Anchors and chain cables or mooring cable, chain stoppers, and chain locker pumping arrangements

ii) Anchor windlass, mooring winches, and roller fairleads

iii) Drill floor and machinery-space drain wells together with bilge pumping arrangements and hull penetrations

iv) Random ballast or preload tanks, pump rooms, ballast piping, and associated ballast control system and pumping arrangements

v) (2010) Watertight and weathertight doors, machinery room skylights (where fitted), fire dampers, ventilators, portlights, hatch covers and their respective closing devices

vi) General examination of the mud and cement storage and mixing tank. Examination and random testing of the associated piping as deemed necessary by the attending Surveyor

vii) Internal examination of cofferdams and void spaces together with their pumping arrangements

viii) Cleaning and flushing of potable water tanks

ix) General examination and testing of whistle, internal communications systems, engine-order telegraph, steering arrangements and controls (if applicable), alarm systems, rudder angle indicator and navigational or warning lights

x) (2010) Helideck arrangements

xi) Fire extinguishing arrangements

xii) Tank venting arrangements including closing devices, pressure-vacuum relief valves and flame arrestors

3.5 Machinery and Drilling Equipment

i) Stack and ventilation covers to be removed or opened up.

ii) Boilers, heat exchangers, piping systems and other equipment to be drained and cleaned of preservatives or inhibitors, inspected and closed up in good order and afterwards tested under operating conditions.

iii) Engine lubricating oil, stern bearing oil, and steering system hydraulic fluids to be analyzed for contamination or chemical degradation and if found unserviceable, the system is to be drained, flushed, sterilized if bacterial deteriorations is present, and refilled with new oil or fluid of the proper grade.

iv) BOP stack control system, derrick skidding system, braking system, heave compensation and riser tensioning hydraulic fluids are to be analyzed for contamination or chemical degradation and if found unserviceable, the system is to be drained, sterilized if bacterial deterioration is present, and refilled with new oil or fluid of the proper grade.

If the system was drained at the time of lay-up, the preservatives are to be flushed out and the system refilled with new fluid of the proper specification and air purged as necessary.
v) Thruster units, reduction and reverse gearing to be examined as accessible via inspection openings including lubrication arrangements. Gear casing and foundations to be examined and reversing and braking arrangements operationally tested as necessary.

vi) Thrust bearings, lineshaft bearings and their respective lubrication arrangements to be checked.

vii) Diesel engines and their accessory gear to be selectively opened out and examined for corrosion, excess wear, damage, proper tensioning and torque. Low-speed engine crankshaft deflections (drillships) to be taken and recorded. Protective trips and alarms are to be verified.

viii) All essential auxiliary machinery and equipment to be operationally tested and protective devices verified.

ix) All essential piping systems to be examined under pressure, checked for leaks, and over-pressure relieving arrangements verified. All connections to the sea and their respective valves and non-metallic expansion pieces to be examined.

x) All required fire extinguishing arrangements to be examined, including fire pumps, and operationally tested as necessary.

xi) The rotary assembly, top drive, leg and raw-water jacking machinery, derrick skidding gear, racks and pinions, are to be re-lubricated, operationally tested and safety or protective devices verified.

xii) The condition of hazardous-areas doors and closures in boundary bulkheads are to be checked.

xiii) The drilling and well-control equipment is to be examined prior to re-installation, function tested as considered necessary and verified in proper working condition.

3.7 Electrical

i) Insulation resistance of all power and lighting circuits together with generators, motors and switchgear, to be tested, results evaluated and low-reading components dealt with as necessary.

ii) Generators to be tested under operating conditions, and switches, circuit breakers and electrical protective devices verified.

iii) Electrical lighting, electrical fixtures, and instrumentation in hazardous areas to be verified in satisfactory condition.

3.9 Tensioner System and Motion Compensator

Tensioner system and heave compensators are to be examined, trial actuated to full stroke, and re-conditioned as necessary.

3.11 Control and Instrumentation

All essential control systems, monitoring instrumentation, limit alarms and emergency shut-offs to be verified in working order.

3.13 Trials

In addition to the operational tests of individual units of machinery, for self-propelled units, a dock trial and subsequent sea trial if deemed necessary or applicable, are to be carried out to the satisfaction of the attending Surveyor.

3.15 Documentation and Certification

i) The validity of the various statutory or operating documents such as the Register of Lifting Appliances, IMO MODU Code, MARPOL, Load Line and any applicable SOLAS Certificates are to be checked and up-dated or renewal surveys carried out as necessary.

ii) Statutory certificates issued by ABS that are still valid at the time of the Reactivation Survey will require at least a general examination of the covered items to confirm continued validity.

iii) Possible changes or revisions in international convention requirements since the time of lay-up or in the interpretations of same by the registry Administration are to be investigated.