

U.S. Department of
Homeland Security

United States
Coast Guard



Commandant
United States Coast Guard

2100 2nd Street, S.W. Stop 7126
Washington, DC 20593-7126
Staff Symbol: CG-ENG
Phone: (202) 372-1355
Fax: (202) 372-1925

16715
CG-ENG Policy Letter
No. 01-13
June 26, 2013

From: J. W. Mauger, CAPT
COMDT (CG-ENG)

A handwritten signature in blue ink, appearing to read "John W. Mauger".

To: Distribution

Subj: ALTERNATE DESIGN AND EQUIPMENT STANDARD FOR FLOATING
OFFSHORE INSTALLATIONS (FOI) AND FLOATING PRODUCTION, STORAGE,
AND OFFLOADING (FPSO) UNITS ON THE U.S. OUTER CONTINENTAL SHELF

1. Purpose. This policy letter establishes an alternate design and equipment standard to Title 33, Code of Federal Regulations (CFR) Part 143 Section 120 Paragraph b (33 CFR 143.120(b)) for both U.S. and foreign flagged floating offshore installations (FOIs) and floating production, storage, and offloading units (FPSOs) located on the U.S. Outer Continental Shelf (OCS). The intent of this policy is to provide guidance to facilitate certification, as described in 33 CFR 143.120(c), of new FOIs and FPSOs that comply with the industry standards in enclosures (1) and (2).
2. Directives Affected. None.
3. Action.
 - a. The U.S. Coast Guard Marine Safety Center (MSC) and local Officers in Charge, Marine Inspection (OCMI) may consider the enclosed standards as providing a level of safety comparable to or greater than those listed in 33 CFR 143.120(b) on FOIs and FPSOs constructed after the date of this policy letter.
 - b. For the purpose of this policy letter, a floating OCS facility is considered an FOI if it assigned one of the class notations listed in enclosure (1) and an FPSO if it is assigned one of the class notations listed in enclosure (2).
 - c. This policy letter can only be applied to FOIs that meet the class notations listed in enclosure (1)/paragraph (1), and FPSOs that meet the class notations listed in enclosure (2)/paragraph (1). FOIs and FPSOs that are not assigned one of these notations are not eligible to use this policy letter.
4. Background.
 - a. As the offshore industry continues to expand and move into deeper water, the design of floating OCS facilities is becoming more technologically complex. This policy recognizes that international standards, industry standards and classification society rules provide a framework to address safety and environmental protection regulations for outer continental shelf activities. Using this framework as a baseline, this policy describes how

submitters demonstrate compliance with existing regulations applicable to FOI and FPSOs.

- b. The Office of Design and Engineering Standards (CG-ENG) has fielded multiple requests for alternative standards to 33 CFR 143.120(b) on a “case by case” basis. The experience and knowledge gained in developing these alternative standards has enabled the U.S. Coast Guard to establish the general standard enclosed in this policy letter. The Coast Guard recognizes that other proposals may exist that would provide an equivalent level of safety to that of existing regulations. In addition to this policy letter, the Office of Design and Engineering Standards (CG-ENG) will continue to consider requests for alternative design and equipment standards on a “case by case” basis.
5. Discussion.
- a. FOIs that are designed and constructed in accordance with enclosure (1) and FPSO units that are designed in accordance with enclosures (1) and (2) are considered to provide a level of safety comparable to or greater than that provided by 33 CFR 143.120(b). For an FPSO, where the requirements differ in enclosures (1) and (2) the requirements in enclosure (2) shall be applied.
 - b. This policy only provides guidance on design and equipment standards. It does not provide guidance on the operational aspects, including manning, of these installations.
6. Disclaimer. While the guidance contained in this document may assist the industry, public, Coast Guard, and other Federal and State regulators in applying statutory and regulatory requirements, the guidance is not a substitute for applicable legal requirements nor is it a regulation itself. Thus, it is not intended to, nor does it impose legally binding requirements on, any party outside the U.S. Coast Guard.
7. Changes. Changes to this policy will be issued as necessary. Suggestions for improvements of this policy should be submitted in writing to this office.

#

Enclosure: (1) Requirements for FOIs and FPSOs on the U.S. OCS
(2) Requirements for FPSOs on the U.S. OCS

Dist: Anadarko, Atwood, BHP Billiton, Black Elk Energy, BP, Chevron, Cobalt International, ConocoPhillips, Diamond Offshore, ENI, Ensco, Hess Corp., Helix Energy Solutions, LLOG, Marathon Oil, Noble Energy, Petrobras, Transocean, Shell, Statoil, API, ABS, DNV, LR, Commandant (CG-OES), (CG-CVC), Marine Safety Center, Commander, Eighth Coast Guard District (dp), OCSNCOE, All Eighth District Sectors and MSUs, Activities Europe, Activities Far East

- References:
- (a) ASTM International Standard ASTM F1273 - 91(2007), "Specification for Tank Vent Flame Arresters"
 - (b) International Maritime Organization Maritime Safety Committee Circular MSC/Circ.677, "Revised Standards for the Design, Testing and Locating of Devices to Prevent the Passage of Flame into Cargo Tankers", 1994, as amended.
 - (c) American Petroleum Institute (API) Recommended Practice (RP) 2FPS, "Planning, Designing, and Constructing Floating Production Systems," 2011, 2nd Ed.
 - (d) API RP 2T, "Planning, Designing, and Constructing Tension Leg Platforms," 2010, 3rd Ed.
 - (e) ASTM F1122-04(2010), "Standard Specification for Quick Disconnect Couplings (6in. NPS and Smaller)"
 - (f) IMO Resolution A.1023(26), "Code for the Construction and Equipment of Mobile Offshore Drilling Units," 2009 (2009 MODU Code)
 - (g) API RP 14FZ, Recommended Practice for Design, Installation, and Maintenance of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Zone 0, Zone 1 and Zone 2 locations, Second Edition, 2013
 - (h) API Standard 607, "Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats", 2010, 6th Ed.
 - (i) ISO 19921:2005, "Ships and marine technology – Fire resistance of metallic pipe components with resilient and elastomeric seals – Test methods"
 - (j) API RP 500, "Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division I and Division 2", 2012
 - (k) National Fire Protection Association (NFPA) 70, "National Electrical Code", 2011
 - (l) American National Standards Institute (ANSI) UL 674 – Standard for Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations, Fifth Edition (dated May 31, 2011) ("ANSI/UL 674")
 - (m) ANSI/UL 823 – Standard for Electric Heaters for Use in Hazardous (Classified) Locations, Ninth Edition including revisions through November 15, 2007 (dated October 20, 2006)
 - (n) ANSI/UL 844 – Standard for Luminaires for Use in Hazardous (Classified) Locations, Thirteenth Edition (dated June 29, 2012) ("ANSI/UL 844")
 - (o) ANSI/UL 913 - Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations, Seventh Edition including revisions through June 3, 2010 (dated July 31, 2006)
 - (p) ANSI/ISA 12.12.01-2012 (UL 1604)- Non-Incendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Division 1 and 2 Hazardous (Classified) Locations
 - (q) ANSI/UL 1203 – Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations, Fourth Edition including revisions through October 28, 2009 (dated September 15, 2006)

- (r) ANSI/UL 2225 – Standard for Cables and Cable-Fittings for Use in Hazardous (Classified) Locations, Third Edition February 25, 2011
- (s) Canadian Standards Association (CAN/CSA), CAN/CSA-C22.2 No. 0-M91 - General Requirements - Canadian Electrical Code, Part II, July 1991, Reaffirmed 2006
- (t) CAN/CSA-C22.2 No. 157-92 - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations, June 2003, Reaffirmed 2006
- (u) C22.2 No. 30-M1986 - Explosion-Proof Enclosures for Use in Class I Hazardous Locations, November 1988, Reaffirmed 2007
- (v) C22.2 No. 213-M1987 - Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations, March 1987, Reaffirmed 2008
- (w) Factory Mutual (FM) 3600 - Approval Standard for Electric Equipment for use in Hazardous (Classified) Locations General Requirements, November 1998
- (x) FM 3610 - Approval Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations, January 2010
- (y) FM 3611 - Approval Standard for Non-Incendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2, Hazardous (Classified) Locations, December 2004
- (z) FM 3615 - Approval Standard for Explosionproof Electrical Equipment General Requirements, August 2006
- (aa) FM 3620 - Approval Standard for Purged and Pressurized Electrical Equipment for Hazardous (Classified) Locations, August 2000
- (bb) NFPA Standard 496, “Standard for Purged and Pressurized Enclosures for Electrical Equipment”, 2008
- (cc) API RP 505, “Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1 and Zone 2”, 1998
- (dd) ANSI/API RP 14F, “Design, Installation, and Maintenance of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class 1, Division 1 and Division 2 Locations”, 2008
- (ee) IEC 61892-7, “Mobile and fixed offshore units- Electrical installations- Part 7: Hazardous areas”, 2007
- (ff) IEC 60092-502, “Electrical installations in ships –Part 502: Tankers- Special Features”, 1999
- (gg) ASTM E1529-10, “Standard Test Methods for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies”
- (hh) IMO Resolution MSC.307(88), “International Code for Application of Fire Test Procedures, 2010 (2010 FTP Code)
- (ii) API RP 14J, “Recommended Practice for Design and Hazards Analysis for Offshore Production Facilities”, 2001
- (jj) IMO Resolution MSC.48(66), “International Life-Saving Application Code,” 2010 (2010 LSA Code)

(kk) IMO Resolution A.1021(26), "Code on Alerts and Indicators", 2009

General

(1) The floating offshore installation (FOI) must be classed by either the American Bureau of Shipping (ABS), Det Norske Veritas (DNV), or Lloyd's Register (LR) and receive one of the following notations:

- (a) ABS: A1 Floating Offshore Installation (FOI) or other applicable notation described in 1-2-3/3.1 that includes all the elements of "FOI".
- (b) DNV: OI with applicable notations for installation design OR 1A1 for any **self propelled** units.
- (c) LR: OI 100 AT (Unit Type) (Specified Operating Area), with applicable notations for installation design and operating criteria.

(2) Marine sanitation devices (MSD) installed on FOIs and floating production and storage offshore units (FPSO) must be U.S. Coast Guard type approved under 33 CFR Part 159 or may comply with MARPOL 73/78, ANNEX IV in accordance with Navigation and Vessel Inspection Circular 1-09, "Voluntary Compliance with International Sewage Regulations in Annex IV to MARPOL 73/78".

(3) Flame arresters on the FOI/FPSO must meet the requirements in either reference (a) or reference (b), as amended.

(4) Each FOI/FPSO, other than a tension leg platform (TLP) FOI, must comply with the applicable requirements in reference (c).

(5) Each Tension leg platform (TLP) FOI must comply with the applicable requirements (other than those relating to riser systems) in reference (d).

Ship to FOI/FPSO Transfer of Oil and Hazardous Materials as defined by 33 CFR 154.105

(6) Each hose assembly used for transferring oil or hazardous material (Methanol, LDHI, diesel oil, etc) must comply with the requirements in 33 CFR 154.500 and 33 CFR 156.170.

- (a) The FOI/FPSO must have the following oil transfer emergency shutdown and communications capabilities:
 - (i) In a continuously manned control room, a remote emergency means to enable the person in charge (PIC) of a transfer operation to stop the flow must be provided.
 - (ii) The means to stop the flow may be a pump control, a quick-acting power-actuated valve, or another approved operating procedure.
 - (iii) The means to stop the flow must be operable from the operating station of the PIC of the transfer operation.
 - (iv) The installation must have continuous two-way voice communication between the PICs of the oil transfer operations on both vessels.
 - (v) Portable radio devices used during the transfer of flammable or combustible liquids must be tested and listed or certified intrinsically safe for Class I, Division I (IEC Zone 1 or Class I, Zone 1), Group D requirements, by an independent laboratory accepted by the Coast Guard under 46 CFR Part 159.

- (b) Quick-disconnect couplings not designed to reference (e) must meet the following:
- (i) Minimum 4:1 safety factor.
 - (ii) Pipe threads and/or flanges in accordance with reference (e) standards.
 - (iii) The testing and inspection requirements of reference (e).

Machinery and Electrical Installations

(7) Machinery and electrical installations on the FOI must comply with the applicable regulations in reference (f), Chapters 4 and 5. As an alternate, the NEMA or IP ratings in reference (g) Tables 6-10, 6-11 and 6-12 may be used.

(8) In addition, the following requirements apply to FOI/FPSOs:

- (a) The FOI/FPSO must comply with the following electrical bonding requirements:
- (i) Oil piping systems that are separated from the hull structure must be electrically bonded to the hull structure by a method indicated in subparagraph (iii) of this paragraph.
 - (ii) An oil pipe joint or an oil hose connection fitting that has a gasket must be electrically bonded by a method indicated in subparagraph (iii) of this paragraph, which bonds with both sides of the connection to the hull structure.
 - (iii) An electrical bond must be made by one of the following methods:
 - A metal bonding strap attached by welding or bolting;
 - Two or more bolts that give metal-to-metal contact between the bolts and the parts to be bonded; or
 - Metal-to-metal contact between adjacent parts under designed operating conditions.
- (b) Except as noted below, for prime movers and units that use fuel with a closed-cup flashpoint of less than 60°C (140°F), the complete installation must specifically be approved by the Marine Safety Center (MSC).
- (i) Emergency generators, as well as equipment not located in a Category A machinery space, are permitted to use fuel with a flashpoint of not less than 43°C (110°F).
- (c) The emergency generator must meet the following:
- (i) The requirements for emergency switchboards in 46 CFR 111.30-29.
 - (ii) An emergency generator must be provided with a permanent magnet, or a residual magnetism type exciter that has a capability of voltage build up after two months of no operation. The voltage built up must be accomplished without the aid of an external electric power source.
 - (iii) The emergency generator or its vital components must not adjoin a Category A machinery space, or those spaces containing the unit's main source of electrical power and its vital components. The emergency generator must have an emergency switchboard which must be as near as practicable to the emergency power source but not in the same space as the accumulator batteries. The separate compartments must be accessible from the weather deck, from either location, and on the same deck level. Compartments must not adjoin a Category A machinery

space or spaces containing the main source of electrical power and its vital component, and cables must be kept clear of the of the bulkheads forming these boundaries.

- (d) Unless demonstrated otherwise by engineering calculation or empirical data, an ambient temperature of 40°C (104°F) is assumed except as otherwise stated below.
- (i) A 50°C (122°F) ambient temperature is assumed for all rotating electrical machinery in boiler rooms, engine rooms, auxiliary machinery rooms, and weather decks, unless it can be shown that a 45°C (113°F) ambient temperature will not be exceeded in these spaces.
 - (ii) A 45 °C (113 °F) ambient temperature is assumed for cable and all other non-rotating electrical equipment in boiler rooms, in engine rooms, in auxiliary machinery rooms, and on weather decks. A 30 °C (86 °F) ambient temperature in air conditioned spaces.
 - (iii) A 55°C (131°F) ambient temperature is assumed for all control and instrumentation equipment.
 - (iv) If electrical equipment is utilized in a space in which the equipment's rated ambient temperature is below the assumed ambient temperature of the space, its load must be derated. The assumed ambient temperature of the space plus the equipment's actual temperature rise at its derated load must not exceed the equipment's total rated temperature (equipment's rated ambient temperature plus its rated temperature rise).
- (9) For FOIs, in addition to Regulation 5.4 of reference (f), and loads required as per design/operational requirements, the following loads must be arranged so that they can be energized by the emergency generator:
- (a) Essential marine control, alarm, and monitoring systems;
 - (b) The marine manual and automatic safety shutdown systems;
 - (c) The automatic electric power management system;
 - (d) Each critical production/process control/import/export, alarm, and monitoring system necessary to prevent a process upset;
 - (e) A process safety control system to shut down the flow of hydrocarbon from all wells and exports to a pipeline;
 - (f) The blowout preventer controls, if used;
 - (g) Control systems for all equipment that is required for emergency operations;
 - (h) The diving equipment, if equipped, that is dependent on the unit for its power source.
- (10) For FOIs, in addition to the emergency generator, the emergency loads in paragraph (9) above must have a temporary or transitional supply source that provides power for at least 30 minutes and must be powered continuously, i.e. loads must not have a power outage.
- (11) For FOIs, the above design and engineering standards listed in paragraph (7) and (8) apply to the industrial power system when the system is connected to the ship service power system.
- (12) Cranes on FOI/FPSOs must be certified, inspected, tested and designed in accordance with 46 CFR 107.258, 46 CFR 107.259, 46 CFR 107.260, and 46 CFR 108.601, or other standards determined by the Commandant (CG-ENG-3) to provide an equivalent level of safety.

(13) All FOI/FPSO bilge systems must meet the requirements of either:

- (a) SOLAS chapter II-1, regulation 35-1.2; or
- (b) Code of Federal Regulations subchapter F, sections 56.50-50 and 56.50-55.

(14) TLP, spar and column-stabilized FOI ballast pumping systems must meet the requirements of section 4.10 of reference (f).

(15) On all FOI/FPSO valves employing resilient materials and installed at the following locations must be fire-tested to either reference (h) or reference (i), and must meet the Category A requirements of 46 CFR 56.20-15:

- (a) Vital piping system manifolds; and
- (b) Closure for any opening in the shell of the vessel.

Nonmetallic Piping Materials

(16) Plastic and nonmetallic pipe installations on FOI/FPSOs must meet the requirements of 46 CFR 56.60-25(a). Nonmetallic flexible hose must meet the requirements of 46 CFR 56.60-25(b).

Fuel Gas Supply Valves

(17) On the FOI/FPSOs, fuel supply for service generator prime movers must be fitted with positive shutoff valves arranged for both local control and remote control from an accessible location outside the engine compartment. These valves must be located as close as practicable to the tank or other source of fuel. The installation must have maintenance and testing plans for these valves and operators.

Stability

(18) The lightweight displacement and centers of gravity of the FOI/FPSO must be determined in accordance with the requirements in 46 CFR 170 subpart F. This includes submission and approval of a stability test procedure as prescribed by 46 CFR 170.085.

(19) The operating manual must include sufficient stability information to enable the master or person in charge to operate the FOI/FPSO in compliance with the applicable requirements of this section and must be maintained throughout the life of the installation.

(20) Ship-type FOIs, other than those used to store produced oil in bulk, must comply with the requirements in sections 3.2, 3.3, 3.4, 3.5, 3.6, and 3.7 of reference (f), that are applicable to surface units.

(21) Column-stabilized FOIs must comply with the requirements in sections 3.2, 3.3, 3.4, 3.5, 3.6, and 3.7 (except that issuance of a load line certificate is not required) of reference (f) that are applicable to column-stabilized units.

(22) Spar and Deep Draft Caisson FOIs must comply with the following requirements in each condition of operation over the full range of operating drafts:

- (a) The height of the vertical center of gravity must not exceed that of the vertical center of buoyancy.

- (b) Curves of righting moments and wind heeling moments must be calculated in accordance with section 3.2 of reference (f), except that the lever of the wind overturning force in paragraph 3.2.6 must be taken to the attachment point of the mooring lines if that is below the center of lateral resistance of the underwater body.
- (c) In the intact condition, the area under the righting moment curve to 30 degrees must not be less than 130 percent of the area under the wind heeling moment curve to the same angle, and the downflooding angle must not be less than 30 degrees.
- (d) In the intact condition with the wind heeling moment applied, the maximum angle of heel must not be greater than 6 degrees for normal operating conditions and 12 degrees for severe storm conditions.
- (e) The spar must comply with the requirements in paragraphs 3.3.2, 3.7.2 through 3.7.6, and section 3.6 of reference (f).
- (f) For damage stability assessment purposes, the assumed extent of damage must have a height and width of 3 meters (10 feet) with a horizontal penetration of 1.5 meters (5 feet) inboard from the hull plating. This extent of damage must be assumed at all levels between 3 meters (10 feet) below the minimum operating draft and 5 meters (16.4 feet) above the maximum operating draft.
 - (i) All compartments within the extent of damage must be assumed to be flooded.
 - (ii) Any piping and ventilation systems within the extent of damage must be assumed to be damaged, and a positive means of closure for these systems must be provided at all adjacent watertight boundaries to prevent progressive flooding of other compartments.
 - (iii) In any case where damage of a lesser extent would result in a more severe stability condition, such lesser extent must be assumed.
- (g) In the damaged condition, the spar must comply with the requirements in paragraphs 3.4.3, 3.4.4, 3.4.5, and 3.4.6 of reference (f), except that the damage referenced in paragraph 3.4.3.1 must be replaced by the damage indicated in paragraph (f).
- (h) In the damaged condition with the wind heeling moment applied, the final waterline must be at least 1.5 meters (5 feet) below the lowest point of the hull upper deck.

(23) TLP FOIs must comply with the following requirements:

- (a) Tendon tensions must be maintained in a safe positive range to ensure integrity of the tendons and floating installation in all operating conditions. The analysis to demonstrate a safe positive range of tendon tensions must include all loading conditions and center of gravity variations permitted by the operating manual, and must be conducted in accordance with the applicable provisions of reference (d) and API Bulletin 2INT-MET.
- (b) A tendon load monitoring system must be installed in accordance with reference (d). The system must have sufficient redundancy to ensure continued or restored operation in the event of a single component failure.
- (c) A tendon removed analysis must be conducted in accordance with reference (d), section 5.6.4.4.
- (d) A safe positive range of tendon tensions must also be maintained after assumed flooding from the following damage cases:

- (i) An extent of damage with a height and width of 3 meters (10 feet) and a horizontal penetration of 1.5 meters (5 feet) inboard from the hull plating. This extent of damage must be assumed on the exposed periphery of the hull at all levels between 3 meters (10 feet) below the minimum operating draft and 5 meters (16.4 feet) above the maximum operating draft. However, no vertical bulkhead should be assumed to be damaged except where bulkheads are spaced closer than a distance of one eighth of the column perimeter at the draft under consideration, measured at the periphery. The “exposed periphery of the hull” means outboard of a plane that connects the vertical centerlines of the columns on the periphery of the floating installation;
 - (ii) Damage to any one hull compartment at or below the waterline at all operating drafts; and
 - (iii) Damage to any one tendon compartment.
- (e) In addition to the provisions in paragraph (a), the analysis to demonstrate a safe positive range of tendon tensions after damage must apply the following provisions:
- (i) No pumping out or ballasting of compartments to compensate for flooding may be considered in the analysis.
 - (ii) All compartments within the extent of damage specified in subparagraph (d)(i) must be assumed to be flooded.
 - (iii) Any piping and ventilation systems within the extent of damage specified in subparagraph (d)(i) must be assumed to be damaged, and a positive means of closure for these systems must be provided at all adjacent watertight boundaries to prevent progressive flooding of other compartments.
- (f) The TLP must comply with the requirements in paragraphs 3.3.2, 3.7.2, and 3.7.3, and section 3.6 of reference (f).
- (g) If the OCMI determines that it is necessary, an analysis will be required comparing the tendon tensions from the tendon load monitoring system to the tendon tensions calculated from weight and buoyancy principles. Any significant differences between the tendon tensions in the analysis must be reconciled to the satisfaction of the OCMI.
- (24) In applying the requirements of reference (f) in paragraphs (20) to (23) above:
- (a) The term “Administration” means the Commandant (CG-ENG), U.S. Coast Guard, except in paragraph 3.3.2, where it means the Commanding Officer, Marine Safety Center (MSC).
 - (b) The term “should” means “must” and all “recommendations” are “requirements.”
 - (c) For purposes of paragraph 3.2.1, the free surface of liquids in tanks must be determined according to the IMO 2008 Intact Stability Code.
 - (d) Paragraphs 3.2.4.2, 3.2.8, and 3.3.3 do not apply.
- (25) A site-specific metocean study, performed in accordance with the applicable standards in API Bulletin 2INT-MET, must be conducted to determine the expected environment conditions for the FOI/FPSO location. If the one minute mean wind speed (at 10 meters above sea level) for the 100-year return period is less than 100 knots (51.5 m/s), a minimum 100 knots wind speed must be used as the severe storm condition wind velocity for compliance with the applicable requirements of this section.

This paragraph does not apply to FOI/FPSOs that are capable of disconnecting from its mooring and riser systems for purposes of severe weather evasion.

(26) All sliding watertight doors on the FOI/FPSO must comply with the requirements listed in 46 CFR 174.100(e) and (f).

Hazardous Locations

Electrical installations in hazardous locations on the FOI must meet the following requirements:

(27) Electrical equipment installed in hazardous areas is subject to plan review and approval by the MSC. **Equipment certified under the ATEX scheme is not accepted by the U.S. Coast Guard.**

(28) Electrical installations in hazardous locations must comply with either (a), (b)(i) or (b)(ii) of this paragraph. Standards must not be combined in a manner that would compromise system integrity or safety:

(a) The criteria of reference (j) may be used to identify hazardous locations. When reference (j) is selected to determine hazardous locations, the protection techniques listed in section 500.7 of reference (k) may be used and the equipment requirements in section 500.8 of reference (k) must be met. The equipment must be tested and listed by an independent laboratory accepted by the U.S. Coast Guard under 46 CFR Part 159 as meeting any of the standards of references (l)-(z). You may also use the standards of section (b)(i) of this paragraph. Where these standards are applied, the zone to division mapping criteria of Clause 501.5 of Article 501 of reference (k) must be used. Equipment that meets references (aa) or (bb) is subject to plan review and approval by the MSC.

(b) The criteria of reference (cc) to identify hazardous locations may be used. When reference (cc) is selected to determine hazardous locations, the requirements listed in paragraphs (b)(i) or (b)(ii) may be used.

(i) Equipment identified for Class I locations may meet Sections 505.7 and 505.9 of reference (k) and must be tested and listed by an independent laboratory accepted by the U.S. Coast Guard under 46 CFR Part 159 as meeting one or the combination of the ANSI/ISA 60079 Series of standards incorporated in reference (k) Article 505. You may also use the standards of section (a) of this paragraph. Where these standards are applied, the zone to division mapping criteria of Clause 505.9(C)(1) of Article 505 of reference (k) must be used.

(ii) Electrical apparatus in hazardous locations must meet one or the combination of the IEC 60079-0, -1, -2, -5, -6, -7, -11, -13, -15, -18 and/or -25 standards and be tested by an Ex Testing Laboratory (ExTL) and certified by an Ex Certification Body (ExCB) under the IECEx System, both accepted by the Coast Guard under 46 CFR 159.010. Where these standards are applied, the zone to division mapping criteria of Clause 501.5 of Article 501 of the NEC 2011 may be used.

(29) Cable and wiring in hazardous locations must meet the following:

(a) As allowed in reference (k) Articles 501-505, rigid metal conduit, and MI or HL type cables may be used instead of the marine shipboard cables. Conduits, cable seals and sealing methods must meet Clause 6.8 of references (dd) and (g).

(b) For hydrocarbon production, production support, process, transfer, and venting systems, the wiring materials and methods in Clause 6.4 of reference (dd) may be used.

(c) The wiring methods for intrinsically safe systems must meet Section 504.30 of reference (k). The installation and wiring to the standards in paragraph (28)(b)(ii), must comply with Clause 7 of reference (ee).

(d) Joints or splices in hazardous locations must be avoided if possible. Any joints or splices must be provided junction boxes or enclosures for hazardous locations.

(30) Lighting circuits serving flameproof or explosion proof lighting fixtures in an enclosed hazardous location must have at least two lighting branch circuits, be arranged so that there is light for relamping any de-energized lighting circuit, and be arranged so that the switch for the room containing flameproof or explosion proof lighting fixtures is not within the hazardous location.

(31) Ventilation requirements for hazardous locations must comply with Clauses 8.1.3, 8.2, and 8.3 of reference (ff). Note: The word “mechanical”, as used in this section, is interchangeable with the word “artificial” in reference (ff).

(a) The power ventilation of enclosed hydrocarbon pump rooms must be sufficient to effect a minimum complete 20 air changes per hour, based upon the volume of the pump room and associated trunks up to the deck at which access from the weather is provided. The power ventilation units must be able to remove vapors from points near the deck or bilges at points where concentrations of vapors may be expected. Enclosed areas containing devices handling hydrocarbons, such as hydrocarbon handling or pump rooms are Class I, Special Division 1 (Zone 0) hazardous locations.

(b) The mechanical ventilation for the enclosed pump-engine compartment that contain the prime movers for the pumps that handle flammable or combustible liquids must be sufficient to provide at least 8 air changes per hour.

Lifesaving Equipment

(32) Lifesaving equipment must be USCG type approved. The FOI/FPSO must comply with the lifesaving requirements of 46 CFR 108.503 and chapter 10 of the reference (f), “Lifesaving Appliances and Equipment.”

(33) Equipment approved under the MRA agreement will be accepted; provided it has a Coast Guard type approval series number as per the requirements of NVIC 08-04, Change 1: “Guide to Marine Equipment Approvals Covered by US-EC MRA & by US-EEA EFTA MRA”.

(a) In accordance with 77 Federal Register 70172 “Lifesaving and Fire-Fighting Equipment, Training and Drills Onboard Offshore Facilities and Mobile Offshore Drilling Units (MODUs) Operating on the U.S. Outer Continental Shelf (OCS)” November 23, 2012, it is recommended that:

(i) New or replacement lifeboats use a weight of 95 kg (210 lbs) per person with a minimum seat width of 530 mm (21 inches); and

(ii) A dedicated approved SOLAS rescue boat (USCG approval series 160.156 or equivalent) and dedicated approved launching appliance be provided instead of relying on a dual approved life/rescue boat.

Firefighting and Fire Protection

(34) Structural fire protection boundaries and materials for the FOI must comply with Chapter 9, paragraphs 9.2 through 9.3, of reference (f). Except for H-60, all structural fire protection materials must be Coast Guard type approved. Materials that have USCG type approval under the U.S. and EC/EEA MRA agreements are acceptable.

(35) Fire-extinguishing and fire-detection equipment must be USCG type approved, and comply with Chapter 9, paragraphs 9.5, 9.6, 9.8, 9.10 and 9.11, of the reference (f). The fire main system and all associated components, including, but not limited to, fire pumps, fire hoses, fire hydrants, and fire hose nozzles, must comply with 46 CFR 108.425 in lieu of the paragraphs 9.7.20 and 9.7.21 of reference (f). Fixed low expansion foam systems installed on the cargo decks must comply with 46 CFR 34.20 and acceptance is also contingent upon the review of the proposed modifications of the system to account for the fire suppression of both the process modules and the cargo tanks under the modules. AFFF hose reel stations with non-collapsible hose that are USCG approved for fire main service may be substituted for collapsible hoses on open deck fire hydrants, and in enclosed columns, pontoons and machinery spaces.

(36) Portable and semi-portable fire extinguishers must be USCG type approved and comply with 46 CFR 108.491 through 108.496.

(37) Fire-fighter's outfits and self contained breathing apparatus must comply with 46 CFR 108.497.

(38) Means of escape must comply with paragraph 9.4 of the reference (f) and 46 CFR 108.151. To satisfy paragraph 9.4.5 of reference (f) at least one escape route from accommodation areas to a primary means of escape must provide protection for escaping personnel from fires, blowouts, and explosions. Solid steel decking must be used in this escape route. Additionally, all doors in escape routes must open in the direction of travel to the embarkation stations and survival craft. Any doors with provisions for locking must comply with SOLAS regulation II-2/13.3.2.6.

(39) Fire protection equipment must be marked in accordance with 46 CFR 108.621 through 108.635 and 108.637.

(40) Exterior boundaries of all normally occupied deckhouses or temporarily installed modular buildings that are normally occupied, including overhanging decks that face process areas, wellheads, produced oil storage tanks and similar hydrocarbon hazards must meet minimum H-60 rating standards, and extend on the sides of any such structures for a minimum distance of 10 feet. H-60 test methods must be in accordance with:

(a) Reference (gg), test method C, Tests of Fire-Containment Capability or Walls; or

(b) Annex 1, Part 3 of reference (hh), using the H-class time-temperature curve, where the furnace temperature reaches 815°C after 3 minutes, 1010°C after 5 minutes, and is maintained between 1010°C and 1180°C for the duration of the test.

(41) Any escape routes, lifeboat embarkation stations, fire extinguishing equipment and vital systems needed for power management must be protected from any fired vessels such as glycol re-boilers and hot oil heaters by barriers with a minimum A-0 rating.

(42) General arrangement of process areas and segregation of fuel and ignition sources must be in accordance with reference (ii).

General Emergency Alarm Systems

(43) The general emergency alarm system for the FOI/FPSO must comply with the following:

- (a) Each general emergency alarm system to signal personnel to their emergency stations must be audible throughout the FOI/FPSO and must be distinct and unambiguous from other audible alarm signals. The general emergency alarm must continue to function after it has initiated until it is manually turned off or is temporarily interrupted by a message on the public address system.
- (b) The general emergency alarm must:
 - (i) Be audible in all permanent, temporary, and crew accommodation spaces, and in all crew working spaces where persons may be maintaining, repairing, or operating equipment, stowing or drawing store of equipment, or transiting, such as public spaces; work spaces; machinery spaces; workshops; galleys; emergency fire pump rooms; bow thruster rooms; storage areas for paint, rope, and other stores; and under deck passageways and open decks;
 - (ii) The alarm system must provide a minimum sound pressure levels for the general emergency alarm tone specified in chapter VII, section 7.2.1.2 and 7.2.1.3 of reference (jj).
- (c) Wiring materials for the general emergency alarm system must meet the construction and testing requirements for marine shipboard cables.
- (d) Manually operated contact makers must be installed in the following locations:
 - (i) In the main control room, if provided;
 - (ii) At the drilling console on a unit with a drilling package;
 - (iii) At the feeder distribution panel;
 - (iv) In the navigation bridge, if there is a navigation bridge; and
 - (v) In a routinely occupied space that is as far as practicable from all other activation locations.
- (e) The general emergency alarm system must have at least two branch supply circuits for the general emergency alarm system. One supply must be from the main switchboard and the other must be from an emergency source of power that meets SOLAS II-1/42 or II-1/43 or reference (f) (as applicable). An automatic change-over switch from these feeders must be located, or adjacent to, the feeder distribution panel. The emergency power source may be a battery, provided that has the capacity for at least 30 minutes of continuous operation and 18 hours in standby, and a battery charger that is charged from the emergency switchboard.
- (f) The general emergency alarm system feeders and branch circuits must have a feeder distribution panel to divide the system into the necessary number of zone feeders, except where, because of the arrangement of the FOI/FPSO, only one zone feeder is necessary.
- (g) General emergency alarm feeders and branch circuit cables must be in passageways and must not be in staterooms, lockers, galleys, machinery spaces, or other enclosed spaces, unless it is necessary to supply general emergency alarm signal in those spaces.
- (h) The general emergency alarm must have flashing lights or rotating beacons installed in locations, where the general emergency alarm signal cannot be heard due to high ambient noise, and must meet the requirements of section 6 and equipment marked in colors specified in reference (kk).

- (i) Each general emergency alarm signal and/or alarm sounding device on the system must be marked with visual indicators that meet the requirements of reference (kk).

Obstruction Lights and Warning Devices

(44) The FOI/FPSO must meet the applicable requirements for obstruction lights and warning devices in 33 CFR part 67.

Catwalks, Floors, and Openings

(45) The unprotected perimeter of all catwalks, floor or deck areas, and openings on FOIs must be rimmed with guardrails or wire mesh fences, at least 42 inches high. Guardrails used on FOIs must comply with the requirements in 33 CFR 143.110.

Helicopter Landing Facilities

(46) Helicopter landing facilities, on all FOI/FPSOs, must be designed in accordance with one of the following standards:

- (a) The requirements in Chapter 13 of reference (f); or
- (b) The requirements in 46 CFR 108.231 through 46 CFR 108.241.
- (c) In addition to meeting the requirements in paragraph (46)(a) or (46)(b) above, aluminum helidecks must also meet the provisions of NVIC 9-97, CH-1, "Guide to Structural Fire Protection" in Enclosure 1, Section 5.2.

Stairways

(47) Stairways on the FOI/FPSO must have at least two courses of rails. The top course must serve as a handrail and be at least 36 inches above the front tread.

Accommodation spaces

(48) Accommodation spaces in the FOI/FPSO must comply with the requirements in 46 CFR 108.193 through 46 CFR 108.215.

- References:
- (a) IMO Specifications for the Design, Operation and Control of Crude Oil Washing Systems adopted by resolution A.446(XI) and amended by resolution A.497(XII) and further amended by resolution A.897(21)
 - (b) ISO 15364:2007, "Ships and marine technology – Pressure/vacuum valves for cargo tanks"
 - (c) IMO Resolution A.1023(26), "Code for the Construction and Equipment of Mobile Offshore Drilling Units," 2009 (2009 MODU Code)
 - (d) API RP 500, "Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division I and Division 2", 2012
 - (e) API RP 505, "Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1 and Zone 2", 1998

For a floating production, storage, and offloading unit (FPSO) design, the requirements in this enclosure should be combined with the requirements in enclosure (1). Where the requirements of enclosures (1) and (2) differ for an FPSO, enclosure (2) takes precedence.

General

(1) The FPSO must be classed by either the American Bureau of Shipping (ABS), Det Norske Veritas (DNV), or Lloyd's Register (LR) and receive the following notations as applicable:

- (a) ABS: A1 Floating Production, Storage and Offloading System (ship-type) (Disconnectable) AMS
- (b) DNV: 1A1, Oil Production, Oil Storage, Oil Loading with additional notations applicable to the installation design
- (c) LR: OI 100 AT Floating production and oil storage installation, with additional notations applicable to the installation design and operating criteria. If a notation applicable to mobile units is required, the designation "OI" will be replaced with "OU" and other notations modified as necessary.

Produced Oil Storage and Handling

(2) The following requirements apply:

- (a) Ballast water must not be carried in any fuel tanks.
- (b) Ballast water must not be carried in any produced oil storage tanks, except when considered necessary for the safety of the FPSO in a severe weather emergency.
- (c) Ballast tank capacity must be sufficient to meet the following draft and trim requirements with the produced oil storage tanks empty:
 - (i) The molded draft amidship (d_m) in meters, without taking into account any hull deformation, must not be less than $d_m = 2.0 + 0.02L$.
 - (ii) The drafts at the forward and after perpendiculars must correspond to that determined by the draft amidship in paragraph (c)(i), in association with a trim by the stern of no more than 0.015L.

- (iii) If a self-propelled FPSO employs a disconnectable system, the minimum draft at the after perpendicular must be sufficient to obtain full immersion of the propeller.
- (d) Double hull requirements in 33 CFR 157.10d(c)(1)(i) and 33 CFR 157.10d(c)(2)(i), and the requirements in 33 CFR 157.10d(c)(3) and 33 CFR 157.11(g)(2) must be met.
- (e) The aggregate volume of the double hull tanks, forepeak tanks, and afterpeak tanks must not be less than the ballast tank capacity required in paragraph (c).
- (f) Oil must not be stored in any tank extending forward of the collision bulkhead except independent fuel oil tanks that must serve adjacent deck equipment that cannot be located further aft. Such tanks must be as small and as far aft as practicable.
- (g) Oil must not be stored in any tank closer to the stern than 2.0 meters.
- (h) The FPSO must comply with MARPOL Annex I regulations 23, 29 and 30 (paragraphs 1, 4 and 7 only).
- (i) The FPSO must comply with SOLAS regulation II-2/4 (paragraphs 5.2, 5.3, 5.4, 5.9 and 5.10 only), and regulation II-2/9 (paragraphs 2.4.2.5 and 2.4.2.6 only).
- (j) Irrespective of its deadweight, a fixed inert gas system must be installed that complies with the requirements in SOLAS regulation II-2/4.5.5, except that a dry type water seal must not be used.
- (k) If crude oil washing equipment is installed, it must comply with the crude oil washing system safety requirements in reference (a).
- (l) If an oil piping system interconnects produced oil storage tanks, the system must have valves to separate the tanks from each other.
- (m) Ballast and produced oil piping systems must meet the requirements in 33 CFR 157.11(g)(1).
- (n) Pressure vacuum relief valves must meet the requirements in 46 CFR 162.017 or reference (b).
- (o) Each produced oil transfer hose must comply with the requirements in 33 CFR 154.500 and 33 CFR 156.170.
- (p) The produced oil pumping/piping systems must be arranged independently from all other systems. Recovered oil transfer pumps and piping (including fill, discharge, vent, and sounding piping) must not be located in or pass through any accommodation, service or machinery spaces.

Machinery and Electrical Installations

(3) Machinery and electrical installations must comply with the applicable cargo ship regulations in SOLAS, Chapter II-1, Parts C, D and E. In addition, the following requirements apply:

- (a) The FPSO must comply with the arrangement requirements in SOLAS regulation II-2/4.5.1, except that a power generation unit may be located above the produced oil storage tanks if:
 - (i) The power generation unit and all related systems are located outside of the hazardous area locations;

- (ii) The power generation unit exhaust pipes do not emit sparks or discharge exhaust gas in the direction of a hazardous area;
 - (iii) The power generation unit is enclosed in A-class divisions if used for emergency shipboard power service or is required to supply loads necessary to maintain or restore the propulsion plant, including thrusters; and
 - (iv) A Coast Guard approved fixed fire extinguishing system is installed for the power generation unit enclosure.
- (4) In addition to regulations 42.4 and 43.2, Chapter II-1 SOLAS, and loads required as per design/operational requirements, the following additional loads must be arranged so that they can be energized by the emergency generator:
- (a) Essential marine control, alarm, and monitoring systems;
 - (b) The marine manual and automatic safety shutdown systems;
 - (c) The automatic electric power management system;
 - (d) The control system for the position thrusters for the thruster-assisted mooring system, if installed;
 - (e) Each critical production/process control/import/export, alarm, and monitoring system necessary to prevent a process upset;
 - (f) A process safety control system to shut down the flow of hydrocarbon from all wells and process systems;
 - (g) Control systems for all equipment that is required for emergency operations;
 - (h) The diving equipment, if equipped, that is dependent on the unit for its power source;
 - (i) Quick disconnect systems that are used to stop all process flow to the floating installation automatically, without leaks from process fluids.
- (5) In addition to the emergency generator, the emergency loads in paragraph (4) above must have a temporary or transitional supply source that provides power for at least 30 minutes.
- (6) If self propelled: the emergency generator is used for part or all of the electric power necessary to start the installation's electric and propulsion plants (via a bus-tie to the main switchboard from a dead-ship condition), the emergency power source or emergency generator must be capable of providing power to all the emergency loads, in addition to the power used to start the installation's electric and propulsion plants. If arranged for feedback operation, the emergency bus-tie to the main switchboard must open automatically upon overload of the emergency generator before the emergency generator is tripped off the line due to the overload.
- (7) The above design and engineering standards in paragraph (3) of this section apply to the industrial power system when the system is connected to the ship service power system.

Criteria for Emergency Disconnect

- (8) The FPSO must be able to detect conditions that require disconnection from the turret, such as:
- (a) Current or predicted environmental conditions in excess of the FPSO design capabilities;
 - (b) Exceeding turret and disconnect systems' operational limits;

- (c) Exceeding vessel motion operational limits.

Stability

(9) The FPSO must comply with the requirements in MARPOL Annex I regulations 27 and 28 (with the exception of paragraph 6), and the requirements in sections 3.6 and 3.7 of reference (c), that are applicable to surface units. In applying the requirements from reference (c):

- (a) The term “Administration” means the Commandant (CG-ENG), U.S. Coast Guard.
- (b) The term “should” means “must”.
- (c) The term “recommendations” means “requirements”.

(10) Any FPSO that employs a disconnectable system for severe weather evasion must demonstrate that the disconnect procedure does not jeopardize the stability.

Hazardous Locations

(11) In lieu of using the criteria of references (i) and (bb) of enclosure (1) to identify hazardous locations, paragraphs (12) and (13) of this enclosure must be used. Except as noted in paragraphs (14) and (15) of this enclosure, electrical installations in hazardous locations must meet paragraphs (26) through (30) of enclosure (1).

(12) Hazardous location classification of storage and handling locations for hydrocarbons with closed-cup flashpoints not exceeding 140°F (60°C).

- (a) The following are Zone 0 locations:
 - (i) Enclosed areas containing devices handling hydrocarbons, such as hydrocarbon handling or pump rooms;
 - (ii) The interiors of hydrocarbon storage tanks, slop tanks, any pipework for pressure relief or other venting systems for hydrocarbon and slop tanks, pipes, and equipment containing the hydrocarbon or developing flammable gases or vapors;
 - (iii) Areas on an open deck, or a semi-enclosed space on an open deck, within 0.5 meters of any hydrocarbon storage tank outlet, hydrocarbon gas or vapor outlet, ullage opening, sounding pipe, hydrocarbon tank opening for pressure release, or hydrocarbon storage tank pressure or vacuum valve provided to permit the flow of small volumes of gas or vapor mixtures caused by thermal variation;
 - (iv) Areas on an open deck, or semi-enclosed spaces on an open deck, within 0.5 meters of any hydrocarbon handling or pump room entrance, or hydrocarbon ventilation handling or pump room ventilation inlet or outlet;
 - (v) Areas in the vicinity of any hydrocarbon vent outlet for the free flow of large volumes of vapor mixtures during hydrocarbon loading and discharging of storage tanks, within a vertical cylinder of unlimited height, of 1 meter radius centered upon the vent outlet, and within a hemisphere of 1-meter radius below the vent outlet; and
 - (vi) Areas in the vicinity of any hydrocarbon high-velocity vent outlet during hydrocarbon loading and discharging of storage tanks, within a vertical cylinder of unlimited height, of 0.5 meters radius centered upon the vent outlet, and within a hemisphere of 0.5 meters radius below the vent outlet.

(b) The following are Zone 1 locations:

- (i) Areas on an open deck, or a semi-enclosed space on an open deck, that are 2.5 meters beyond the Zone 0 areas cited in paragraphs (12)(a)(iii) and (12)(a)(iv) of this section;
- (ii) Areas on an open deck, or a semi-enclosed space on an open deck, that are within 3 meters of any hydrocarbon manifold valve, hydrocarbon valve, hydrocarbon pipe flange, hydrocarbon tank hatches, sight ports, tank cleaning openings, and openings into cofferdams or other Zone 1 spaces;
- (iii) Regardless of the level of natural ventilation, areas on an open deck above the tank top of each hydrocarbon tank extending out 3 meters beyond the tank top boundaries of each hydrocarbon tank, up to a height of 2.4 meters above the deck;
- (iv) Areas on open deck within spillage coamings surrounding hydrocarbon manifold valves extending 3 meters beyond the boundaries of the spillage coamings, up to a height of 1.2 meters;
- (v) A void space or an enclosed space, including cofferdams and permanent (e.g., segregated) ballast tanks, immediately above, below, or adjacent to an integral hydrocarbon storage tank;
- (vi) A hold space containing an independent hydrocarbon storage tank;
- (vii) Compartments for hydrocarbon transfer hoses;
- (viii) Enclosed or semi-enclosed spaces in which pipes containing hydrocarbons are located;
- (ix) Areas 7.5 meters beyond the cylinder and 7.5 meters beyond the hemisphere of the Zone 0 hazardous areas cited in paragraph (12)(a)(v) of this section; and
- (x) Areas 5.5 meters beyond the cylinder and 5.5 meters beyond the hemisphere of the Zone 0 hazardous areas cited in paragraph (12)(a)(vi) of this section;

(c) The following are Zone 2 locations:

- (i) Areas on an open deck, or a semi-enclosed space on an open deck, that are 1.5 meters beyond the Zone 1 areas cited in paragraphs (12)(b)(i), (12)(b)(ii), (12)(b)(iii), and (12)(b)(iv) of this section;
- (ii) Areas 1.5 meters beyond the cylinder and 1.5 meters beyond the hemisphere of the Zone 1 hazardous areas cited in paragraph (12)(b)(ix) of this section;
- (iii) Areas 4 meters beyond the cylinder and 4 meters beyond the hemisphere of the Zone 1 hazardous areas cited in paragraph (12)(b)(x) of this section; and
- (iv) Enclosed spaces beyond the open deck areas cited in paragraph (12)(b)(iii) which are below the level of the main deck, and have an opening onto the main deck or at a level less than 0.5 meters above the main deck, unless the entrances to such spaces, including ventilation inlets and outlets, are situated at least 5 meters from the closest integral hydrocarbon tank bulkhead and at least 10 meters measured horizontally from any integral hydrocarbon tank outlet or gas or vapor outlet; and the spaces are mechanically ventilated.

(13) Hazardous location classification of heated combustible hydrocarbon storage and handling locations.

(a) This section applies to storage and handling locations for hydrocarbons with closed-cup flashpoints exceeding 60°C (140°F).

(b) The interiors of storage tanks and integral tanks containing hydrocarbons with closed-cup flashpoints of 60 °C (140°F) or higher and heated to within 15 °C (59°F) of its flashpoint are considered Zone 0. The hazardous locations in paragraphs (12)(a)(iii), (12)(a)(iv), (12)(b)(i), (12)(b)(ii) and (12)(c)(i) apply.

(14) Requirements for enclosed locations containing devices handling hydrocarbons with closed-cup flashpoints not exceeding 60°C (140°F).

(a) Hydrocarbon pumps must be isolated from all sources of vapor ignition by gastight bulkheads. The gastight bulkhead between the pump room and the pump-engine compartment may be pierced by fixed lights, drive shaft, and pump-engine control rods, provided that the shafts and rods are fitted with stuffing boxes where they pass through the gastight bulkheads. The access to a hydrocarbon pump enclosed room must be from the open deck.

(b) The hydrocarbon pumping/piping systems must be arranged independently from all other systems. Hydrocarbon transfer pumps and piping (including fill, discharge, vent, and sounding piping) must not be located in or pass through any accommodation, service or machinery locations.

(c) Fixed lights in hydrocarbon pump enclosed locations must be lighted through fixed glass lenses in the bulkhead or overhead. Each fixed glass lens must be wire-inserted glass that is at least 6.35 mm (0.25 inches) thick and arranged to maintain the watertight and gastight integrity of the structure. The fixed glass lens may form a part of a listing fixture if the following are met:

- (i) There is no access to the interior of the fixture from the hydrocarbon pump or handling room.
- (ii) The fixture is vented to the engine room or a similar non-hazardous location.
- (iii) The fixture is wired from outside the cargo handling room.
- (iv) The surface temperature of the fixed glass lens on the hydrocarbon pump or handling room, based on an ambient temperature of 40°C, must not be higher than 180°C.

(d) An enclosed hydrocarbon handling location that precludes the lighting arrangement or where the lighting arrangement does not give the required illumination in paragraph (13)(c) above, must have explosion proof or, flameproof (Ex “d”), or flameproof-increased safety (Ex “de”) lighting fixtures.

(15) In lieu of meeting paragraphs (12) through (14) the FPSO may meet 46 CFR 111.105-29 and 31.

Production Processing/Support Systems and Associated Venting

(16) Hazardous area classification of production processing and process systems, venting, production support systems, and auxiliary equipment for processing hydrocarbon liquid and gas mixtures from wells or other sources, must meet the applicable requirements and classification of

hazardous areas in paragraphs (11), (12) and (15), and the applicable appendixes of references (d) and (e).

Hazardous Areas for Hydrocarbon Product Swivels, Turrets, and Yokes

(17) The hazardous location classification of hydrocarbon product swivels, internal or external turrets, yokes, and associated electrical apparatus or equipment must meet the following:

- (a) The internals of tanks, swivels or pipes containing hydrocarbons are considered Zone 0 locations.
- (b) An enclosed location where a hydrocarbon product swivel is installed is considered a Zone 1 location.
- (c) In a non-enclosed location, the area within 3 meters (10 feet) of a hydrocarbon product swivel is considered a Zone 2 location.

(18) The hydrocarbon product electrical swivel, must be tested and listed or certified by a Coast Guard accepted independent laboratory in accordance with 46 CFR Part 159.

(19) The current rating of the hydrocarbon product electrical swivel (slip ring) must be adequate to carry the full-load current of the equipment supplied.

Firefighting and Fire Protection

(20) Structural fire protection boundaries and materials must comply with SOLAS Cargo ship Method 1C requirements. All structural fire protection materials must be Coast Guard type approved.

(21) Fire-fighting and fire-detection equipment, except for the fire main system, must comply with SOLAS Cargo ship requirements. The fire main system and all associated components, including, but not limited to, fire pumps, fire hoses, fire hydrants, and fire hose nozzles, must comply with 46 CFR 95.10. Fixed low expansion foam systems installed on the cargo decks must comply with 46 CFR 34.20 and acceptance is also contingent upon the review of the proposed modifications of the system to account for the fire suppression of both the process modules and the cargo tanks under the modules. AFFF hose reel stations with non-collapsible hose that are Coast Guard approved for fire main service may be substituted for collapsible hoses on open deck locations, and in enclosed columns, pontoons and machinery spaces. All equipment must be Coast Guard type approved.

(22) Fire-fighter's outfits and self contained breathing apparatus must comply with 46 CFR 96.35.

(23) Produced oil pump rooms must be separated from adjacent normally occupied rooms by A-60 barriers, except that bulkheads and decks separating pump rooms from machinery spaces of category and other machinery spaces may be reduced to A-0. Such bulkheads may be penetrated by pump shaft glands, provided that gas-tight seals are provided to prevent seepage of flammable vapors into the machinery space.

(24) If applicable, wellheads (i.e. production areas containing oil and gas risers, export lines and associated shut down valves) with a maximum shut-in pressure exceeding 600 psi must be enclosed within minimum A-0 barriers to protect any escape routes, lifeboat embarkation stations, fire extinguishing equipment and vital systems needed for power management.

Catwalks, Floors, and Openings

(25) The unprotected perimeter of all catwalks, floor or deck areas, and openings must be rimmed with guardrails or wire mesh fences, at least 1 meter (39 inches) high. If guardrails are used:

- (a) They must comply with the requirements in 46 CFR 108.217 through 46 CFR 108.223;
- (b) If a toe board is installed, one of the intermediate courses may be omitted and the other course placed approximately halfway between the top of the toe board and the top course.