SUBCHAPTER J—ELECTRICAL ENGINEERING

PART 110—GENERAL PROVISIONS

Subpart 110.01—Applicability

Subpart 110.10—Reference Specifications, Standards, and Codes

Subpart 110.15—Terms Used in This Subchapter

Subpart 110.20—Equivalents

Subpart 110.25—Plan Submittal

Subpart 110.30—Testing and Inspection

AUTHORITY: 33 U.S.C. 1509; 43 U.S.C 1333; 46 U.S.C. 3306, 3307, 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; Department of Homeland Security Delegation No. 0170.1; §110.01–2 also issued under 44 U.S.C. 3507.

SOURCE: CGD 74–125A, 47 FR 15232, Apr. 8, 1982, unless otherwise noted.

Subpart 110.01—Applicability

§110.01–1 General.

(a) This subchapter applies to all electrical installations on vessels subject to subchapters D, H, I, I-A, K, L, O, Q, R, T, U, and W of this chapter whenever those subchapters require an electrical installation to be in accordance with this subchapter.

(b) This subchapter applies only to electrical installations contracted for after September 30, 1996.

(c) Installations and equipment accepted by the Coast Guard as meeting the applicable requirements in this subchapter in effect on the date the installation was contracted for and which are maintained in good and serviceable condition to the satisfaction of the Officer in Charge, Marine Inspection, may be continued in use until replacement is ordered by the Officer in Charge, Marine Inspection, or as specified in the regulations.

(d) [Reserved]

(e) Electrical systems internal to a pressure vessel for human occupancy (PVHO) need not meet the requirements of this subchapter, but must meet the requirements of Subpart B (Commercial Diving Operations) of part 197 of this chapter.

[CGD 74–125A, 47 FR 15232, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28271, June 4, 1996]

§110.01–2 OMB control numbers assigned pursuant to the Paperwork Reduction Act.

(a) *Purpose.* This section collects and displays the control numbers assigned to information collection and recordkeeping requirements in this subchapter by the Office of Management and Budget (OMB) pursuant to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 *et seq.*). The Coast Guard intends that this section comply with the requirements of 44 U.S.C. 3507(f) which requires that agencies display a current control number assigned by the Director of the OMB for each approved agency information collection requirement.

(b) *Display.*

46 CFR part or section where identified or described	Current OMB control No.
Subpart 110.25	1625–0031

[49 FR 38121, Sept. 27, 1984, as amended by USCG–2004–18884, 69 FR 58348, Sept. 30, 2004]

§110.01–3 Repairs and alterations.

(a) Repairs and replacements in kind must comply with either the regulations in this subchapter or those in effect when the vessel was built.

(b) Alterations and modifications, such as re-engining, re-powering, upgrading of the main propulsion control system, or replacing extensive amounts of cabling, must comply with the regulations in this subchapter.

(c) Conversions specified in 46 U.S.C. 2101(14a), such as the addition of a midbody or a change in the service of the vessel, are handled on a case-by-case basis by the Commanding Officer, Marine Safety Center.

[CGD 94–108, 61 FR 28271, June 4, 1996, as amended at 62 FR 23906, May 1, 1997]

§ 110.01–4 Right of appeal.

Any person directly affected by a decision or action taken under this subchapter, by or on behalf of the Coast Guard, may appeal therefrom in accordance with subpart 1.03 of this chapter.

[CGD 88–033, 54 FR 50380, Dec. 6, 1989]

Subpart 110.10—Reference Specifications, Standards, and Codes

§ 110.10–1 Incorporation by reference.

(a) Certain material is incorporated by reference into this subchapter with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, the Coast Guard must publish notice of change in the FEDERAL REGISTER and the material must be available to the public. The word ''should,'' when used in material incorporated by reference, is to be construed the same as the words ''must'' or ''shall'' for the purposes of this subchapter. All approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030 or go to *http://www.archives.gov/federal__register/code__of__federal__regulations/ibr__locations.html*. The material is also available for inspection at the U.S. Coast Guard, Office of Design and Engineering Standards (CG–521), 2100 2nd St. SW., Stop 7126, Washington, DC 20593–7126, and is available from the sources listed below.

(b) *American Bureau of Shipping (ABS)*, ABS Plaza, 16855 Northchase Drive, Houston, TX 77060:

(1) Rules for Building and Classing Steel Vessels, Part 4 Vessel Systems and Machinery (2003) (''ABS Steel Vessel Rules''), 110.15–1; 111.01–9; 111.12–3; 111.12–5; 111.12–7; 111.33–11; 111.35–1; 111.70–1; 111.105–31; 111.105–39; 111.105–40; 113.05–7; and

(2) Rules for Building and Classing Mobile Offshore Drilling Units, Part 4 Machinery and Systems (2001) (''ABS MODU Rules''), 111.12–1; 111.12–3; 111.12–5; 111.12–7; 111.33–11; 111.35–1; 111.70–1.

(c) *American National Standards Institute (ANSI)*, 25 West 43rd Street, New York, NY 10036:

(1) ANSI/IEEE C37.12–1991, American National Standard for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis-Specifications Guide (1991) (''ANSI/IEEE C37.12''), 111.54–1; and

(2) ANSI/IEEE C37.27–1987 (IEEE Std 331) Application Guide for Low-Voltage AC Nonintegrally Fused Power Circuitbreakers (Using Separately Mounted Current-Limiting Fuses) (1987) (''ANSI/IEEE C37.27''), 111.54–1;

(d) *American Society of Mechanical Engineers (ASME) International*, Three Park Avenue, New York, NY 10016–5990:

(1) ASME A17.1–2000 Part 2 Electric Elevators (2000) (''ASME A17.1''), 111.91–1; and

(2) [Reserved]

(e) *ASTM International (formerly American Society for Testing and Materials) (ASTM)*, 100 Barr Harbor Drive, West Conshohocken, PA 19428–2959:

(1) ASTM B 117–97, Standard Practice for Operating Salt Spray (Fog) Apparatus (''ASTM B 117''), 110.15–1; and

(2) [Reserved]

(f) *Institute of Electrical and Electronic Engineers IEEE)*, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854:

(1) IEEE Std C37.04–1999, IEEE Standard Rating Structure for AC High-Voltage Circuit Breakers (1999) (''IEEE C37.04''), 111.54–1;

(2) IEEE Std C37.010–1999 IEEE Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis (1999) (''IEEE C37.010''), 111.54–1;

(3) IEEE Std C37.13–1990 IEEE Standard for Low-Voltage AC Power Circuit

Breakers Used in Enclosures (Oct. 22, 1990) (''IEEE C37.13''), 111.54–1;

(4) IEEE Std C37.14–2002 IEEE Standard for Low-Voltage DC Power Circuit Breakers Used in Enclosures (Apr. 25, 2003) (''IEEE C37.14''), 111.54–1;

(5) IEEE Std 45–1998 IEEE Recommended Practice for Electric Installations on Shipboard—1998 (Oct. 19, 1998) (''IEEE 45–1998''), 111.30–19; 111.105–3; 111.105–31; 111.105–41;

(6) IEEE Std 45–2002 IEEE Recommended Practice for Electrical Installations On Shipboard—2002 (Oct. 11, 2002) (''IEEE 45–2002''), 111.05–7; 111.15–2; 111.30–1; 111.30–5; 111.33–3; 111.33–5; 111.40–1; 111.60–1; 111.60–3; 111.60–5; 111.60–11; 111.60–13; 111.60–19; 111.60–21; 111.60–23; 111.75–5; 113.65–5;

(7) IEEE 100, The Authoritative Dictionary of IEEE Standards Terms, Seventh Edition (2000) (''IEEE 100''), 110.15–1;

(8) [Reserved]

(9) IEEE Std 1202–1991, IEEE Standard for Flame Testing of Cables for Use in Cable Tray in Industrial and Commercial Occupancies (May 29, 1991) (''IEEE 1202''), 111.60–6; 111.107–1; and

(10) IEEE Std 1580–2001, IEEE Recommended Practice for Marine Cable for Use on Shipboard and Fixed or Floating Platforms (Dec. 17, 2001) (''IEEE 1580''), 111.60–1; 111.60–2; 111.60–3.

(g) *International Electrotechnical Commission (IEC)*, 3 Rue de Varembe, Geneva, Switzerland:

(1) IEC 68–2–52, Environmental Testing Part 2: Tests—Test Kb: Salt Mist, Cyclic (Sodium Chloride Solution), Second Edition (1996) (''IEC 68–2–52''), 110.15–1;

(2) IEC 60331–11 Tests for electric cables under fire conditions—Circuit integrity—Part 11: Apparatus—Fire alone at a flame temperature of at least 750 °C, First Edition (1999) (''IEC 60331–11''), 113.30–25;

(3) IEC 60331–21 Tests for Electric Cables Under Fire Conditions—Circuit Integrity—Part 21: Procedures and Requirements—Cables of Rated Voltage up to and Including 0.6/1.0kV, First Edition (1999) (''IEC 60331–21''), 113.30–25;

(4) IEC 332–1 Tests on Electric Cables Under Fire Conditions, Part 1: Test on a Single Vertical Insulated Wire or Cable, Third Edition (1993) (''IEC 332–1''), 111.30–19;

(5) IEC 60332–3–22 Tests on Electric Cables Under Fire Conditions—Part 3–22: Test for Vertical Flame Spread of Vertically-Mounted Bunched Wires or Cables—Category A, First Edition (2000) (''IEC 60332–3–22''), 111.60–1; 111.60–2; 111.60–6; 111.107–1;

(6) IEC 60079–0 Electrical apparatus for Explosive Gas Atmospheres—Part 0: General Requirements (Edition 3.1) (2000) (''IEC 60079–0''), 111.105–1; 111.105–3; 111.105–5; 111.105–7; 111.105–17;

(7) IEC 60079–1 Electrical Apparatus for Explosive Gas Atmospheres—Part 1: Flameproof Enclosures ''d'' including corr.1, Fourth Edition (June 2001) (''IEC 60079–1''), 111.105–1; 111.105–3; 111.105–5; 111.105–7; 111.105–9; 111.105–17;

(8) IEC 60079–2 Electrical Apparatus for Explosive Gas Atmospheres—Part 2: Pressurized Enclosures ''p'', Fourth Edition (2001) (''IEC 60079–2''), 111.105–1; 111.105–3; 111.105–5; 111.105–7; 111.105–17;

(9) IEC 60079–5 Electrical Apparatus for Explosive Gas Atmospheres—Part 5: Powder Filling ''q'', Second Edition (1997) (''IEC 60079–5''), 111.105–1; 111.105–3; 111.105–5; 111.105–7; 111.105–15; 111.105–17;

(10) IEC 79–6 Electrical Apparatus for Explosive Gas Atmospheres—Part 6: Oil Immersion ''o'', Second Edition (1995) (''IEC 79–6''), 111.105–1; 111.105–3; 111.105–5; 111.105–7; 111.105–15; 111.105–17;

(11) IEC 60079–7 Electrical Apparatus for Explosive Gas Atmospheres—Part 7: Increased Safety ''e'', Third Edition (2001) (''IEC 60079–7''), 111.105–1; 111.105–3; 111.105–5; 111.105–7; 111.105–15; 111.105–17;

(12) IEC 60079–11 Electrical Apparatus for Explosive Gas Atmospheres—Part 11: Intrinsic Safety ''i'', Fourth Edition (1999) (''IEC 60079–11''), 111.105–1; 111.105–3; 111.105–5; 111.105–7; 111.105–11; 111.105–17;

(13) IEC 60079–15 Electrical Apparatus for Explosive Gas Atmospheres—Part 15: Type of Protection ''n'', Second Edition (2001) (''IEC 60079–15''), 111.105–1; 111.105–3; 111.105–5; 111.105–7; 111.105–15; 111.105–17;

(14) IEC 79–18 Electrical Apparatus for Explosive Gas Atmospheres—Part 18: Encapsulation ''m'', First Edition (1992) (''IEC 79–18''), 111.105–1; 111.105–3; 111.105–5; 111.105–7; 111.105–15; 111.105–17;

(15) IEC 60092–101 Electrical Installation in Ships, Part 101: Definitions and General Requirements, Edition 4.1 (2002) (''IEC 60092–101''), 110.15–1; 111.81–1;

(16) IEC 92–201 Electrical Installation in Ships, Part 201: System Design-General, Fourth Edition (1994) (''IEC 92–201''), 111.70–3; 111.81–1;

(17) IEC 92–202 Amendment 1 Electrical Installation in Ships, Part 202: System Design-Protection (1996) (''IEC 92–202''), 111.12–7; 111.50–3; 111.53–1; 111.54–1;

(18) IEC 92–301 Amendment 2 Electrical Installation in Ships, Part 301: Equipment-Generators and Motors, (1995) (''IEC 92–301''), 111.12–7; 111.25–5; 111.70–1;

(19) IEC 60092–302 Electrical Installation in Ships, Part 302: Low-Voltage Switchgear and Control Gear Assemblies, Fourth Edition (1997) (''IEC 60092–302''), 111.30–1; 111.30–5; 111.30–19;

(20) IEC 92–303 Electrical Installation in Ships, Part 303: Equipment-Transformers for Power and Lighting, Third Edition (1980) (''IEC 92–303''), 111.20–15;

(21) IEC 92–304 Amendment 1 Electrical Installation in Ships, Part 304: Equipment-Semiconductor Convertors (1995) (''IEC 92–304''), 111.33–3; 111.33–5;

(22) IEC 92–306 Electrical Installation in Ships, Part 306: Equipment-Luminaries and accessories, Third Edition (1980) (''IEC 92–306''), 111.75–20; 111.81–1;

(23) IEC 60092–352 Electrical Installation in Ships—Choice and Installation of Cables for Low-Voltage Power Systems, Second Edition (1997) (''IEC 60092–352''), 111.60–3; 111.60–5; 111.81–1;

(24) IEC 92–353 Electrical Installations in Ships—Part 353: Single and Multicore Non-Radial Field Power Cables with Extruded Solid Insulation for Rated Voltages 1kV and 3kV, Second Edition (1995) (''IEC 92–353''), 111.60–1; 111.60–3; 111.60–5;

(25) IEC 92–401 Electrical Installations in Ships, Part 401: Installation and Test of completed Installation with amendment 1 (1987) and amendment 2 (1997), Third Edition (1980) (''IEC 92–401''), 111.05–9; 111.81–1;

(26) IEC 60092–502 Electrical Installation in Ships, Part 502: Tankers—Special Features (1999) (''IEC 60092–502''), 111.81–1; 111.105–31;

(27) IEC 92–503 Electrical installations in ships, Part 503: Special features: A.C. supply systems with voltages in the range of above 1kV up to and including 11kV, First Edition (1975) (''IEC 92–503''), 111.30–5;

(28) IEC 60529 Degrees of Protection Provided by Enclosures (IP Code), Edition 2.1 (2001) (''IEC 60529''), 110.15–1; 111.01–9; 113.10–7; 113.20–3; 113.25–11; 113.30–25; 113.37–10; 113.40–10; 113.50–5;

(29) IEC 60533 Electrical and Electronic Installations in Ships—Electromagnetic Compatibility, Second Edition (1999) (''IEC 60533''), 113.05–7;

(30) IEC 60947–2 Low-Voltage Switchgear and Controlgear Part 2: Circuit-Breakers, Third Edition (2003) (''IEC 60947–2''), 111.54–1;

(31) IEC 61363–1 Electrical Installations of Ships and Mobile and Fixed Offshore Units—Part 1: Procedures for Calculating Short-Circuit Currents in Three-Phase a.c., First Edition (1998) (''IEC 61363–1''), 111.52–5; and

(32) IEC 62271–100, High-voltage switchgear and controlgear—part 100: High-voltage alternating current circuitbreakers, Edition 1.1 (2003) (''IEC 62271–100''), 111.54–1.

(h) *International Maritime Organization (IMO),* Publications Section, 4 Albert Embankment, London SE1 7SR, United Kingdom:

(1) International Convention for the Safety of Life at Sea (SOLAS), Consolidated Text of the International Convention for the Safety of Life at Sea, 1974, and its Protocol of 1988: Article, Annexes and Certificates. (Incorporating all Amendments in Effect from January 2001) (2001) (''IMO SOLAS 74''), 111.99–5; 111.105–31; 112.15–1; 113.25–6.

(i) *International Society for Measurement and Control (ISA),* 67 Alexander Drive, P.O. Box 12277, Research Triangle Park, NC 27709:

(1) RP 12.6, Wiring Practices for Hazardous (Classified) Locations Instrumentation Part I: Intrinsic Safety, 1995 (''ISA RP 12.6''), 111.105–11; and

(2) [Reserved]

(j) *Lloyd's Register,* 71 Fenchurch Street, London EC3M 4BS, Type Approval System-Test Specification Number 1 (2002), 113.05–7.

(k) *National Electrical Manufacturers Association (NEMA),* 1300 North 17th Street, Arlington, VA 22209:

(1) NEMA Standards Publication ICS 2–2000, Industrial Control and Systems Controllers, Contactors, and Overload Relays, Rated 600 Volts (2000) (''NEMA ICS 2''), 111.70–3;

(2) NEMA Standards Publication ICS 2.3–1995, Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers Rated not More Than 600 Volts (1995) (''NEMA ICS 2.3''), 111.70–3;

(3) NEMA Standards Publication No. ICS 2.4–2003, NEMA and IEC Devices for Motor Service—a Guide for Understanding the Differences (2003) (''NEMA ICS 2.4''), 111.70–3;

(4) NEMA Standards Publication No. ANSI/NEMA 250–1997, Enclosures for Electrical Equipment (1000 Volts Maximum) (Aug. 30, 2001) (''NEMA 250''), 110.15–1; 111.01–9; 110.15–1; 113.10–7; 113.20–3; 113.25–11; 113.30–25; 113.37–10; 113.40–10; 113.50–5;

(5) NEMA Standards Publication No. WC–3–1992, Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy, Revision 1, February 1994 (''NEMA WC–3''), 111.60–13; and

(6) NEMA WC–70/ICEA S–95–658–1999 Standard for Non-Shielded Power Rated Cable 2000V or Less for the Distribution of Electrical Energy (1999) (''NEMA WC–70''), 111.60–13.

(l) *National Fire Protection Association (NFPA),* 1 Batterymarch Park, Quincy, MA 02169:

(1) NEC 2002 (NFPA 70), National Electrical Code Handbook, Ninth Edition (2002) (''NFPA NEC 2002''), 111.05–33; 111.20–15; 111.25–5; 111.50–3; 111.50–7; 111.50–9; 111.53–1; 111.54–1; 111.55–1; 111.59–1; 111.60–7; 111.60–13; 111.60–23; 111.81–1; 111.105–1; 111.105–3; 111.105–5; 111.105–7; 111.105–9; 111.105–15; 111.105–17; 111.107–1;

(2) NFPA 77, Recommended Practice on Static Electricity (2000) (''NFPA 77''), 111.105–27;

(3) NFPA 99, Standard for Health Care Facilities (2005) (''NFPA 99''), 111.105–37; and

(4) NFPA 496, Standard for Purged and Pressurized Enclosures for Electrical Equipment (2003) (''NFPA 496''), 111.105–7.

(m) *Naval Publications and Forms Center (NPFC),* Department of Defense, Single Stock Point, 700 Robins Avenue, Philadelphia, PA 19111:

(1) MIL–C–24640A, Military Specification Cables, Light Weight, Electric, Low Smoke, for Shipboard Use, General Specification for (1995) Supplement 1 (June 26, 1995) (''NPFC MIL–C–24640A''), 111.60–1; 111.60–3;

(2) MIL–C–24643A, Military Specification Cables and Cords, Electric, Low Smoke, for Shipboard Use, General Specification for (1996) Amendment 2 (Mar. 13, 1996) (''NPFC MIL–C–24643A''), 111.60–1; 111.60–3; and

(3) MIL–W–76D, Military Specification Wire and Cable, Hook-Up, Electrical, Insulated, General Specification for (2003) (Revision of MIL–W–76D–1992) Amendment 1–2003 (Feb. 6, 2003) (''NPFC MIL–W–76D''), 111.60–11.

(n) *Naval Sea Systems Command (NAVSEA),* Code 55Z, Department of the Navy, Washington, DC 20362:

(1) DDS 300–2, A.C. Fault Current Calculations, 1988 (''NAVSEA DDS 300–2''), 111.52–5; and

(2) MIL–HDBK–299(SH), Military Handbook Cable Comparison Handbook Data Pertaining to Electric Shipboard Cable Notice 1–1991 (Revision of MIL–HDBK–299(SH) (1989)) (Oct. 15, 1991) (''NAVSEA MIL–HDBK–299(SH)''), 111.60–3; and

(3) [Reserved]

(o) *Underwriters Laboratories Inc. (UL),* 12 Laboratory Drive, Research Triangle Park, NC 27709–3995:

(1) UL 44, Standard for Thermoset-Insulated Wire and Cable, Fifteenth Edition, Mar. 22, 1999 (Revisions through and including May 13, 2002) (''UL 44''), 111.60–11;

(2) UL 50, Standard for Safety Enclosures for Electrical Equipment, Eleventh Edition (Oct. 19, 1995) (''UL 50''), 111.81–1;

(3) UL 62, Standard for Flexible Cord and Fixture Wire, Sixteenth Edition (Oct. 15, 1997) (''UL 62''), 111.60–13;

(4) UL 83, Standard for Thermoplastic-Insulated Wires and Cables, Twelfth Edition (Sep. 29, 1998) (''UL 83''), 111.60–11;

(5) UL 484, Standard for Room Air Conditioners, Seventh Edition, Apr. 27, 1993 (Revisions through and including Sep. 3, 2002) (''UL 484''), 111.87–3;

(6) UL 489, Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, Ninth Edition, Oct. 31, 1996 (Revisions through and including Mar. 22, 2000) (''UL 489''), 111.01–15; 111.54–1;

(7) UL 514A, Metallic Outlet Boxes, Ninth Edition (Dec. 27, 1996) (''UL 514A''), 111.81–1;

(8) UL 514B, Conduit, Tubing, and Cable Fittings, Fourth Edition (Nov. 3, 1997) (''UL 514B''), 111.81–1;

(9) UL 514C, Standard for Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers, Second Edition (Oct. 31, 1988) (''UL 514C''), 111.81–1;

(10) UL 913, Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class i, ii, and iii, Division 1, Hazardous (Classified) Locations, Sixth Edition, Aug. 8, 2002 (Revisions through and including Dec. 15, 2003) (''UL 913''), 111.105–11;

(11) UL 1042, Standard for Electric Baseboard Heating Equipment (Apr. 11, 1994) (''UL 1042''), 111.87–3;

(12) UL 1072, Standard for Medium-Voltage Power Cables, Third Edition, Dec. 28, 2001 (Revisions through and including Apr. 14, 2003) (''UL 1072''), 111.60–1;

(13) UL 1104, Standard for Marine Navigation Lights, 1998 (''UL 1104''), 111.75–17;

(14) UL 1203, Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations, Third Edition, Sep. 7, 2000 (Revisions through and including Apr. 30, 2004) (''UL 1203''), 111.105–9;

(15) UL 1309, Marine Shipboard Cables, First Edition (July 14, 1995) (''UL 1309''), 111.60–1; 111.60–3;

(16) UL 1581 (May 6, 2003) (''UL 1581''), 111.30–19; 111.60–2; 111.60–6;

(17) UL 1598, Luminaires, First Edition (Jan. 31, 2000) (''UL 1598''): 111.75–20; and

(18) UL 1598A, Standard for Supplemental Requirements for Luminaires for Installation on Marine Vessels, First Edition (Dec. 4, 2000) (''UL 1598A''), 111.75–20.

[USCG–2003–16630, 73 FR 65193, Oct. 31, 2008, as amended by USCG–2009–0702, 74 FR 49234, Sept. 25, 2009]

Subpart 110.15—Terms Used in This Subchapter

§ 110.15–1 Definitions.

As used in this subchapter—

(a) The electrical and electronic terms are defined in IEEE 100 or IEC 60092–101 (both incorporated by reference; see 46 CFR 110.10–1).

(b) In addition to the definitions in paragraph (a) of this section—

Coastwise Vessel means a vessel that normally navigates the waters of any ocean or the Gulf of Mexico 20 nautical miles or less offshore and is certificated for coastwise navigation by the Coast Guard.

Commandant means the Commandant of the Coast Guard.

Corrosion resistant material or finish means any material or finish that meets the testing requirements of ASTM B 117 (incorporated by reference; see 46 CFR 110.10–1) or test Kb in IEC 68–2–52 (incorporated by reference, see 46 CFR 110.10–1) for 200 hours and does not show pitting, cracking, or other deterioration more severe than that resulting from a similar test on passivated AISI Type 304 stainless steel.

Corrosive location means a location exposed to the weather on vessels operating in salt water or a location on board which may be exposed to the corrosive effects of the cargo carried or of the vessel's systems.

Dead ship condition is the condition in which the main propulsion plant, boilers and auxiliaries are not in operation due to the absence of power.

Dripproof means enclosed so that equipment meets at least a NEMA 250 (incorporated by reference; see 46 CFR 110.10–1) Type 1 with dripshield, Type 2, or Type 12; or IEC 60529 (incorporated by reference; see 46 CFR 110.10–1) IP 22 rating.

Embarkation station means a location from which persons embark into survival craft or are assembled before embarking into survival craft.

Emergency squad means the crew designated on the station bill as the nucleus of a damage control party.

Flashpoint means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to form an ignitable mixture with air

near the surface of the liquid, as specified by the appropriate test procedure and apparatus.

Great Lakes vessel means a vessel that navigates exclusively on the Great Lakes and their connecting and tributary waters.

Independent laboratory means a laboratory that is accepted by the Commandant under part 159 of this chapter for the testing and listing or certification of electrical equipment.

Location not requiring an exceptional degree of protection means a location which is not exposed to the environmental conditions outlined in the definition for locations requiring exceptional degrees of protection. This location requires the degree of protection of §111.01–9 (c) or (d) of this chapter. These locations include—

(1) An accommodation space;

(2) A dry store room;

(3) A passageway adjacent to quarters;

(4) A water closet without a shower or bath;

(5) A radio, gyro and chart room; and

(6) A location with similar environmental conditions.

Location requiring an exceptional degree of protection means a location exposed to weather, seas, splashing, pressure-directed liquids, or similar moisture conditions. These locations include—

(1) On deck;

(2) A machinery space;

(3) A cargo space;

(4) A location within a galley or pantry area, laundry, or water closet which contains a shower or bath; and

(5) Other spaces with similar environmental conditions.

Marine inspector or *inspector* means a civilian employee or military member of the Coast Guard assigned by an Officer in Charge, Marine Inspection, or the Commandant to perform duties with respect to the inspection, enforcement, and administration of vessel safety and navigation laws and regulations.

Nonsparking fan means nonsparking fan as defined in ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1), section 4–8–3/11.

Ocean vessel means a vessel that navigates the waters of any ocean or the Gulf of Mexico more than 20 nautical miles offshore and is certificated by the Coast Guard for ocean navigation.

Qualified person means a person who by virtue of that person's knowledge, ability, experience, specialized training, or licensing can competently and safely perform required electrical duties or functions.

Waterproof means watertight; except that, moisture within or leakage into the enclosure is allowed if it does not interfere with the operation of the equipment enclosed. In the case of a generator or motor enclosure, *waterproof* means watertight; except that, leakage around the shaft may occur if the leakage is prevented from entering the oil reservoir and the enclosure provides for automatic drainage.

Watertight means enclosed so that equipment meets at least a NEMA 250 Type 4 or 4X or an IEC 60529 IP 56 rating.

[CGD 94–108, 61 FR 28274, June 4, 1996, as amended at 62 FR 23907, May 1, 1997; 62 FR 27659, May 20, 1997; USCG–2000–7790, 65 FR 58462, Sept. 29, 2000; USCG–2003–16630, 73 FR 65195, Oct. 31, 2008]

Subpart 110.20—Equivalents

§ 110.20–1 Equivalents.

The Commanding Officer, Marine Safety Center (MSC), may approve any arrangement, fitting, appliance, apparatus, equipment, calculation, information, or test that provides a level of safety equivalent to that established by specific provisions of this subchapter. Requests for approval must be submitted to the Marine Safety Center. If necessary, the Marine Safety Center may require engineering evaluations and tests to demonstrate the equivalence of the substitute.

[CGD 94–108, 61 FR 28275, June 4, 1996]

Subpart 110.25—Plan Submittal

§ 110.25–1 Plans and information required for new construction.

The following plans, if applicable to the particular vessel, must be submitted for Coast Guard review in accordance with §110.25–3:

NOTE: A Navigation and Vessel Inspection Circular on the Subject of ''Coast Guard Review of Merchant Vessel Plans and Specifications'' is available from the offices listed in §110.25–3. The Circular recommends practices and procedures for plan submittals.

(a) Elementary one-line wiring diagram of the power system, supported, by cable lists, panelboard summaries, and other information including—

(1) Type and size of generators and prime movers;

(2) Type and size of generator cables, bus-tie cables, feeders, and branch circuit cables;

(3) Power, lighting, and interior communication panelboards with number of circuits and rating of energy consuming devices;

(4) Type and capacity of storage batteries;

(5) Rating of circuit breakers and switches, interrupting capacity of circuit breakers, and rating or setting of overcurrent devices;

(6) Computations of short circuit currents in accordance with Subpart 111.52; and

(7) Overcurrent protective device coordination analysis for each generator distribution system of 1500 kilowatts or above that includes selectivity and shows that each overcurrent device has an interrupting capacity sufficient to interrupt the maximum asymmetrical short-circuit current available at the point of application.

(b) Electrical plant load analysis including connected loads and computed operating loads for each condition of operation.

(c) Elementary and isometric or deck wiring plans, including the location of each cable splice, a list of symbols, and the manufacturer's name and identification of each item of electrical equipment, of each—

(1) Steering gear circuit and steering motor controller;

(2) General emergency alarm system;

(3) Sound-powered telephone or other fixed communication system;

(4) Power-operated boat winch;

(5) Fire detecting and alarm system;

(6) Smoke detecting system;

(7) Electric watertight door system;

(8) Fire door holding systems;

(9) Public address system;

(10) Manual alarm system; and

(11) Supervised patrol system.

(d) Deck wiring or schematic plans of power systems and lighting systems, including symbol lists, with manufacturer's name and identification of each item of electric equipment, and showing:

(1) Locations of cables;

(2) Cable sizes and types;

(3) Locations of each item of electric equipment;

(4) Locations of cable splices.

(e) Switchboard wiring diagram.

(f) Switchboard material and nameplate list.

(g) Elementary wiring diagram of metering and automatic switchgear.

(h) Description of operation of propulsion control and bus transfer switchgear.

(i) For vessels with hazardous locations for which part 111, subpart 111.105, is applicable, plans showing the extent and classification of all hazardous locations, including information on—

(1) Equipment identification by manufacturer's name and model number;

(2) Equipment use within the system;

(3) Cable parameters;

(4) Equipment locations;

(5) Installation details; and

(6) A certificate of testing, and listing or certification, by an independent laboratory, where required by the respective standard.

(j) Plans and installation instructions for each approved component of an intrinsically safe system listed or certified by an independent laboratory (see §111.105–11 of this chapter).

(k) Motor starter elementary wiring diagram, enclosure drawing, and starter application.

(l) Plans and information sufficient to evaluate equipment to be considered for equivalency under §110.20–1.

(m) Plans and information sufficient to evaluate equipment or systems required to meet the specifications of this Subchapter but not to be approved by the Commandant.

NOTE TO PARAGRAPH (m): This equipment evaluation is generally performed by the Commanding Officer, Marine Safety Center and includes items such as cable splices, signalling lights, shore connection boxes, submersible pumps, engine order telegraph systems, shaft speed and thrust indicator systems, and steering gear failure alarm systems.

(n) Plans and information sufficient to evaluate equipment required by this subchapter to meet a reference standard or military specification.

NOTE TO PARAGRAPH (n): This equipment evaluation is generally performed by the Commanding Officer, Marine Safety Center, and includes items such as circuit breakers, switches, lighting fixtures, air heating equipment, busways, outlet boxes, and junction boxes. Items required to meet an IEEE, IEC, NEMA, UL, ANSI, or other industry standard or a military specification are considered acceptable if manufacturer's certification of compliance is indicated on a material list or plan. However, if the standards require third-party testing and listing or certification, proof of listing or certification by an independent laboratory must also be submitted.

(o) Detailed analysis showing compliance with the MC cable requirements in §111.60–23(b) of this chapter.

[CGD 74–125A, 47 FR 15232, Apr. 8, 1982, as amended by CGD 81–030, 53 FR 17846, May 18, 1988; CGD 94–108, 61 FR 28275, June 4, 1996; 62 FR 23907, May 1, 1997]

§ 110.25–3 Procedure for submitting plans.

(a) The plans required by §110.25–1 must be submitted to one of the following Coast Guard offices:

(1) By visitors to the Commanding Officer, U.S. Coast Guard Marine Safety Center, 1900 Half Street, SW., Suite 1000, Room 525, Washington, DC 20024, or by mail to: Commanding Officer, U.S. Coast Guard Marine Safety Center, 2100 2nd St. SW., Stop 7102, Washington, DC 20593–7102, in a written or electronic format. Information for submitting the VSP electronically can be found at *http://www.uscg.mil/HQ/MSC*.

(2) The Officer in Charge, Marine Inspection at or nearest the place where the vessel is to be built.

(b) [Reserved]

(c) Three copies of each plan are required so that one can be returned to the submitter. If the submitter desires additional copies of approved plans, he should submit enough for the necessary distribution.

NOTE: The Coast Guard and the American Bureau of Shipping (ABS) coordinate plan review for vessels classed by the ABS in order to eliminate duplication of effort. An applicant for plan review of a vessel that is classed by the ABS should consult Commanding Officer, Marine Safety Center, to determine applicable procedures for submitting plans.

[CGD 74–125A, 47 FR 15232, Apr. 8, 1982]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §110.25–3, see the list of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

EDITORIAL NOTE: By CGD 96–041, 61 FR 50730, Sept. 27, 1996, paragraph (a)(1) of §110.25–3 was amended by removing the word ''(G-MSC)''. However, by CGD 94–108, 61 FR 28275, June 4, 1996, the word ''(G-MSC)'' was removed and the word ''(MSC)'' was added in its place.

Subpart 110.30—Testing and Inspection

§ 110.30–1 General.

(a) This section supplements the general requirements for testing and inspecting vessels in other parts of this chapter.

(b) In the inspection of electric equipment and installations, the rules of the American Bureau of Shipping for materials and construction, and the certificate of classification that refers to them, except as otherwise provided by this subchapter, are accepted as standard.

(c) This subpart must not be construed to imply that shop tests or factory inspections of electric apparatus or equipment of the types conducted by the American Bureau of Shipping are conducted by the Coast Guard. Shop tests of electric apparatus or equipment are conducted by the Coast Guard only when required by this chapter or when requested, either by the manufacturer, shipbuilder, owner, or the Coast Guard, and agreed to by all.

[CGD 74–125A, 47 FR 15232, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28275, June 4, 1996]

§ 110.30–3 Initial inspection.

The initial inspection, which may be a series of inspections during the construction of the vessel, includes a complete inspection of the electric installation and electric equipment or apparatus. The inspection is to determine that the arrangement, materials, and their installations meet this chapter and the approved plans. The inspection

also is to determine that the workmanship of all equipment and apparatus and the installation is satisfactory.

§ 110.30–5 Inspection for certification.

Electric installations and electric equipment must be inspected at the inspection for certification and periodic inspection to determine mechanical and electrical condition and performance. Particular note must be made of circuits added or modified after the original issuance of the Certificate of Inspection.

[USCG 1999–4976, 65 FR 6504, Feb. 9, 2000]

§ 110.30–7 Repairs or alterations.

The Officer in Charge, Marine Inspection must be notified before—

(a) Alterations or modifications that deviate from approved plans; or

(b) Repairs, alterations, or modifications that affect the safety of the vessel.

[CGD 94–108, 61 FR 28275, June 4, 1996]

PART 111—ELECTRIC SYSTEMS—GENERAL REQUIREMENTS

Subpart 111.01—General

Sec.

Subpart 111.05—Equipment Ground, Ground Detection, and Grounded Systems

EQUIPMENT GROUND

SYSTEM GROUNDING

GROUND DETECTION

GROUNDED CONDUCTORS

Subpart 111.10—Power Supply

Subpart 111.12—Generator Construction and Circuits

Subpart 111.15—Storage Batteries and Battery Chargers: Contruction and Installation

Subpart 111.20—Transformer Construction, Installation, and Protection

Subpart 111.25—Motors

Subpart 111.30—Switchboards

Subpart 111.33—Power Semiconductor Rectifier Systems

Subpart 111.35—Electric Propulsion

Subpart 111.40—Panelboards

Subpart 111.50—Overcurrent Protection

Subpart 111.51—Coordination of Overcurrent Protective Devices

Subpart 111.52—Calculation of Short-Circuit Currents

Subpart 111.53—Fuses

Subpart 111.54—Circuit Breakers

Subpart 111.55—Switches

Subpart 111.59—Busways

Subpart 111.60—Wiring Materials and Methods

Subpart 111.70—Motor Circuits, Controllers, and Protection

Subpart 111.75—Lighting Circuits and Protection

Subpart 111.77—Appliances and Appliance Circuits

Subpart 111.79—Receptacles

Subpart 111.81—Outlet Boxes and Junction Boxes

Subpart 111.83—Shore Connection Boxes

Subpart 111.85—Electric Oil Immersion Heaters

Subpart 111.87—Electric Air Heating Equipment

Subpart 111.91—Elevators and Dumbwaiters

Subpart 111.95—Electric Power-Operated Boat Winches

Subpart 111.97—Electric Power-Operated Watertight Door Systems

Subpart 111.99—Fire Door Holding and Release Systems

Subpart 111.101—Submersible Motor-Driven Bilge Pumps

Subpart 111.103—Remote Stopping Systems

Subpart 111.105—Hazardous Locations

Subpart 111.107—Industrial Systems

AUTHORITY: 46 U.S.C. 3306, 3703; Department of Homeland Security Delegation No. 0170.1.

SOURCE: CGD 74–125A, 47 FR 15236, Apr. 8, 1982, unless otherwise noted.

Subpart 111.01—General

§ 111.01–1 General.

(a) Electric installations on vessels must ensure:

(1) Maintenance of services necessary for safety under normal and emergency conditions.

(2) Protection of passengers, crew, other persons, and the vessel from electrical hazards.

(3) Maintenance of system integrity through compliance with the applicable system requirements (IEEE, NEC, IEC, etc.) to which plan review has been approved.

(b) Combustible material should be avoided in the construction of electrical equipment.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28275, June 4, 1996; 62 FR 23907, May 1, 1997]

§ 111.01–3 Placement of equipment.

(a) Electric equipment must be arranged, as far as practicable, to prevent mechanical damage to the equipment from the accumulation of dust, oil vapors, steam, or dripping liquids.

(b) Apparatus that may arc must be ventilated or be in ventilated compartments in which flammable gases, acid fumes, and oil vapors cannot accumulate. Skylights and ventilators must be arranged to prevent flooding of the apparatus.

§ 111.01–5 Protection from bilge water.

Each of the following in or around the bilge area must be arranged or constructed so that it cannot be damaged by bilge water:

(a) Generators.

(b) Motors.

(c) Electric coupling.

(d) Electric cable.

[CGD 94–108, 61 FR 28275, June 4, 1996]

§ 111.01–7 Accessibility and spacing.

(a) The design and arrangement of electric apparatus must afford accessibility to each part as needed to facilitate proper inspection, adjustment, maintenance, or replacement.

(b) Within an enclosure, the spacing between energized components (or between an energized component and ground) must be to the appropriate industry standard for the voltage and current utilized in the circuit. Additionally, spacing within any enclosure must be sufficient to facilitate servicing.

[CGD 94–108, 61 FR 28275, June 4, 1996]

§ 111.01–9 Degrees of protection.

(a) Interior electrical equipment exposed to dripping liquids or falling solid particles must be manufactured to at least NEMA 250 or IEC 60529 (both incorporated by reference; see 46 CFR 110.10–1) IP 22 degree of protection as appropriate for the service intended.

(b) Electrical equipment in locations requiring exceptional degrees of protection as defined in 46 CFR 110.15–1 must be enclosed to meet at least the minimum degrees of protection in ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1), section 4–8–3, Table 2, or appropriate NEMA 250 type for the service intended. Each enclosure must be designed so that the total rated temperature of the equipment inside the enclosure is not exceeded.

(c) Central control consoles and similar control enclosures must be manufactured to at least NEMA 250 Type 2 or IEC 60529 IP 22 degree of protection regardless of location.

(d) Equipment for interior locations not requiring exceptional degrees of protection must be manufactured to at least NEMA 250 Type 1 with dripshield or IEC 60529 IP 11 as specified in IEC 60529.

[USCG–2003–16630, 73 FR 65195, Oct. 31, 2008]

§ 111.01–11 Corrosion-resistant parts.

Each enclosure and part of electric equipment that can be damaged by corrosion must be made of corrosion-resistant materials or of materials having a corrosion resistant finish.

§ 111.01–13 Limitations on porcelain use.

Porcelain must not be used for lamp sockets, switches, receptacles, fuse blocks, or other electric equipment where the item is solidly mounted by machine screws or their equivalent, unless the porcelain piece is resiliently mounted.

§ 111.01–15 Temperature ratings.

(a) In this subchapter, an ambient temperature of 40°C (104°F) is assumed except as otherwise stated.

(b) 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.

(c) 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. For installations using UL 489 (incorporated by reference; see 46 CFR 110.10–1) SA marine type circuit breakers, the ambient temperature for that component is assumed to be 40 °C (104 °F). For installations using Navy type circuit breakers, the ambient temperature for that component is assumed to be 50 °C (122 °F).

(d) Unless otherwise indicated in this subchapter, a 55°C (131°F) ambient temperature is assumed for all control and instrumentation equipment.

(e) 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).

[CGD 94–108, 61 FR 28276, June 4, 1996, as amended at 62 FR 23907, May 1, 1997; USCG–2004–18884, 69 FR 58348, Sept. 30, 2004; USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

§ 111.01–17 Voltage and frequency variations.

Unless otherwise stated, electrical equipment must function at variations of at least ±5 percent of rated frequency and +6 percent to −10 percent of rated voltage. This limitation does not address transient conditions.

[CGD 94–108, 61 FR 28276, June 4, 1996]

§ 111.01–19 Inclination of the vessel.

(a) All electrical equipment must be designed and installed to operate for the particular location and environment in which it is to be used. Additionally, electrical equipment necessary for the maneuvering, navigation, and safety of the vessel or its personnel must be designed and installed to operate under any combination of the following conditions:

(1) 15 degrees static list, 22.5 degrees dynamic roll; and

(2) 7.5 degrees static trim.

(b) All emergency installations must be designed and installed to operate when the vessel is at 22.5 degrees list and 10 degrees trim.

[CGD 94–108, 61 FR 28276, June 4, 1996, as amended at 62 FR 23907, May 1, 1997]

Subpart 111.05—Equipment Ground, Ground Detection, and Grounded Systems

§ 111.05–1 Purpose.

This subpart contains requirements for the grounding of electric systems, circuits, and equipment.

NOTE: Circuits are grounded to limit excessive voltage from lightning, transient surges, and unintentional contact with higher voltage lines, and to limit the voltage to ground during normal operation. Conductive materials enclosing electric conductors and equipment, or forming part of that equipment, are grounded to prevent a voltage above ground on the enclosure materials.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28276, June 4, 1996]

EQUIPMENT GROUND

§ 111.05–3 Design, construction, and installation; general.

(a) An electric apparatus must be designed, constructed, and installed to prevent any person from accidentally contacting energized parts.

(b) Exposed, noncurrent-carrying metal parts of fixed equipment that may become energized because of any condition must be grounded.

(c) Exposed, noncurrent-carrying metal parts of portable equipment must be grounded through a conductor in the supply cable to the grounding pole in the receptacle.

(d) If the installation of the electrical equipment does not ensure a positive ground to the metal hull or equivalent conducting body, the apparatus must be grounded to the hull with a grounding conductor.

§ 111.05–7 Armored and metallic sheathed cable.

When installed, the metallic armor or sheath must meet the installation requirements of Section 25 of IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

§ 111.05–9 Masts.

Each nonmetallic mast and topmast must have a lightning-ground conductor in accordance with section 10 of IEC 92–401 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

SYSTEM GROUNDING

§ 111.05–11 Hull return.

(a) A vessel's hull must not carry current as a conductor except for the following systems:

(1) Impressed current cathodic protection systems.

(2) Limited and locally grounded systems, such as a battery system for engine starting that has a one-wire system and the ground lead connected to the engine.

(3) Insulation level monitoring devices if the circulation current does not exceed 30 milliamperes under the most unfavorable conditions.

(4) Welding systems with hull return except vessels subject to 46 CFR Subchapter D.

§ 111.05–13 Grounding connection.

Each grounded system must have only one point of connection to ground regardless of the number of power sources operating in parallel in the system.

§ 111.05–15 Neutral grounding.

(a) Each propulsion, power, lighting, or distribution system having a neutral bus or conductor must have the neutral grounded.

(b) The neutral of a dual-voltage system must be solidly grounded at the generator switchboard.

§ 111.05–17 Generation and distribution system grounding.

The neutral of each grounded generation and distribution system must:

(a) Be grounded at the generator switchboard, except the neutral of an emergency power generation system must be grounded with:

(1) No direct ground connection at the emergency switchboard;

(2) The neutral bus permanently connected to the neutral bus on the main switchboard; and

(3) No switch, circuit breaker, or fuse in the neutral conductor of the bus-tie feeder connecting the emergency switchboard to the main switchboard; and

(b) Have the ground connection accessible for checking the insulation resistance of the generator to ground before the generator is connected to the bus.

§ 111.05–19 Tank vessels; grounded distribution systems.

(a) If the voltage of a distribution system is less than 1,000 volts, line to line, a tank vessel must not have a grounded distribution system.

(b) If the voltage of a distribution system on a tank vessel is 1,000 volts or greater, line to line, and the distribution system is grounded (including high-impedance grounding), any resulting current must not flow through a hazardous (classified) location.

[CGD 94–108, 61 FR 28276, June 4, 1996, as amended at 62 FR 23907, May 1, 1997]

GROUND DETECTION

§ 111.05–21 Ground detection.

There must be ground detection for each:

(a) Electric propulsion system;

(b) Ship's service power system;

(c) Lighting system; and

(d) Power or lighting distribution system that is isolated from the ship's service power and lighting system by transformers, motor generator sets, or other devices.

§ 111.05–23 Location of ground indicators.

Ground indicators must:

(a) Be at the vessel's ship's service generator distribution switchboard for the normal power, normal lighting, and emergency lighting systems;

(b) Be at the propulsion switchboard for propulsion systems; and

(c) Be readily accessible.

(d) Be provided (at the distribution switchboard or at another location, such as a centralized monitoring position for the circuit affected) for each feeder circuit that is isolated from the main source by a transformer or other device.

NOTE TO PARAGRAPH (d): An alarm contact or indicating device returned to the main switchboard via a control cable, that allows the detecting equipment to remain near the transformer or other isolating device for local troubleshooting, is allowed.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28276, June 4, 1996; 62 FR 23907, May 1, 1997]

§ 111.05–25 Ungrounded systems.

Each ungrounded system must be provided with a suitably sensitive ground detection system located at the respective switchboard which provides continuous indication of circuit status to ground with a provision to momentarily remove the indicating device from the reference ground.

[CGD 94–108, 61 FR 28276, June 4, 1996]

§ 111.05–27 Grounded neutral alternating current systems.

Grounded neutral and high-impedance grounded neutral alternating current systems must have a suitably sensitive ground detection system which indicates current in the ground connection, is able to withstand the maximum available fault current without damage, and provides continuous indication of circuit status to ground. A provision must be included to compare indications under fault conditions with those under normal conditions.

[CGD 94–108, 62 FR 23907, May 1, 1997]

§ 111.05–29 Dual voltage direct current systems.

Each dual voltage direct current system must have a suitably sensitive ground detection system which indicates current in the ground connection, has a range of at least 150 percent of neutral current rating and indicates the polarity of the fault.

[CGD 94–108, 61 FR 28276, June 4, 1996]

GROUNDED CONDUCTORS

§ 111.05–31 Grounding conductors for systems.

(a) A conductor for grounding a direct-current system must be the larger of:

(1) The largest conductor supplying the system; or

(2) No. 8 AWG (8.4mm^2).

(b) A conductor for grounding the neutral of an alternating-current system must meet Table 111.05–31(b).

TABLE 111.05–31(b)—NEUTRAL GROUNDING CONDUCTOR FOR ALTERNATING-CURRENT SYSTEM

Size of the largest generator cable or equivalent for parallel generators—AWG-MCM (mm^2)		Size of the system grounding conductor—AWG(mm^2)
Greater than	Less than or equal to	
.....	2 (33.6)	8 (8.4)
2 (33.6)	0 (53.5)	6 (13.3)
0 (53.5)	3/0 (85.0)	4 (21.2)
3/0 (85.0)	350 MCM (177)	2 (33.6)
350 MCM (177)	600 MCM (304)	0 (53.5)
600 MCM (304)	1100 MCM (557)	2/0 (67.5)
1100 MCM (557)	.....	3/0 (85.0)

§ 111.05–33 Equipment safety grounding (bonding) conductors.

(a) Each equipment-grounding conductor must be sized in accordance with Section 250.122 of NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1).

(b) Each equipment-grounding conductor (other than a system-grounding conductor) of a cable must be permanently identified as a grounding conductor in accordance with the requirements of Section 250.119 of NFPA NEC 2002.

[USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

§ 111.05–37 Overcurrent devices.

(a) A permanently grounded conductor must not have an overcurrent device unless the overcurrent device simultaneously opens each ungrounded conductor of the circuit.

(b) The neutral conductor of the emergency-main switchboard bus-tie must not have a switch or circuit breaker.

[CGD 94–108, 61 FR 28276, June 4, 1996]

Subpart 111.10—Power Supply

§ 111.10–1 Definitions.

As used in this Subpart:

(a) *Ships's service loads* mean electrical equipment for all auxiliary services necessary for maintaining the vessel in a normal, operational and habitable condition. Ship's service loads include, but are not limited to, all safety, lighting, ventilation, navigational, communications, habitability, and propulsion auxiliary loads. Electrical propulsion motor, bow thruster motor, cargo transfer, drilling, cargo refrigeration for other than Class 5.2 organic peroxides and Class 4.1 self-reactive substances, and other industrial type loads are not included.

(b) *Drilling loads* means all loads associated exclusively with the drilling operation including power to the drill table, mud system, and positioning equipment.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28276, June 4, 1996; 62 FR 23907, May 1, 1997]

§ 111.10–3 Two generating sources.

In addition to the emergency power sources required under part 112 of this chapter, each self-propelled vessel and each mobile offshore drilling unit must have at least two electric generating sources.

[CGD 94–108, 61 FR 28276, June 4, 1996]

§ 111.10–4 Power requirements, generating sources.

(a) The aggregate capacity of the electric ship's service generating sources required in §111.10–3 must be sufficient for the ship's service loads.

(b) With the ship's service generating source of the largest capacity stopped, the combined capacity of the remaining electric ship's service generating source or sources must be sufficient to supply those services necessary to provide normal operational conditions of propulsion and safety, and minimum comfortable conditions of habitability. Habitability services include cooking, heating, air conditioning (where installed), domestic refrigeration, mechanical ventilation, sanitation, and fresh water.

(c) The capacity of the ship's service generating sources must be sufficient for supplying the ship's service loads without the use of a generating source which is dependent upon the speed or direction of the main propelling engines or shafting.

(d) Operating generators must provide a continuous and uninterrupted source of power for the ship's service load under normal operational conditions. Any vessel speed change or throttle movement must not cause a ship's service load power interruption.

(e) Vessels with electric propulsion that have two or more constant-voltage generators which supply both ship's service and propulsion power do not need additional ship's service generators provided that with any one propulsion/ship's service generator out of service the capacity of the remaining generator(s) is sufficient for the electrical loads necessary to provide normal operational conditions of propulsion and safety, and minimum comfortable conditions of habitability.

(f) A generator driven by a main propulsion unit (such as a shaft generator) which is capable of providing electrical power continuously, regardless of the speed and direction of the propulsion shaft, may be considered one of the ship's service generating sets required by §111.10–3. A main-engine-dependent generator which is not capable of providing continuous electrical power may be utilized as a supplemental generator provided that a required ship's service generator or generators having sufficient capacity to supply the ship's service loads can be automatically brought on line prior to the main-engine-dependent generator tripping offline due to a change in the speed or direction of the main propulsion unit.

[CGD 94–108, 61 FR 28277, June 4, 1996; 61 FR 36787, July 12, 1996]

§ 111.10–5 Multiple energy sources.

Failure of any single generating set energy source such as a boiler, diesel, gas turbine, or steam turbine must not

cause all generating sets required in §111.10–3 to be inoperable.

§ 111.10–7 Dead ship.

(a) The generating plant of each self-propelled vessel must provide the electrical services necessary to start the main propulsion plant from a dead ship condition.

(b) If the emergency generator is used for part or all of the electric power necessary to start the main propulsion plant from a dead ship condition, the emergency generator must be capable of providing power to all emergency lighting, emergency internal communications systems, and fire detection and alarm systems in addition to the power utilized for starting the main propulsion plant. Additional requirements are in §112.05–3(c) of this chapter.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28277, June 4, 1996]

§ 111.10–9 Ship's service supply transformers; two required.

If transformers are used to supply the ship's service distribution system required by this subpart for ships and mobile offshore drilling units, there must be at least two installed, independent power transformers. With the largest transformer out of service, the capacity of the remaining units must be sufficient to supply the ship service loads.

NOTE TO §111.10–9: A ship's service supply system would consist of transformers, overcurrent protection devices, and cables, and would normally be located in the system between a medium voltage bus and a low voltage ship's service switchboard.

[CGD 94–108, 61 FR 28277, June 4, 1996; 61 FR 33045, June 26, 1996]

Subpart 111.12—Generator Construction and Circuits

§ 111.12–1 Prime movers.

(a) Prime movers must meet section 58.01–5 and 46 CFR subpart 58.10 except that those for mobile offshore drilling units must meet Part 4, Chapter 3, sections 4/3.17 and 4/3.19 of the ABS MODU Rules (incorporated by reference; see 46 CFR 110.10–1). Further requirements for emergency generator prime movers are in 46 CFR subpart 112.50.

(b) Each generator prime mover must have an overspeed device that is independent of the normal operating governor and adjusted so that the speed cannot exceed the maximum rated speed by more than 15 percent.

(c) Each prime mover must shut down automatically upon loss of lubricating pressure to the generator bearings if the generator is directly coupled to the engine. If the generator is operating from a power take-off, such as a shaft driven generator on a main propulsion engine, the generator must automatically declutch (disconnect) from the prime mover upon loss of lubricating pressure to generator bearings.

[CGD 94–108, 61 FR 28277, June 4, 1996; 61 FR 33045, June 26, 1996, as amended at 62 FR 23907, May 1, 1997; USCG–2003–16630, 73 FR 65196, Oct 31, 2008]

§ 111.12–3 Excitation.

In general, excitation must meet sections 4–8–3/13.2(a), 4–8–5/5.5.1, 4–8–5/5.5.2, and 4–8–5/5.17.6 of the ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1), except that those for mobile offshore drilling units must meet Part 4, Chapter 3, sections 4/3.21.1 and 4/3.23.1 of the ABS MODU Rules (incorporated by reference; see 46 CFR 110.10–1). In particular, no static exciter may be used for excitation of an emergency generator unless it is provided with a permanent magnet or a residual-magnetism-type exciter that has the capability of voltage build-up after two months of no operation.

[USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

§ 111.12–5 Construction and testing of generators.

Each generator must meet the applicable requirements for construction and testing in section 4–8–3 of the ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1) except that each one for a mobile offshore drilling unit must meet the requirements in part 4, chapter 3, section 4 of the ABS MODU Rules (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

§ 111.12–7 Voltage regulation and parallel operation.

Voltage regulation and parallel operation must meet:

(a) For AC systems: sections 4–2–3/7.5.2, 4–2–4/7.5.2, 4–8–3/3.13.2, and 4–8–3/3.13.3 of the ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1);

(b) For DC systems: section 4–8–3/3.13.3(c) of the ABS Steel Vessel Rules, and IEC 92–202 and IEC 92–301 (both incorporated by reference; see 46 CFR 110.10–1); and

(c) For mobile offshore drilling units: Part 4, Chapter 3, section 4/3.21.2, 4/3.21.3, 4/3.23.2, and 4/3.23.3 of the ABS MODU Rules (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

§ 111.12–9 Generator cables.

(a) The current-carrying capacity of generator cables must not be:

(1) Less than 115 percent of the continuous generator rating; or

(2) Less than 115 percent of the overload for a machine with a 2 hour or greater overload rating.

(b) Generator cables must not be in the bilges.

§ 111.12–11 Generator protection.

(a) *Applicability*. This section applies to each generator except a propulsion generator.

(b) *General*. Each ship's service generator and emergency generator must be protected by an individual, tripfree, air circuit breaker whose tripping characteristics can be set or adjusted to closely match the generator capabilities and meet the coordination requirements of Subpart 111.51. Each circuit breaker must contain the trips required by this section.

(c) *Type of trips*. A circuit breaker for a generator must:

(1) Open upon the shutting down of the prime mover;

(2) Have longtime overcurrent trips or relays set as necessary to coordinate with the trip settings of the feeder circuit breakers; and

(3) Not have an instantaneous trip with the exception that an instantaneous trip is required if:

(i) Three or more alternating-current generators can be paralleled; or

(ii) The circuit breaker is for a direct current generator.

(d) *Setting of longtime overcurrent trips*. The pickup setting of the longtime overcurrent trip of a generator circuit breaker must not be larger than:

(1) 115 percent of the generator rating for a continuous rated machine; or

(2) 115 percent of the overload rating for a machine with a 2-hour or greater overload rating.

(e) *Setting of instantaneous trips*. The instantaneous trip of a generator circuit breaker must be set above, but as close as practicable to, the maximum asymmetrical short circuit available from any one of the generators that can be paralleled.

(f) *Reverse-power and reverse-current trips*. Each generator arranged for parallel operation must have reverse-power or reverse-current trips.

(g) *Location*. A ship's service generator overcurrent protective device must be on the ship's service generator switchboard. The generator and its switchboard must be in the same space. (For the purposes of this section, the following are not considered separate from the machinery space: (1) A control room that is inside of the machinery casing and (2) a dedicated switchgear and semiconductor rectifier (SCR) compartment on a mobile offshore drilling unit that is separate from but directly adjacent to and on the same level as the generator room).

(h) *Three-wire, single-phase and four-wire, three-phase generators*. There must be circuit breaker poles for each generator lead, except in the neutral lead.

(i) *Three-wire, direct-current generators*. Each three-wire, direct current generator must meet the following requirements:

(1) *Circuit breaker poles*. There must be separate circuit breaker poles for the positive and negative leads, and, unless the main poles provide protection, for each equalizer lead. If there are equalizer poles for a three-wire generator, each overload trip must be of the ''Algebraic'' type. If there is a neutral pole in the generator circuit breaker, there must not be an overload trip element for the neutral pole. In

this case, there must be a neutral overcurrent relay and alarm system that is set to function at a current value not more than the neutral rating.

(2) *Equalizer buses.* For each three-wire generator, the circuit breaker must protect against a short circuit on the equalizer bus.

(j) *Circuit breaker reclosing.* Generator circuit breakers must not automatically close after tripping.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 81–030, 53 FR 17847, May 18, 1988; CGD 94–108, 61 FR 28277, June 4, 1996; 62 FR 23908, May 1, 1997]

§ 111.12–13 Propulsion generator protection.

For general requirements, see § 111.35–1 of this chapter.

Subpart 111.15—Storage Batteries and Battery Chargers: Construction and Installation

§ 111.15–1 General.

Each battery must meet the requirements of this subpart.

[CGD 94–108, 61 FR 28277, June 4, 1996]

§ 111.15–2 Battery construction.

(a) A battery cell, when inclined at 40 degrees from the vertical, must not spill electrolyte.

(b) Each fully charged lead-acid battery must have a specific gravity that meets section 22 of IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1).

(c) Batteries must not evolve hydrogen at a rate exceeding that of a similar size lead-acid battery under similar charging condition.

(d) Batteries must be constructed to take into account the environmental conditions of a marine installation, including temperature, vibration, and shock.

[CGD 94–108, 61 FR 28277, June 4, 1996, as amended by USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

§ 111.15–3 Battery categories.

(a) A battery installation is classified as one of three types, based upon power output of the battery charger, as follows:

(1) *Large.* A large battery installation is one connected to a battery charger that has an output of more than 2 kw computed from the highest possible charging current and the rated voltage of the battery installation.

(2) *Moderate.* A moderate battery installation is one connected to a battery charger that has an output of between 0.2 kw and 2 kw computed from the highest possible charging current and the rated voltage of the battery installation.

(3) *Small.* A small battery installation is one connected to a battery charger that has an output of less than 0.2 kw computed from the highest possible charging current and the rated voltage of the battery installation.

(b) Batteries that generate less hydrogen under normal charging and discharging conditions than an equivalent category of lead-acid batteries (e.g., sealed batteries) may have their battery category reduced to an equivalent category of lead-acid batteries.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28278, June 4, 1996]

§ 111.15–5 Battery installation.

(a) *Large batteries.* Each large battery installation must be in a room that is only for batteries or a box on deck. Installed electrical equipment must meet the hazardous location requirements in subpart 111.105 of this part.

(b) *Moderate batteries.* Each moderate battery installation must be in a battery room, in a box on deck, or in a box or locker in another space such as an engineroom, storeroom, or similar space, except if a moderate battery installation is in a ventilated compartment such as the engineroom and is protected from falling objects, a box or locker is not required. A moderate battery installation must not be in a sleeping space. An engine cranking battery for one or more engines must be as close as possible to the engine or engines.

(c) *Small batteries.* Small size battery installations must not be located in poorly-ventilated spaces, such as closets, or in living spaces, such as staterooms.

(d) *Battery trays.* Each battery tray must be chocked with wood strips or

their equivalent to prevent movement, and each tray must have non-absorbent insulating supports on the bottom and similar spacer blocks at the sides, or equivalent provisions for air circulation space all around each tray. Each battery tray must provide adequate accessibility for installation, maintenance, and removal of the batteries.

(e) *Nameplates.* Each battery must be provided with the name of its manufacturer, model number, type designation, either the cold cranking amp rating or the amp-hour rating at a specific discharge and, for a lead-acid battery, the fully charged specific gravity value. This information must be permanently fixed to the battery.

(f) *Lining in battery rooms and lockers.* (1) Each battery room and locker must have a watertight lining that is—

(i) On each shelf to a height of at least 76 mm (3 inches); or

(ii) On the deck to a height of at least 152 mm (6 inches).

(2) For lead-acid batteries, the lining must be 1.6 mm (1/16 inch) thick lead or other material that is corrosion-resistant to the electrolyte of the battery.

(3) For alkaline batteries, the lining must be 0.8 mm (1/32 inch) thick steel or other material that is corrosion-resistant to the electrolyte of the battery.

(g) *Lining of battery boxes.* Each battery box must have a watertight lining to a height of at least 76 mm (3 inches) that meets paragraphs (f)(2) and (f)(3) of this section.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28278, June 4, 1996; 61 FR 36787, July 12, 1996; 62 FR 23908, May 1, 1997]

§ 111.15–10 Ventilation.

(a) *General.* Each room, locker, and box for storage batteries must be arranged or ventilated to prevent accumulation of flammable gas.

(b) *Power ventilation.* If power ventilation is required, the following must be met:

(1) The power ventilation system must be separate from ventilation systems for other spaces.

(2) Electric motors must be outside the duct and compartment and:

(i) Have an explosion-proof motor for a Class I, Division 1, Group B location; or

(ii) Be at least 10 ft. (3 m) from the exhaust end of the duct.

(3) Each blower must have a non-sparking fan.

(4) The power ventilation system must be interlocked with the battery charger so that the battery cannot be charged without ventilation.

(c) *Large battery installations.* Each battery room for large battery installations must have a power exhaust ventilation system and have openings for intake air near the floor that allow the passage of the quantity of air that must be expelled. The quantity of the air expelled must be at least:

$$q=3.89(i)(n).$$

where: q=quantity of expelled air in cubic feet per hour.
i=Maximum charging current during gas formation, or one-fourth of the maximum obtainable charging current of the charging facility, whichever is greater.
n=Number of cells.

(d) *Moderate and small battery installations.* Each battery room or battery locker for moderate or small battery installations must have louvers near the bottom of the room or locker for air, and must be ventilated by:

(1) Ventilation that meets paragraph (c) of this section;

(2) An exhaust duct:

(i) That ends in a mechanically ventilated space or in the weather;

(ii) That extends from the top of the room or locker to at least 3 ft. (1 m) above the top of the room or locker;

(iii) That is at an angle of 45 degrees or less from the vertical; and

(iv) That has no appliances, such as flame arresters, that impede free passage of air or gas mixtures; or

(3) A duct from the top of the room or locker to an exhaust ventilation duct.

(e) *Deck boxes.* Except for a deck box for a small battery installation, each deck box must have a duct from the top of the box to at least 4 ft. (1.2 m) above the box ending in a gooseneck or mushroom head that prevents entrance of water. Holes for air must be on at least two parallel sides of each box.

(f) *Weathertight.* Each deck box must be weathertight.

(g) *Boxes for small battery installations.* Each box for a small battery installation must have openings near the top

to allow escape of gas. If the installation is in a non-environmentally-controlled location, the installation must prevent the ingress of water.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28278, June 4, 1996]

§ 111.15–20 Conductors.

(a) Each conductor penetration to a battery room must be made watertight.

(b) The termination of each cable must be sealed to prevent the entrance of electrolyte by spray or creepage.

(c) Each connecting cable must have sufficient capacity to carry the maximum charging current or maximum discharge current, whichever is greater, while maintaining the proper voltage at the load end.

[CGD 94–108, 61 FR 28278, June 4, 1996, as amended at 62 FR 23908, May 1, 1997]

§ 111.15–25 Overload and reverse current protection.

(a) An overload protective device must be in each battery conductor, except conductors of engine cranking batteries and batteries with a nominal potential of 6 volts or less. For large storage battery installations, the overcurrent protective devices must be next to, but outside of, the battery room.

(b) Except when a rectifier is used, the charging equipment for all batteries with a nominal voltage more than 20 percent of line voltage must protect automatically against reversal of current.

§ 111.15–30 Battery chargers.

Each battery charger enclosure must meet §111.01–9. Additionally, each charger must be suitable for the size and type of battery installation that it serves. Chargers incorporating grounded autotransformers must not be used. Except for rectifiers, chargers with a voltage exceeding 20 percent of the line voltage must be provided with automatic protection against reversal of current.

[CGD 94–108, 61 FR 28278, June 4, 1996; 61 FR 36787, July 12, 1996]

Subpart 111.20—Transformer Construction, Installation, and Protection

§ 111.20–1 General requirements.

Each transformer winding must be resistant to moisture, sea atmosphere, and oil vapor, unless special precautions are taken, such as enclosing the winding in an enclosure with a high degree of ingress protection.

[CGD 94–108, 61 FR 28278, June 4, 1996]

§ 111.20–5 Temperature rise.

(a) The temperature rise, based on an ambient temperature of 40 degrees C, must not exceed the following:

(1) For Class A insulation, 55 degrees C.

(2) For Class B insulation, 80 degrees C.

(3) For Class F insulation, 115 degrees C.

(4) For Class H insulation, 150 degrees C.

(b) If the ambient temperature is higher than 40 degrees C, the transformer must be derated so that the total temperature stated in this section is not exceeded. The temperature must be taken by the resistance method.

§ 111.20–10 Autotransformers.

An autotransformer must not supply feeders or branch circuits.

§ 111.20–15 Protection of transformers against overcurrent.

Each transformer must have protection against overcurrent that meets Article 450 of NFPA NEC 2002 or IEC 92–303 (both incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

Subpart 111.25—Motors

§ 111.25–1 General requirements.

The requirements for generators contained in §111.12–5 apply to motors.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 62 FR 23908, May 1, 1997]

§ 111.25–5 Marking.

(a) Each motor must have a marking or nameplate that meets either Section 430.7 of NFPA NEC 2002 or clause 16 of IEC 92–301 (both incorporated by reference; see 46 CFR 110.10–1).

(b) The marking or nameplate for each motor that is in a corrosive location must be corrosion-resistant.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28278, June 4, 1996; USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

§ 111.25–15 Duty cycle.

Each motor must be rated for continuous duty, except a motor for an application listed in Table 111.25–15 or a similar duty must meet the minimum short-time rating stated in the table.

TABLE 111.25–15

Application of motor	Minimum short-time rating of motor, in hours
Deck winch and direct acting capstan.	Half.
Deck winch with hydraulic transmission.	Continuous at no load followed by ½ hr. at full load.
Direct acting windlass	One fourth.
Windlass with hydraulic transmission.	Half hour idle pump operation, followed by ¼ hr. full load operation.
Steering gear, direct acting ...	One.
Steering gear, indirect drive ..	Continuous operation at 15 pct. load followed by 1 hr. at full load.
Watertight door operators	1/12.
Boat winches	1/12.

Subpart 111.30—Switchboards

§ 111.30–1 Location and installation.

Each switchboard must meet the location and installation requirements in section 8.2 of IEEE 45–2002 or IEC 60092–302 (both incorporated by reference; see 46 CFR 110.10–1), as applicable.

[USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

§ 111.30–3 Accessibility of switchboard components and connections.

Each component and bus bar connection on a switchboard that is not accessible from the rear, except a bus bar connection for a draw-out type circuit breaker, must be within 0.5 m (20 in.) of the front of the switchboard.

§ 111.30–4 Circuit breakers removable from the front.

Circuit breakers, when installed on generator or distribution switchboards, must be mounted or arranged in such a manner that the circuit breaker may be removed from the front without unbolting bus or cable connections or deenergizing the supply, unless the switchboard is divided into sections, such that each section is capable of providing power to maintain the vessel in a navigable condition, and meets § 111.30–24 (a) and (b).

[CGD 94–108, 61 FR 28278, June 4, 1996]

§ 111.30–5 Construction.

(a) All low voltage and medium voltage switchboards (as low and medium are determined within the standard used) must meet—

(1) For low voltages, either section 8.3 of IEEE 45–2002 or IEC 60092–302 (both incorporated by reference; see 46 CFR 110.10–1), as appropriate.

(2) For medium voltages, either section 8.4 of IEEE 45–2002 or IEC 92–503 (incorporated by reference; see 46 CFR 110.10–1), as appropriate.

(b) Each switchboard must be fitted with a dripshield unless the switchboard is a deck-to-overhead mounted type which cannot be subjected to leaks or falling objects.

[CGD 94–108, 61 FR 28278, June 4, 1996, as amended at 62 FR 23908, May 1, 1997; USCG–2003–16630, 73 FR 65196, Oct. 31, 2008]

§ 111.30–11 Deck coverings.

Non-conducting deck coverings, such as non-conducting mats or gratings, suitable for the specific switchboard voltage must be installed for personnel protection at the front and rear of the switchboard and must extend the entire length of, and be of sufficient width to suit, the operating space.

[CGD 94–108, 62 FR 23908, May 1, 1997]

§ 111.30–15 Nameplates.

(a) Each device must have a nameplate showing the device's function.

(b) Each nameplate for a circuit breaker must show the electrical load served and the setting of the circuit breaker.

§ 111.30–17 Protection of instrument circuits.

(a) Each circuit that supplies a device on a switchboard, except a circuit under paragraph (b) of this section, must have overcurrent protection.

(b) A circuit that supplies a device on a switchboard must not have overload protection if it supplies:

(1) An electric propulsion control;

(2) A voltage regulator;

(3) A ship's service generator circuit breaker tripping control; or

(4) A device that creates a hazard to the vessel if deenergized.

(c) If short circuit protection is used in any of the circuits listed in paragraph (b) of this section, it must be set at not less than 500% of the expected current.

(d) A secondary circuit of a current transformer must not be fused, and the circuit from a current transformer to a device that is not in the switchboard must have a high voltage protector to short the transformer during an open circuit.

§ 111.30–19 Buses and wiring.

(a) *General.* Each bus must meet the requirements of either—

(1) Section 7.10 of IEEE 45–1998 (incorporated by reference; see 46 CFR 110.10–1); or

(2) IEC 60092–302 (clause 7) (incorporated by reference; see 46 CFR 110.10–1).

(b) *Wiring.* Instrumentation and control wiring must be—

(1) Suitable for installation within in a switchboard enclosure and be rated at 90 °C or higher;

(2) Stranded copper;

(3) No. 14 AWG (2.10 mm^2) or larger or must be ribbon cable or similar conductor size cable recommended for use in low-power instrumentation, monitoring, or control circuits by the equipment manufacturer;

(4) Flame-retardant meeting test VW–1 of UL 1581 or IEC 332–1 (both incorporated by reference; see 46 CFR 110.10–1); and

(5) Extra flexible, if used on a hinged panel.

[CGD 94–108, 61 FR 28278, June 4, 1996, as amended at 62 FR 23908, May 1, 1997; USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

§ 111.30–24 Generation systems greater than 3000 kw.

Except on a non-self-propelled mobile offshore drilling unit (MODU) and a non-self-propelled floating Outer Continental Shelf facility, when the total installed electric power of the ship's service generation system is more than 3000 kW, the switchboard must have the following:

(a) At least two sections of the main bus that are connected by:

(1) A non-automatic circuit breaker;

(2) A disconnect switch; or

(3) Removable links.

(b) As far as practicable, the connection of generators and duplicated equipment equalized between the sections of the main bus.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28279, June 4, 1996]

§ 111.30–25 Alternating-current ship's service switchboards.

(a) Except as allowed in paragraph (g) of this section, each alternating-current ship's service switchboard must have the equipment required by paragraphs (b) through (f) of this section.

(b) For each connected generator, each switchboard must have the following:

(1) A circuit breaker that meets § 111.12–11 and § 111.50–5.

(2) A disconnect switch or link for each generator conductor, except a switchboard having a draw-out or plug-in type generator circuit breaker that disconnects:

(i) Each generator conductor; or

(ii) If there is a switch in the generator neutral, each ungrounded conductor.

(3) A pilot lamp connected between the generator and the circuit breaker.

(4) An ammeter with a selector switch that connects the ammeter to show the current in each phase.

(5) A voltmeter with a selector switch that connects the voltmeter to show the:

(i) Generator voltage of each phase; and

(ii) Bus voltage of one phase.

(6) A voltage regulator and voltage regulator functional cut-out switch.

(c) For each generator that is not excited from a variable voltage or rotary

amplifier that is controlled by a voltage regulator unit acting on the exciter field, each switchboard must have:

(1) A generator field rheostat;

(2) A double-pole field switch;

(3) Discharge clips; and

(4) A discharge resistor.

(d) If generators are arranged for parallel operation, each switchboard must have:

(1) A speed control for the prime mover of each generator;

(2) An indicating wattmeter for each generator; and

(3) A synchroscope and synchronizing lamp that have a selector switch to show synchronization for paralleling generators.

(e) Each switchboard must have the following:

(1) Ground detection that meets Subpart 111.05 for the:

(i) Ship's service power system;

(ii) Normal lighting system; and

(iii) Emergency lighting system.

(2) A frequency meter with a selector switch to connect the meter to each generator.

(3) An exciter field rheostat.

(f) For each shore power connection each switchboard must have:

(1) A circuit breaker or fused switch;

(2) A pilot light connected to the shore side of the circuit breaker or fused switch; and

(3) One of the voltmeters under paragraph (b)(5) of this section connected to show the voltage of each phase of the shore power connection.

(g) The equipment under paragraphs (b), (d), (e), and (f) of this section, except the equipment under paragraphs (b)(1), (b)(2), and (f)(1), must be on the ship's service switchboard or on a central control console that:

(1) Is in the same control area as the main ship's service switchboard or can remotely control the ship's service generator circuit breaker;

(2) Has a generator section that has only generator functions;

(3) Has the generator section segregated from each other console section by a fire-resistant barrier; and

(4) Has cabling from the main switchboard to the generator section of the console that:

(i) Has only generator control and generator instrumentation circuits; and

(ii) Is protected from mechanical damage.

§ 111.30–27 Direct current ship's service switchboards.

(a) Each direct current ship's service switchboard must have the equipment required by paragraphs (b) through (f) of this section.

(b) For each connected generator, each switchboard must have the following:

(1) A circuit breaker that meets § 111.12–11 and § 111.50–5.

(2) A disconnect switch or link for each generator conductor, except a switchboard having a draw-out or plug-in type generator circuit breaker that disconnects—

(i) Each conductor; or

(ii) If there is a switch in the generator neutral, each ungrounded conductor.

(3) A field rheostat.

(4) A pilot lamp connected between the generator and circuit breaker.

(c) For each two-wire generator, each switchboard must have:

(1) An ammeter; and

(2) A voltmeter with a selector switch that connects the voltmeter to show:

(i) Generator voltage; and

(ii) Bus voltage.

(d) For each three-wire generator, each switchboard must have the following:

(1) An ammeter for:

(i) The positive lead; and

(ii) The negative lead.

(2) A center zero type ammeter for the neutral ground connection.

(3) A voltmeter with a selector switch that connects the voltmeter to show generator and bus voltage:

(i) Positive to negative;

(ii) Positive to neutral; and

(iii) Neutral to negative.

(e) Each switchboard must have ground detection that meets Subpart 111.05 for the:

(1) Main power system;

(2) Main lighting system; and

(3) Emergency lighting system.

(f) For each shore power connection, each switchboard must have:

(1) A circuit breaker or fused switch; and

(2) A pilot light connected to the shore side.

(g) One of the voltmeters under paragraph (c)(2) or (d)(3) of this section must be connected to show:

(1) For each two-wire system, shore connection voltage; and

(2) For each three-wire system, shore connection voltage:

(i) Positive to negative;

(ii) Positive to neutral; and

(iii) Neutral to negative.

§ 111.30–29 Emergency switchboards.

(a) Each emergency generator must have an emergency switchboard.

(b) There must be a test switch at the emergency switchboard to simulate a failure of the normal power source and cause the emergency loads to be supplied from the emergency power source.

(c) The emergency switchboard must be as near as practicable to the emergency power source but not in the same space as a battery emergency power source.

(d) Each alternating-current emergency switchboard must have the equipment required by paragraphs (c) through (e) of this section.

(e) For each connected emergency generator, each emergency switchboard must have:

(1) A circuit breaker that meets §111.12–11;

(2) A disconnect switch or link for each emergency generator conductor, except for a switchboard with a draw out or plug-in type generator circuit breaker that disconnects:

(i) Each generator conductor; and

(ii) If there is a switch in the generator neutral, each ungrounded conductor; and

(3) A pilot lamp connected between the generator and circuit breaker.

(f) For each emergency generator that is not excited from a variable voltage or rotary amplifier exciter that is controlled by a voltage regulator unit acting on the exciter field, each emergency switchboard must have:

(1) A generator field rheostat;

(2) A double pole field switch;

(3) Discharge clips; and

(4) A discharge resistor.

(g) Each emergency switchboard must have the following:

(1) An ammeter with a selector switch that connects the ammeter to show the current for each phase.

(2) A voltmeter with a selector switch that connects the voltmeter to show:

(i) Generator voltage of each phase; and

(ii) Bus voltage of one phase.

(3) Ground detection that meets subpart 111.05 for the emergency lighting system.

(4) A frequency meter.

(5) An exciter field rheostat.

(6) A voltage regulator and a voltage regulator functional cut-out switch.

(h) Each direct-current emergency switchboard must have the:

(1) Equipment under §111.30–27 (b) through (d); and

(2) Ground detection under subpart 111.05 for the emergency lighting system.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28279, June 4, 1996]

Subpart 111.33—Power Semiconductor Rectifier Systems

§ 111.33–1 General.

This subpart is applicable to all power semiconductor rectifier systems. In addition to the regulations contained in this subpart, the requirements of §§111.30–11, 111.30–19 and 111.30–21 of this part must be met, if applicable.

§ 111.33–3 Nameplate data.

(a) Each semiconductor rectifier system must have a nameplate of durable material affixed to the unit that meets the requirements of—

(1) Section 10.20.12 of IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1); or

(2) Clause 8 of IEC 92–304 (incorporated by reference; see 46 CFR 110.10–1).

(b) Each semiconductor rectifier system must have a nameplate containing the words ''marine semiconductor rectifier,'' and the following information:

(1) Manufacturer's name and address.

(2) Manufacturer's serial number.

(3) Type.

(4) Rated AC volts.
(5) Rated AC amperes.
(6) Number of phases.
(7) Frequency.
(8) Rated DC volts.
(9) Rated DC amperes.
(10) Ambient temperature range.
(11) Duty cycle.
(12) Cooling medium.

(c) If, on small rectifiers, the information required by paragraph (a) of this section cannot be shown because of space limitations, the nameplate must be at least large enough to contain the manufacturer's name and serial number. The remaining information must be shown on the schematic diagram.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28279, June 4, 1996; USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

§ 111.33–5 Installation.

Each semiconductor rectifier system must meet the installation requirements, as appropriate, of—

(a) Sections 10.20.2, 10.20.7, and 10.20.8 of IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1); or

(b) IEC 92–304 (incorporated by reference; see 46 CFR 110.10–1).

[CGD 94–108, 61 FR 28279, June 4, 1996, as amended by USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

§ 111.33–7 Alarms and shutdowns.

Each power semiconductor rectifier must have a high temperature alarm or shutdown, except as provided in § 111.33–11.

§ 111.33–9 Ventilation exhaust.

The exhaust of each forced-air semiconductor rectifier system must:

(a) Terminate in a location other than a hazardous location under Subpart 111.105 of this part; and

(b) Not impinge upon any other electric device.

§ 111.33–11 Propulsion systems.

Each power semiconductor rectifier system in a propulsion system must meet sections 4–8–5/5.17.9 and 4–8–5/5.17.10 of ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1), except that each one for mobile offshore drilling units must meet the requirements in Part 4, Chapter 3, section 4/3.5.3 of ABS MODU Rules (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

Subpart 111.35—Electric Propulsion

§ 111.35–1 Electrical propulsion installations.

Each electric propulsion installation must meet sections 4–8–5/5.5, 4–8–5/5.11, 4–8–5/5.13, 4–8–5/5.17.8(e), 4–8–5/5.17.9, and 4–8–5/5.17.10 of ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1), except that each one for mobile offshore drilling units must meet the requirements in part 4, chapter 3, section 4/3.5.3 of ABS MODU Rules (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

Subpart 111.40—Panelboards

§ 111.40–1 Panelboard standard.

Each panelboard must meet section 17.1 of IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

§ 111.40–5 Enclosure.

Each panelboard must have a noncombustible enclosure that meets §§ 111.01–7 and 111.01–9.

[CGD 94–108, 61 FR 28279, June 4, 1996]

§ 111.40–7 Location.

Each panelboard must be accessible but not in a bunker or a cargo hold, except a cargo hold on a roll-on/roll-off vessel.

[CGD 94–108, 61 FR 28279, June 4, 1996]

§ 111.40–9 Locking device.

The door of each panelboard enclosure that is accessible to any passenger must have a locking device.

§ 111.40–11 Numbered switching unit and panelboard directory.

(a) Each panelboard switching unit must be numbered.

(b) Each panelboard must have:

(1) A circuit directory cardholder; and

(2) A circuit directory that has:

(i) The circuit designation of each circuit;

(ii) A description of the load of each circuit; and

(iii) The rating or setting of the overcurrent protective device for each circuit.

§ 111.40–13 Rating.

Each panelboard must have a current rating not less than the feeder circuit capacity.

§ 111.40–15 Overcurrent device.

The total load on any overcurrent device located in a panelboard must not exceed 80 percent of its rating if, in normal operation, the load will continue for 3 hours or more; except if the assembly, including the overcurrent device, is rated for continuous duty at 100% of its rating.

Subpart 111.50—Overcurrent Protection

§ 111.50–1 Protection of equipment.

Overcurrent protection of electric equipment must meet the following listed subparts of this chapter:

(a) Appliances, Subpart 111.77.

(b) Generators, Subpart 111.12.

(c) Motors, motor circuits, and controllers, Subpart 111.70.

(d) Transformers, Subpart 111.20.

§ 111.50–2 Systems integration.

The electrical characteristics of each overcurrent protective device must be compatible with other devices and its coordination must be considered in the design of the entire protective system.

NOTE TO § 111.50–2: The electrical characteristics of overcurrent protective devices may differ between standards. The interchangeability and compatibility of components complying with differing standards cannot be assumed.

[CGD 94–108, 61 FR 28279, June 4, 1996]

§ 111.50–3 Protection of conductors.

(a) *Purpose.* The purpose of overcurrent protection for conductors is to open the electric circuit if the current reaches a value that will cause an excessive or dangerous temperature in the conductor or conductor insulation. A grounded conductor is protected from overcurrent if a protective device of a suitable rating or setting is in each ungrounded conductor of the same circuit.

(b) *Overcurrent protection of conductors.* Each conductor must be protected in accordance with its current carrying capacity, except a conductor for the following circuits which must meet the following listed subparts of this chapter:

(1) Propulsion circuits, Subpart 111.35.

(2) Steering circuits, subchapter F of this chapter.

(3) Motor circuits, Subpart 111.70.

(4) Flexible cord and fixture wire for lighting circuits, Subpart 111.75.

(5) Switchboard circuits, Subpart 111.30.

(c) *Fuses and circuitbreakers.* If the allowable current-carrying capacity of the conductor does not correspond to a standard rating for fuses or circuitbreakers that meets Section 240.6 of NFPA NEC 2002 or IEC 92–202 (both incorporated by reference; see 46 CFR 110.10–1), then the next larger such rating is acceptable, except that:

(1) This rating must not be larger than 150 percent of the current-carrying capacity of the conductor; and

(2) The effect of temperature on the operation of fuses and thermally controlled circuitbreakers must be taken into consideration.

(d) *Parallel overcurrent protective devices.* An overcurrent protective device must not be connected in parallel with another overcurrent protective device.

(e) *Thermal devices.* No thermal cutout, thermal relay, or other device not designed to open a short circuit may be used for protection of a conductor against overcurrent due to a short circuit or ground, except in a motor circuit as described in Article 430 of NFPA NEC 2002 or in IEC 92–202.

(f) *Ungrounded conductors.* A fuse or overcurrent trip unit of a circuit breaker must be in each ungrounded conductor. A branch switch or circuit breaker must open all conductors of the circuit, except grounded conductors.

(g) *Grounded conductor.* An overcurrent device must not be in a permanently grounded conductor, except:

(1) An overcurrent device that simultaneously opens all conductors of the circuit, unless prohibited by §111.05–17 for the bus-tie feeder connecting the emergency and main switchboards; and

(2) For motor-running protection described in Article 430 of NFPA NEC 2002 or in IEC 92–202.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28279, June 4, 1996; CGD 97–057, 62 FR 51047, Sept. 30, 1997; USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

§ 111.50–5 Location of overcurrent protective devices.

(a) *Location in circuit.* Overcurrent devices must be at the point where the conductor to be protected receives its supply, except as follows:

(1) The generator overcurrent protective device must be on the ship's service generator switchboard. (See §111.12–11(g) for additional requirements.)

(2) The overcurrent protection for the shore connection conductors must meet §111.30–25.

(3) If the overcurrent device that protects the larger conductors also protects the smaller conductors, an overcurrent device is not required at the supply to the smaller conductors.

(4) If the overcurrent device protecting the primary side of a single phase transformer (two wire with single-voltage secondary) also protects the conductors connected to the secondary side, as determined by multiplying the current-carrying capacity of the secondary conductor by the secondary to primary transformer voltage ratio, and this protection meets §111.20–15 of this chapter, an overcurrent device is not required at the supply to the secondary side conductors.

(b) *Location on vessel.* Each overcurrent device:

(1) Must be:

(i) Readily accessible; and

(ii) In a distribution panelboard, switchboard, motor controller, or similar enclosure; and

(2) Must not be:

(i) Exposed to mechanical damage; and

(ii) Near an easily ignitable material or where explosive gas or vapor may accumulate.

§ 111.50–7 Enclosures.

(a) Each enclosure of an overcurrent protective device must meet Sections 240–30 and 240–33 of NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1).

(b) No enclosure may be exposed to the weather unless accepted by the Commandant.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

§ 111.50–9 Disconnecting and guarding.

Disconnecting and guarding of overcurrent protective devices must meet Part IV of Article 240 of NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

Subpart 111.51—Coordination of Overcurrent Protective Devices

§ 111.51–1 Purpose.

The purpose of this subpart is to provide continuity of service for equipment vital to the propulsion, control or safety of the vessel under short-circuit conditions through coordination and selective operation of overcurrent protective devices.

§ 111.51–3 Protection of vital equipment.

(a) The coordination of overcurrent protective devices must be demonstrated for all potential plant configurations.

(b)Overcurrent protective devices must be installed so that:

(1) A short-circuit on a circuit that is not vital to the propulsion, control, or safety of the vessel does not trip equipment that is vital; and

(2) A short-circuit on a circuit that is vital to the propulsion, control, or safety of the vessel is cleared only by the protective device that is closest to the point of the short-circuit.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 62 FR 23908, May 1, 1997]

Subpart 111.52—Calculation of Short-Circuit Currents

§ 111.52–1 General.

The available short-circuit current must be computed—

(a) From the aggregate contribution of all generators that can simultaneously operate in parallel;

(b) From the largest probable motor load; and

(c) With a three phase fault on the load terminals of the protective device.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28279, June 4, 1996]

§ 111.52–3 Systems below 1500 kilowatts.

The following short-circuit assumptions must be made for a system with an aggregate generating capacity below 1500 kilowatts, unless detailed computations in accordance with § 111.52–5 are submitted:

(a) The maximum short-circuit current of a direct current system must be assumed to be 10 times the aggregate normal rated generator currents plus six times the aggregate normal rated currents of all motors that may be in operation.

(b) The maximum asymmetrical short-circuit current for an alternating current system must be assumed to be 10 times the aggregate normal rated generator currents plus four times the aggregate normal rated currents of all motors that may be in operation.

(c) The average asymmetrical short-circuit current for an alternating-current system must be assumed to be 8½ times the aggregate normal rated generator currents plus 3½ times the aggregate normal rated currents of all motors that may be in operation.

§ 111.52–5 Systems 1500 kilowatts or above.

Short-circuit calculations must be submitted for systems with an aggregate generating capacity of 1500 kilowatts or more by utilizing one of the following methods:

(a) Exact calculations using actual impedance and reactance values of system components.

(b) Estimated calculations using NAVSEA DDS 300–2 (incorporated by reference, see 46 CFR 110.10–1).

(c) Estimated calculations using IEC 61363–1 (incorporated by reference; see 46 CFR 110.10–1).

(d) The estimated calculations using a commercially established analysis procedure for utility or industrial applications.

[CGD 94–108, 61 FR 28279, June 4, 1996, as amended by USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

Subpart 111.53—Fuses

§ 111.53–1 General.

(a) Each fuse must—

(1) Meet the general provisions of Article 240 of NFPA NEC 2002 or IEC 92–202 (both incorporated by reference; see 46 CFR 110.10–1) as appropriate.

(2) Have an interrupting rating sufficient to interrupt the asymmetrical RMS short-circuit current at the point of application; and

(3) Be listed by an independent laboratory.

(b) Renewable link cartridge-type fuses must not be used.

(c) Each fuse installation must provide for ready access to test the condition of the fuse.

[CGD 94–108, 61 FR 28279, June 4, 1996, as amended by61 FR 33045, June 26, 1996; USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

Subpart 111.54—Circuit Breakers

§ 111.54–1 Circuit breakers.

(a) Each Circuit breaker must—

(1) Meet the general provision of Article 240 of NFPA NEC 2002 or IEC 92–202 (both incorporated by reference; see 46 CFR 110.10–1) as appropriate;

(2) Meet subpart 111.55 of this part; and

(3) Have an interrupting rating sufficient to interrupt the maximum asymmetrical short-circuit current available at the point of application.

(b) No molded-case circuitbreaker may be used in any circuit having a nominal voltage of more than 600 volts (1,000 volts for a circuit containing a circuitbreaker manufactured to the standards of the IEC). Each molded-case circuitbreaker must meet section

9 and marine supplement SA of UL 489 (incorporated by reference, see 46 CFR 110.10–1) or part 2 of IEC 60947–2 (incorporated by reference; see §110.10–1), except as noted in paragraph (e) of this section.

(c) Each circuitbreaker, other than a molded-case one, that is for use in any of the following systems must meet the following requirements:

(1) An alternating-current system having a nominal voltage of 600 volts or less (1,000 volts for such a system with circuitbreakers manufactured to the standards of the IEC) must meet:

(i) IEEE C37.13 (incorporated by reference; see 46 CFR 110.10–1);

(ii) ANSI/IEEE C37.27 (incorporated by reference; see 46 CFR 110.10–1); or

(iii) IEC 60947–2.

(2) A direct-current system of 3,000 volts or less must meet IEEE C37.14 (incorporated by reference; see 46 CFR 110.10–1) or IEC 60947–2.

(3) An alternating-current system having a nominal voltage greater than 600 volts (or greater than 1,000 volts for IEC standard circuitbreakers) must meet:

(i) IEEE C37.04, IEEE C37.010, and ANSI/IEEE C37.12 (all three standards incorporated by reference; see 46 CFR 110.10–1); or

(ii) IEC 62271–100 (incorporated by reference; see 46 CFR 110.10–1).

(d) A circuit breaker must not:

(1) Be dependent upon mechanical cooling to operate within its rating; or

(2) Have a long-time-delay trip element set above the continuous current rating of the trip element or of the circuit breaker frame.

(e) Each circuit breaker located in an engineroom, boilerroom, or machinery space must be calibrated for a 50 degree C ambient temperature. If the circuit breaker is located in an environmentally controlled machinery control room where provisions are made for ensuring an ambient temperature of 40 degree C or less, a circuit breaker must have at least the standard 40 degrees C ambient temperature calibration.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28279, June 4, 1996; 61 FR 33045, June 26, 1996; 62 FR 23908, May 1, 1997; USCG–2003–16630, 73 FR 65197, Oct. 31, 2008]

§ 111.54–3 Remote control.

Remotely controlled circuit breakers must have local manual means of operation.

[CGD 81–030, 53 FR 17847, May 18, 1988]

Subpart 111.55—Switches

§ 111.55–1 General.

(a) Each switch must meet Article 404 of NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1).

(b) Each switch that is in the weather must be in a watertight enclosure and be externally operable.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by USCG–2003–16630, 73 FR 65198, Oct. 31, 2008]

§ 111.55–3 Circuit connections.

The load side of each circuit must be connected to the fuse end of a fused-switch or to the coil end of a circuit breaker, except a generator which is connected to either end of a circuit breaker.

Subpart 111.59—Busways

§ 111.59–1 General.

Each busway must meet Article 368 of NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65198, Oct. 31, 2008]

§ 111.59–3 No mechanical cooling.

A busway must not need mechanical cooling to operate within its rating.

[CGD 94–108, 61 FR 28280, June 4, 1996]

Subpart 111.60—Wiring Materials and Methods

§ 111.60–1 Construction and testing of cable.

(a) Each marine shipboard cable must meet all the requirements for construction and identification of either IEEE 1580, UL 1309, IEC 92–353, or NPFC MIL–C–24640A or NPFC MIL–C–24643A (all five standards incorporated by reference; see 46 CFR 110.10–1), including the respective flammability tests contained therein, and must be of a copper-stranded type.

(b) Each cable constructed to IEC 92–353 must meet the flammability requirements of Category A of IEC 60332–3–22 (incorporated by reference; see 46 CFR 110.10–1).

(c) Medium-voltage electric cable must meet the requirements of IEEE 1580 and UL 1072 (incorporated by reference; see 46 CFR 110.10–1), where applicable, for cables rated above 5,000 volts.

(d) Electrical cable that has a polyvinyl-chloride insulation with a nylon jacket (Type T/N) must meet either UL 1309, IEEE 1580, or section 8 of IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1).

(e) Electrical cable regardless of construction must meet, at a minimum, all of the performance and marking requirements of section 5.13 of IEEE 1580.

[USCG–2003–16630, 73 FR 65198, Oct. 31, 2008]

§ 111.60–2 Specialty cable for communication and RF applications.

Specialty cable such as certain coaxial cable that cannot pass the flammability test contained in IEEE 1580, test VW–1 of UL 1581, or Category A of IEC 60332–3–22 (all three standards incorporated by reference; see 46 CFR 110.10–1) because of unique properties of construction, must:

(a) Be installed physically separate from all other cable; and

(b) Have fire stops installed—

(1) At least every 7 meters (21.5 feet) vertically, up to a maximum of 2 deck heights;

(2) At least every 15 meters (46 feet) horizontally;

(3) At each penetration of an A or B Class boundary;

(4) At each location where the cable enters equipment; or

(5) In a cableway that has an A–60 fire rating.

[CGD 94–108, 61 FR 28280, June 4, 1996, as amended by USCG–2003–16630, 73 FR 65198, Oct. 31, 2008]

§ 111.60–3 Cable application.

(a)(1) Cable constructed according to IEEE 1580 must meet the provisions for cable application of section 24 of IEEE 45–2002 (both incorporated by reference; see 46 CFR 110.10–1).

(2) Cable constructed according to IEC 92–353 or UL 1309 (both incorporated by reference; see 46 CFR 110.10–1) must meet section 24 of IEEE 45–2002, except 24.6.1, 24.6.7, and 24.8.

(3) Cable constructed according to IEC 92–353 must be applied in accordance with IEC 60092–352 (incorporated by reference; see 46 CFR 110.10–1), Table 1, for ampacity values.

(b)(1) Cable constructed according to IEEE 1580 must be applied in accordance with Table 25, Note 6, of IEEE 45–2002.

(2) Cable constructed according to IEC 92–353 must be derated according to IEC 60092–352, clause 8.

(3) Cable constructed according to NPFC MIL–C–24640A or NPFC MIL–C–24643A must be derated according to NAVSEA MIL–HDBK–299 (SH) (all three standards incorporated by reference; see 46 CFR 110.10–1).

(c) Cable for special applications defined in section 24 of IEEE 45–2002 must meet the provisions of that section.

[USCG–2003–16630, 73 FR 65198, Oct. 31, 2008]

§ 111.60–4 Minimum cable conductor size.

Each cable conductor must be #18 AWG (0.82 mm^2) or larger except—

(a) Each power and lighting cable conductor must be #14 AWG (2.10 mm^2) or larger; and

(b) Each thermocouple, pyrometer, or instrumentation cable conductor must be #22 AWG (0.33 mm^2) or larger.

[CGD 94–108, 61 FR 28280, June 4, 1996]

§ 111.60–5 Cable installation.

(a) Each cable installation must meet—

(1) Sections 25, except 25.11, of IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1); or

(2) Cables manufactured to IEC 92–353 must be installed in accordance with IEC 60092–352 (both incorporated by reference; see 46 CFR 110.10–1), including clause 8.

(b) Each cable installation made in accordance with clause 8 of IEC 60092–352 must utilize the conductor ampacity values of Table I of IEC 60092–352.

(c) No cable may be located in any tank unless—

(1) The purpose of the cable is to supply equipment or instruments especially designed for and compatible with service in the tank and whose function requires the installation of the cable in the tank;

(2) The cable is either compatible with the liquid or gas in the tank or protected by an enclosure; and

(3) Neither braided cable armor nor cable metallic sheath is used as the grounding conductor.

(d) Braided cable armor or cable metallic sheath must not be used as the grounding conductor.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28280, June 4, 1996; USCG–2003–16630, 73 FR 65198, Oct. 31, 2008]

§ 111.60–6 Fiber optic cable.

Each fiber optic cable must—

(a) Be constructed to pass the flammability test contained in IEEE 1202, test VW–1 of UL 1581, or Category A of IEC 60332–3–22 (all three standards incorporated by reference; see 46 CFR 110.10–1); or

(b) Be installed in accordance with § 111.60–2.

[CGD 94–108, 61 FR 28280, June 4, 1996, as amended by USCG–2003–16630, 73 FR 65198, Oct. 31, 2008]

§ 111.60–7 Demand loads.

Generator, feeder, and bus-tie cables must be selected on the basis of a computed load of not less than the demand load given in Table 111.60–7.

TABLE 111.60–7—DEMAND LOADS

Type of circuit	Demand load
Generator cables	115 percent of continuous generator rating.
Switchboard bus-tie, except ship's service to emergency switchboard bus-tie.	75 percent of generating capacity of the larger switchboard.
Emergency switchboard bus-tie	115 percent of continuous rating of emergency generator.
Motor feeders	Article 430, NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1).
Galley equipment feeder	100 percent of either the first 50 KW or one-half the connected load, whichever is the larger, plus 65 percent of the remaining connected load, plus 50 percent of the rating of the spare switches or circuit breakers on the distribution panel.
Lighting feeder	100 percent of the connected load plus the average active circuit load for the spare switches or circuit breakers on the distribution panels.
Grounded neutral of a dual voltage feeder	100 percent of the capacity of the ungrounded conductors when grounded neutral is not protected by a circuit breaker overcurrent trip, or not less than 50 percent of the capacity of the ungrounded conductors when the grounded neutral is protected by a circuit breaker overcurrent trip or overcurrent alarm.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by USCG–2004–18884, 69 FR 58348, Sept. 30, 2004; USCG–2003–16630, 73 FR 65198, Oct. 31, 2008]

§ 111.60–9 Segregation of vital circuits.

(a) *General.* A branch circuit that supplies equipment vital to the propulsion, control, or safety of the vessel must not supply any other equipment.

(b) *Passenger vessels.* (1) Each passenger vessel with firescreen bulkheads that form main fire zones must have distribution systems arranged so that fire in a main fire zone does not interfere with essential services in another main fire zone.

(2) Main and emergency feeders passing through a main fire zone must be separated vertically and horizontally as much as practicable.

§ 111.60–11 Wire.

(a) Wire must be in an enclosure.

(b) Wire must be component insulated.

(c) Wire, other than in switchboards, must meet the requirements in sections 24.6.7 and 24.8 of IEEE 45–2002, NPFC MIL–W–76D, UL 44, UL 83 (all

four standards incorporated by reference; see 46 CFR 110.10–1), or equivalent standard.

(d) Switchboard wire must meet subpart 111.30 of this part.

(e) Wire must be of the copper stranded type.

[CGD 94–108, 61 FR 28281, June 4, 1996, as amended at 62 FR 23908, May 1, 1997; 62 FR 27659, May 20, 1997; USCG–2003–16630, 73 FR 65198, Oct. 31, 2008]

§ 111.60–13 Flexible electric cord and cables.

(a) *Construction and testing.* Each flexible cord and cable must meet the requirements in section 24.6.1 of IEEE 45–2002, Article 400 of NFPA NEC 2002, NEMA WC–3, NEMA WC–70, or UL 62 (all five standards incorporated by reference; see 46 CFR 110.10–1).

(b) *Application.* No flexible cord may be used except:

(1) As allowed under Sections 400–7 and 400–8 of NFPA NEC 2002; and

(2) In accordance with Table 400–4 in NFPA NEC 2002.

(c) *Allowable current-carrying capacity.* No flexible cord may carry more current than allowed under Table 400–5 in NFPA NEC 2002, NEMA WC–3, or NEMA WC–70.

(d) *Conductor size.* Each flexible cord must be No. 18 AWG (0.82 mm^2) or larger.

(e) *Splices.* Each flexible cord and cable must be without splices or taps except for a cord or cable No. 12 AWG (3.3 mm^2) or larger spliced for repairs in accordance with § 111.60–19.

(f) *Pull at joints and terminals.* Each flexible cord and cable must be connected to a device or fitting by a knot, tape, or special fitting so that tension is not transmitted to joints or terminal screws.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28281, June 4, 1996; USCG–2003–16630, 73 FR 65198, Oct. 31, 2008]

§ 111.60–17 Connections and terminations.

(a) In general, connections and terminations to all conductors must retain the original electrical, mechanical, flame-retarding, and, where necessary, fire-resisting properties of the cable. All connecting devices must be suitable for copper stranded conductors.

(b) If twist-on type of connectors are used, the connections must be made within an enclosure and the insulated cap of the connector must be secured to prevent loosening due to vibration.

(c) Twist-on type of connectors may not be used for making joints in cables, facilitating a conductor splice, or extending the length of a circuit.

[CGD 94–108, 61 FR 28281, June 4, 1996]

§ 111.60–19 Cable splices.

(a) A cable must not be spliced in a hazardous location, except in intrinsically safe systems.

(b) Each cable splice must be made in accordance with section 25.11 of IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1).

[CGD 94–108, 61 FR 28281, June 4, 1996, as amended by USCG–2003–16630, 73 FR 65198, Oct 31, 2008]

§ 111.60–21 Cable insulation tests.

All cable for electric power and lighting and associated equipment must be checked for proper insulation resistance to ground and between conductors. The insulation resistance must not be less than that in section 34.2.1 of IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

§ 111.60–23 Metal-clad (Type MC) cable.

(a) Metal-clad (Type MC) cable permitted on board a vessel must be continuous corrugated metal-clad cable.

(b) The cable must have a corrugated gas-tight, vapor-tight, and watertight sheath of aluminum or other suitable metal that is close-fitting around the conductors and fillers and that has an overall jacket of an impervious PVC or thermoset material.

(c) The cable is not allowed in areas or applications exposed to high vibration, festooning, repeated flexing, excessive movement, or twisting, such as in engine rooms, on elevators, or in the area of drill floors, draw works, shakers, and mud pits.

(d) The cable must be installed in accordance with Article 326 of NFPA NEC 2002 (incorporated by reference; see 46

CFR 110.10–1). The ampacity values found in table 25 of IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1) may not be used.

(e) The side wall pressure on the cable must not exceed 1,000 pounds per foot of radius.

(f) Equipment grounding conductors in the cable must be sized in accordance with Section 250.122 of NFPA NEC 2002. System grounding conductors must be of a cross-sectional area not less than that of the normal current carrying conductors of the cable. The metal sheath must be grounded but must not be used as a required grounding conductor.

(g) On an offshore floating drilling and production facility, the cable may be used as interconnect cable between production modules and between fixed distribution panels within the production modules, except that interconnection between production and temporary drilling packages is prohibited. Also, the cable may be used within columns, provided that the columns are not subject to the conditions described in paragraph (c) of this section.

(h) When the cable is used within a hazardous (classified) location, terminations or fittings must be listed, and must be appropriate, for the particular Type MC cable used and for the environment in which they are installed.

[CGD 94–108, 62 FR 23908, May 1, 1997, as amended by USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

Subpart 111.70—Motor Circuits, Controllers, and Protection

§ 111.70–1 General.

(a) Each motor circuit, controller, and protection must meet the requirements of ABS Steel Vessel Rules, sections 4–8–2/9.17, 4–8–3/5.7.3, 4–8–4/9.5, and 4–8–3/5; ABS MODU Rules, Part 4, Chapter 3, sections 4/7.11 and 4/7.17; or IEC 92–301 (all three standards incorporated by reference; see 46 CFR 110.10–1), as appropriate, except for the following circuits:

(1) Each steering gear motor circuit and protection must meet part 58, subpart 58.25, of this chapter.

(2) Each propulsion motor circuit and protection must meet subpart 111.35 of this part.

(b) In ungrounded three-phase alternating current systems, only two motor-running protective devices (overload coil or heater type relay within the motor and controller) need be used in any two ungrounded conductors, except when a wye-delta or a delta-wye transformer is used.

(c) The motor disconnecting means must be an externally operable switch or circuit breaker.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28281, June 4, 1996; 62 FR 23909, May 1, 1997; USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

§ 111.70–3 Motor controllers and motor-control centers.

(a) *General.* The enclosure for each motor controller or motor-control center must meet either NEMA ICS 2 and NEMA ICS 2.3, or Table 5 of IEC 92–201 (all three standards incorporated by reference; see 46 CFR 110.10–1), as appropriate, for the location where it is installed. In addition, each such enclosure in a hazardous location must meet subpart 111.105 of this part. NEMA ICS 2.4 (incorporated by reference; see 46 CFR 110.10–1) provides guidance on the differences between devices meeting NEMA and those meeting IEC for motor service.

(b) *Low-voltage release.* Each motor controller for a fire pump, elevator, steering gear, or auxiliary that is vital to the vessel's propulsion system, except a motor controller for a vital propulsion auxiliary which can be restarted from a central control station, must have low-voltage release if automatic restart after a voltage failure or its resumption to operation is not hazardous. If automatic restart is hazardous, the motor controller must have low-voltage protection. Motor controllers for other motors must not have low-voltage release unless the starting current and the short-time sustained current of the additional low-voltage release load is within the capacity of one ship's service generator. Automatic sequential starting of low-voltage release controllers is acceptable to meet this paragraph.

(c) *Low-voltage protection.* Each motor controller must have low-voltage protection, except for the following motor controllers:

(1) A motor controller that has low-voltage release under paragraph (b) of this section.

(2) A motor controller for a motor of less than 2 horsepower (1.5 kW).

(d) *Identification of controllers.* (1) Each motor controller and motor control center must be marked externally with the following information:

(i) Manufacturer's name or identification.

(ii) Voltage.

(iii) Number of phases.

(iv) Current.

(v) kW (Horsepower).

(vi) Identification of motor being controlled.

(vii) Current rating of trip setting.

(2) Each controller must be provided with heat durable and permanent elementary wiring/schematic diagrams of the controller located on the door interior.

[CGD 94–108, 61 FR 28281, June 4, 1996; 61 FR 33045, June 26, 1996, as amended by USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

§ 111.70–5 Heater circuits.

(a) If an enclosure for a motor, master switch, or other equipment has an electric heater inside the enclosure that is energized from a separate circuit, the heater circuit must be disconnected from its source of potential by a disconnect device independent of the enclosure containing the heater. The heater disconnecting device must be adjacent to the equipment disconnecting device. A fixed sign, warning the operator to open both devices, must be on the enclosure of the equipment disconnect device, except as in paragraph (b) of this section.

(b) If the location of the enclosure for a motor, master switch, or other equipment for deck machinery is remote from the motor and controller disconnect device, a sign must be fixed to the enclosure if the disconnect arrangement required by paragraph (a) of this section is not used. The sign must warn the operator of the presence of two sources of potential within the enclosure and show the location of the heater circuit disconnect device.

(c) Electric heaters installed within motor controllers and energized from a separate circuit must be disconnected in the same manner as required by paragraph (a) of this section or by §111.70–7(d).

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28282, June 4, 1996]

§ 111.70–7 Remote control, interlock, and indicator circuits.

(a) *Overcurrent protection.* A conductor of a control, interlock, or indicator circuit of a motor controller must be protected against overcurrent unless:

(1) The conductor is wholly within the controller enclosure;

(2) The rating or setting of the branch circuit overcurrent device is not more than 300 percent of the current-carrying capacity of the control, interlock, or indicator circuit conductor;

(3) There is an overcurrent device in each side of the line that has a rating or setting of not more than 300 percent of the current-carrying capacity of the control, electrical interlock, or indicator circuit conductor, except if under operating conditions there is no appreciable difference in potential between the external conductors, overcurrent protection need only be at the supply of that side of the line; or

(4) The opening of the control, interlock, or indicator circuit creates a hazard.

NOTE: For overcurrent protection of steering gear control and indicator circuits, see Subpart 111.93 of this chapter.

(b) *Accidental ground.* The controller must be designed to prevent an accidental ground in a remote control circuit from causing the stop switches to fail to operate or causing the motor to start.

(c) *Source of potential.* The potential for a control, interlock, or indicator circuit must be derived from the load side of the motor and controller disconnect device, except if the control functions require circuits that must be common to two or more controllers, the switching arrangement in paragraph (d) of this section must be met.

(d) *Switching.* In the design of a control, interlock, or indicator circuit, all practicable steps must be taken to eliminate all but one source of power in an enclosure. If the control functions make it impracticable to energize

a control interlock or indicator circuit from the load side of a motor and controller disconnect device and the voltage of the control, interlock, or indicator circuit is more than 24 volts, there must be one of the following alternative methods of switching:

(1) Each conductor of a control, interlock, or indicator circuit must be disconnected from all sources of potential by a disconnect device independent of the motor and controller disconnect device. The two independent devices must be adjacent to each other, and a fixed sign, warning the operator to open both devices to disconnect completely the motor and controller, must be on the exterior of the door of the main disconnect device.

(2) Each conductor of a control, interlock, or indicator circuit must be disconnected from all sources of power by a disconnect device actuated by the opening of the controller door, or the power must first be disconnected to allow opening of the door. The disconnect device and its connections, including each terminal block for terminating the vessel's wiring, must have no electrically uninsulated or unshielded surface. When this type of disconnect device is used for vital auxiliary circuits, a nameplate must be affixed to the vital auxiliary motor controller door that warns that opening the door will trip a vital auxiliary offline.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28282, June 4, 1996; 62 FR 23909, May 1, 1997]

Subpart 111.75—Lighting Circuits and Protection

§ 111.75–1 Lighting feeders.

(a) *Passenger vessels*. On a passenger vessel with fire bulkheads forming main vertical and horizontal fire zones, the lighting distribution system, including low location egress lighting where installed, must be arranged so that, to the maximum extent possible, a fire in any main vertical and horizontal fire zone does not interfere with the lighting in any other fire zone. This requirement is met if main and emergency feeders passing through any zone are separated both vertically and horizontally as widely as practicable.

(b) *Machinery spaces*. Lighting for enginerooms, boilerrooms, and auxiliary machinery spaces must be supplied from two or more feeders. One of these feeders must be a ship's service feeder.

NOTE: Special requirements for emergency lighting, feeders, and branch circuits are in subpart 112.43 of this chapter.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28282, June 4, 1996; 61 FR 33045, June 26, 1996]

§ 111.75–5 Lighting branch circuits.

(a) *Loads*. A lighting distribution panel must not supply branch circuits rated at over 30 amperes.

(b) *Connected Load*. The connected loads on a lighting branch circuit must not be more than 80 percent of the rating of the overcurrent protective device, computed on the basis of the fixture ratings and in accordance with IEEE 45–2002 (incorporated by reference; see 46 CFR 110.10–1), section 5.4.2.

(c) *Lighting fixtures on lighting circuits*. Each lighting fixture must be on a lighting branch circuit.

(d) *Overcurrent protection*. Each lighting branch circuit must be protected by an overcurrent device rated at 20 amperes or less, except as allowed under paragraph (e) of this section.

(e) *25 or 30 ampere lighting branch circuits*. Lighting branch circuits rated at 25 and 30 amperes supplying only fixed nonswitched lighting fixtures for cargo hold or deck lighting having only lampholders of the mogul type, or other lampholding devices required for lamps of more than 300 watts, may be supplied by a 30 ampere branch circuit wired with at least No. 10 AWG (5.3 mm^2) conductors if each fixture wire used in wiring each lighting fixture is No. 12 AWG (3.3 mm^2) or larger.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28282, June 4, 1996; 62 FR 23909, May 1, 1997; USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

§ 111.75–15 Lighting requirements.

(a) *Lights in passageways, public spaces, and berthing compartments*. The supply to lights in each passageway, public space, or berthing compartment accommodating more than 25 persons must be divided between two or more

branch circuits, one of which may be an emergency branch circuit.

(b) *Lights in machinery spaces.* Alternate groups of lights in an engineroom, boilerroom, or auxiliary machinery space must be arranged so that the failure of one branch circuit does not leave an area without light.

(c) *Illumination of passenger and crew spaces.* (1) Each space used by passengers or crew must be fitted with lighting that provides for a safe habitable and working environment under normal conditions.

(2) Sufficient illumination must be provided by the emergency lighting source under emergency conditions to effect damage control procedures and to provide for safe egress from each space.

(d) *Berth lights.* Each crew berth must have a fixed berth light that is not wired with a flexible cord. The berth light must have minimum horizontal projection so that the light may not be covered with bedding.

(e) *Exit lights.* Each exit light required on passenger vessels under §112.15–1 of this subchapter must have the word ''Exit'' in red block letters at least 2 inches (50 mm) high.

(f) *Pilot ladders.* There must be a means for lighting each station from which a pilot may be deployed.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28282, June 4, 1996]

§111.75–16 Lighting of survival craft and rescue boats.

(a) During preparation, launching, and recovery, each survival craft and rescue boat, its launching appliance, and the area of water into which it is to be launched or recovered must be adequately illuminated by lighting supplied from the emergency power source.

(b) The arrangement of circuits must be such that the lighting for adjacent launching stations for survival craft or rescue boats is supplied by different branch circuits.

[CGD 94–108, 61 FR 28282, June 4, 1996]

§111.75–17 Navigation lights.

Each navigation light system must meet the following:

(a) *Feeders.* On vessels required to have a final emergency power source by §112.05–5(a) of this chapter, each navigation light panel must be supplied by a feeder from the emergency switchboard (see §112.43–13). The feeder must be protected by overcurrent devices rated or set at a value of at least twice that of the navigation light panel main fuses.

(b) *Navigation light indicator panel.* Each self-propelled vessel must have a navigation light indicator panel in the navigating bridge to control side, masthead, and stern lights. The panel must visually and audibly signal the failure of each of these navigation lights. Each light source must be connected to a separate fused branch circuit. The panel must have a fused feeder disconnect switch, and the fuses must have at least twice the rating of the largest branch circuit fuse and must be greater than the maximum panel load.

(c) *Dual light sources.* Each self-propelled vessel must have duplicate light sources for the side, masthead, and stern lights.

(d) *Navigation lights.* Each navigation light must meet the following:

(1) Meet the technical details of the applicable navigation rules.

(2) Be certified by an independent laboratory to the requirements of UL 1104 (incorporated by reference; see 46 CFR 110.10–1) or an equivalent standard under 46 CFR 110.20–1. Portable battery powered lights need meet only the requirements of the standard applicable to those lights.

(3) Be labeled with a label stating the following:

(i) ''MEETS _____.'' (Insert the identification name or number of the standard under paragraph (d)(2) of this section to which the light was type-tested.)

(ii) ''TESTED BY _____.'' (Insert the name or registered certification mark of the independent laboratory that tested the fixture to the standard under paragraph (d)(2) of this section).

(iii) Manufacturer's name.

(iv) Model number.

(v) Visibility of the light in nautical miles.

(vi) Date on which the fixture was type-tested.

(vii) Identification of bulb used in the compliance test.

(4) If it is a flashing light, have its intensity determined by the formula:

$$Ie=G/(0.2+t2-t1)$$

Where

Ie=Luminous Intensity.
G=Integral of Idt evaluated between the limits of t1 and t2.
t1=Time in seconds of the beginning of the flash.
t2=Time in seconds of the end of the flash.
I=Instantaneous intensity during the flash.

NOTE: The limits, t1 and t2, are to be chosen so as to maximize Ie.

(e) *Installation of navigation lights.* Each navigation light must:

(1) Be installed so that its location and its angle of visibility meet the applicable navigation rules;

(2) Except as permitted by the applicable navigation rules, be arranged so that light from a navigation light is not obstructed by any part of; the vessel's structure or rigging;

(3) Be wired by a short length of heavy-duty, flexible cable to a watertight receptacle outlet next to the light or, for permanently mounted fixtures, by direct run of fixed cable; and

(4) If it is a double-lens, two-lamp type, have each lamp connected to its branch circuit conductors either by an individual flexible cable and watertight receptacle plug or, for permanently mounted fixtures, by an individual direct run of fixed cable.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28282, June 4, 1996; 61 FR 33045, June 26, 1996; 62 FR 23909, May 1, 1997; USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

§ 111.75–18 Signaling lights.

Each self-propelled vessel over 150 gross tons when engaged on an international voyage must have on board an efficient daylight signaling lamp that may not be solely dependent upon the vessel's main source of electrical power and that meets the following:

(a) The axial luminous intensity of the beam must be at least 60,000 candelas.

(b) The luminous intensity of the beam in every direction within an angle of 0.7 degrees from the axial must be at least 50 percent of the axial luminous intensity.

[CGD 94–108, 61 FR 28282, June 4, 1996]

§ 111.75–20 Lighting fixtures.

(a) The construction of each lighting fixture for a non-hazardous location must meet UL 1598A or IEC 92–306 (both incorporated by reference; see 46 CFR 110.10–1).

(b) Each fixture globe, lens, or diffuser must have a high strength guard or be made of high strength material, except in an accommodation space, navigating bridge, gyro room, radio room, galley, or similar space where it is not subject to damage.

(c) No fixture may be used as a connection box for a circuit other than the branch circuit supplying the fixture.

(d) Lighting fixtures must be installed as follows:

(1) Each fixture in the weather or in a location exposed to splashing water must be watertight. Each fixture in a damp or wet location must at least be dripproof.

(2) Each fixture and lampholder must be fixed. A fixture must not be supported by the screw shell of a lampholder.

(3) Each pendent-type fixture must be suspended by and supplied through a threaded, rigid conduit stem.

(4) Each tablelamp, desklamp, floorlamp, and similar equipment must be secured in place so that it cannot be displaced by the roll or pitch of the vessel.

(e) Nonemergency and decorative interior-lighting fixtures in environmentally protected, nonhazardous locations need meet only the applicable UL type-fixture standards in UL 1598 (incorporated by reference; see 46 CFR 110.10–1) and UL 1598A marine supplement or the standards in IEC 92–306. These fixtures must have vibration clamps on fluorescent tubes longer than 102 cm (40 inches), secure mounting of glassware, and rigid mounting.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28283, June 4, 1996; 61 FR 36787, July 12, 1996; 62 FR 23909, May 1, 1997; USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

Subpart 111.77—Appliances and Appliance Circuits

§ 111.77–1 Overcurrent protection.

If a circuit supplies only one appliance or device, the rating or setting of the branch circuit overcurrent device must not be more than 150 percent of the rating of the appliance or device, or 15 amperes, whichever is greater.

§ 111.77–3 Appliances.

All electrical appliances, including, but not limited to, cooking equipment, dishwashers, refrigerators, and refrigerated drinking water coolers, must meet UL safety and construction standards or equivalent standards under §110.20-1 of this chapter. Also, this equipment must be suitably installed for the location and service intended.

[CGD 94–108, 61 FR 28283, June 4, 1996; 61 FR 33045, June 26, 1996]

Subpart 111.79—Receptacles

§ 111.79–1 Receptacle outlets; general.

(a) There must be a sufficient number of receptacle outlets in the crew accommodations for an adequate level of habitability.

(b) There must be a sufficient number of receptacle outlets throughout the machinery space so that any location can be reached by a portable power cord having a length not greater than 24 meters (75 feet).

(c) Each receptacle outlet must be compatible with the voltage and current of the circuit in which it is installed.

(d) Each receptacle outlet must be suitable for the environment in which it is installed and constructed to the appropriate NEMA or IEC protection standard as referenced in §111.01–9. Special attention must be given to outlets in hazardous locations.

(e) A receptacle outlet must not have any exposed live parts with the plug opening uncovered.

[CGD 94–108, 61 FR 28283, June 4, 1996]

§ 111.79–3 Grounding pole.

Each receptacle outlet that operates at 100 volts or more must have a grounding pole.

§ 111.79–9 Transmitting power between receptacles.

(a) If it is necessary to transmit current in one direction between two receptacle outlets by a flexible cable with a plug on each end, such as a battery charging lead between a receptacle outlet on a ship and a receptacle outlet in a lifeboat, the plug that may be energized when not in the receptacle outlet must be female.

(b) If a receptacle outlet may be used as a source of power and as a receiver of power, such as the receptacles on barges that may have to supply power to adjoining barges in some makeup and receive power from the towboat or adjoining barge in other makeups, the receptacles must be male and reverse service. Plugs of flexible cable must be female and must be at both ends of the flexible lead. The female plug must meet §111.79–7.

§ 111.79–11 Lifeboat receptacles.

Each receptacle outlet on a lifeboat for connection to a vessel's electrical system must allow the plug to pull free when the lifeboat is lowered.

§ 111.79–13 Different voltages and power types.

If receptacle outlets on a vessel are supplied by different voltages (e.g., 110 volts and 220 volts) or by different types of power (e.g., AC and DC), each receptacle outlet must preclude the plugging of a portable device into a receptacle outlet of an incompatible voltage or type of power.

[CGD 94–108, 61 FR 28283, June 4, 1996]

§ 111.79–15 Receptacles for refrigerated containers.

Receptacles for refrigerated containers must meet one of the following:

(a) Each receptacle for refrigerated containers must have a switch interlocked in such a way that the receptacle's contacts are deenergized before the making or breaking of the connection between the plug and receptacle contacts.

(b) Each group of receptacles for refrigerated containers must have:

(1) A switch near the receptacles that disconnects all power to those receptacles; and

(2) A sign stating that the switch should be opened before cables are disconnected from the receptacles or refrigerated containers.

(c) Each receptacle for refrigerated containers must be designed for circuit breaking service.

Subpart 111.81—Outlet Boxes and Junction Boxes

§ 111.81–1 Outlet boxes and junction boxes; general.

(a) The requirements of this subpart apply to each outlet box used with a lighting fixture, wiring device, or similar item, including each separately installed connection and junction box.

(b) An outlet box must be at each outlet, switch, receptacle, or junction point.

(c) Each outlet or junction box must have a cover unless a fixture canopy, switch cover, receptacle cover, or other cover is used.

(d) As appropriate, each outlet-box or junction-box installation must meet the following standards, all of which are incorporated by reference (see 46 CFR 110.10–1): Article 314 of NFPA NEC 2002; UL 50; UL 514A, UL 514B, and UL 514C; IEC 60092–101; IEC 92–201; IEC 92–306; IEC 60092–352; IEC 92–401; and IEC 60092–502.

(e) Each outlet or junction box must be securely attached to its mounting and be affixed so as to maintain its designated degree of protection.

(f) Each outlet and junction box must be suitable for the environment in which it is installed and be constructed to the appropriate NEMA or IEC standard.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28283, June 4, 1996; USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

§ 111.81–3 Cables entering boxes.

Each cable entering a box or fitting must be protected from abrasion and must meet the following:

(a) Each opening through which a conductor enters must be closed.

(b) Cable armor must be secured to the box or fitting.

(c) Each cable entrance in a damp or wet location must be made watertight by a terminal or stuffing tube.

Subpart 111.83—Shore Connection Boxes

§ 111.83–1 General.

Each shore connection box must be of a size that accommodates the connections of the flexible and fixed cables.

§ 111.83–5 Bottom entrance and protected enclosures.

Each shore connection box must have a bottom entrance for the shore connection cable. The box must provide protection to the shore connection when the connection is in use.

Subpart 111.85—Electric Oil Immersion Heaters

§ 111.85–1 Electric oil immersion heaters.

Each oil immersion heater must have the following:

(a) An operating thermostat.

(b) Heating elements that have no electrical contact with the oil.

(c) A high temperature limiting device that:

(1) Opens all conductors to the heater;

(2) Is manually reset; and

(3) Actuates at a temperature below the flashpoint of the oil.

(d) Either—

(1) A low-fluid-level device that opens all conductors to the heater if the operating level drops below the manufacturer's recommended minimum safe level; or

(2) A flow device that opens all conductors to the heater if there is inadequate flow.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28283, June 4, 1996]

Subpart 111.87—Electric Air Heating Equipment

§ 111.87–1 Applicability.

This subpart applies to electrically energized units or panels for heating a

room or compartment. This subpart does not apply to electrically energized units for heating the air in an enclosed apparatus, such as a motor or controller.

§ 111.87–3 General requirements.

(a) Each electric heater must meet applicable UL 484 or UL 1042 construction standards (both incorporated by reference; see 46 CFR 110.10–1) or equivalent standards under §110.20–1 of this chapter

(b) Each heater element must be an enclosed type. The heater element case or jacket must be of a corrosion-resistant material.

(c) Each heater must have a thermal cutout of the manually-reset type that prevents overheating and must have a thermal regulating switch.

(d) Each heater for bulkhead mounting must have its top slanted or otherwise designed to prevent hanging anything on the heater. If a heater is portable, it must have a clip or bracket to hold the heater in a fixed position.

(e) The external temperature of a heater enclosing case must not be over 125 degrees C, except that the external temperature of the enclosing case of a flush-mounted heater must not be over 100 degrees C. If a heater is mounted on or next to a deck or bulkhead, the heater must not cause the temperature of the nearest deck or bulkhead to be over 55 degrees C. For test purposes, an ambient temperature of 25 degrees C must be used.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28283, June 4, 1996; 61 FR 33045, June 26, 1996; 61 FR 36608, July 11, 1996; USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

Subpart 111.91—Elevators and Dumbwaiters

§ 111.91–1 Power, control, and interlock circuits.

Each electric power, control, and interlock circuit of an elevator or dumbwaiter must meet ASME A17.1 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

Subpart 111.95—Electric Power-Operated Boat Winches

§ 111.95–1 Applicability.

(a) The electric installation of each electric power-operated boat winch must meet the requirements in this subpart, except that limit switches must be adapted to the installation if there are no gravity davits.

(b) The provisions of this subpart supplement the requirements for boat winches in other parts of this chapter under which vessels are certificated and in subchapter Q, Equipment approvals.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28283, June 4, 1996]

§ 111.95–3 General requirements.

(a) Each electrical component (e.g., enclosure, motor controller, or motor) must be constructed to the appropriate NEMA or IEC degree of protection requirement for the service and environment in which it is installed.

(b) Each main line emergency disconnect switch, if accessible to an unauthorized person, must have a means to lock the switch in the open-circuit position with a padlock or its equivalent. The switch must not lock in the closed-circuit position.

[CGD 94–108, 61 FR 28283, June 4, 1996]

§ 111.95–7 Wiring of boat winch components.

(a) If the motor controller of a boat winch power unit is next to the winch, the main line emergency switch must disconnect all parts of the boat winch power unit, including the motor controller and limit switches, from all sources of potential. Other power circuit switches must be connected in series with the main line emergency switch and must be ahead of the motor controller. The main line emergency switch must be the motor and controller disconnect required by Subpart 111.70 and must have a horsepower rating of at least that of the winch motor.

(b) If the motor controller of a boat winch power unit is remote from the winch, there must be a switch at the controller that can disconnect the entire winch electric installation from all

sources of potential. The switch must be in series with and on the supply side of the main line emergency switch.

(c) Each davit arm limit switch, whether connected in the power circuit or in the control circuit, must disconnect all ungrounded conductors of the circuit controlled.

(d) If one motor is used with two winches, there must be a main line emergency switch, a clutch interlock switch, and a master switch for each winch, except that a single main line emergency switch located as required by paragraph (e) of this section may be used for both winches. The main line emergency switches must be connected, in series, ahead of the motor controller. The master switches must be connected in parallel and each, in series, with the corresponding clutch interlock switch for that winch. Each clutch interlock switch must open the circuit to its master switch, except when the power unit is clutched to the associated winch. There must be a means to prevent the power unit from being clutched to both winches simultaneously.

(e) The main line emergency disconnect switch must be adjacent to the master switch, within reach of the winch operator, accessible to the person in charge of the boat stowage, and for gravity davit installations, in a position from which the movement of boat davit arms can be observed as they approach the final stowed position.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28283, June 4, 1996]

Subpart 111.97—Electric Power-Operated Watertight Door Systems

§ 111.97–1 Applicability.

This subpart applies to electric power-operated watertight door systems required under Subpart H of Part 170 of this chapter.

[CGD 79–023, 48 FR 51008, Nov. 4, 1983]

§ 111.97–3 General requirements.

Each watertight door operating system must meet Subpart H, § 170.270 of this chapter.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by USCG–2000–7790, 65 FR 58462, Sept. 29, 2000]

§ 111.97–5 Electric and hydraulic power supply.

(a) Each electric motor-driven door operating system must have the same source of power as the emergency lighting and power system.

(b) The temporary emergency power source and the final emergency power source must each be capable of operating all doors simultaneously or sequentially as allowed by § 170.270(c) of this chapter.

(c) The power supply for each hydraulically operated watertight door system that uses a hydraulic system common to more than one watertight door must be an accumulator tank with enough capacity to open all doors once and to close all doors two times and be supplied by one or more motor-driven hydraulic pumps that can operate from the final source of the emergency lighting and power system.

(d) The motor-driven hydraulic pumps must automatically maintain the accumulator tank pressure within the design limits, be above the uppermost continuous deck, and be controlled from above the uppermost continuous deck.

(e) The accumulator tank capacity required in paragraph (c) of this section must be available when the accumulator tank pressure is at the automatic pump ''cut-in'' pressure.

(f) The source of power for each hydraulically operated watertight door system using an independent hydraulic system for each door operator must meet paragraphs (a) and (b) of this section.

(g) The power supply for other types of watertight door operators must be accepted by the Commandant.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28283, June 4, 1996; USCG–2000–7790, 65 FR 58462, Sept. 29, 2000]

§ 111.97–7 Distribution.

(a) Each distribution panelboard for a watertight door system must be above the uppermost continuous deck and must have means for locking.

(b) Each feeder supplying a watertight door operating system must be above the uppermost continuous deck.

(c) Each watertight door operating system must have a separate branch circuit.

§ 111.97–9 Overcurrent protection.

Overcurrent devices must be arranged to isolate a fault with as little disruption of the system as possible. The relationship between the load and the rating or setting of overcurrent devices must meet the following:

(a) The rating or setting of each feeder overcurrent device must be not less than 200 percent of its maximum load.

(b) The rating or setting of a branch circuit overcurrent device must be not more than 25 percent of that of the feeder overcurrent device.

Subpart 111.99—Fire Door Holding and Release Systems

§ 111.99–1 Applicability.

This subpart applies to fire door holding and release systems, if fitted.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28284, June 4, 1996]

§ 111.99–3 Definitions.

As used in this subpart—

Central control panel means a manually-operated device on the navigating bridge or in the fire control room for releasing one or more fire doors.

Fire door means a door that is in a fire boundary, such as a stairway enclosure or main vertical zone bulkhead, that is not usually kept closed.

Fire door holding magnet means an electromagnet for holding a fire door open.

Local control panel means a manually-operated device next to a fire door for releasing the door so that the fire door self-closing mechanism may close the door.

[CGD 94–108, 61 FR 28284, June 4, 1996; 61 FR 33045, June 26, 1996; as amended by USCG–2004–18884, 69 FR 58348, Sept. 30, 2004]

§ 111.99–5 General.

Fire door release systems, if installed, must meet regulation II–2/30.4.3 of IMO SOLAS 74 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

Subpart 111.101—Submersible Motor-Driven Bilge Pumps

§ 111.101–1 Applicability.

This subpart applies to each submersible motor-driven bilge pump required on certain vessels under 46 CFR 56.50–55.

[USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

§ 111.101–3 General requirements.

(a) Each electric motor driving a submersible bilge pump must be in an open end air bell of rugged construction and be of a size that does not allow water to enter the motor if the compartment that the motor is in is flooded to the uppermost continuous deck.

(b) The motor, if of the open type, must be protected from splashing water from the bottom.

(c) The cable to each motor must enter through the open bottom of the air bell.

(d) Each motor must be able to operate continuously at rated load under any condition, dry or with water in the air bell at any level up to the maximum allowed under paragraph (a) of this section.

(e) Each motor controller must be above the uppermost continuous deck. There must be a master switch at the controller and a master switch at the motor. The master switch at the motor must be disconnected from the circuit when the motor is started or stopped from the master switch at the controller.

(f) Each motor must be energized from the final emergency power source.

Subpart 111.103—Remote Stopping Systems

§ 111.103–1 Power ventilation systems except machinery space ventilation systems.

Each power ventilation system must have:

(a) A control to stop the ventilation that is:

(1) Outside the space ventilated; and

(2) Grouped with the controls for every power ventilation system to which this section is applicable; and

(b) In addition to the control required by paragraph (a), a stop control that is:

(1) As far as practicable from the control required by paragraph (a) and grouped with the controls for every power ventilation system to which this section is applicable; or

(2) The circuit breakers for ventilation grouped on the main switchboard and marked, ''In Case of Fire Trip to Stop Ventilation.''

NOTE: The requirements of this section do not apply to closed ventilation systems for motors or generators, diffuser fans for refrigerated spaces, room circulating fans, or exhaust fans for private toilets of an electrical rating comparable to that of a room circulating fan.

§ 111.103–3 Machinery space ventilation.

(a) Each machinery space ventilation system must have two controls to stop the ventilation, one of which may be the supply circuit breaker.

(b) The controls required in paragraph (a) of this section must be grouped so that they are operable from two positions, one of which must be outside the machinery space.

§ 111.103–7 Ventilation stop stations.

Each ventilation stop station must:

(a) Be protected by an enclosure with a glass-paneled door on the front;

(b) Be marked, ''In Case of Fire Break Glass and Operate Switch to Stop Ventilation;''

(c) Have the ''stop'' position of the switch clearly identified;

(d) Have a nameplate that identifies the system controlled; and

(e) Be arranged so that damage to the switch or cable automatically stops the equipment controlled.

§ 111.103–9 Machinery stop stations.

(a) Each forced draft fan, induced draft fan, blower of an inert gas system, fuel oil transfer pump, fuel oil unit, fuel oil service pump, and any other fuel oil pumps must have a stop control that is outside of the space containing the pump or fan.

(b) Each stop control must meet § 111.103–7.

Subpart 111.105—Hazardous Locations

§ 111.105–1 Applicability; definition.

This subpart applies to installations in hazardous locations as defined in NFPA NEC 2002 and in IEC 60079–0 (both incorporated by reference; see 46 CFR 110.10–1). As used in this subpart, ''IEC 60079 series'' means IEC 60079–0, IEC 60079–1, IEC 60079–2, IEC 60079–5, IEC 79–6, IEC 60079–7, IEC 60079–11, IEC 60079–15, and IEC 79–18 (all incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 65199, Oct. 31, 2008]

§ 111.105–3 General requirements.

All electrical installations in hazardous locations must comply with the general requirements of section 33 of IEEE 45–1998 (incorporated by reference; see 46 CFR 110.10–1), and with either Articles 500 through 505 of NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1) or with the IEC 60079 series (as defined in 46 CFR 111.105–1 and incorporated by reference; see 46 CFR 110.10–1). When installations are made in accordance with NFPA NEC 2002 articles, and when installed fittings are approved for the specific hazardous location and the cable type, marine shipboard cable that complies with 46 CFR subpart 111.60 may be used instead of rigid metal conduit.

[USCG–2003–16630, 73 FR 65199, Oct. 31, 2008]

§ 111.105–5 System integrity.

In order to maintain system integrity, each individual electrical installation in a hazardous location must comply specifically with Articles 500–505 of NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1), as modified by 46 CFR 111.105–3, or with the IEC 60079 series (as defined in 46 CFR 111.105–1 and incorporated by reference; see 46 CFR 110.10–1), but not in combination in a manner that will compromise system integrity or safety. Hazardous location equipment must be approved as suitable for use in the specific hazardous atmosphere in which it

is installed. The use of nonapproved equipment is prohibited.

[USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§ 111.105–7 Approved equipment.

When this subpart or NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1) states that an item of electrical equipment must be approved, or when IEC 60079–0 (incorporated by reference; see 46 CFR 110.10–1) states that an item of electrical equipment must be tested or approved in order to comply with the IEC 60079 series (as defined in §111.105–1 and incorporated by reference; see 46 CFR 110.10–1), that item must be—

(a) Listed or certified by an independent laboratory as approved for use in the hazardous locations in which it is installed; or

(b) Purged and pressurized equipment that meets NFPA 496 (incorporated by reference; see 46 CFR 110.10–1) or IEC 60079–2.

[CGD 94–108, 61 FR 28284, June 4, 1996, as amended by USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§ 111.105–9 Explosion-proof and flameproof equipment.

Each item of electrical equipment required by this subpart to be explosion-proof under the classification system of NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1) must be approved as meeting UL 1203 (incorporated by reference; see 46 CFR 110.10–1). Each item of electrical equipment required by this subpart to be flameproof must be approved as meeting IEC 60079–1 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§ 111.105–11 Intrinsically safe systems.

(a) Each system required by this subpart to be intrinsically safe must use approved components meeting UL 913 or IEC 60079–11 (both incorporated by reference; see 46 CFR 110.10–1).

(b) Each electric cable of an intrinsically safe system must—

(1) Be 50 mm (2 inches) or more from cable of non-intrinsically safe circuits, partitioned by a grounded metal barrier from other non-intrinsically safe electric cables, or a shielded or metallic armored cable; and

(2) Not contain conductors for non-intrinsically safe systems.

(c) As part of plan approval, the manufacturer must provide appropriate installation instructions and restrictions on approved system components. Typical instructions and restrictions include information addressing—

(1) Voltage limitations;

(2) Allowable cable parameters;

(3) Maximum length of cable permitted;

(4) Ability of system to accept passive devices;

(5) Acceptability of interconnections with conductors or other equipment for other intrinsically safe circuits; and

(6) Information regarding any instructions or restrictions which were a condition of approval of the system or its components.

(d) Each intrinsically safe system must meet ISA RP 12.6 (incorporated by reference, see 46 CFR 110.10–1), except Appendix A.1.

[CGD 94–108, 61 FR 28284, June 4, 1996, as amended at 62 FR 23909, May 1, 1997; USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§ 111.105–15 Additional methods of protection.

Each item of electrical equipment that is—

(a) A powder-filled apparatus must meet IEC 60079–5 (incorporated by reference; see 46 CFR 110.10–1);

(b) An oil-immersed apparatus must meet either IEC 79–6 (incorporated by reference; see 46 CFR 110.10–1) or Article 500.7(I) of NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1);

(c) Type of protection ''e'' must meet IEC 60079–7 (incorporated by reference; see 46 CFR 110.10–1);

(d) Type of protection ''n'' must meet IEC 60079–15 (incorporated by reference; see 46 CFR 110.10–1); and

(e) Type of protection ''m'' must meet IEC 79–18 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§ 111.105–17 Wiring methods for hazardous locations.

(a) Through runs of marine shipboard cable meeting subpart 111.60 of this

part are required for all hazardous locations. Armored cable may be used to enhance ground detection capabilities. Additionally, Type MC cable may be used subject to the restrictions in §111.60–23.

(b) Where conduit is installed, the applicable requirements of either NFPA NEC 2002 (incorporated by reference; see 46 CFR 110.10–1) or the IEC 60079 series (as defined in §111.105–1 and incorporated by reference; see 46 CFR 110.10–1) must be followed.

(c) Each cable entrance into explosionproof or flameproof equipment must be made with approved seal fittings, termination fittings, or glands that meet the requirements of §111.105–9.

(d) Each cable entrance into Class II and Class III (Zone 10, 11, Z, or Y) equipment must be made with dust-tight cable entrance seals approved for the installation.

[CGD 94–108, 61 FR 28284, June 4, 1996, as amended at 62 FR 23909, May 1, 1997; USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§111.105–19 Switches.

A switch that is explosionproof or flameproof, or that controls any explosionproof or flameproof equipment, under §111.105–19 must have a pole for each ungrounded conductor.

[CGD 94–108, 61 FR 28284, June 4, 1996]

§111.105–21 Ventilation.

A ventilation duct which ventilates a hazardous location has the classification of that location. Each fan for ventilation of a hazardous location must be nonsparking.

[CGD 94–108, 61 FR 28285, June 4, 1996]

§111.105–27 Belt drives.

Each belt drive in a hazardous location must have:

(a) A conductive belt; and

(b) Pulleys, shafts, and driving equipment grounded to meet NFPA 77 (incorporated by reference, see 46 CFR 110.10–1).

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§111.105–29 Combustible liquid cargo carriers.

(a) Each vessel that carries combustible liquid cargo with a closed-cup flashpoint of 60 degrees C (140 degrees F) or higher must have:

(1) Only intrinsically safe electric systems in cargo tanks; and

(2) No storage battery in any cargo handling room.

(b) If a submerged cargo pump motor is in a cargo tank, it must meet the requirements of §111.105–31(d).

(c) Where the cargo is heated to within 15°C of its flashpoint, the cargo pumproom must meet the requirements of §111.105–31(f) and the weather locations must meet §111.105–31(l).

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28285, June 4, 1996; 61 FR 36787, July 12, 1996; 61 FR 39695, July 30, 1996]

§111.105–31 Flammable or combustible cargo with a flashpoint below 60 °C (140 °F), carriers of liquid-sulphur or inorganic acid.

(a) *Applicability*. Each vessel that carries combustible or flammable cargo with a closed-cup flashpoint lower than 60 degrees C (140 degrees F) or liquid sulphur cargo, or inorganic acid cargo must meet the requirements of this section, except—

(1) A vessel carrying bulk liquefied flammable gases as a cargo, cargo residue, or vapor which must meet the requirements of §111.105–32; and

(2) A vessel carrying carbon disulfide must have only intrinsically safe electric equipment in the locations listed in paragraphs (e) through (l) of this section.

(b) *Cable location*. Electric cable must be as close as practicable to the centerline and must be away from cargo tank openings.

(c) *Lighting circuits*. An enclosed hazardous space that has explosionproof lighting fixtures must:

(1) Have at least two lighting branch circuits;

(2) Be arranged so that there is light for relamping any deenergized lighting circuit; and

(3) Not have the switch within the space for those spaces containing explosionproof lighting fixtures under

paragraphs (g), (i) and (j) of this section.

(d) *Submerged cargo pump motors.* If a submerged cargo pump motor is in a cargo tank:

(1) Low liquid level, motor current, or pump discharge pressure must automatically shutdown power to the motor if the pump loses suction;

(2) An audible and visual alarm must be actuated by the shutdown of the motor; and

(3) There must be a lockable circuit breaker or lockable switch that disconnects power to the motor.

(e) *Cargo Tanks.* A cargo tank is a Class I, Division 1 (IEC Zone 0) location that has additional electrical equipment restrictions outlined in section 33 of IEEE 45–1998 and IEC 60092–502 (both incorporated by reference; see 46 CFR 110.10–1). Cargo tanks must not contain any electrical equipment except the following:

(1) Intrinsically safe equipment; and

(2) Submerged cargo pump motors and their associated cable.

(f) *Cargo handling rooms.* A cargo handling room must not have any electric cable or other electric equipment, except:

(1) Intrinsically safe equipment;

(2) Explosionproof lighting fixtures;

(3) Cables supplying intrinsically safe equipment in the cargo handling room; and

(4) Marine shipboard cables that supply explosionproof lighting fixtures that are in the cargo handling room.

(g) *Lighting of cargo handling rooms.* Lighting for a cargo handling room except a cargo handling room under paragraph (h) of this section, 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 .025 inches (6.35 mm) 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:

(1) There is no access to the interior of the fixture from the cargo handling room.

(2) The fixture is vented to the engineroom or a similar nonhazardous area.

(3) The fixture is wired from outside the cargo handling room.

(4) The temperature on the cargo handling room surface of the glass lens, based on an ambient temperature of 40 degrees C, is not higher than 180 degrees C.

(h) A cargo handling room which precludes the lighting arrangement of paragraph (g) of this section, or where the lighting arrangement of paragraph (g) of the section does not give the required light, must have explosionproof lighting fixtures.

(i) *Enclosed spaces.* An enclosed space that is immediately above, below, or next to a cargo tank must not contain any electric equipment except equipment allowed for cargo handling rooms in paragraphs (f) and (g), and:

(1) Through runs of marine shipboard cable; and

(2) Watertight enclosures with bolted and gasketed covers containing only:

(i) Depth sounding devices;

(ii) Log devices; and

(iii) Impressed-current cathodic protection system electrodes.

(j) *Cargo hose stowage space.* A cargo hose stowage space must not have any electrical equipment except explosionproof lighting fixtures and through runs of marine shipboard cable.

(k) *Cargo piping in a space.* A space that has cargo piping must not have any electrical equipment except explosionproof lighting fixtures and through runs of marine shipboard cable.

(l) *Weather locations.* The following locations in the weather are Class I, Division 1 (Zone 1) locations (except the open deck area on an inorganic acid carrier which is considered a nonhazardous location) and may have only approved intrinsically safe, explosionproof, or purged and pressurized electrical equipment, and through runs of marine shipboard cable if the location is—

(1) Within 10 feet (3 m) of:

(i) A cargo tank vent outlet;

(ii) A cargo tank ullage opening;

(iii) A cargo pipe flange;

(iv) A cargo valve;

(v) A cargo handling room entrance; or

(vi) A cargo handling room ventilation opening; or

(2) On a tankship and on the open deck over the cargo area and 10 feet (3 m) forward and aft of the cargo area on the open deck and up to 8 feet (2.4 m) above the deck.

(3) Within 5 meters (16 ft) of cargo pressure/vacuum valves with an unlimited height; or

(4) Within 10 meters (33 ft) of vent outlets for free flow of vapor mixtures and high velocity vent outlets for the passage of large amounts of vapor, air or inert gas mixtures during cargo loading and ballasting or during discharging.

(m) *Other spaces.* Except for those spaces listed in paragraphs (e) through (k), a space that has a direct opening to any space listed in paragraphs (e) through (l) must have only the electric installations that are allowed for the space to which it opens.

(n) *Duct keel ventilation or lighting.* (1) The lighting and ventilation system for each pipe tunnel must meet ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1), section 5–1–7/31.17.

(2) If a fixed gas detection system is installed, it must meet the requirements of IMO SOLAS 74 (incorporated by reference; see 46 CFR 110.10–1) and Part 4, Chapter 3 of ABS Steel Vessel Rules.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 82–096, 49 FR 4947, Feb. 9, 1984; CGD 94–108, 61 FR 28285, June 4, 1996; 61 FR 33045, June 26, 1996; 62 FR 23909, May 1, 1997; USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§ 111.105–32 Bulk liquefied flammable gas and ammonia carriers.

(a) Each vessel that carries bulk liquefied flammable gases or ammonia as a cargo, cargo residue, or vapor must meet the requirements of this section.

(b) As used in this section:

(1) The terms ''gas-safe'' and ''gas-dangerous'' spaces are used as defined in § 154.7 of this chapter.

(2) The term ''gas-dangerous'' does not include the weather deck of an ammonia carrier.

(c) Each submerged cargo pump motor design must receive concept approval by the Commandant (CG–521) and its installation must receive plan approval by the Commanding Officer, Marine Safety Center.

(d) Electrical equipment must not be installed in a gas-dangerous space or zone, except:

(1) Intrinsically safe electrical equipment and wiring, and

(2) Other equipment as allowed in this section.

(e) A submerged cargo pump motor, if installed in a cargo tank, must meet § 111.105–31(d).

(f) Electrical equipment must not be installed in a hold space that has a tank that is not required to have a secondary barrier under § 154.459 of this chapter, except:

(1) Through runs of marine shipboard cable;

(2) Explosionproof lighting fixtures;

(3) Depth sounding devices in gastight enclosures;

(4) Log devices in gastight enclosures;

(5) Impressed current cathodic protection system electrodes in gastight enclosures; and

(6) Armored or MI type cable for a submerged cargo pump motor.

(g) Electrical equipment must not be installed in a space that is separated by a gastight steel boundary from a hold space that has a tank that must have a secondary barrier under the requirements of § 154.459 of this chapter, except:

(1) Through runs of marine shipboard cable;

(2) Explosionproof lighting fixtures;

(3) Depth sounding devices in gastight enclosures;

(4) Log devices in gastight enclosures;

(5) Impressed current cathodic protection system electrodes in gastight enclosures;

(6) Explosionproof motors that operate cargo system valves or ballast system valves;

(7) Explosionproof bells for general alarm systems; and

(8) Armored or MI type cable for a submerged cargo pump motor.

(h) A cargo-handling room must not have any installed electrical equipment, except explosionproof lighting fixtures.

(i) A space for cargo hose storage or a space that has cargo piping must not have any installed electrical equipment, except:

(1) Explosionproof lighting fixtures; and

(2) Through runs of marine shipboard cable.

(j) A gas dangerous zone on the open deck must not have any installed electrical equipment, except:

(1) Explosionproof equipment that is necessary for the operation of the vessel; and

(2) Through runs of marine shipboard cable.

(k) A space, except those named in paragraphs (f) through (i) of this section, that has a direct opening to gas-dangerous spaces or zones must have no electrical equipment except as allowed in the gas-dangerous space or zone.

(l) Each gas-dangerous space that has lighting fixtures must have at least two branch circuits for lighting.

(m) Each switch and each overcurrent protective device for any lighting circuit that is in a gas-dangerous space must open all conductors of the circuit simultaneously.

(n) Each switch and each overcurrent protective device for lighting in a gas-dangerous space must be in a gas-safe space.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 77–069, 52 FR 31626, Aug. 21, 1987; CGD 94–108, 61 FR 28285, June 4, 1996; 62 FR 23909, May 1, 1997; USCG–2009–0702, 74 FR 49234, Sept. 25, 2009]

§ 111.105–33 Mobile offshore drilling units.

(a) *Applicability*. This section applies to each mobile offshore drilling unit.

(b) *Definitions*. As used in this section:

(1) ''Enclosed spaces'' are locations delineated by floors, bulkheads, or decks which may have doors or windows.

(2) ''Semi-enclosed spaces'' are locations where natural conditions of ventilation are notably different from those on open deck due to the presence of structures such as roofs, windbreaks, and bulkheads which are so arranged that dispersion of gas may not occur.

(c) The internal space of each pressure vessel, tank, and pipe for drilling mud and for gas venting must have only intrinsically safe electric equipment.

(d) The following are Class I, Division 1 locations:

(1) An enclosed space that contains any part of the mud circulating system that has an opening into the space and is between the well and final degassing discharge.

(2) An enclosed or semi-enclosed location that is below the drill floor and contains a possible source of gas release such as the top of a drilling nipple.

(3) An enclosed space that is on the drill floor and is not separated by a solid, gas-tight floor from the spaces specified in paragraph (d)(2) of this section.

(4) A space that would normally be considered a Division 2 location under paragraph (e) of this section but where combustible or flammable gases might accumulate. This could include pits, ducts, and similar structures downstream of the final degassing discharge.

(5) A location in the weather or a semi-enclosed location, except as provided in paragraph (d)(2) of this section, that is within 5 feet (1.5 m) of the boundary of any:

(i) Equipment or opening specified in paragraph (d)(1) of this section;

(ii) Ventilation outlet, access, or other opening to a Class I, Division 1 space; or

(iii) Gas vent outlet.

(6) Except as provided in paragraph (f) of this section, an enclosed space that has an opening into a Class I, Division 1 location.

(e) The following are Class I, Division 2 locations:

(1) An enclosed space that has any open portion of the mud circulating system from the final degassing discharge to the mud suction connection at the mud pit.

(2) A location in the weather that is:

(i) Within the boundaries of the drilling derrick up to a height of 10 feet (3m) above the drill floor;

(ii) Below the drill floor and within a radius of 10 feet (3m) of a possible source of release, such as the top of a drilling nipple; or

(iii) Within 5 feet (1.5m) of the boundaries of any ventilation outlet, access, or other opening to a Class I, Division 2 space.

(3) A location that is:

(i) Within 5 feet (1.5m) of a semi-enclosed Class I, Division 1 location indicated in paragraph (d)(2) of this section; or

(ii) Within 5 feet (1.5m) of a Class I, Division 1 space indicated in paragraph (d)(5).

(4) A semi-enclosed area that is below and contiguous with the drill floor to the boundaries of the derrick or to the extent of any enclosure which is liable to trap gases.

(5) A semi-enclosed derrick to the extent of its enclosure above the drill floor, or to a height of 10 feet (3m) above the drill floor, whichever is greater.

(6) Except as provided in paragraph (f) of this section, an enclosed space that has an opening into a Class I, Division 2 location.

(f) An enclosed space that has direct access to a Division 1 or Division 2 location is the same division as that location, except:

(1) An enclosed space that has direct access to a Division 1 location is not a hazardous location if:

(i) The access has self-closing gastight doors that form an air lock;

(ii) The ventilation causes greater pressure in the space than in the Division 1 location; and

(iii) Loss of ventilation overpressure is alarmed at a manned station;

(2) An enclosed space that has direct access to a Division 1 location can be considered as a Division 2 location if:

(i) The access has a self-closing, gastight door that opens into the space and that has no hold-back device;

(ii) Ventilation causes the air to flow with the door open from the space into the Division 1 location; and

(iii) Loss of ventilation is alarmed at a manned control station; and

(3) An enclosed space that has direct access to a Division 2 location is not a hazardous location if:

(i) The access has a self-closing, gastight door that opens into the space and that has no hold-back device;

(ii) Ventilation causes the air to flow with the door open from the space into the Division 2 location; and

(iii) Loss of ventilation actuates an alarm at a manned control station.

(g) Electrical equipment and devices installed in spaces made non-hazardous by the methods indicated in paragraph (f) of this section must be limited to essential equipment.

§ 111.105–35 Vessels carrying coal.

(a) The following are Class II, Division 1, (Zone 10 or Z) locations on a vessel that carries coal:

(1) The interior of each coal bin and hold.

(2) Each compartment that has a coal transfer point where coal is transferred, dropped, or dumped.

(3) Each open area within 3 meters (10 ft) of a coal transfer point where coal is dropped or dumped.

(b) Each space that has a coal conveyer on a vessel that carries coal is a Class II, Division 2, (Zone 11 or Y) space.

(c) A space that has a coal conveyer on a vessel that carries coal must have electrical equipment approved for Class II, Division 2, (Zone 11 or Y) hazardous locations, except watertight general emergency alarm signals.

[CGD 94–108, 61 FR 28285, June 4, 1996]

§ 111.105–37 Flammable anesthetics.

Each electric installation where a flammable anesthetic is used or stored must meet NFPA 99 (incorporated by reference, see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§ 111.105–39 Additional requirements for vessels carrying vehicles with fuel in their tanks.

Each vessel that carries a vehicle with fuel in its tank must meet the requirements of ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1), section 5–10–4/3, except as follows:

(a) If the ventilation requirements of ABS Steel Vessel Rules section 5–10–4/3 are not met, all installed electrical equipment must be suitable for a Class I, Division 1; Zone 0; or Zone 1 hazardous location.

(b) If the vessel is fitted with an approved fixed gas detection system set at 25 percent the LEL, each item of the installed electrical equipment must meet the requirements for a Class I, Division 1; Class I, Division 2; Zone 0; Zone 1; or Zone 2 hazardous location.

[CGD 94–108, 61 FR 28285, June 4, 1996, as amended at 62 FR 23909, May 1, 1997; USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§ 111.105–40 Additional requirements for RO/RO vessels.

(a) Each RO/RO vessel must meet ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1), section 4–8–4/27.3.2.

(b) Each item of installed electrical equipment must meet the requirements for a Class I, Division 1; Class I, Division 2; Zone 0; Zone 1; or Zone 2 hazardous location when installed 460 mm (18 inches) or more above the deck of closed cargo spaces. Electrical equipment installed within 460 mm (18 inches) of the deck must be suitable for either a Class I, Division 1; Zone 0; or Zone 1 hazardous location.

(c) Where the ventilation requirement of ABS Steel Vessel Rules section 4–8–4/27.3.2 is not met—

(1) All installed electrical equipment must be suitable for a Class I, Division 1; Zone 0; or Zone 1 hazardous location; or

(2) If fitted with an approved fixed gas detection system (set at 25 percent of the LEL), each item of installed electrical equipment must meet the requirements for either a Class I, Division 1; Class I, Division 2; Zone 0; Zone 1; or Zone 2 hazardous location.

[CGD 94–108, 61 FR 28285, June 4, 1996; 61 FR 33045, June 26, 1996, as amended at 62 FR 23909, May 1, 1997; USCG–2003–16630, 73 FR 65200, Oct. 31, 2008]

§ 111.105–41 Battery rooms.

Each electrical installation in a battery room must meet 46 CFR subpart 111.15 and IEEE 45–1998 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

§ 111.105–43 Paint stowage or mixing spaces.

A space for the stowage or mixing of paint must not have any electric equipment, except:

(a) Intrinsically safe electric equipment approved for a Class I, Division 1, Group D (Zone 0 or Zone 1) location;

(b) Explosionproof electric equipment approved for a Class I, Division 1, Group D (Zone 0 or Zone 1) location; or

(c) Through runs of marine shipboard cable.

[CGD 74–125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28285, June 4, 1996; 62 FR 23909, May 1, 1997]

§ 111.105–45 Vessels carrying agricultural products.

(a) The following areas are Class II, Division 1, (Zone 10 or Z) locations on vessels carrying bulk agricultural products that may produce dust explosion hazards:

(1) The interior of each cargo hold or bin.

(2) Areas where cargo is transferred, dropped, or dumped and locations within 1 meter (3 feet) of the outer edge of these areas in all directions.

(b) The following areas are Class II, Division 2, (Zone 11 or Y) locations on vessels carrying bulk agricultural products that may produce dust explosion hazards:

(1) All areas within 2 meters (6.5 feet) of a Division 1 (Zone 10 or Z) location in all directions except when there is an intervening barrier, such as a bulkhead or deck.

NOTE TO §111.105–45: Information on the dust explosion hazards associated with the carriage of agricultural products is contained in Coast Guard Navigation and Vessel Inspection Circular 9–84 (NVIC 9–84) ''Electrical Installations in Agricultural Dust Locations.''

[CGD 94–108, 61 FR 28285, June 4, 1996]

Subpart 111.107—Industrial Systems

§ 111.107–1 Industrial systems.

(a) For the purpose of this subpart, an industrial system is a system that—

(1) Is not a ship's service load, as defined in §111.10–1;

(2) Is used only for the industrial function of the vessel;

(3) Is not connected to the emergency power source; and

(4) Does not have specific requirements addressed elsewhere in this subchapter.

(b) An industrial system that meets the applicable requirements of NFPA NEC 2002 (incorporated by reference, see 46 CFR 110.10–1) must meet only the following:

(1) The switchgear standards in part 110, subpart 110.10, of this chapter.

(2) Part 110, subpart 110.25, of this chapter—Plan Submittal.

(3) Subpart 111.01 of this part—General.

(4) Subpart 111.05 of this part—Equipment Ground, Ground Detection, and Grounded Systems.

(5) Sections 111.12–1(b) and 111.12–1(c)—Prime movers.

(6) Subpart 111.105 of this part—Hazardous Locations.

(c) Cables that penetrate a watertight or fire boundary deck or bulkhead must—

(1) Be installed in accordance with 46 CFR 111.60–5 and meet the flammability-test requirements of either IEEE 1202 or Category A of IEC 60332–3–22 (both incorporated by reference; see 46 CFR 110.10–1); or

(2) Be specialty cable installed in accordance with §111.60–2.

[CGD 94–108, 61 FR 28286, June 4, 1996, as amended at 62 FR 23910, May 1, 1997; USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

PART 112—EMERGENCY LIGHTING AND POWER SYSTEMS

Subpart 112.01—Definitions of Emergency Lighting and Power Systems

Sec.

Subpart 112.05—General

Subpart 112.15—Emergency Loads

Subpart 112.20—Emergency Systems Having a Temporary and a Final Emergency Power Source

Subpart 112.25—Emergency Systems Having an Automatic Starting Diesel Engine or Gas Turbine Driven Emergency Power Source as the Sole Emergency Power Source

Subpart 112.30—Emergency Systems Having an Automatically Connected Storage Battery as the Sole Emergency Power Source

Subpart 112.35—Manually Controlled Emergency Systems Having a Storage Battery or a Diesel Engine or Gas Turbine Driven Generator as the Sole Emergency Power Source

Subpart 112.37—Temporary Emergency Power Source

Subpart 112.39—Battery Operated Lanterns

AUTHORITY: 46 U.S.C. 3306, 3703; Department of Homeland Security Delegation No. 0170.1.

SOURCE: CGD 74–125A, 47 FR 15267, Apr. 8, 1982, unless otherwise noted.

Subpart 112.01—Definitions of Emergency Lighting and Power Systems

§ 112.01–1 Purpose.

The purpose of this subpart is to define types of emergency lighting and power systems.

§ 112.01–5 Manual emergency lighting and power system.

A manual emergency lighting and power system is one in which a single manual operation, such as the manual operation of a switch from an ''off'' to an ''on'' position, is necessary to cause the emergency power source to supply power to the emergency loads.

§ 112.01–10 Automatic emergency lighting and power system.

An automatic emergency lighting and power system is one in which a reduction in potential from the ship's service power and lighting plant causes the emergency power source to supply power to the emergency loads.

§ 112.01–15 Temporary emergency power source.

A temporary emergency power source is one of limited capacity that carries, for a short time, selected emergency loads while an emergency power source of larger capacity is being started.

§ 112.01–20 Final emergency power source.

A final emergency power source is one that functions after the temporary emergency power source is disconnected.

Subpart 112.05—General

§ 112.05–1 Purpose.

(a) The purpose of this part is to ensure a dependable, independent, and dedicated emergency power source with sufficient capacity to supply those services that are necessary for the safety of the passengers, crew, and other persons in an emergency and those additional loads that may be authorized under paragraph (c) of this section.

(b) No load may be powered from an emergency power source, except:

(1) A load required by this part to be powered from the emergency power source;

(2) A bus-tie to the main switchboard that meets §112.05–3; and

(3) Emergency loads that may be necessary to maintain or restore the propulsion plant, such as control systems, controllable pitch propellers, hydraulic pumps, control air compressors, and machinery necessary for dead-ship start-up.

(c) Other loads may be authorized by the Commanding Officer, Marine Safety Center (MSC), to be connected to the emergency source of power to provide an increased level of safety in recognition of a unique vessel mission or

configuration. When these loads are authorized, the emergency power source must—

(1) Be sized to supply these loads using a unity (1.0) service factor; or

(2) Be provided with automatic load shedding that removes these loads and operates before the emergency generator trips due to overload. The automatic load shedding circuit breakers must be manually reset.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28286, June 4, 1996; 61 FR 36787, July 12, 1996]

§ 112.05–3 Main-emergency bus-tie.

Each bus-tie between a main switchboard and an emergency switchboard must:

(a) Disconnect automatically upon loss of potential at the emergency switchboard;

(b) Be arranged to prevent parallel operation of an emergency power source with any other source of electric power, except for interlock systems for momentary transfer of loads; and

(c) If arranged for feedback operation, open automatically upon overload of the emergency power source before the emergency power source is tripped off the line from the overload.

§ 112.05–5 Emergency power source.

(a) The emergency power source must meet table 112.05–5(a) and have the capacity to supply all loads that are simultaneously connected to it, except a load on a bus-tie to the main switchboard or non-required loads that are connected in accordance with § 112.05–1(c).

TABLE 112.05–5(a)

Size of vessel and service	Type of emergency power source or lighting	Period of operation and minimum capacity of emergency power
Passenger vessels:		
Ocean, Great Lakes, or coastwise; or on an international voyage.	Temporary emergency power source; and final emergency power source (automatically connected storage battery or an automatically started generator).	36 hours.[1] [2]
Other than Ocean, Great Lakes, or coastwise and not on an international voyage.	Final emergency power source (automatically connected storage battery or an automatically started generator).	8 hours or twice the time of run, whichever is less.[2]
Cargo vessels; miscellaneous self-propelled vessels; tankships; barges with sleeping accommodations for more than 6 persons; mobile offshore drilling units; and oceanographic vessels:		
Ocean, Great Lakes, or coastwise and 500 GT or more; on an international voyage and 500 GT or more; or all waters and 1600 GT or more.	Final emergency power source (automatically connected storage battery or an automatically started generator).	18 hours.[1] [2]
Ocean, Great Lakes, or coastwise and less than 500 GT; or other than ocean, Great Lakes, or coastwise, 300 GT or more but less than 1600 GT, and not on an international voyage..	Emergency lighting provided by an automatically connected or manually controlled storage battery; automatically or manually started generator; or relay-controlled, battery-operated lanterns.[3] [4].	6 hours or twice the time of run, whichever is less.

[1] A 12-hour power supply may be especially considered for vessels engaged regularly in voyages of short duration.
[2] The capacity for the operation of the steering gear, as required by § 111.93, is for a period of 30 minutes continuous operation.
[3] The emergency lighting requirements of § 112.15–1 (b), (c), (f), and (g) must be met.
[4] Requirements of Subpart 112.39 must be met by the relay-controlled, battery-operated lanterns.

(b) The emergency power source must be independent of the ship's service lighting and powerplant and propulsion plant, except for the compressed air starting means allowed in § 112.50–7(c)(3)(i). A stop control for an emergency generator must be only in the space that has the emergency generator, except a remote mechanical reach rod is permitted for the fuel oil shut-off valve to an independent fuel oil tank located in the space.

(c) The complete emergency installation must function at full rated power when the vessel is upright or inclined to the maximum angle of heel that results from the assumed damage defined in 33 CFR part 155 or in subchapter S of this chapter for the specific vessel type or 22.5 degrees, whichever is greater;

when the trim of the ship is 10 degrees, either in the fore or aft direction, or is in any combination of angles within those limits.

(d) The emergency power source, its associated transforming equipment, and the emergency switchboard must be located aft of the collision bulkhead, outside of the machinery casing, and above the uppermost continuous deck. Each compartment containing this equipment must be readily accessible from the open deck and must not contain machinery not associated with, or equipment not in support of, the normal operation of the emergency power source. Equipment in support of the normal operation of the emergency power source includes, but is not limited to, ventilation fans, CO_2 bottles, space heaters, and internal communication devices, such as sound powered phones.

(e) No compartment that has an emergency power source or its vital components may adjoin a Category A machinery space or those spaces containing the main source of electrical power and its vital components.

(f) Except for a cable for connecting equipment in the engineroom or boilerroom, no cable supplied from the emergency switchboard may penetrate the boundaries of the engineroom, boilerroom, uptakes, or casings of these spaces. These cables must be kept clear of the bulkheads and decks forming these boundaries. No emergency circuit in an engineroom or a boilerroom may supply equipment in any other space.

(g) The emergency switchboard must be as near as practicable to the emergency power source but not in the same space as a battery emergency power source.

(h) If the emergency power source is a generator, the emergency switchboard must be in the same space as the emergency power source.

(i) The prime mover of an emergency generator must be either a diesel engine or a gas turbine.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28286, June 4, 1996; 62 FR 23910, May 1, 1997]

Subpart 112.15—Emergency Loads

§ 112.15–1 Temporary emergency loads.

On vessels required by §112.05–5(a) to have a temporary emergency power source, the following emergency lighting and power loads must be arranged so that they can be energized from the temporary emergency power source:

(a) Navigation lights.

(b) Enough lights throughout machinery spaces to allow essential operations and observations under emergency conditions and to allow restoration of service.

(c) Lighting, including low location lighting if installed, for passageways, stairways, and escape trunks in passenger quarters, crew quarters, public spaces, machinery spaces, damage control lockers, emergency equipment lockers, and work spaces sufficient to allow passengers and crew to find their way to open decks and to survival craft, muster stations, and embarkation stations with all watertight doors and fire doors closed.

(d) Illuminated signs with the word ''EXIT'' in red letters throughout a passenger vessel so the direction of escape to the open deck is obvious from any portion of the vessel usually accessible to the passengers or crew, except machinery spaces, and except stores and similar spaces where the crew are not normally employed. There must be sufficient signs so that the direction of escape is obvious, with all fire doors in stairway enclosures and main vertical zone bulkheads closed and all watertight doors closed. For the purpose of this paragraph, an individual stateroom or other similar small room is not required to have a sign, but the direction of escape must be obvious to a person emerging from the room.

(e) Illumination to allow safe operation of each power operated watertight door.

(f) At least one light in each space where a person may be maintaining, repairing, or operating equipment, stowing or drawing stores or equipment, or transiting, such as public spaces, work spaces, machinery spaces, workshops, galleys, emergency fire pumprooms, bow thruster rooms, storage areas for

paint, rope, and other stores, underdeck passageways in cargo areas, steering gear rooms, windlass rooms, normally accessible duct keels with valve operators, cargo handling rooms, and holds of roll-on/roll-off vessels.

(g) Lighting for survival craft launching, including muster stations, embarkation stations, the survival craft, its launching appliances and the area of the water where it is to be launched.

(h) Electric communication systems that are necessary under temporary emergency conditions and that do not have an independent storage battery source of power.

(i) Each power operated watertight door system.

(j) All shipwide communications systems necessary for the transmittal of information during an emergency.

(k) Each fire door holding and release system.

(l) Supply to motor generator or other conversion equipment if a temporary emergency power source of alternating current is necessary for essential communication systems or emergency equipment.

(m) Each daylight signaling light.

(n) Each smoke detector system.

(o) Each electrically controlled or powered ship's whistle.

(p) Each fire detection system; and gas detection system if installed.

(q) All lighting relative to helicopter operations and landing if installed, unless provided for by another source of power (such as independent batteries separately charged by solar cells).

(r) Each general emergency alarm system required by IMO SOLAS 74 (incorporated by reference; see 46 CFR 110.10–1).

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28286, June 4, 1996; USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

§ 112.15–5 Final emergency loads.

On vessels required to have a final emergency power source by § 112.05–5(a) of this chapter, the following emergency lighting and power loads must be arranged so that they can be energized from the final emergency power source:

(a) Each load under § 112.15–1.

(b) The machinery, controls, and alarms for each passenger elevator.

(c) Each charging panel for:

(1) Temporary emergency batteries;

(2) Starting batteries for diesel engines or gas turbines that drive emergency generators; and

(3) General alarm batteries.

(d) One of the bilge pumps, if the emergency power source is its source of power to meet Part 56 of this chapter.

(e) One of the fire pumps, if the emergency power source is its source of power to meet the requirements of the subchapter under which the vessel is certificated.

(f) Each sprinkler system, water spray extinguishing system, or foam system pump.

(g) If necessary, the lube oil pump for each propulsion turbine and reduction gear, propulsion diesel reduction gear, and ship's service generator turbine which needs external lubrication.

(h) Each rudder angle indicator.

(i) Each radio or global maritime distress and safety system (GMDSS) component.

(j) Each radio direction finder, radar, gyrocompass, depth sounder, global positioning system (GPS), satellite navigation system (SATNAV), speed log, rate-of-turn indicator and propeller pitch indicator.

(k) Each steering gear feeder, if required by part 58, subpart 58.25, of this chapter.

(l) Each general emergency alarm flashing light required by § 113.25–10 of this chapter.

(m) Each electric blow-out-preventer control system.

(n) Any permanently installed diving equipment that is dependent upon the vessel's or drilling unit's power.

(o) Each emergency generator starting compressor, as allowed by § 112.50–7(c)(3)(ii).

(p) Each steering gear failure alarm required by part 113, subpart 113.43, of this chapter.

(q) The ballast control system on each column-stabilized mobile offshore drilling unit.

(r) Each vital system automation load required by part 62 of this chapter.

(s) Motor-operated valves for each cargo oil and fuel oil system, if the emergency power source is the source

of power to meet §56.60(d) of this chapter.

(t) Each ship's stabilizer wing, unless a separate source of emergency power is supplied.

(u) Each indicator that shows the position of the stabilizer wings, if the emergency power source is its emergency source of power.

(v) Each smoke extraction fan (not including smoke detector sampling) and CO_2 exhaust fan for spaces.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996; 61 FR 36787, July 12, 1996; USCG–2010–0759, 75 FR 60003, Sept. 29, 2010]

§112.15–10 Loads on systems without a temporary emergency power source.

If there is no temporary emergency power source, the loads under §112.15–1 must be arranged so that they can be energized from the final emergency power source.

Subpart 112.20—Emergency Systems Having a Temporary and a Final Emergency Power Source

§112.20–1 General.

This subpart contains requirements applicable to emergency power installations having both a temporary and a final emergency power source.

§112.20–3 Normal source for emergency loads.

(a) The normal source for emergency loads must be the ship's service generating plant.

(b) The power from the ship's service generating plant for the emergency loads must be supplied to the emergency switchboard through automatic transfer switches.

§112.20–5 Failure of power from the normal source or final emergency power source.

(a) If there is a reduction of potential of the normal source by 15 to 40 percent, the loads under §112.15–1 must be automatically supplied from the temporary emergency power source.

(b) For systems in which a reduction of frequency of the normal source or final emergency power source adversely affects the emergency system and emergency loads, there must be means to transfer the loads under §112.15–1 to the temporary emergency power source upon a reduction in the frequency of the normal source or final emergency power source.

§112.20–10 Diesel or gas turbine driven emergency power source.

Simultaneously with the operation of the transfer means under §112.20–5, the diesel engine or gas turbine driving the final emergency power source must start automatically with no load on the final emergency power source.

§112.20–15 Transfer of emergency loads.

(a) When the potential of the final emergency power source reaches 85 to 95 percent of normal value, the emergency loads under §112.15–5 must transfer automatically to the final emergency power source and, on a passenger vessel, this transfer must be accomplished in no more than 45 seconds after failure of the normal source of power.

(b) When the potential from the normal source has been restored, the emergency loads must be manually or automatically transferred to the normal source, and the final emergency power source must be manually or automatically stopped.

(c) If the potential of the final emergency power source is less than 75 to 85 percent of normal value while supplying the emergency loads, the temporary emergency loads under §112.15–1 must transfer automatically to the temporary emergency power source.

Subpart 112.25—Emergency Systems Having an Automatic Starting Diesel Engine or Gas Turbine Driven Emergency Power Source as the Sole Emergency Power Source

§112.25–1 General.

This subpart contains requirements applicable to emergency power installations having an automatic starting diesel engine or gas turbine driven emergency power source as the sole emergency power source.

§ 112.25–3 Normal source for emergency loads.

(a) The normal source for emergency loads must be the ship's service generating plant.

(b) The power from the ship's service generating plant for the emergency loads must be supplied to the emergency switchboard by an automatic transfer switch located at the emergency switchboard.

§ 112.25–5 Failure of power from the normal source.

If there is a reduction of potential of the normal source by 15 to 40 percent, the diesel engine or gas turbine driving the final emergency power source must start automatically with no load on the emergency power source.

§ 112.25–10 Transfer of emergency loads.

(a) When the potential of the final emergency source reaches 85 to 95 percent of normal value, the emergency loads under §112.15–5 must transfer automatically to the final emergency power source and this transfer must be accomplished in no more than 45 seconds after failure of the normal source of power.

(b) When the potential from the normal source has been restored, the emergency loads must be manually or automatically transferred to the normal source, and the final emergency power source must be manually or automatically stopped.

Subpart 112.30—Emergency Systems Having an Automatically Connected Storage Battery as the Sole Emergency Power Source

§ 112.30–1 General.

This subpart contains requirements applicable to emergency power installations having an automatically connected storage battery as the sole emergency power source.

§ 112.30–3 Normal source for emergency loads.

(a) The normal source for emergency loads must be the ship's service generating plant.

(b) The power from the ship's service generating plant for the emergency loads must be supplied to the emergency loads through automatic transfer switches.

§ 112.30–5 Transfer of emergency loads.

If there is a reduction of potential of the normal source by 15 to 40 percent, the emergency loads under §112.15–5 must transfer automatically from the normal source to the emergency power source.

§ 112.30–10 Restoration of normal source potential.

When the potential from the normal source is restored to 85 to 95 percent of its normal value, the emergency loads must transfer automatically to the normal source.

Subpart 112.35—Manually Controlled Emergency Systems Having a Storage Battery or a Diesel Engine or Gas Turbine Driven Generator as the Sole Emergency Power Source

§ 112.35–1 General.

This subpart contains requirements applicable to emergency power installations having a manually controlled storage battery, diesel engine, or gas turbine driven generator as the sole emergency power source.

§ 112.35–3 Normal source for emergency loads.

The normal source for emergency loads must be the ship's service generating plant.

§ 112.35–5 Manually started emergency systems.

Manually started emergency lighting and power systems must be activated by one manual operation, such as the manual operation of a switch from an ''off'' to an ''on'' position, to cause the emergency system to supply its connected loads.

§ 112.35–7 Activating means.

The activating means must be in the navigating bridge or in a location

where the means can be controlled by the chief engineer.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996]

Subpart 112.37—Temporary Emergency Power Source

§ 112.37–1 General.

Each temporary source of emergency power required by Table 112.05–5(a) must consist of a storage battery of sufficient capacity to supply the temporary emergency loads for not less than one-half hour.

Subpart 112.39—Battery Operated Lanterns

§ 112.39–1 General.

(a) Each battery-operated, relay-controlled lantern used in accordance with Table 112.05–5(a) must:

(1) Have rechargeable batteries;

(2) Have an automatic battery charger that maintains the battery in a fully charged condition; and

(3) Not be readily portable.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996]

§ 112.39–3 Operation.

(a) The lanterns must be capable of providing light for at least 3 hours.

(b) The lantern must be relay-controlled so that the loss of normal power causes the lanterns to light.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996]

Subpart 112.40—Alternating-Current Temporary Source of Supply

§ 112.40–1 General requirements.

Installations requiring alternating current for the operation of communication equipment or other apparatus essential under temporary emergency conditions must be provided with the necessary conversion equipment. If the conversion equipment operates both under normal conditions and under temporary emergency conditions, the conversion equipment must be provided in duplicate.

Subpart 112.43—Emergency Lighting Systems

§ 112.43–1 Switches.

An emergency lighting system must not have a switch, except:

(a) In a distribution panel;

(b) As required in § 112.43–7; or

(c) In a circuit that serves a hazardous space such as a paint room or cargo handling room if the switch is located outside of the hazardous location.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996]

§ 112.43–5 Controls on island type vessels.

On an island type vessel, such as a containership, emergency lights for illumination of survival craft launching operations must be controlled from a central location within the island nearest the launching operations or from the navigating bridge.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996]

§ 112.43–7 Navigating bridge distribution panel.

(a) Except as allowed in paragraph (b) of this section, the following emergency lights must be supplied from a distribution panel on the navigating bridge:

(1) Navigation lights not supplied by the navigation light indicator panel.

(2) Lights for survival craft launching operations under § 111.75–16, except as allowed in § 112.43–5.

(3) Signaling lights.

(4) Emergency lights:

(i) On open decks;

(ii) On the navigating bridge;

(iii) In the chartroom;

(iv) In the fire control room; and

(v) For navigation equipment.

(b) On a mobile offshore drilling unit, the distribution panel required in paragraph (a) of this section must be in the control room.

(c) Each distribution panel required in paragraphs (a) and (b) of this section

must have a fused switch or circuit breaker for each branch circuit.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996]

§ 112.43–9 Signaling lights.

Each signaling light must be supplied by a branch circuit that supplies no other equipment.

§ 112.43–11 Illumination for launching operations.

Branch circuits supplying power to lights for survival craft launching operations must supply no other equipment and meet § 111.75–16 of this chapter.

[CGD 94–108, 61 FR 28287, June 4, 1996]

§ 112.43–13 Navigation light indicator panel supply.

Each navigation light indicator panel must be supplied:

(a) Directly from the emergency switchboard; or

(b) Be a through feed, without switch or overcurrent protection, from the feeder supply the navigating bridge emergency lighting panel.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996]

§ 112.43–15 Emergency lighting feeders.

For a vessel with fire bulkheads forming fire zones, at least one emergency lighting feeder must supply only the emergency lights between two adjacent main vertical fire zone bulkheads. The emergency lighting feeder must be separated as widely as practicable from any general lighting feeder supplying the same space.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996]

Subpart 112.45—Visible Indicators

§ 112.45–1 Visible indicators.

There must be visible indicators in the machinery space to show;

(a) When an emergency battery is discharging; and

(b) When the automatically controlled emergency power source is supplying the emergency loads.

Subpart 112.50—Emergency Diesel and Gas Turbine Engine Driven Generator Sets

§ 112.50–1 General.

(a) The prime mover of a generator set must have:

(1) All accessories necessary for operation and protection of the prime mover; and

(2) A self-contained cooling system of a size that ensures continuous operation with 100 degrees F (37 degrees C) air.

(b) The fuel used must have a flashpoint of not less than 110 degrees F (43 degrees C).

(c) The room that has the generator set must have intake and exhaust ducts to supply adequate cooling air.

(d) The generator set must be capable of carrying its full rated load within 45 seconds after cranking is started with the intake air, room ambient temperature, and starting equipment at O°C. The generator's prime mover must not have a starting aid to meet this requirement, except that a thermostatically-controlled electric water-jacket heater connected to the final emergency bus is permitted.

(e) The generator set must start by hydraulic, compressed air, or electrical means.

(f) The generator set must maintain proper lubrication when inclined to the angles specified in § 112.05–5(c), and must be arranged so that it does not spill oil under a vessel roll of 30 degrees to each side of the vertical.

(g) The generator set must shut down automatically upon loss of lubricating oil pressure, overspeed, or operation of a fixed fire extinguishing system in the emergency generator room (see § 111.12–1(b) for detailed overspeed trip requirements).

(h) If the prime mover is a diesel engine, there must be an audible alarm that sounds on low oil pressure and high cooling water temperature.

(i) If the prime mover is a gas turbine, it must meet the shutdown and alarm requirements in § 58.10–15(f) of this chapter.

(j) An independent fuel supply must be provided for the prime mover.

(k) Each emergency generator that is arranged to be automatically started must be equipped with a starting device with an energy-storage capability of at least six consecutive starts. A second, separate source of starting energy may provide three of the required six starts. If a second source is provided, the system need only provide three consecutive starts.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996; USCG–2004–18884, 69 FR 58348, Sept. 30, 2004]

§ 112.50–3 Hydraulic starting.

A hydraulic starting system must meet the following:

(a) The hydraulic starting system must be a self-contained system that provides the cranking torque and engine starting RPM recommended by the engine manufacturer. The hydraulic starting system must be capable of six consecutive starts, unless a second, separate source of starting energy capable of three consecutive starts is provided. A second, separate source of starting energy may provide three of the required six starts. If a second source is provided, the hydraulic system need only provide three consecutive starts.

(b) The stored hydraulic pressure must be automatically maintained within the predetermined pressure limits.

(c) The means of automatically maintaining the hydraulic system within the predetermined pressure limits must be electrically energized from the final emergency bus.

(d) There must be a means to manually recharge the hydraulic system.

(e) Charging of the hydraulic starting system must not cause insufficient hydraulic pressure for engine starting.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28287, June 4, 1996]

§ 112.50–5 Electric starting.

An electric starting system must have a starting battery with sufficient capacity for at least six consecutive starts. A second, separate source of starting energy may provide three of the required six starts. If a second source is provided, the electrical starting system need only provide three consecutive starts.

[CGD 94–108, 61 FR 28288, June 4, 1996]

§ 112.50–7 Compressed air starting.

A compressed air starting system must meet the following:

(a) The starting, charging, and energy storing devices must be in the emergency generator room, except for the main or auxiliary air compressors addressed in paragraph (c)(3)(i) of this section.

(b) The compressed air starting system must provide the cranking torque and engine starting RPM recommended by the engine manufacturer.

(c) The compressed air starting system must have an air receiver that meets the following:

(1) Has a capacity for at least six consecutive starts. A second, separate source of starting energy may provide three of the required consecutive starts. If a second source is provided, the compressed air starting system need only provide three consecutive starts.

(2) Supplies no other system.

(3) Is supplied from one of the following:

(i) The main or auxiliary compressed air receivers with a nonreturn valve in the emergency generator room and a handcranked, diesel-powered air compressor for recharging the air receiver.

(ii) An electrically driven air compressor that is automatically operated and is powered from the emergency power source. If this compressor supplies other auxiliaries, there must be a non-return valve at the inlet of the starting air receiver and there must be a handcranked, diesel-powered air compressor for recharging the air receiver.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28288, June 4, 1996]

Subpart 112.55—Storage Battery Installation

§ 112.55–1 General.

Each storage battery installation must meet Subpart 111.15 of this chapter.

§ 112.55–5 Emergency lighting loads.

When supplying emergency lighting loads, the storage battery initial voltage must not exceed the standard system voltage by more than 5 percent.

§ 112.55–10 Storage battery charging.

(a) Each storage battery installation for emergency lighting and power, and starting batteries for an emergency diesel or gas turbine driven generator set, must have apparatus to automatically maintain the battery fully charged.

(b) When the ship's service generating plant is available, the battery must have a continuous trickle charge, except that after discharge the battery must be charged automatically at a higher rate.

(c) Charging operations must not cause an absence of battery power.

(d) There must be instruments to show the rate of charge.

§ 112.55–15 Capacity of storage batteries.

(a) A storage battery for an emergency lighting and power system must have the capacity—

(1) To close all watertight doors two times;

(2) To open all watertight doors once; and

(3) To carry the remaining emergency loads continuously for the time prescribed in §112.05–5(a), table 112.05–5(a).

(b) At the end of the time specified in paragraph (a) of this section, the potential of the storage battery must be at least 88 percent of the standard voltage.

[CGD 74–125A, 47 FR 15267, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28288, June 4, 1996; 61 FR 39695, July 30, 1996]

PART 113—COMMUNICATION AND ALARM SYSTEMS AND EQUIPMENT

Subpart 113.05—General Provisions

Sec.

Subpart 113.10—Fire and Smoke Detecting and Alarm Systems

Subpart 113.20—Automatic Sprinkler Systems

Subpart 113.25—General Emergency Alarm Systems

Subpart 113.27—Engineers' Assistance-Needed Alarm

Subpart 113.30—Internal Communications

Subpart 113.35—Engine Order Telegraph Systems

AUTHORITY: 46 U.S.C. 3306, 3703; Department of Homeland Security Delegation No. 0170.1.

SOURCE: CGD 74–125A, 47 FR 15272, Apr. 8, 1982, unless otherwise noted.

Subpart 113.05—General Provisions

§ 113.05–5 Approved equipment.

If approved equipment is required in this part, that equipment must be specifically approved by the Commandant.

NOTE: Many specifications for equipment that must be approved are in Subchapter Q for this chapter.

§ 113.05–7 Environmental tests.

Communication, alarm system, control, and monitoring equipment must meet the environmental tests of—

(a) Section 4–9–7, Table 9, of ABS Steel Vessel Rules (incorporated by reference; see 46 CFR 110.10–1) or the applicable ENV category of Lloyd's Register Type Approval System—Test Specification Number 1 (incorporated by reference; see 46 CFR 110.10–1); and

(b) IEC 60533 (incorporated by reference; see 46 CFR 110.10–1) as appropriate.

[CGD 94–108, 61 FR 28288, June 4, 1996, as amended by 62 FR 23910, May 1, 1997; USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

Subpart 113.10—Fire and Smoke Detecting and Alarm Systems

§ 113.10–1 Approved equipment.

Each alarm annunciator, fire detector, test station, manual station, and vibrating bell must be approved under Subpart 161.002 of this chapter and meet the requirements of this subpart.

§ 113.10–3 Cable runs.

Cable runs between the fire alarm annunciator and fire detecting or fire alarm zones must be as direct as practicable and, where practicable, must not be in staterooms, lockers, or other enclosed spaces in order to reduce the risk of damage by a localized fire or other cause.

§ 113.10–5 Common return.

A conductor must not be used as a common return from more than one zone.

§ 113.10–7 Connection boxes.

Each connection box must be constructed in accordance with Type 4 or 4X of NEMA 250 or IP 56 of IEC 60529 (both incorporated by reference; see 46 CFR 110.10–1) requirements.

[USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

§ 113.10–9 Power supply.

(a) *General.* There must be at least two sources of power for the electrical equipment of each fire detecting and alarm system. The normal source must be the main power source. The other source must be the emergency power source or an automatically charged battery. If the other source is an automatically charged battery, the charger must be supplied from the final emergency power source. Upon loss of power to the system from the normal source,

the system must be automatically supplied from the other source.

(b) *Batteries.* Each battery used in a fire detecting and alarm system must meet Subpart 111.15 of this chapter.

(c) *Capacity of power supply branch circuit.* The capacity of each branch circuit providing power to a fire detection or alarm system must not be less than 125 percent of the maximum load.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28288, June 4, 1996]

Subpart 113.20—Automatic Sprinkler Systems

§ 113.20–1 Sprinkler alarm system.

Each sprinkler alarm system, including annunciator, power supply, alarm switches, and bells, must meet Subpart 76.25 of this chapter.

§ 113.20–3 Connection boxes.

Each connection box and each switch enclosure in an automatic sprinkler system must be constructed in accordance with Type 4 or 4X of NEMA 250 or IP 56 of IEC 60529 (both incorporated by reference; see 46 CFR 110.10–1) requirements.

[USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

Subpart 113.25—General Emergency Alarm Systems

EDITORIAL NOTE: Nomenclature changes to subpart 113.25 appear at 61 FR 28288, June 4, 1996.

§ 113.25–1 Applicability.

(a) This subpart, except §§ 113.25–25 and 113.25–30, applies to each manned vessel of over 100 gross tons, except barges, scows, and similar vessels.

(b) Section 113.25–25 applies to each manned ocean and coastwise barge of over 100 gross tons if the crew is divided into watches for the purpose of steering.

(c) Section 113.25–30 applies to each barge of 300 or more gross tons that has sleeping accommodations for more than six persons.

§ 113.25–3 Requirements.

Each vessel must have a general emergency alarm system that meets the requirements of this subpart.

§ 113.25–5 Location of contact makers.

(a) *Passenger vessels and cargo and miscellaneous vessels.* Each passenger vessel, cargo vessel, and miscellaneous vessel must have a manually operated contact maker for the general emergency alarm system:

(1) In the navigating bridge; and

(2) At the feeder distribution panel if the general alarm power supply is not in or next to the navigating bridge.

(b) *Tank vessels.* Each tank vessel must have a manually operated contact maker for the general emergency alarm system:

(1) In the navigating bridge;

(2) At the deck officers' quarters farthest from the engineroom;

(3) in the engineroom;

(4) At the location of the emergency means of stopping cargo transfer required under 33 CFR 155.780; and

(5) At the feeder distribution panel if the general alarm power supply is not in or next to the navigating bridge.

(c) *Mobile offshore drilling units.* Each mobile offshore drilling unit must have a manually operated contact maker for the general emergency alarm system:

(1) In the main control room;

(2) At the drilling console;

(3) At the feeder distribution panel;

(4) In the navigating bridge, if a navigating bridge is installed; and

(5) In a routinely occupied space that is as far as practicable from all other contact makers.

(d) *Additional contact maker.* A vessel must not have more than one other contact maker that operates the general emergency alarm system in addition to those required under paragraph (a), (b), or (c) of this section unless the installation of other contact makers has been accepted by the Commandant.

(e) *Special system.* If a vessel has an emergency squad when operating, has a manual fire alarm system, or is an ocean-going passenger vessel, it must have:

(1) An independent manually operated contact maker in the navigating bridge that is connected to operate

only the general emergency alarm signal in crew's quarters and machinery spaces; or

(2) A separate alarm system that sounds in the crew's quarters and machinery spaces.

§ 113.25–6 Power supply.

The emergency power source for the general emergency alarm system must meet the requirements of IMO SOLAS 74 (incorporated by reference; see 46 CFR 110.10–1), Regulation II–1/42 or II–1/43, as applicable.

[USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

§ 113.25–7 Power supply overcurrent protection.

(a) If the general emergency alarm system is the only load supplied by the general emergency alarm system battery or batteries, the battery or batteries must have an enclosed fused switch or circuit breaker that has a means of locking. The fused switched or circuit breaker must be outside of, and next to, the battery room or battery locker, and the capacity of the fuses or circuit breaker must be at least 200 percent of the connected load.

(b) If the general emergency alarm system is supplied from an emergency or interior communication switchboard, or if duplicate general alarm batteries supply other loads as allowed under §113.25–6(e)(2), there must be a fused switch or circuit breaker supplying the general emergency alarm system that has a means of locking.

§ 113.25–8 Distribution of general emergency alarm system feeders and branch circuits.

(a) Each system 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 vessel, only one zone feeder is necessary; then a branch circuit distribution panel or feeder distribution panel must be used.

(b) The feeder distribution panel must have overcurrent protection for each zone feeder, but there must be no disconnect switches.

(c) The feeder distribution panel must be in an enclosed space next to the general alarm power supply.

(d) Each system must have at least one feeder for each vertical fire zone that has general emergency alarm signal.

(e) Each system must have one or more branch circuit distribution panels for each zone feeder, with at least one fused branch circuit for each deck level. The distribution panel must be above the uppermost continuous deck, in the zone served, and there must be no disconnect switches for the branch circuits.

(f) A branch circuit must not supply emergency alarm signal on more than one deck level, except for a single branch circuit supplying all levels of a single space containing more than one deck level if all other requirements of this section are met.

(g) On a vessel not divided into fire zones by main vertical fire bulkheads, the general emergency alarm system must be arranged into vertical service zones not more than 40 meters (131 feet) long, and there must be a general alarm feeder for each of these zones that has general emergency alarm signal.

(h) General 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.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28288, June 4, 1996]

§ 113.25–9 Location of general emergency alarm signal.

General emergency alarm signal must:

(a) Be located in passenger and crew quarters areas where they can alert persons in spaces where those persons may be maintaining, repairing, or operating equipment, stowing or drawing stores or equipment, or transiting, such as public spaces, work spaces, machinery spaces, workshops, galleys, emergency firepump room, bow thruster rooms, storage areas for paint, rope, and other stores, underdeck passageways in cargo areas, steering gear rooms, windless rooms, holds of roll-on/roll-off vessels, and, except those that are accessible only through bolted

manhole covers, duct keels with valve operators; and

(b) Be audible in the spaces identified in paragraph (a) of this section with all normally closed doors and accesses closed; and

(c) Be installed in cabins without loudspeaker installation. Other audible devices, such as electronic alarm transducers, are permitted.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28288, June 4, 1996]

§ 113.25–10 Emergency red-flashing lights.

(a) In a space described in § 113.25–9(a), where the general emergency alarm signal cannot be heard over the background noise, there must be a red-flashing light or rotating beacon, in addition to the general emergency alarm signal, that:

(1) Has sufficient intensity above the background lighting that would alert personnel in the space;

(2) Is activated whenever the general emergency alarm signal in the space are activated; and

(3) Is supplied by the general emergency alarm system power supply or the vessel emergency power source through a relay that is operated by the general emergency alarm system.

(b) A red-flashing light or rotating beacon must be installed so that it is visible in the cargo pump rooms of vessels that carry combustible liquid cargoes. The installation must be in accordance with the requirements of part 111, subpart 111.105, of this chapter.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28288, June 4, 1996; 62 FR 23910, May 1, 1997]

§ 113.25–11 Contact makers.

Each contact maker must—

(a) Have normally open contacts and be constructed in accordance with Type 4 or 4X of NEMA 250 or IP 56 of IEC 60529 (both incorporated by reference; see 46 CFR 110.10–1) requirements;

(b) Have a switch handle that can be maintained in the ''on'' position;

(c) Have the ''off'' and ''on'' positions of the operating handle permanently marked; and

(d) Have an inductive load rating not less than the connected load or, on large vessels, have auxiliary devices to interrupt the load current.

[CGD 94–108, 61 FR 28288, June 4, 1996, as amended at 62 FR 23910, May 1, 1997; USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

§ 113.25–12 Alarm signals.

(a) Each general emergency alarm signal must be an electrically-operated bell, klaxon, or other warning device capable of producing a signal or tone distinct from any other audible signal on the vessel.

(b) Electronic devices used to produce the general emergency alarm signal must meet the requirements of subpart 113.50 of this part.

(c)(1) The minimum sound-pressure levels for the emergency-alarm tone in interior and exterior spaces must be a sound level of not less than 80 dB(A) measured at 10 feet on the axis; and

(2) At least 10 dB(A) measured at 10 feet on the axis, above the background noise level when the vessel is underway in moderate weather unless flashing red lights are used in accordance with 46 CFR 113.25–10(b).

(d) Alarm signals intended for use in sleeping compartments may have a minimum sound level of 75 dB(A) measured 3 feet (1 meter) on axis, and at least 10 dB(A) measured 3 feet (1 meter) on axis, above ambient noise levels with the ship under way in moderate weather.

[CGD 94–108, 61 FR 28289, June 4, 1996, as amended by USCG–2003–16300, 73 FR 65201, Oct. 31, 2008]

§ 113.25–14 Electric cable and distribution fittings.

Each cable entrance to an emergency alarm signal or distribution fitting must be made watertight by a terminal or stuffing tube.

§ 113.25–15 Distribution panels.

Each distribution panel must:

(a) Be watertight;

(b) Need a tool to be opened.

§ 113.25–16 Overcurrent protection.

(a) Each fuse in a general emergency alarm system must meet the requirements of part 111, subpart 111.53, of this chapter.

(b) Each overcurrent protection device must cause as wide a differential as possible between the rating of the branch circuit overcurrent protection device and that of the feeder overcurrent protection device.

(c) The capacity of the feeder overcurrent device must be as near practicable to 200 percent of the load supplied. The capacity of a branch circuit overcurrent device must not be higher than 50 percent of the capacity of the feeder overcurrent device.

[CGD 94–108, 61 FR 28289, June 4, 1996]

§ 113.25–20 Marking of equipment.

(a) Each general emergency alarm system fused switch and distribution panel must have a fixed nameplate on the outside of its cover that has a description of its function. The rating of fuses must also be shown on the outside of the cover of a fused switch.

(b) Each general alarm contact maker must be marked ''GENERAL ALARM'' in red letters on a corrosion-resistant plate or on a sign.

(c) A contact maker that operates only the general emergency alarm signal in crew quarters, machinery spaces, and work spaces must be marked ''CREW ALARM'' by the method described in paragraph (b) of this section.

(d) Each general emergency alarm signal must be marked ''GENERAL ALARM—WHEN EMERGENCY ALARM SIGNAL RINGS GO TO YOUR STATION'' in red letters at least ½ inch high.

(e) Each general emergency alarm system distribution panel must have a directory attached to the inside of its cover giving the designation of each circuit, the area supplied by each circuit, and the rating of each circuit fuse.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by USCG–2004–18884, 69 FR 58348, Sept. 30, 2004]

§ 113.25–25 General emergency alarm systems for manned ocean and coastwise barges.

A manned ocean or coastwise barge of more than 100 gross tons, if it is one that operates with the crew divided into watches for steering the vessel, must have an emergency alarm signal installation. The system must:

(a) Have an automatically charged battery as the power source;

(b) Have a manually operated contact maker at the steering station and in the crew accommodation area; and

(c) Must meet the requirements of §113.25.7 and §§113.25–9 through 113.25–20 of this subpart.

§ 113.25–30 General emergency alarm systems for barges of 300 or more gross tons with sleeping accommodations for more than six persons.

The general emergency alarm system for a barge of 300 or more gross tons with sleeping accommodations for more than six persons must meet the requirements of Subpart 113.25, except as follows:

(a) The number and location of contact makers must be determined by the design, service, and operation of the barge.

NOTE: Contact makers in the primary work area, quarters area, galley and mess area, machinery spaces, and the navigating bridge or control area should be considered.

(b) If a distribution panel cannot be above the uppermost continuous deck because of the design of the barge and is installed below the deck, it must be as near the deck as practicable.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28289, June 4, 1996]

Subpart 113.27—Engineers' Assistance-Needed Alarm

§ 113.27–1 Engineers' assistance-needed alarm.

Each self-propelled ocean, Great Lakes, or coastwise vessel must have a manually-operated engineers' assistance-needed alarm that is:

(a) Operated from:

(1) The engine control room, if the vessel has an engine control room; or

(2) The maneuvering platform, if the vessel has no engine control room;

(b) Audible in the engineers' accommodation spaces; and

(c) Powered from the general alarm power source.

Subpart 113.30—Internal Communications

§ 113.30–1 Applicability.

This subpart applies to each self-propelled vessel.

§ 113.30–3 Means of communications.

(a) An emergency means of communication required by this subpart must—

(1) Be comprised of either fixed or portable equipment; and

(2) Provide common talking means of two-way voice communication and calling among the navigating bridge, emergency control stations, muster stations, embarkation stations, and other strategic positions listed in § 113.30–5.

(b) The means of communication and calling must be a reliable means of voice communication and must be independent of the vessel's electrical system.

[CGD 94–108, 61 FR 28289, June 4, 1996, as amended by USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

§ 113.30–5 Requirements.

(a) *Communication.* Each vessel must have a means of communication among the following:

(1) Navigating bridge.

(2) Steering gear room, if outside the engineroom.

(3) Alternative steering station if outside of the steering gear room.

(4) Engine control room, if the vessel has an engine control room.

(5) Maneuvering platform, if the vessel has no engine control room.

(6) Control room, if the vessel is a mobile offshore drilling unit.

(7) The engineering officers' accommodations, if the vessel is an automated, self-propelled vessel under § 62.50–20(f) of this chapter.

(b) *Gyrocompass.* Each vessel that has a master gyrocompass that is not in or next to the navigating bridge must have a means of communication between the master gyrocompass and the navigating bridge repeater compass.

(c) *Radar.* Each vessel that has a radar plan position indicator that is not in or next to the navigating bridge must have a means of communication between the navigating bridge and the radar plan position indicator.

(d) *Emergency lockers.* If the emergency equipment lockers or spaces used by the emergency squad are not next to the navigating bridge or, on a mobile offshore drilling unit, next to the control room, there must be a means of communication between the navigating bridge or control room and the emergency equipment lockers or spaces.

(e) *Radio and radio direction finder.* Communication to the radio and radio direction finder must meet the following requirements:

(1) Each vessel that has a radio installation must have a means of communication between the radio room, the navigating bridge, or, if the vessel is a mobile offshore drilling unit, the control room, and any other place from which the vessel may be navigated under normal conditions, other than a place that is only for emergency functions, a place that is only for docking or maneuvering, or a place that is for navigating the vessel in close quarters. A location that has the apparatus that is necessary to steer the vessel, give engine orders, and control the whistle, is a place from which the vessel may be navigated.

(2) If the operating position of the emergency radio installation is not in the compartment normally used for operating the main radio installation, there must be means of communication between the emergency radio room, the navigating bridge, or, if the vessel is a mobile offshore drilling unit, the control room, and any other place from which the vessel may be navigated under normal conditions; other than a place that is only for emergency functions, a place that is only for docking or maneuvering, or a place that is for navigating the vessel in close quarters.

(3) Each vessel equipped with radio direction-finding apparatus that is not in or next to the navigating bridge must have a means of communication between the navigating bridge and the direction-finding apparatus.

(4) The communication system required by this paragraph must be independent of all other systems on the vessel. The location of the termination of these systems is subject to approval

by the Federal Communication Commission.

(f) *Fire or smoke detecting systems.* Each vessel equipped with a fire or smoke detecting system, if control units are not in the navigating bridge, must have means of communication between the navigating bridge and the stations where the control units are located.

(g) *Lookout.* Each vessel must have a means of communication between the navigating bridge and the bow or forward lookout station unless direct voice communication is possible.

(h) *Engineroom local control station.* Each self-propelled vessel equipped with control from the navigating bridge must have a means of communication between the local station for the control of the speed or direction of thrust of the propulsion machinery and the engine control room, unless an engine order telegraph is installed in accordance with §113.35–3. Each communication station at a local control station must—

(1) Be on a circuit separate from any other station required by this section; and

(2) Provide the capability of reliable voice communication when the vessel is underway.

(i) *Mobile offshore drilling units.* Each non-self-propelled mobile offshore drilling unit must have a means of communication among the control room, drill floor, machinery space, and silicon controlled rectifier (SCR) room (if installed). Each column-stabilized mobile offshore drilling unit must have a means of communication between the ballast control room and the spaces that contain the ballast pumps and valves.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28289, June 4, 1996; 62 FR 23910, May 1, 1997; USCG–2004–18884, 69 FR 58348, Sept. 30, 2004]

§113.30–20 General requirements.

(a) The communications stations listed in §113.30–5(a) through (d), (f), (g), and (i) and other communications stations for the operation of the vessel, such as the captain's and chief engineer's offices and staterooms, emergency power room, carbon dioxide (or other extinguishing agent) control room, and firepump room, must not be on the same circuit as communications stations installed to meet the requirements of §§113.30–5(e) and 113.30–5(h).

(b) If a communications station is in the weather and on the same circuit as other required stations, there must be a cut-out switch on the navigating bridge that can isolate this station from the rest of the stations, unless the system possesses other effective means of station isolation during a fault condition.

(c) No jack-box or headset may be on a communication system that includes any station required by this subpart, except for a station installed to meet 46 CFR 113.30–5(h) or 46 CFR 113.30–25(f).

[CGD 94–108, 61 FR 28289, June 4, 1996, as amended by USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

§113.30–25 Detailed requirements.

(a) Multiple stations must be able to communicate at the same time.

(b) The loss of one component of the system must not disable the rest of the system.

(c) The system must be able to operate under full load for the same period of operation as required for the emergency generator. See 46 CFR 112.05–5, Table 112.05–5(a).

(d) Each voice-communication station device in the weather must be in a proper enclosure as required in 46 CFR 111.01–9. The audible-signal device must be outside the station enclosure.

(e) Each station in a navigating bridge or a machinery space must be in an enclosure meeting at least Type 2 of NEMA 250 or IP 22 of IEC 60529 (both incorporated by reference; see 46 CFR 110.10–1).

(f) In a noisy location, such as an engine room, there must be a booth or other equipment to permit reliable voice communication while the vessel is operating.

(g) In a space throughout which the voice communication station audible-signal device cannot be heard, there must be another audible-signal device or a visual-device, such as a light, either of which is energized from the final emergency bus.

(h) If two or more voice communication stations are near each other, there

must be a means that indicates the station called.

(i) Each connection box must meet at least Type 4 or 4X of NEMA 250 or IP 56 of IEC 60529.

(j) Voice communication cables must run as close to the fore-and-aft centerline of the vessel as practicable.

(l) No cable for voice communication may run through any space at high risk of fire such as machinery rooms and galleys, unless it is technically impracticable to route it otherwise or it must serve circuits within those spaces.

(2) Each cable running through any space at high risk of fire must meet IEC 60331–11 and IEC 60331–21 (both incorporated by reference; see 46 CFR 110.10–1).

(k) If the communications system uses a sound-powered telephone, the following requirements also apply:

(1) Each station except one regulated by paragraph (d) of this section must include a permanently wired handset with a push-to-talk button and a hanger for the handset.

(2) The hanger must be constructed so that it holds the handset away from the bulkhead and so that the motion of the vessel will not dislodge the handset.

(3) Each talking circuit must be electrically independent of each calling circuit.

(4) No short circuit, open circuit, or ground on either side of a calling circuit may affect a talking circuit.

(5) Each circuit must be insulated from ground.

[USCG–2003–16630, 73 FR 65201, Oct. 31, 2008]

Subpart 113.35—Engine Order Telegraph Systems

§ 113.35–1 Definitions.

As used in this subpart:

(a) *Indicator* means an instrument in the engine room to receive and acknowledge engine orders; and

(b) *Transmitter* means an instrument to send engine orders to the engineroom and receive acknowledgement from the engineroom.

§ 113.35–3 General requirements.

(a) Each self-propelled vessel, except as provided in paragraph (d) of this section, must have an electric or mechanical engine order telegraph system from the navigating bridge to the engineroom.

(b) On a vessel with more than one propulsion engine, each engine must have this system.

(c) On a double-ended vessel that has two navigating bridges, this system must be between the engineroom and each navigating bridge.

(d) If a small vessel has no engine order telegraph system between the navigating bridge and the engineroom, the propulsion plant must be controlled entirely from the navigating bridge, with no means of normal engine control from the engineroom.

(e) On vessels equipped with pilothouse control, each local control station in the engineroom must have an indicator if:

(1) Manual operation from the local control station is an alternative means of control; and

(2) The local control station is not immediately adjacent to the engineroom control station; and

(3) Reliable voice communication and calling that meets the requirements of § 113.30–5(h) is not provided.

(f) Engine order telegraph and remote propulsion control systems must be electrically separate and independent, except that a single mechanical operator control device with separate transmitters and connections for each system may be used.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 81–030, 53 FR 17847, May 18, 1988; CGD 94–108, 61 FR 28290, June 4, 1996]

§ 113.35–5 Electric engine order telegraph systems.

(a) Each electric engine order telegraph system must have transmitters and indicators that are electrically connected to each other.

(b) Each engineroom indicator must be capable of acknowledgment of orders.

(c) There must be an audible signal at each instrument. The signal at both locations must sound continuously when the transmitter and the indicator do not show the same order.

(d) Each telegraph instrument must meet the protection requirements of §111.01–9 of this chapter.

(e) Each system must have an alarm which—

(1) Automatically sounds and visually signals a loss of power to the system;

(2) Is on the navigating bridge; and

(3) Has a means to reduce the audible signal from 100 percent to not less than 50 percent.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28290, June 4, 1996]

§ 113.35–7 Electric engine order telegraph systems; operations.

(a) Where two or more transmitters, located on or on top of, or on the wings of, the navigating bridge operate a common indicator in the engineroom, the transmitters must:

(1) Operate in synchronism as required in paragraph (b) of this section; or

(2) Operate under the control of a transmitter transfer control in accordance with paragraph (c) of this section.

(b) All transmitter handles and pointers must operate in synchronism. Where the transmitters are mechanically interlocked to effect synchronous operation, the requirements of §113.35–13 must be met.

(c) Except for a transmitter in an unattended navigating bridge on a double-ended vessel, each transmitter must operate under the control of a transmitter transfer control so that movement of any one transmitter handle automatically connects that transmitter electrically to the engineroom indicator and simultaneously disconnects electrically all other transmitters. The reply pointers of all transmitters must operate in synchronism at all times.

(d) On a double-ended vessel that has two navigating bridges, a manually operated transfer switch which will disconnect the system in the unattended navigating bridge must be provided.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982. Redesignated and amended by CGD 94–108, 61 FR 28290, June 4, 1996]

§ 113.35–9 Mechanical engine order telegraph systems.

(a) Each mechanical engine order telegraph system must consist of transmitters and indicators mechanically connected to each other, as by means of chains and wires.

(b) Each transmitter and each indicator must have an audible signal device to indicate, in the case of an indicator, the receipt of an order, and in the case of a transmitter, the acknowledgment of an order. The audible signal device must not be dependent upon any source of power for operation other than that of the movement of the transmitter or indicator handle.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28290, June 4, 1996]

§ 113.35–13 Mechanical engine order telegraph systems; operation.

If more than one transmitter operates a common indicator in the engineroom, all the transmitters must be mechanically interlocked and operate in synchronism. A failure of the transmission wire or chain at any transmitter must not interrupt or disable any other transmitter.

§ 113.35–15 Mechanical engine order telegraph systems; application.

If a mechanical engine order telegraph system is installed on any vessel to provide the communication required by this subpart, the length of cables or other mechanical limitations must not prevent the efficient operation of the system.

§ 113.35–17 Vessels with navigating bridge control.

Each vessel with navigating bridge throttle control must have a positive mechanical stop on each telegraph transmitter that prevents movement to the ''Navigating Bridge Control'' position without positive action by the operator.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28290, June 4, 1996]

Subpart 113.37—Shaft Speed and Thrust Indicators

§ 113.37–1 Applicability.

This subpart applies to all self-propelled vessels.

§ 113.37–5 General requirements.

(a) A vessel equipped with fixed pitch propellers must have on the navigating bridge and at the engineroom control station a propeller speed and direction indicator for each shaft.

(b) A vessel equipped with controllable pitch propellers must have on the navigating bridge and at the engineroom control station a propeller speed and pitch position indicator for each shaft.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28290, June 4, 1996]

§ 113.37–10 Detailed requirements.

(a) Each indicator must be independent of the propulsion control system. A failure of the propulsion control system must not affect the operation of the indicators.

(b) Each electric component or its enclosure must meet Type 4 or 4X of NEMA 250 or IP 56 of IEC 60529 (both incorporated by reference; see 46 CFR 110.10–1) requirements.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28290, June 4, 1996; USCG–2003–16630, 73 FR 65202, Oct. 31, 2008]

Subpart 113.40—Rudder Angle Indicator Systems

§ 113.40–1 Applicability.

This subpart applies to self-propelled vessels.

§ 113.40–5 General requirements.

The position of the rudder, if power-operated, must be shown at the principal steering station. If there is non-follow-up steering control at the alternative steering station, there must be a separate rudder angle indicator system for that station that is electrically independent from each other rudder angle indicator system.

§ 113.40–10 Detailed requirements.

(a) Each rudder angle indicator system must have a transmitter at the rudder head that is actuated by movement of the rudder with the angular movements of the rudder transmitted to a remote indicator or indicators. This system must be independent of all other systems and not receive power or signal from the steering gear control, autopilot, or dynamic positioning systems. However, the indicator may be physically located on a control console, such as an integrated bridge system, if it is readily visible by the helmsman at the steering stand.

(b) Each electric component or its enclosure must meet Type 4 or 4X of NEMA 250 or IP 56 of IEC 60529 (both incorporated by reference; see 46 CFR 110.10–1) requirements.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28290, June 4, 1996; 62 FR 23910, May 1, 1997; USCG–2003–16630, 73 FR 65202, Oct. 31, 2008]

Subpart 113.43—Steering Failure Alarm Systems

§ 113.43–1 Applicability.

This subpart applies to each vessel of 1600 gross tons and over that has power driven main or auxiliary steering gear.

§ 113.43–3 Alarm system.

(a) Each vessel must have a steering failure alarm system that actuates an audible and visible alarm in the pilothouse when the actual position of the rudder differs by more than 5 degrees from the rudder position ordered by the followup control systems, required by part 58, subpart 58.25, of this chapter, for more than:

(1) 30 seconds for ordered rudder position changes of 70 degrees;

(2) 6.5 seconds for ordered rudder position changes of 5 degrees; and

(3) The time period calculated by the following formula for ordered rudder positions changes between 5 degrees and 70 degrees:

$t = (R/2.76)+4.64$

Where

t = maximum time delay in seconds
R = ordered rudder change in degrees

(b) The alarm system must be separate from, and independent of, each steering gear control system, except for input received from the steering wheel shaft.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 62 FR 23910, May 1, 1997; USCG–2004–18884, 69 FR 58348, Sept. 30, 2004]

§ 113.43–5 Power supply.

Each steering failure alarm system must be supplied by a circuit that:

(a) Is independent of other steering gear system and steering alarm circuits;

(b) Is fed from the final emergency power source through the emergency distribution panel in the wheelhouse, if installed; and

(c) Has no overcurrent protection except short-circuit protection by an instantaneous fuse or circuit breaker rated or set at 400 to 500 percent of:

(1) The current-carrying capacity of the smallest alarm system interconnecting conductors; or

(2) The normal load of the system.

Subpart 113.45—Refrigerated Spaces Alarm Systems

§ 113.45–5 General requirements.

(a) Each refrigerated space that is accessible to the vessel's personnel and that can be locked from the outside so that it cannot be opened from the inside, must have an audible alarm system that can be operated from within the refrigerated space.

(b) The alarm activator must be in the refrigerated space at its exit.

(c) The audible signal must sound at a manned location.

(d) If there is a common audible signal for more than one lockable refrigerated space, there must be an annunciator for locating the space from which the signal was initiated.

Subpart 113.50—Public Address Systems

§ 113.50–1 Applicability.

This subpart applies to each vessel required to have a general emergency alarm system in accordance with § 113.25–1.

[CGD 94–108, 61 FR 28290, June 4, 1996]

§ 113.50–5 General requirements.

(a) Each vessel must have an amplifier-type announcing system that will supplement the general emergency alarm. This system must provide for the transmission of orders and information throughout the vessel by means of microphones and loudspeakers connected through an amplifier. If a decentralized-type system is used, its overall performance must not be affected by the failure of a single call station. This system may be combined with the general emergency alarm and fire detecting and alarm systems. The public address system must be protected against unauthorized use.

(b) The announcing station must be located adjacent to the general emergency alarm contact maker on the navigating bridge.

(c) There must be a means to silence all other audio distribution systems at the announcing station.

(d) The system may be arranged to allow broadcasting separately to, or to any combination of, various areas on the vessel. If the amplifier system is used for the general emergency alarm required by subpart 113.25 of this part, the operation of a general emergency alarm contact maker must activate all speakers in the system, except that a separate crew alarm may be used as allowed by § 113.25–5(e)(2).

(e) The amplifier, and any device used to produce the general emergency alarm signal, must be provided in duplicate.

(f) The power supply must be in accordance with the requirements of §§ 113.25–6 and 113.25–7.

(g) Each electrical subsystem in a weather location must be watertight or in a watertight enclosure and must meet Type 4 or 4X of NEMA 250 or IP 56 of IEC 60529 (both incorporated by reference; see 46 CFR 110.10–1) requirements.

[CGD 94–108, 61 FR 28290, June 4, 1996, as amended at 62 FR 23910, May 1, 1997; USCG–2003–16630, 73 FR 65202, Oct. 31, 2008]

§ 113.50–10 Additional requirements for passenger vessels.

Each passenger vessel must have a public address system capable of broadcasting separately or collectively to the following stations:

(a) Survival craft stations, port.

(b) Survival craft stations, starboard.

(c) Survival craft embarkation stations, port.

(d) Survival craft embarkation stations, starboard.

(e) Public spaces used for passenger assembly points.

(f) Crew quarters.

(g) Accommodation spaces and service spaces.

[CGD 94–108, 61 FR 28290, June 4, 1996]

§ 113.50–15 Loudspeakers.

(a) Loudspeakers must be located to eliminate feedback or other interference which would degrade communication.

(b) Loudspeakers must be located to provide intelligible and audible one-way communication throughout the vessel. Weatherdeck loudspeakers must be watertight and suitably protected from the effects of the wind and seas.

(c) There must be a sufficient number of loudspeakers throughout the vessel. The public address system must be installed with regard to acoustically marginal conditions and not require any action from the addressee. With the vessel underway in normal conditions, the minimum sound pressure levels for broadcasting emergency announcements must be—

(1) In interior spaces, 75 dB(A) or, if the background noise level exceeds 75 dB(A), then at least 20 dB(A) above maximum background noise level; and

(2) In exterior spaces, 80 dB(A) or, if the background noise level exceeds 80 dB(A), then at least 15 dB(A) above maximum background noise level.

(d) Loudspeakers must not have external volume controls or local cutout switches.

[CGD 74–125A, 47 FR 15272, Apr. 8, 1982, as amended by CGD 94–108, 61 FR 28291, June 4, 1996; 61 FR 36787, July 12, 1996]

§ 113.50–20 Distribution of cable runs.

(a) Each system must have a feeder distribution panel to divide the system into the necessary number of zone feeders. Where, because of the arrangement of the vessel, only one zone feeder is necessary, a branch circuit distribution panel must be used.

(b) The feeder distribution panel must be in an enclosed space next to the public address system power supply.

(c) Each system must have at least one feeder for each vertical fire zone.

(d) Each system must have one or more branch circuit distribution panels for each zone feeder, with at least one branch circuit for each deck level. The distribution panel must be above the uppermost continuous deck, in the zone served, and there must be no disconnect switches for the branch circuits.

(e) A branch circuit must not supply speakers on more than one deck level, except for a single branch circuit supplying all levels of a single space if all other requirements of this section are met.

(f) On a vessel not divided into vertical fire zones by main vertical fire bulkheads, the vessel must be divided into vertical zones not more than 40 meters (131 feet) long. There must be a feeder for each of these zones.

(g) Feeders and branch circuit cables must be in passageways. They must not be in staterooms, lockers, galleys, or machinery spaces, unless it is necessary to supply public address speakers in those spaces.

[CGD 94–108, 61 FR 28291, June 4, 1996]

Subpart 113.65—Whistle Operators

§ 113.65–5 General requirements.

Each whistle operator must meet section 21.5 of IEEE Std 45–2002 (incorporated by reference; see 46 CFR 110.10–1).

[USCG–2003–16630, 73 FR 65202, Oct. 31, 2008]