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 the Naval Sea Systems Command Design Data Sheet DDS 300–2.

(c) Estimated calculations using IEC 363.

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

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

Subpart 111.53—Fuses

§ 111.53–1 General.

(a) Each fuse must—

(1) Meet the general provisions of article 240 of the NEC or IEC 92–202 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; 61 FR 33045, June 26, 1996]

Subpart 111.54—Circuit Breakers

§ 111.54–1 Circuit breakers.

(a) Each Circuit breaker must—

(1) Meet the general provision of article 240 of the NEC or IEC 92–202, 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) Molded case circuit breakers must not be used in circuits having a nominal voltage of more than 600 volts (1,000 volts for circuits containing circuit breakers manufactured to IEC requirements). Each molded case circuit breaker must meet UL 489 and its marine supplement 489 SA or IEC 947–2 Part 2, except as noted in paragraph (e) of this section.

(c) Circuit breakers, other than the molded case type, that are for use in one of the following systems must meet the following requirements:

(1) An alternating current system having a nominal voltage of 600 volts or less, or 1,000 volts for IEC standard circuit breakers must meet—

(i) IEEE C37.13;

(ii) IEEE Std 331; or

(iii) IEC 947–2, Part 2.

(2) A direct current system of 3,000 volts or less must meet ANSI C37.14 or IEC 947–2, Part 2.

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

(i) ANSI/IEEE C37.04 including all referenced supplements, IEEE Std 320 including all referenced supplements, and ANSI C37.12; or

(ii) IEC 56.

(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]

§ 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 380 of the National Electrical Code.

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

§ 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 364 of the NEC.

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

§ 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 Cable construction and testing.

(a) Each marine shipboard cable must meet all of the construction and identification requirements of either IEEE Std 45, IEC 92–3, IEC 92–350, IEC 92–353, UL 1309, MIL-C-24640A, or MIL-C-24643A (incorporated by reference, see § 110.10–1 of this chapter), and the respective flammability tests contained in them and be of a copper stranded type.

NOTE TO PARAGRAPH (a): MIL-C-915 cable is acceptable only for repairs and replacements in kind. MIL-C-915 cable is no longer acceptable for alterations, modifications, conversions, or new construction. (See § 110.01–3 of this chapter).

(b) Each cable constructed to IEC 92–3 or IEC 92–353 must meet the flammability requirements of IEC 332–3, Category A.

(c) Electrical cable that has a polyvinyl chloride insulation with a nylon jacket (Type T/N) must meet UL 1309 or must meet the requirements for polyvinyl chloride insulated cable in section 18 of IEEE Std 45. If meeting the requirements for polyvinyl chloride insulated cable in IEEE Std 45, section 18, the following exceptions apply—

(1) The thickness of the polyvinyl chloride insulation must meet UL 83 for type THWN wire;

(2) Each conductor must have a nylon jacket;

(3) The thickness of the nylon jacket must meet UL 83 for type THWN wire;

(4) The material of the nylon jacket must meet ASTM D 4066 (incorporated by reference, see § 110.10–1 of this chapter);

(5) The cable must have identification provided by a durable printing or embossing on the cable jacket or a marker under the cable jacket that gives, at intervals not exceeding 610 mm (24 inches), the information required by section 18.8 of IEEE Std 45; and

(6) Type T (T/N) insulations are limited to a 75° C maximum conductor temperature rating.

(d) Electrical cable regardless of construction must meet, at a minimum, all of the performance and marking requirements of section 18 of IEEE Std 45.

(e) Medium voltage electric cable must meet the requirements of IEEE Std 45 and UL 1072, where applicable, for cables rated above 5,000 volts.

(f) Direct current electric cable, for industrial applications only, may be applied in accordance with IADC-DCCS-1/1991.

[CGD 94–108, 61 FR 28280, June 4, 1996, as amended at 62 FR 23908, May 1, 1997; USCG 1999–5151, 64 FR 67182, Dec. 1, 1999; USCG–1999–6096, 66 FR 29911, June 4, 2001]