than 169.92 cubic meters (6000 cubic feet).

(3) A space with a gross volume exceeding 169.92 cubic meters (6000 cubic feet) must be fitted with a manually actuated and alarmed fixed gas fire extinguishing system.

(c) *General requirements.* (1) A fixed gas fire extinguishing system aboard a vessel must be approved by the Commandant and be custom engineered, unless the system meets the requirements for a pre-engineered fixed gas fire extinguishing system in paragraph (d) of this section.

(2) System components must be listed and labeled by an independent, nationally recognized testing laboratory for the system being installed.

(3) System design and installation must be in accordance with the Manufacturer's Marine Design, Installation, Operation, and Maintenance Manual approved for the system by the Commandant.

(4) A fixed gas fire extinguishing system may protect more than one space. The quantity of extinguishing agent must be at least sufficient for the largest space protected by the system.

(d) *Pre-engineered fixed gas fire extinguishing systems.* (1) A pre-engineered fixed gas fire extinguishing system must:

(i) Be approved by the Commandant;

(ii) Be capable of manual actuation from outside the space in addition to any automatic actuation devices; and

(iii) Automatically shut down all power ventilation systems serving the protected space and all engines that draw intake air from within the protected space.

(2) A vessel on which a pre-engineered fixed gas fire extinguishing system is installed must have the following equipment at the operating station:

(i) A visual alarm to indicate the discharge of the extinguishing agent;

(ii) An audible alarm to sound upon discharge of the extinguishing agent; and

(iii) A means to reset devices used to automatically shut down ventilation systems and engines as required by paragraph (d)(1)(iii) of this section.

[CGD 88–079, 56 FR 40393, Aug. 14, 1991, as amended by CGD 96–046, 61 FR 57275, Nov. 5, 1996]

§ 28.325 Fire detection systems.

(a) Each accommodation space must be equipped with an independent modular smoke detector or a smoke actuated fire detecting unit installed in accordance with 46 CFR part 76, subpart 76.33.

(b) An independent modular smoke detector must meet UL 217 and be listed as a ''Single Station Smoke Detector—Also suitable for use in Recreational Vehicles.''

§ 28.330 Galley hood and other fire protection equipment.

(a) Each vessel must be fitted with a grease extraction hood complying with UL 710 above each grill, broiler, and deep fat fryer.

(b) Each grease extraction hood must be equipped with a pre-engineered dry or wet chemical fire extinguishing system meeting the applicable sections of NFPA 17 or 17A and must be listed by an independent laboratory.

(c) A vessel 79 feet (24 meters) or more in length must have at least one fire axe located in or adjacent to the operating station.

§ 28.335 Fuel systems.

(a) *Applicability.* Except for the components of an outboard engine or portable bilge pump, each vessel must meet the requirements of this section.

(b) *Portable fuel systems.* Portable fuel systems including portable tanks and related fuel lines and accessories are prohibited except where used for outboard engines or portable bilge pumps. The design, construction, and stowage of portable tanks and related fuel lines and accessories must meet the requirements of ABYC H–25.

(c) *Fuel restrictions.* Except for outboard engines, the use of fuel other than bunker C or diesel is prohibited. An installation using bunker C must comply with the requirements of subchapter F of this chapter.

(d) *Vent pipes for integral fuel tanks.* Each integral fuel tank must meet the requirements of this paragraph.

(1) Each fuel tank must be fitted with a vent pipe connected to the highest point of the tank terminating in a 180 degree (3.14 radians) bend on a weather deck and fitted with a flame screen.

(2) Except where provision is made to fill a tank under pressure, the net cross-sectional area of the vent pipe for a fuel tank must not be less than 0.484 square inches (312.3 square millimeters).

(3) Where provision is made to fill a tank under pressure, the net cross-sectional area of the vent pipe must not be less than that of the fill pipe.

(e) *Fuel piping*. Except as permitted in paragraph (e)(1) and (e)(2) of this section, each fuel line must be seamless and must be of steel, annealed copper, nickel-copper, or copper-nickel. Each fuel line must have a wall thickness of not less than that of 0.035 inch (0.9 millimeters) except that:

(1) Aluminum piping is acceptable on an aluminum hull vessel provided it is installed outside the machinery space and is at least Schedule 80 in thickness; and

(2) Nonmetallic flexible hose is acceptable but must—

(i) Not be used in lengths of more than 30 inches (0.82 meters);

(ii) Be visible, easily accessible, and must not penetrate a watertight bulkhead;

(iii) Be fabricated with an inner tube and a cover of synthetic rubber or other suitable material reinforced with wire braid.

(iv) Be fitted with suitable, corrosion resistant, compression fittings; and

(v) Be installed with two clamps at each end of the hose, if designed for use with clamps. Clamps must not rely on spring tension and must be installed beyond the bead or flare or over the serrations of the mating spud, pipe, or hose fitting.

(f) A fuel line subject to internal head pressure from fuel in the tank must be fitted with a positive shutoff valve located at the tank which is operable from a safe location outside the space in which the valve is located.

(g) A vessel less than 79 feet (24 meters) in length may comply with one of the following standards in lieu of the requirements of paragraphs (e) and (f) of this section.

(1) ABYC H–33.

(2) Chapter 5 of NFPA 302.

(3) 33 CFR Chapter I, subchapter S (Boating Safety).

§ 28.340 Ventilation of enclosed engine and fuel tank spaces.

(a) *Applicability*. Each vessel with a gasoline outboard engine or gasoline storage tank must comply with the requirements of this section.

(b) *Ventilation of spaces containing gasoline*. Each space that contains a gasoline engine, a gasoline storage tank, or gasoline piping connected to an integral gasoline tank must be open to the atmosphere and so arranged as to prevent the entrapment of vapors or be ventilated by a mechanical exhaust system with a nonsparking fan. The fan motor must comply with 46 CFR 111.105–23.

(c) *Alternative standards*. A vessel less than 65 feet in length with ventilation installations in accordance with NFPA 302, chapter 2, section 2–2, or ABYC H–2 and 33 CFR part 183, subpart K, will be considered as meeting the requirements of this section.

§ 28.345 Electrical standards for vessels less than 79 feet (24 meters) in length.

(a) A vessel less than 79 feet (24 meters) in length with an alternating current electrical distribution system may comply with the requirements of ABYC E–8 and either paragraph (c) or (d) of this section, as applicable, in lieu of meeting the requirements of §§ 28.350 through 28.370.

(b) A vessel less than 79 feet (24 meters) in length with a direct current system may comply with the requirements of ABYC E–1, ABYC E–9, and either paragraph (c) or (d) of this section, as applicable, in lieu of meeting the requirements of §§ 28.350 through 28.370.

(c) In addition to paragraph (a) or (b) of this section, the vessel may comply with the requirements of NFPA 302, chapters 7 and 8.

(d) In addition to paragraph (a) or (b) of this section, the vessel may comply with the requirements of 33 CFR part 183, subpart I and § 28.370.