

through 193.10-15 insofar as the number and general type of equipment is concerned.

(b) Existing equipment, except firehose nozzles and low-velocity water spray applicators, previously approved but not meeting the applicable requirements of §§193.10-5 through 193.10-15, may be continued in service so long as they are maintained in good condition to the satisfaction of the Officer in Charge, Marine Inspection. Minor repairs, alterations, and replacements may be permitted to the same standards as the original installations. However, all new installations or major replacements must meet the applicable requirements in this subpart for new installations.

(c) Vessels must comply with the general requirements of §193.10-5 (c) through (g), §193.10-10 (d) through (m), and §193.10-15 insofar as is reasonable and practicable.

(d) Each firehose nozzle must meet §193.10-10(i), and each low-velocity water spray applicator must meet §193.10-10(j).

[CGD 95-027, 61 FR 26013, May 23, 1996]

Subpart 193.15—Carbon Dioxide Extinguishing Systems, Details

§ 193.15-1 Application.

(a) The provisions of this subpart shall apply to all new installations contracted for on or after March 1, 1968.

(b) Installations contracted for prior to March 1, 1968, shall meet the requirements of §193.15-90.

(c) The requirements of this subpart are based on a "high pressure system," i.e., one in which the carbon dioxide is stored in liquid form at atmospheric temperature. Details for "low pressure systems," i.e., those in which the carbon dioxide is stored in liquid form at a continuously controlled low temperature, may be specifically approved by the Commandant where it is demonstrated that a comparable degree of safety and fire extinguishing ability is achieved.

§ 193.15-5 Quantity, pipe sizes, and discharge rates.

(a) *General.* The amount of carbon dioxide required for each space shall be as determined by paragraphs (b) through (d) of this section.

(b) *Total available supply.* A separate supply of carbon dioxide need not be provided for each space protected. The total available supply shall be at least sufficient for the space requiring the greatest amount.

(c) *Enclosed ventilation systems for rotating electrical propulsion equipment.* (1) The number of pounds of carbon dioxide required for the initial charge shall be equal to the gross volume of the system divided by 10 for systems having a volume of less than 2,000 cubic feet, and divided by 12 for systems having a volume of 2,000 cubic feet or more.

(2) In addition to the amount required by paragraph (c)(1) of this section there shall be sufficient carbon dioxide available to permit delayed discharges of such quantity as to maintain at least a 25-percent concentration until the equipment can be stopped. If the initial discharge is such as to achieve this concentration until the equipment is stopped, no delayed discharge need be provided.

(3) The piping for the delayed discharge shall not be less than ½-inch standard pipe, and no specific discharge rate need be applied to such systems. On small systems, this pipe may be incorporated with the initial discharge piping.

(4) The piping for the initial charge shall be in accordance with Table 193.15-5(d)(4), and the discharge of the required amount shall be completed within 2 minutes.

(d) *Machinery spaces, paint lockers, tanks, chemical storerooms, and similar spaces.* (1) Except as provided in paragraph (d)(3) of this section, the number of pounds of carbon dioxide required for each space shall be equal to the gross volume of the space divided by the appropriate factor noted in Table 193.15-5(d)(1). If fuel can drain from the compartment being protected to an adjacent compartment, or if the compartments are not entirely separate, the requirements for both compartments

shall be used to determine the amount of carbon dioxide to be provided. The carbon dioxide shall be arranged to discharge into both such compartments simultaneously.

TABLE 193.15-5(d)(1)
[Gross volume of compartment, cubic feet]

Over	Not over	Factor
.....	500	15
500	1,600	16
1,600	4,500	18
4,500	50,000	20
50,000	22

(2) For the purpose of the requirements of this paragraph, the volume of the machinery space shall be taken as exclusive of the normal machinery casing unless the boiler, internal combustion machinery, or fuel oil installations extend into such space, in which case the volume shall be taken to the top of the casing or the next material reduction in casing area, whichever is lower. "Normal machinery casing" and "material reduction in casing area" shall be defined as follows:

(i) By "normal machinery casing" shall be meant a casing the area of which is not more than 40 percent of the maximum area of the machinery space.

(ii) By "material reduction in casing area" shall be meant a reduction to at least 40 percent of the casing area.

(3) For vessels on an international voyage contracted for on or after May 26, 1965, the amount of carbon dioxide required for a space containing propulsion boilers or internal combustion propulsion machinery shall be as given by paragraphs (d)(1) and (2) of this section or by dividing the entire volume, including the casing, by a factor of 25, whichever is the larger.

(4) Branch lines to the various spaces shall be as noted in Table 193.15-5(d)(4).

TABLE 193.15-5(d)(4)

Maximum quantity of carbon dioxide required, pounds	Minimum pipe size, inches
100	1/2
225	3/4
300	1
600	1 1/4
1,000	1 1/2
2,450	2
2,500	2 1/2
4,450	3

TABLE 193.15-5(d)(4)—Continued

Maximum quantity of carbon dioxide required, pounds	Minimum pipe size, inches
7,100	3 1/2
10,450	4
15,000	4 1/2

(5) Distribution piping within the space shall be proportioned from the supply line to give proper distribution to the outlets without throttling.

(6) The number, type, and location of discharge outlets shall be such as to give a uniform distribution throughout the space.

(7) The total area of all discharge outlets shall not exceed 85 percent nor be less than 35 percent of the normal cylinder outlet area or the area of the supply pipe, whichever is smaller. The nominal cylinder outlet area in square inches shall be determined by multiplying the factor 0.0022 by the number of pounds of carbon dioxide required, except that in no case shall this outlet area be less than 0.110 square inch.

(8) The discharge of at least 85 percent of the required amount of carbon dioxide shall be complete within 2 minutes.

§ 193.15-10 Controls.

(a) Except as noted in §193.15-20(b), all controls and valves for the operation of the system shall be outside the space protected and shall not be located in any space that might be cut off or made inaccessible in the event of fire in any of the spaces protected.

(b) If the same cylinders are used to protect more than one hazard, a manifold with normally closed stop valves shall be used to direct the carbon dioxide into the proper space. If cylinders are used to protect only one hazard, a normally closed stop valve shall be installed between the cylinders and the hazard except for systems of the type indicated in §193.15-5(d) which contain not more than 300 pounds of carbon dioxide.

(c) One of the stations controlling the system for the main machinery space and the chemical storerooms shall be located as convenient as practicable to one of the main escapes from these spaces. All control stations and the individual valves and controls shall