PART 57—MAIN AND AUXILIARY MACHINERY

CONTENTS

AUTHORITY: The provisions of this Part 57 issued under R.S. 4405, as amended, 4462, as amended; 46 U.S.C. 375, 416. Interpret or apply R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4417a, as amended, 4418, as amended, 4421, as amended, 4426-4431, as amended, 4433, as amended, 4434, as amended, 4453, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 391a, 392, 399, 404-409, 411, 412, 435, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.; Treasury Department Orders 120, July 31, 1950, 15 F.R. 6521; 167-14, Nov. 26, 1954, 19 F.R. 8026; 167-20, June 18, 1956, 21 F.R. 4894; CGFR 56-28, July 24, 1956, 21 F.R. 5659; 167-38, Oct. 26, 1959, 24 F.R. 8857, unless otherwise noted.

SUBPART 57.01—GENERAL REQUIREMENTS

57.01-1 Scope. (*a*) The regulations in this part contain requirements for the design and construction of main and auxiliary machinery installed on vessels subject to inspection by the Coast Guard, except as otherwise prescribed in this subchapter.

57.01-5 Applicable standards. In general the applicable standards established by the American Bureau of Shipping may be considered as standard for the design, construction, and testing of main and auxiliary machinery, except as modified in this subchapter.

57.01-10 Fuel for internal combustion engines on passenger vessels. (*a*) All internal combustion engines, whether used for main propulsion or auxiliaries, installed on passenger vessels exceeding 100 gross tons, or on all passenger vessels engaged in international voyages, shall be driven by fuel having a flashpoint exceeding 110 degrees F.

57.01-15 Fuel oil for boilers. Oil to be used as fuel to be burned under boilers on vessels subject to inspection by the Coast Guard shall have a flashpoint of not less than 150 degrees F. (Closed cup test.)

SUBPART 57.05—MAIN PROPULSION MACHINERY

57.05-1 Material, design and construction. The material, design, construction and workmanship of main and auxiliary machinery shall be at least equivalent to the standards established by the American Bureau of Shipping or other recognized classification society.

57.05-5 Astern power. (*a*) All vessels shall have sufficient power for going astern to secure proper control of the ship in all normal circumstances.

SUBPART 57.10—INTERNAL COMBUSTION ENGINE INSTALLATIONS

57.10-1 Scope. The requirements in this subpart apply to all vessels subject to inspection. The requirements governing the installation of internal combustion engines on motorboats and motor vessels of more than 15 gross tons carrying passengers for hire shall be effective on new vessels or vessels converted to passenger service for the first time, the construction of which is commenced on or after December 1, 1945, and to all existing vessels as far as it is practicable.

57.10-5 Gasoline engine installations—(a) Engine design. All installations shall be of marine type engines suitable for the intended service, designed and constructed in conformance with the requirements of this subchapter.

(b) Carburetors. (1) Drip collectors shall be fitted under all carburetors, except the downdraft type, to prevent fuel leakage from reaching the bilges and so arranged as to permit ready removal of such fuel leakage. Drip collectors shall be covered with flame screens.

(2) All gasoline engines shall be equipped with an approved means of backfire flame control. Installations of backfire flame arresters or engine air and fuel induction systems bearing basic Approval No. 162.015 may be continued in use as long as they are serviceable and in

good condition. Backfire flame arresters or engine air and fuel induction systems installed or used on new installations or as replacements shall be of an approved type, design, construction, and tested in conformance with applicable requirements in Subpart 162.041 or 162.042 of Subchapter Q (Specifications) of this chapter. Air intakes shall be so directed that backfire cannot blow down into the bilge.

(c) Exhaust manifold. The exhaust manifold shall either be water-jacketed and cooled by discharge from a pump which operates whenever the engine is running, or woodwork within nine inches shall be protected by ¼-inch asbestos board covered with not less than No. 22 USSG galvanized sheet iron or nonferrous metal. A dead air space of ¼ inch shall be left between the protecting asbestos and the wood, and a clearance of not less than two inches maintained between the manifold and the surface of such protection.

(d) Exhaust pipe. (1) The exhaust pipe shall be gastight and the installation shall comply with one of the following requirements:

(i) All of the engine cooling water shall be discharged through the exhaust pipe when water cooled and shall enter the exhaust pipe at a point as near to the manifold as practicable.

(ii) A length of not less than 12 diameters of the exhaust pipe adjacent to the manifold shall be water-jacketed and cooled in the same manner as the manifold. The remainder of the pipe shall be kept clear of internal woodwork at least 1½ inches.

(iii) Woodwork within six inches of any part of the exhaust pipe shall be protected by ¼-inch asbestos board covered with not less than No. 22 USSG galvanized sheet iron or nonferrous metal. A dead air space of ¼ inch shall be left between the protecting asbestos and the wood, and a clearance of not less than ½ of its diameter shall be maintained between the pipe and the surface of such protection.

(2) In all of the above cases described in Subparagraph (1) of this paragraph, the exhaust pipe shall be properly supported by noncombustible hangers or blocks and protective gratings shall be provided at such locations where persons or gear might come in contact therewith. Arrangements shall be made to provide access to the exhaust pipe throughout its length. A spark arrester shall be installed in each exhaust line.

(3) Where exhaust lines pass through watertight bulkheads, noncombustible packings shall be installed. Exhaust piping shall be led to the point of escape without traps and with a minimum number of bends or elbows in order to reduce the effect of back pressure.

(4) Where flexibility is necessary, a section of flexible metallic hose may be used. Suitable non-metallic hose may be used if the exhaust is watercooled.

57.10–10 Diesel engine installations. (*a*) The requirements of Paragraphs 57.10–5 (*a*), (*c*) and (*d*) shall apply to diesel engine installations.

(*b*) On installations of engines of the semi-diesel or hot-bulb type, woodwork within three feet of starting torches shall be protected by at least ¼-inch asbestos board covered with sheet metal and a dead airspace of at least ¼ inch between the asbestos board and the wood.

57.10–15 Gas turbine installations. (*a*) The design, construction, workmanship and tests of gas turbines and their associated machinery shall be at least equivalent to the standards of the American Bureau of Shipping or other recognized classification society.

(*b*) The materials used for gas turbine installations shall have properties suitable for the intended service. When materials not conforming to standard A.S.T.M. specifications are employed, data concerning their properties including high temperature strength data where applicable, shall be furnished.

(*c*) (1) Gas turbine exhaust piping will be considered to be Class II piping under the provisions of Section 55.01–1 of this subchapter, except for installations where the exhaust pressure exceeds 150 p.s.i., such as in closed cycle systems. Where exhaust ducting is employed, the drawings and design data shall be submitted to substantiate its suitability and safety for the intended service.

(2) Where considered necessary, gas turbines and associated exhaust systems shall be suitably insulated or cooled, by means of lagging, water jacketing, water spray, or a combination thereof.

(3) Where specifically approved by the Commandant, exhaust lines of gas turbines may be interconnected with boiler uptakes, provided dampers or other suitable devices are provided to prevent backflow of boiler exhaust gases into the turbine.

(*d*) The air inlet shall be designed and equipped as necessary for the safety of personnel and to prohibit the entrance of harmful foreign material, including water, into the system.

(*e*) The noise level in the vicinity of any part of the installation shall be kept at or below the levels as prescribed in Department of the Navy, Bureau of Ships' Specifications, Section S1–10, or other approved standards.

(*f*) Means shall be provided for circulating air, either natural or forced, through the engine compartment for cooling and ventilation.

(g) (1) The control system shall be designed for automatic shutdown of the engine under the following conditions:

(i) Overspeed.

(ii) Excessive exhaust gas temperature.

(iii) Excessive lubricating oil temperature.

(iv) Low lubricating oil pressure.

(2) Audible or visible alarms shall be provided in the gas temperature control system and in the lubricating oil control system. Such alarms shall be actuated prior to or upon automatic shutdown.

(3) A remote, manually operated shutdown device shall be provided. Such device may be totally mechanical or may be electrical with a manually actuated switch.

(h) Drawings and design data of the following components shall be submitted to substantiate their suitability and safety for the service intended:

(1) Combustion chamber.

(2) Regenerator or recuperator.

(3) Casing or piping conveying the gas from the combustion device to the gas turbine.

(i) Gas turbine fuel systems shall meet, in general, the requirements of Part 55 of this subchapter.

SUBPART 57.20—REFRIGERATING MACHINERY

57.20–1 Installation of refrigerating machinery. (a) Where refrigerating machines are installed in which anhydrous ammonia is used as a refrigerant, such machines shall be located in a well-ventilated, isolated compartment, preferably on the deck, but in no case shall it be permissible to install such machines in the engineroom space unless it is vented and isolated so as to eliminate any hazard from gas escaping to the engineroom. Absorptiou machines using a solution of aqua ammonia and machines using carbon anhydride (CO_2 gas) are exempt from this requirement, provided the maximum charges that might be released in the event of breakage do not exceed 300 pounds.

(b) Machinery compartments containing equipment for ammonia shall be fitted with a sprinkler system providing an effective water spray and having a remote control device located outside the compartment.

(c) All refrigeration compressor spaces shall be effectively ventilated and drained and shall be separated from the insulated spaces by watertight bulkhead, unless otherwise approved.

57.20–5 Small portable, self-contained units. The requirements of this subpart shall not apply to small, portable, self-contained units.

SUBPART 57.25—STEERING APPARATUS

57.25–1 Steering apparatus; existing installations. (a) All existing vessels subject to inspection by the Coast Guard shall be provided with suitable steering apparatus. Extra steering apparatus consisting of relieving cables, or of auxiliary power- or hand-steering gear attached to the rudder stock independent of the regular steering gear, shall be provided.

(b) Replacements of steering apparatus on existing vessels shall be in accordance with this subpart for new installations.

57.25–5 Steering apparatus; new installations. (a) All new vessels snbject to inspection by the Coast Guard, except certain towed barges, shall be provided with main and auxiliary steering apparatus in accordance with Sections 57.25–10 to 57.25–70, inclusive.

(b) The main steering gear shall be of adequate strength and of sufficient capacity to steer the vessel at maximum service speed. The main steering gear and rudder stock shall be so designed that they are not damaged at maximum astern speed.

(c) The auxiliary steering gear shall be independent of the main steering gear and shall be of adequate strength and of sufficient capacity to steer the vessel at navigable speed and capable of being brought speedily into action in au emergency.

(d) When the steering gear is power operated, the exact position of the rudder shall be indicated at the main steering station.

57.25–10 Rudder movement. (a) The main steering gear shall be capable of putting the rudder over from 35 degrees on one side to 35 degrees on the other side with the vessel running ahead at the maximum continuous rated shaft R.P.M. The timing may be conducted from 35 degrees on one side through 30 degrees on the other side, and the average rate of the rudder shall be not less than $2\frac{1}{3}$ degrees per second.

(b) The auxiliary steering gear where power-driven shall be capable of putting the rudder over from 15 degrees on one side to 15 degrees on the other side in 60 seconds with the vessel running ahead at half speed, or 7 knots, whichever is greater.

57.25–15 Plan approval. (a) General arrangement plans of the main and auxiliary steering arrangements and piping systems shall be submitted to the Commandant (MMT), U.S. Coast Guard, Washington, D.C., 20226, for approval.

57.25–20 Power-driven steering gear. (a) The main steering gear shall be power-driven for vessels over 250 feet in length or when the

required upper rudder stock diameter is over 9 inches. However, power-driven main steering gear shall be required for any vessel where the hand steering gear is not considered capable of effectively complying with the requirements of Section 57.25–10.

(*b*) The auxiliary steering gear shall be power-driven when the required upper rudder stock diameter is over 9 inches for passenger vessels and over 14 inches for cargo vessels.

57.25–25 Auxiliory means of steering. (*a*) An auxiliary means of steering will not be required where the main gear is of the dual-power hydraulic type, having two independent pumps and connections and separate leads to the pump prime movers from the source of power, and each independent steering gear power-unit has the required capacity for a main steering gear in order to meet the requirements of Paragraph 57.25–10(a). In such cases the attachment to the rudder stock shall be designed for strength in excess of that of the rudder stock.

(*b*) A suitable arrangement of block and tackle will be acceptable as an auxiliary steering means, and when arranged for operation by means of power-driven winches or similar machinery, will be considered an auxiliary power steering gear.

(*c*) An auxiliary means of steering will not be required on double-ended ferryboats where independent steering gears are fitted at each end of the vessel, and two sources of power are provided where the gear is power-driven.

57.25–30 Steadying the rudder. (*a*) All ocean-going vessels requiring power gears shall be provided with arrangements for steadying the rudder in the event of an emergency and when a change of gear is required. On hydraulic type steering gears a suitable arrangement of stop valves in the main piping may be considered as a means of steadying the rudder.

57.25–35 Rudder stops. (*a*) Main power steering gear shall be provided with positive arrangements for stopping the gear before the rudder stops are reached. These arrangements shall be synchronized with the rudder stock or the position of the gear itself, rather than with the steering gear control system.

(*b*) Strong and effective rudder stops are to be fitted. Where adequate positive stops are provided within the gear, structural stops will not be required.

57.25–40 Buffers. (*a*) On vessels in ocean, coastwise, and Great Lakes service, steering gears other than the hydraulic type shall be designed with suitable buffer arrangements to relieve the gear from shocks to the rudder.

57.25–45 Pilothouse steering gear controls. (*a*) Control of the main steering gear shall be provided from the pilothouse by mechanical, hydraulic, electrical, or other approved means. The arrangement of the control system and steering gear components shall provide full followup control of the rudder. Supplementary steering control not employing full followup may also be provided from the pilothouse.

(*b*) Any power required for the pilothouse steering control systems shall be supplied from the steering gear room. Means shall be provided in the steering gear room to disconnect the steering control system from the power source.

57.25–50 Alternative steering station steering gear controls. (*a*) An alternative steering station shall be provided from which control of the main steering gear can be effected by mechanical, hydraulic, electrical, or other approved means. The alternative steering station shall be located on the after weather deck unless duplicate pilothouse control means are provided in accordance with Section 57.25–55. The arrangement of the alternative steering control system and the steering gear components shall provide full followup control of the rudder unless a suitable rudder angle indicator is provided at the alternative steering station.

(*b*) Means shall be provided to enable orders to be transmitted from the pilothouse to the alternative steering station.

(*c*) Components of the alternative steering station control system shall be completely separate and independent of the pilothouse steering control system. The shafting, piping, or electrical cable associated with the control means at the alternative steering stations shall be run as widely separated as practicable from the shafting, piping, or electrical cable of the pilothouse steering control systems.

(*d*) Any power required for the alternative steering control means shall be supplied from the steering gear room. Means shall be provided in the steering gear room to disconnect the alternative steering means from the source of power and, if necessary, from the associated steering gear.

(*e*) Where it is not practicable to comply with the requirements of this section because of the arrangement of the vessel or the type of steering gear installed, other types of steering gear control systems may be considered. Such systems shall provide steering gear control equivalent to that required by this section. Ease of maintenance, accessibility, and location and arrangement of components, as well as the type of control system, will be among the factors evaluated when determining equivalency.

57.25–55 Duplicate pilothouse steering gear controls systems. (*a*) Two separate and independent steering control systems shall be provided for controlling the steering gear from the pilothouse when the alternative steering means is not located on the after weather deck.

(*b*) Duplicate pilothouse steering gear controls, when installed, shall comply with the following requirements:

(1) Where the steering gear is power-driven, the arrangements of the equipment shall be such that full followup control of the rudder is provided with either of the control systems in use. Supplementary steering control not employing followup may be incorporated.

(2) Means shall be provided in the pilothouse to select either of the two control systems to be in control of the rudder. An "off" position which will disconnect power to both systems may be provided in the pilothouse. Interlocks shall be provided for this control system selector so that only one may be in use at a time.

(3) Any power required for the pilothouse steering control systems shall be supplied from the steering gear room. Means shall be provided in the steering gear room to disconnect remote steering gear control systems from the source of power.

(4) The shafting, piping, or electric cables of the two pilothouse steering control systems shall be run as widely separated as practicable throughout their length between the pilothouse and the steering gear room.

(*c*) Where only the main steering gear is power-driven, arrangements shall be such that either steering control system may be connected to control the main steering gear. Where both the main and auxiliary steering gears are power-driven, one steering control system shall control the main steering gear and the other shall control the auxiliary steering gear.

(*d*) For dual-power hydraulic type steering gears, of such a type that an auxiliary means of steering is not required, one control system shall control one hydraulic unit and the other control system shall control the other hydraulic unit.

57.25–60 Arrangement of steering wheels. (*a*) Steering wheels, including "trick wheels" which are used as the alternative steering means, shall turn in a clockwise direction for "right rudder" and counterclockwise for "left rudder." The ship's heading shall be to the right, following clockwise movement of the wheel.

(*b*) The arrangement of steering stations shall be such that the helmsman is abaft the wheel. However, if a wheel is fitted in the steering gear room, and is intended solely for warming up and testing the gear, the helmsman need not stand abaft the wheel. The rims of the wheels shall be plainly marked with arrows and lettering for right and for left rudder, or a suitable notice indicating these directions shall be posted directly in the helmsman's line of vision.

57.25–65 Special steering apparatus. (*a*) Where no regular rudder is fitted and steering action is obtained by a change of setting of the propelling unit, auxiliary steering is not required, nor will the requirements of this subpart be generally applicable. Special consideration will be given by the Commandant for such installations.

(*b*) When tiller bars instead of wheels are installed in the pilothouse, they shall be fore and aft when the rudders are amidships. A pointer shall be fitted to the forward end of the bar which shall point directly ahead when the rudders are amidships, and shall point to the right when the bow of the ship moves to the right, and shall point to the left when the bow of the ship moves to the left.

57.25–70 Steering gear piping. (*a*) The arrangement of piping for hydraulic steering gears shall be such that a change from the main to the auxiliary gear can be readily effected.

(*b*) A relief valve shall be provided for the protection of the hydraulic system.

(*c*) Pressure piping shall meet the requirements of Part 55 of this subchapter.

SUBPART 57.30—NUCLEAR ENERGY

AUTHORITY NOTE: The provisions of this Subpart 57.30 also interpret or apply R.S. 4472, as amended, sec. 2, 23 Stat. 118, as amended, secs. 2, 633, 63 Stat. 496, 545; 46 U.S.C. 170, 2, 14 U.S.C. 2, 633. Treasury Department Order 167–17, June 29, 1955, 20 F.R. 4976.

57.30–1 Scope. (*a*) The requirements in this subpart apply to all installations, systems, and components thereof, utilizing nuclear energy for propulsion or for any other purpose, or handling radioactive materials other than as cargo.

(*b*) The regulations covering the transportation and handling of radioactive materials as cargo are contained in Part 146 of Subchapter N (Dangerous Cargoes) of this chapter.

57.30–5 Definitions. (*a*) The term "nuclear vessel" means any vessel in which power for propulsion, or for any other purpose, is derived from nuclear energy; or any vessel handling or processing substantial amounts of radioactive material other than as cargo.

(*b*) The term "nuclear energy" means all forms of energy released by nuclear fission or radioactive decay, or by any other form of nuclear transformation.

(*c*) The term "radioactive material" means any material or combination of materials that spontaneously emits ionizing radiation.

57.30–10 General safety requirements. (*a*) The reactor installation shall be designed to take into account the special conditions of service on board the vessel both in normal and exceptional circumstances of operation.

(*b*) Prior to the issuance of a certificate of inspection by the U.S. Coast Guard for a nuclear vessel, it shall be shown to the satisfaction of the Commandant that:

(1) The vessel provides a degree of safety for the non-nuclear portion at least equivalent to the relevant requirements prescribed in this chapter for a conventionally-powered ocean-going passenger vessel of similar size, capacity, and tonnage. In this respect components and systems such as watertight subdivision, stability, fire protection, bilge pumping arrangements, fire extinguishing arrangements, electrical installations, steering gear, astern power, and navigational aids will be evaluated in order to provide for the maximum practicable safety for the vessel.

(2) The vessel complies with such additional requirements as may be prescribed by the Commandant and with the requirements of the Atomic Energy Commission.

(3) The desigu, construction and operation of the vessel do not create an unreasonable radiation, or other hazard, at sea or in port, to the crew, passengers, or public or to the waterways or food or water supply.

(4) The nuclear systems or components thereof are provided with means for preventing the uncontrolled release of hazardous amounts of radioactive material to normally accessible spaces or to the ship's environment in the event of accident or malfunctioning of the nuclear system.

(5) The vessel has standby and emergency components essential to its safe operation in order to provide maximum protection in the event of an accident or malfunctioning of the nuclear system.

(*c*) A license or other certificate issued by the Atomic Energy Commission may be accepted by the Commandant as evidence that the vessel complies with the requirements of the Atomic Energy Commission and subparagraph (*b*) (3) and (4) of this section.

57.30–15 Special operating procedures. (*a*) In addition to the requirements specified in this chapter, all nuclear vessels may be subject to additional requirements governing fueling, startup, and operation.

57.30–20 Inspection, overhaul, and repairs. (*a*) Every nuclear vessel subject to the regulations in this subchapter shall be inspected by the U.S. Coast Guard at least annually to ascertain that the hull, nuclear systems, machinery, equipment, appliances, etc., of the vessel comply with the regulations in this chapter.

(*b*) In addition to the requirements for inspection, test, overhaul and repair specified in this chapter, nuclear vessels may be subject to such additional requirements as may be prescribed by the Commandant for inspection, test, overhaul and repair.

57.30–25 Radiation protection. (*a*) The Standards for Protection Against Radiation set forth in 10 CFR Part 20 will be the radiation protection standards followed by the U.S. Coast Guard, except as otherwise provided for by law.

57.30–30 Safety assessment. (*a*) A "Safety Assessment" shall be prepared to permit evaluation of the nuclear powerplant and safety of the vessel to ensure compliance with Subparagraph 57.30–10(*b*)(3).

(*b*) The "Safety Assessment" shall be submitted to the Commandant for approval and shall always be kept up-to-date.

(*c*) The "Safety Assessment" will be used as a basis for establishing orderly negotiations between the United States and governments of countries which a nuclear vessel intends to visit to permit entry of nuclear ships into ports of different countries.

57.30–35 Operating Manual. (*a*) A fully detailed "Operating Manual" shall be prepared for the information and guidance of the operating personnel in their duties on all matters relating to the operation of the nuclear powerplant and having an important bearing on safety.

(*b*) The "Operating Manual" shall be submitted to the Commandant for approval and shall always be kept up-to-date.

(*c*) A copy of the "Operating Manual" shall be kept on board the vessel at all times.

PART 58—REPAIRS TO BOILERS, UNFIRED PRESSURE VESSELS AND APPURTENANCES

CONTENTS

AUTHORITY: The provisions of this Part 58 issued under R.S. 4405, as amended, 4462, as amended; 46 U.S.C. 375, 416. Interpret or apply R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4417a, as amended, 4418, as amended, 4421, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4453, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 391a, 392, 399, 404–409, 411, 412, 435, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp. Treasury Department Orders 120, July 31, 1950, 15 F.R. 6521; 167-14, Nov. 26, 1954, 19 F.R. 8026; 167-20, June 18, 1956, 21 F.R. 4894; CGFR 56-28, July 24, 1956, 21 F.R. 5659; 167-38, Oct. 26, 1959, 24 F.R. 8857.

SUBPART 58.01—GENERAL REQUIREMENTS

58.01-1 Scope. The regulations in this part apply to the repairs of all boilers, unfired pressure vessels and appurtenances subject to inspection by the Coast Guard.

58.01-5 Repairs, replacements, or alterations. (*a*) No repairs, replacements or alterations, except emergency repairs, etc., shall be made to machinery boilers, unfired pressure vessels, their mountings or internal fittings, safety valves, piping systems, or pressure appliances without prior approval by the Officer in Charge, Marine Inspection.

(*b*) Emergency repairs, replacements, or alterations shall be reported as soon as practicable to the Officer in Charge, Marine Inspection, at or nearest the first port where the vessel may call after such repairs are made.

(*c*) Repairs, replacements, or alterations to installations in service shall so far as practicable be made with materials and in the manner specified for new construction.

SUBPART 58.05—WELDING REPAIRS TO NEW PRESSURE VESSELS

58.05-1 Welding repairs when plate defects develop or are discovered during fabrication—(a) Cracked plates. Plates which crack during cold forming operations as a result of localized stress raisers such as sharp plate edges, minor localized surface imperfections, and fractures which subsequent microstructure shows to be caused by coarse grain size may be repaired if authorized by the Commandant. Prior to such repairs being authorized, information shall be furnished as follows:

(1) Heat treatment to be employed prior to undertaking repairs.

(2) Method of excavating defective material and type of groove to be employed.

(3) Method of examining excavation to insure that all defective material has been removed.

(4) Welding procedure to be employed in effecting the repair.

(5) Heat treatment to be employed during and after welding.

(6) Type of nondestructive test to be made to insure that repair is satisfactory.

(b) Laminations. Laminations or inclusions in the plate which initially appear in the heat affected zone during welding operations or appear during the drilling of tube holes may be repaired if authorized by the Commandant. Prior to such repairs being authorized information shall be furnished as follows:

(1) Method of excavating defective material and type of welding groove to be used if any.

(2) Method of examining excavation to insure that all defective material has been removed.

(3) Welding procedure to be employed in effecting repair.

(4) Heat treatment to be employed during and after welding.

(5) Type of nondestructive test to be made to insure that repair is satisfactory.

Subpart 58.10—Welding Repairs to Boilers and Unfired Pressure Vessels in Service

58.10–1 Scope. (*a*) Repairs to boilers or unfired pressure vessels in service may be performed by welding provided the welding meets the applicable requirements of Part 56 of this subchapter. No repairs by welding shall be made, except temporary emergency repairs, without the prior approval of the Officer in Charge, Marine Inspection. Emergency repairs shall be replaced with permanent repairs meeting the requirements of this subchapter when the vessel returns to a port in which an Officer in Charge, Marine Inspection, is located, except in the case of minor repairs which in the opinion of the Officer in Charge, Marine Inspection, do not materially affect the safety of the boiler or pressure vessel.

(*b*) Repair welding of power boilers not meeting requirements for Class I welded pressure vessels is prohibited unless the stress is carried by such other type(s) of construction complying with the requirements of this subchapter, and where the adequacy of the boiler design is not solely dependent upon the strength of the welds.

(*c*) Only welded repairs as specified in this subchapter are permitted on boilers and unfired pressure vessels. The welding repairs allowed by this subpart apply only to boilers and unfired pressure vessels fabricated of carbon steel. Welding repairs to boilers and unfired pressure vessels fabricated of alloy steel will be given special consideration by the Commandant. Such other method of repairs by means of welding not covered in this subchapter shall be referred to the Commandant and may be authorized by him if, in his opinion, it meets the intent of this subchapter.

58.10–5 Cracks. (*a*) Cracks extending from the calking edge of plates to the rivet holes of circumferential joints may be welded provided the cracks are veed out so that complete penetration of the weld metal is secured.

(*b*) Circumferential cracks from rivet hole to rivet hole in girth joints may be welded provided there are not more than three consecutive cracked ligaments nor more than a total of six cracked ligaments in any one girth joint.

(*c*) Cracks in staybolted plates may be welded provided they are located entirely within staybolted areas and the total length of any crack or series of consecutive cracks does not exceed two staybolt pitches.

(*d*) Cracks in plain, circular or Adamson ring or similar type furnaces may be welded provided any one crack does not exceed 12 inches in length and after completion the weld is stress-relieved as required by Section 56.01–70 of this subchapter. Cracks in corrugated furnaces may be repaired by welding provided any one crack does not exceed 20 inches in length.

(*e*) Fire cracks may be welded at riveted door openings extending from the edge of the plate, but not more than two inches beyond the centerline of the rivet holes.

(*f*) Cracks may be welded between tube holes in the shell of water-tube boiler drums, provided there are not more than two cracks in any one row in any direction, nor more than a total of four cracks in a drum, and further provided the welding meets the requirements of this subchapter for Class I welded pressure vessels and is approved by the Commandant.

(*g*) All cracks permitted to be repaired under this subpart shall be excavated to sound metal by grinding, flame gouging or chipping out the defective metal to form a clean welding groove. The first two methods of excavation are preferable. Either a V groove or U groove wherein complete penetration of the weld metal is secured may be used. After excavation is completed and prior to welding, the excavated area shall be examined by magnetic particle testing to insure that the entire crack was excavated. When the reverse side of the weld is accessible the root of the weld shall be chipped or ground out to insure a clean surface of the originally deposited metal and the resultant groove welded to obtain a sound weld having complete penetration. During welding a preheat of 200 degrees plus or minus 50 degrees F. shall be maintained by controlled temperature. For thicknesses exceeding ¾ inch, suitable U grooves should be employed. A welding sequence shall be used so as to equalize welding stresses.

(*h*) After cracks originating in tube or rivet holes are repaired by welding, the holes shall be properly reamed and the weld reinforcing ground flush with the plate in way of rivet heads.

(*i*) Flat tube sheets in fire-tube boilers which have corroded or where cracks exist in the ligaments may be repaired by welding.

(*j*) The welding repairs to drums of power boilers, except as otherwise permitted in this subpart, is prohibited.

58.10–10 Corroded surfaces. (*a*) Corroded surfaces in the calking edges of circumferential seams may be built up by welding to the original thickness under the following conditions:

(1) The thickness of the original metal to be built up between rivet holes and calking edge shall not be less than one-fourth of the diameter of the rivet hole, and the portion of the calking

edge to be thus reinforced shall not exceed 30 inches in length in a circumferential direction.

(2) In all repairs to circumferential seams by welding, the rivets shall be removed over the portions to be welded for a distance of at least six inches beyond the repaired portion.

(3) After repairs are made the rivet holes shall be reamed before the rivets are re-driven.

(*b*) It is not permissible to build up or reinforce a grooved or corroded area of unstayed internal surfaces by means of welding, except that widely scattered pit holes may be built up by welding.

(*c*) Where external corrosion has reduced the thickness of flat plates around hand holes to an extent of not more than 40 percent of the original thickness and for a distance not exceeding two inches from the edge of the hole, the plate may be built up by welding.

(*d*) Where stayed sheets have corroded to a depth not exceeding 40 percent of their original thickness, they may be reinforced or built up by welding. Where the staybolts are fitted with riveted heads, the staybolts in the reinforced area shall be renewed in accordance with the provisions of Subparts 52.30 and 52.35 of this subchapter, but where the staybolts are fitted with nuts, the nuts may be removed and after reinforcing has been applied, collars may be welded around the staybolts in lieu of the nuts. Such reinforced areas shall not exceed 400 square inches nor more than 30 inches in one direction. Two such areas in any one plate may be reinforced: *Provided*, That the distance between the reinforced surfaces is not less than 30 inches.

(*e*) When the corroded portion of a staybolted surface exceeds 400 square inches, it is permissible to repair the same by cutting out the defective portion and replacing it with a new plate, the edges of the new plate to be welded in position. In such cases, new staybolts shall be fitted in accordance with the requirements of Subparts 52.30 and 52.35 of this subchapter and where welding is performed through a line of staybolts, welded collars as required by Figure 52.35–1 of this subchapter shall be used to attach the staybolts.

58.10–15 Rivets and staybolts. (*a*) It is not permitted to reinforce or build up by welding the heads of rivets or staybolts that have deteriorated. Such rivets or staybolts shall be replaced. The seal welding of rivet heads to secure tightness is prohibited.

(*b*) Where leaks develop around staybolts which are otherwise in good condition, the nuts may be replaced with a beveled collar formed around the end of the stay by means of welding. In such cases, the depth of collar measured on the stay and the width measured on the plate, shall be equal to one-half the diameter of the staybolt. (See Figure 52.35–1 of this subchapter.)

58.10–20 Patches in shells and tube sheets. (*a*) Unreinforced openings in the shells or drums of boilers or pressure vessels, the diameter of which does not exceed the maximum diameter of an unreinforced opening, in accordance with Section 52.25–15 of this subchapter, may be closed by the use of a patch or plate inside the drum or shell and sealed against leakage by welding. Such plates shall have a diameter of at least two inches larger than the diameter of the hole and shall have a thickness equal to the thickness of the plate to which it is attached. It is not permissible to insert such patches in the shell or head flush with the surrounding plate unless the requirements of this subchapter for Class I welded pressure vessels are met.

(*b*) Portions of tube sheets which have deteriorated may be renewed by replacing the wasted portion with a new section. The ligaments between the tube holes may be joined by means of welding and staytubes, or other acceptable means of lowering the stress on the repaired section may be installed if in the judgment of the Officer in Charge, Marine Inspection, it is necessary.

(*c*) The edge preparation and preheat of butt-welded joints employed in the renewal of defective or corroded boiler plates shall comply with the requirements of Paragraph 58.10–5 (*g*).

58.10–25 Stayed areas. Welding repairs are permitted in staybolted areas or areas adequately stayed by other means so that should failure of the welds occur the stress will be carried by the stays. The welds shall be located entirely within staybolted areas which prohibit welds passing through the outer row of stays.

58.10–30 Seal welding. Where leaks occur in riveted joints or connections, they shall be carefully investigated to determine the cause. Such leaks may be made tight by seal welding the edge, if, in the opinion of the Officer in Charge, Marine Inspection, this will make a satisfactory repair.

58.10–35 Wrapper plates and back heads. Wrapper plates and back heads may be renewed in whole or repaired as follows:

(*a*) Wrapper plates or back heads shall be cut between two rows of staybolts or on a line of staybolts where the thickness is approximately the same as the original construction. If welding is employed on a line of staybolts, the staybolts shall be fitted with a welded collar as required in Figure 52.35–1 of this subchapter.

(*b*) The edges of wrapper plates riveted to tube sheets and back heads shall be removed by cutting out the rivets.

(*c*) The edges of existing plates and new plates shall be beveled by chipping, flame cutting, or grinding so as to form a suitable groove whereby complete penetration of the weld metal will be obtained. The edge preparation and preheat shall comply with the requirements of Paragraph 58.10–5(*g*).

(*d*) The edges of the new plate shall be butt-welded and the plate shall be riveted to the flanges of the tube sheet and back heads and the staybolts renewed.

(*e*) Sections of wrapper plates of combustion chambers outside of stayed areas may be repaired by welding provided the welded joints are stress-relieved by means of controlled heat and the joints are nondestructively tested.

SUBPART 58.15—MISCELLANEOUS BOILER REPAIRS

58.15–1 Furnace repairs. (*a*) Where corrugated or plain furnaces or flues are distorted 1½ inches or more, they shall be repaired by either of the following methods:

(1) The furnace shall be forced back to a true circular shape, and the Officer in Charge, Marine Inspection, may require strongbacks or other acceptable means of support to hold the furnace from future collapse, if in his opinion such support is necessary; or,

(2) The furnace shall be adequately stayed as found necessary in the judgment of the Officer in Charge, Marine Inspection.

(*b*) Distortion means the difference between any single measured diameter of the furnace and the diameter of a true circle at the same location. The diameter of the true circle may be taken as the original furnace diameter or may be determined by a means acceptable to the Officer in Charge, Marine Inspection.

(*c*) Where the distortion does not exceed 1½ inches it will not be necessary to force the furnace back to a true circle if the allowable pressure is reduced in the ratio of 1½ percent for each 1/10 of an inch of distortion. However, if the maximum distortion does not exceed one inch and the length of the distorted area is not more than three corrugations, or if the maximum distortion does not exceed ¾ inch for a length greater than three corrugations of distorted area, the repairs or reduction in pressure will not be required unless considered necessary by the marine inspector.

(*d*) When it becomes necessary to rivet a patch to a furnace or other part of the heating surface, the riveted patch shall be placed on the water side of the plate in order not to form a pocket in which sediment may collect.

(*e*) Furnace crowns which have become distorted, not in excess of the limitations provided in Paragraph (*c*) of this section, may be repaired by pumping back the distorted section to as nearly a true circle as possible and reinforcing the same by means of a ring, arc- or gas-welded to the distorted corrugation as shown in Figure 58.15–1(e), the welding to be done by qualified welders using acceptable welding electrodes in accordance with Section 56.01–20 of this subchapter.

58.15–5 Stayed furnaces and combustion chambers. (*a*) Where the plate forming the walls of stayed furnaces or combustion chambers becomes bulged between staybolts, repairs may be made by inserting an additional staybolt in the center of such space supported by the four staybolts.

(*b*) Where it is desired to rivet a patch to the wall of a stayed furnace or combustion chamber, the defective portion of the plate shall be cut away until solid material is reached, the patch shall be riveted on the water side, and the staybolts renewed, and extended through the new plate.

58.15–10 Bagged or blistered shell plates. (*a*) When the shell plates of cylindrical boilers which are exposed to the radiant heat of the fire become bagged or blistered, it shall be the duty of the chief engineer in charge of the vessel to notify the Officer in Charge, Marine Inspection, for examination before raising steam on the boiler.

(*b*) Where the shell plate is bagged due to overheating, the Officer in Charge, Marine Inspection, may, if in his judgment it is practicable, permit the same to be driven back to its original position.

(*c*) Where the shell plate has blistered, bagged, or bulged to such an extent that there is an appreciable thinning of the plate, the Officer in Charge, Marine Inspection, shall require the defective portion to be cut away and the shell repaired by fitting a patch of steel plate conforming to the requirements of Subpart 51.04 of this subchapter in place of the defective portion, care being taken that the riveting schedule of the patch is so arranged as to give the plate sufficient strength to withstand the stress placed on it in service.

SUBPART 58.20—WELDING REPAIRS TO CASTINGS

58.20–1 Welding repairs to defective carbon-steel castings. (*a*) Defects in carbon-steel castings, such as valve bodies, pipe fittings, channels, covers, manifolds, and other pressure-containing

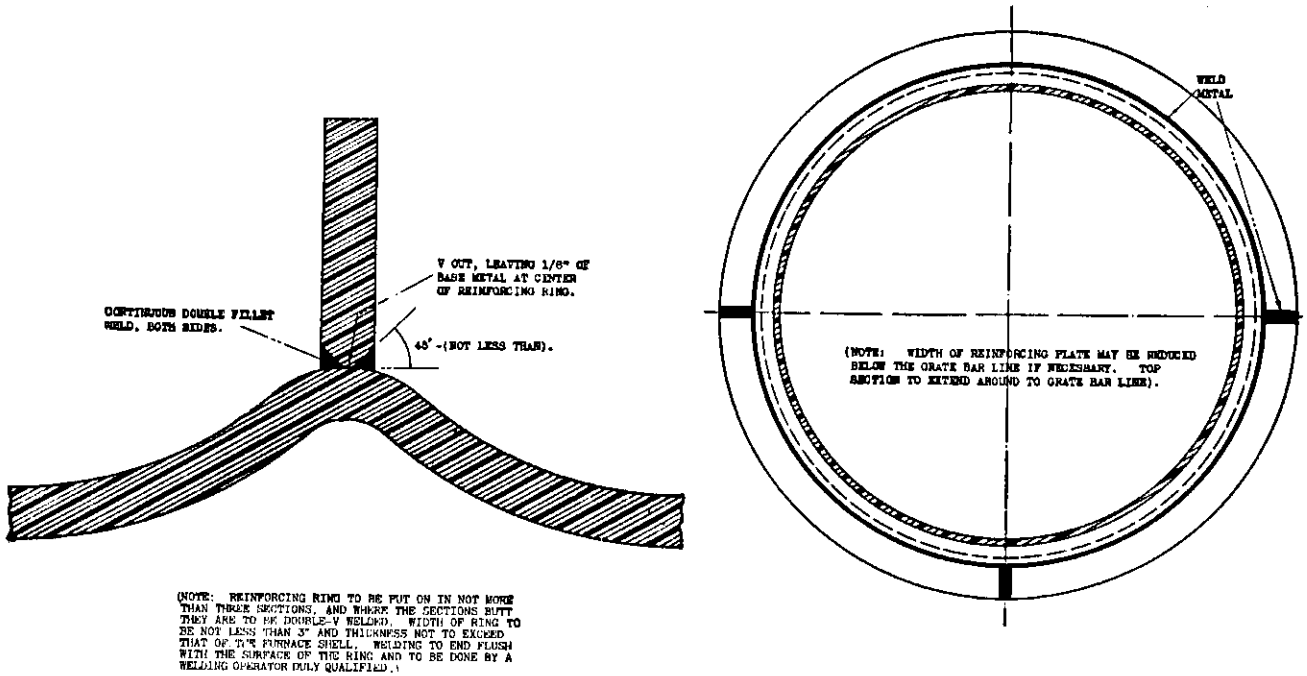

FIGURE 58.15–1 (e)—Approved method of reinforcing furnace crowns by means of arc or gas welding.

appliances, may be repaired by arc or gas welding.

(*b*) Defects in carbon-steel castings shall be classed as follows:

(1) *Minor defects.* Minor defects are undersized defective areas resulting from oxyacetylene cutting, grinding, or chipping during cleaning operation, surface sand or slag defects or other slight surface defects except cracks or cold shuts. The excavated depth of a minor defect shall not exceed 20 percent of the wall thickness or one inch, whichever is the lesser. No lineal dimension shall exceed four times the wall thickness or be greater than six inches, whichever is the lesser.

(2) *Major defects.* All defects exceeding the depth or size given in Subparagraph (1) of this paragraph shall be considered a major defect, which shall be repaired in the same manner as a minor defect. Repairs of major defects shall be nondestructively tested as required by Paragraph (*h*) of this section.

(*c*) Prior to any welding being done, all defective material shall be removed until the base metal is shown to be sound. Defective areas of castings may be removed by chipping, grinding, drilling, or oxyacetylene grooving to a sufficient depth to insure that the remaining base metal is shown to be sound by acid etching, radiography, or magnetic particle testing. The latter methods of testing are preferred. Any slag remaining after oxyacetylene grooving shall be completely removed by chipping or grinding. When defects are removed by drilling, the resulting hole shall be countersunk to a depth of at least 25 percent of the metal thickness with a bevel of the included angle being not less than 45 degrees.

(*d*) Prior to any welding being done, the cavity and the adjoining area shall be preheated to a temperature suitable for the chemical elements and thickness of metal involved which experience indicates is satisfactory. Castings shall be preheated to a temperature which experience indicates is suitable for the chemical elements and thickness of the casting when lugs, supports, ribs, or bosses are to be welded thereto.

(*e*) Castings other than those which have been repaired for minor surface defects, the excavated dimensions of which do not exceed the limitations specified by Subparagraph (*b*)(1) of this section, shall be stress-relieved in a furnace to a temperature of from 1,100 degrees F. to 1,200 degrees F. for one hour per inch of maximum thickness and allowed to cool in the furnace to 500 degrees F. before removal.

(*f*) Filler metal used in the repair of defective steel castings shall be acceptable electrodes in accordance with Section 56.01–20 of this subchapter and shall meet the chemical and physical properties of the base metal.

(*g*) The defective material removed shall be replaced using pipe welders qualified in accordance with Qualification Test No. 4 for the position in which the welding is to be done as given in Section 56.01–10 of this subchapter. The use of welders qualified to weld plate shall be permitted provided the welding is done in the flat position.

(*h*) Completed welds shall be inspected for cracks and other defects by magnetic particle testing, and in the case of major repairs, the welded area shall be examined by radiography if the casting is to be used in steam lines subject to boiler pressure, boiler feed, or blowoff lines. Prior to the use of magnetic particle inspection, the welds shall be made smooth and free of grooves or depressions.

(*i*) After repair of defective castings has been completed a hydrostatic test as prescribed in Section 61.30–5 of this subchapter, based upon the primary service pressure rating shall be applied.

58.20–5 Welding repairs to defective alloy-steel castings. Defects in alloy-steel castings may be repaired by arc or gas welding in accordance with the requirements of Section 58.20–1, provided the preheat and postheat employed are satisfactory for the material to be welded and process approval tests are conducted. The heat treatment and process approval tests shall be acceptable to the Commandant.

PART 59—INDEPENDENT INTERNAL COMBUSTION ENGINE FUEL TANKS

CONTENTS

AUTHORITY: The provisions of this Part 59 issued under R.S. 4405, as amended, 4462, as amended; 46 U.S.C. 375, 416. Interpret or apply R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4417a, as amended, 4418, as amended, 4421, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4453, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 391a, 392, 399, 404–409, 411, 412, 435, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.; Treasury Department Orders 120, July 31, 1950, 15 F.R. 6521; 167–14, Nov. 26, 1954, 19 F.R. 8026; 167–20, June 18, 1956, 21 F.R. 4894; CGFR 56–28, July 24, 1956, 21 F.R. 5659; 167–38, Oct. 26, 1959, 24 F.R. 8857.

SUBPART 59.01—GENERAL REQUIREMENTS

59.01-1 Scope. (*a*) The regulations in this part contain requirements for independent internal combustion engine fuel tanks, on all vessels subject to inspection by the Coast Guard and on all motorboats and motor vessels of more than 15 gross tons carrying passengers for hire.

(*b*) Passenger vessels exceeding 100 gross tons constructed prior to July 1, 1935, may carry gasoline as fuel not exceeding 40 gallons to supply the emergency electrical system. Passenger vessels exceeding 100 gross tons constructed on or after July 1, 1935, and all emergency systems converted on or after July 1, 1935, shall use diesel fuel for internal combustion engine units. Such vessels may carry a sufficient quantity of diesel fuel to supply the emergency electrical system.

(*c*) An outage of two percent shall be provided on all fuel tanks containing petroleum products.

SUBPART 59.05—GASOLINE FUEL TANKS

59.05-1 Construction. (*a*) Tanks may be of either cylindrical or rectangular form, except that tanks for emergency electrical systems shall be of cylindrical form.

(*b*) Tanks shall be designed to withstand the maximum head to which they may be subjected in service, except that in no case shall the thickness of the shell or head be less than ⅛ inch.

(*c*) Tanks shall be constructed of wrought iron, steel or nonferrous material, or corrosion-resistant alloys suitable for the purpose. Tanks constructed of noncorrosion-resistant materials less than 3/16 inch in thickness shall be galvanized by the hot-dipped process both inside and outside.

(*d*) Joints shall be riveted, brazed or welded, except that soldered joints may be used on small tanks of 20 gallons or less capacity, provided the solder used has a melting point of not less than 800 degrees F.

(*e*) All nozzle connections shall be made to the top of the tank and shall be securely riveted, welded, brazed or soldered to the tank.

(*f*) No tubular gage glasses or try-cocks shall be fitted to the tanks.

(*g*) Tanks shall be provided with swash plates and braces, where necessary. The material used shall be the same as the tank.

59.05-5 Installation. (*a*) Gasoline fuel tanks used for propulsion shall be located in watertight compartments separate from, but adjacent to the engineroom or machinery space. Fuel tanks for auxiliaries shall be located on or above the weather deck outside of the engine housing or compartment and as close to the engine as practicable. All tanks shall be so installed as to provide a free circulation of air around the tanks.

(*b*) Cylindrical tanks with longitudinal seams shall be arranged horizontally where practicable so that such seams are located as near the top as possible.

(*c*) All tanks shall be securely fastened and shall be arranged as to be readily inspected or movable for inspection. Portable fuel tanks are not permitted.

59.05-10 Tests. (*a*) Tanks vented to atmosphere shall be hydrostatically tested to a pressure of at least 10 pounds per square inch gage after installation.

(*b*) All tanks not vented to atmosphere shall be constructed and tested in accordance with Parts 54 and 61 of this subchapter.

Subpart 59.10—Diesel Fuel Tanks

59.10–1 Construction. (*a*) Tanks may be of either cylindrical or rectangular form.

(*b*) Tanks shall be designed to withstand the maximum head to which they may be subjected in service, except that in no case shall the thickness of tanks having capacities of 40 gallons or less be less than 1/16 inch, and tanks having capacities over 40 gallons be less than 1/8 inch.

(*c*) Joints shall be riveted, brazed, or welded, except that soldered joints may be used on small tanks of 20 gallons or less capacity provided that the solder used has a melting point of not less than 800 degrees F.

(*d*) Tanks shall be provided with swashplates and braces where necessary. The material used shall be the same as the tank.

(*e*) All nozzles for pipe connections shall be securely riveted, welded, brazed or soldered to the tank. Where liquid level indicating devices are attached to the tank, they shall be of heat resistant materials adequately protected from mechanical damage and provided at the tank connections with devices which will automatically close in the event of rupture of the gage or gage lines.

59.10–5 Installation. (*a*) Tanks containing fuel for emergency lighting units shall be located on an open deck or in an adequately ventilated metal compartment. No tank shall be located in a compartment where the temperature may exceed 150 degrees F.

(*b*) When cylindrical tanks are installed, longitudinal seams shall be located as near the top of the tank as possible.

(*c*) The tanks shall be properly secured and accessible for inspection.

59.10–10 Tests. (*a*) Tanks vented to atmosphere shall be tested to a hydrostatic pressure of five pounds per square inch gage after installation, and at least to the maximum height the liquid may rise in the vent, whichever is greater.

(*b*) All tanks not vented to atmosphere shall be constructed and tested in accordance with Parts 54 and 61 of this subchapter.

PART 61—INSTALLATIONS, TESTS, INSPECTIONS, MARKINGS, AND OFFICIAL FORMS

CONTENTS

AUTHORITY: The provisions of this Part 61 issued under R.S. 4405, as amended, 4462, as amended; 46 U.S.C. 375, 416. Interpret or apply R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4417a, as amended, 4418, as amended, 4421, as amended, 4426-4431, as amended, 4433, as amended, 4434, as amended, 4453, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 391a, 392, 399, 404-409, 411, 412, 435, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp. Treasury Department Orders 120, July 31, 1950, 15 F.R. 6521; 167-14, Nov. 26, 1954, 19 F.R. 8026; 167-20, June 18, 1956, 21 F.R. 4894; CGFR 56-28, July 24, 1956, 21 F.R. 5659; 167-38, Oct. 26, 1959, 24 F.R. 8857.

SUBPART 61.01—GENERAL REQUIREMENTS

61.01-1 Scope. The regulations in this part apply to the installations, tests, inspections and markings of all boilers, pressure vessels and machinery subject to inspection by the Coast Guard.

SUBPART 61.05—INSTALLATIONS

61.05-1 Scope. The regulations in this subpart apply to the installations of machinery and pressure vessels installed on vessels subject to inspection by the Coast Guard.

61.05-5 Foundations. (*a*) Drawings showing details of proposed foundations, or saddles, for boilers and the proposed means of bracing boilers in the vessel shall be submitted for approval to the Officer in Charge, Marine Inspection, in the district where the installation is being made.

(*b*) Provision shall be made in foundations for expansion of the boilers when heated.

(*c*) Boilers shall be provided with chocks to prevent movement in the event of collision unless a bolted or riveted construction satisfactorily provides for this contingency.

61.05-10 Protection of adjacent structure. (*a*) Boilers shall be so placed that all parts may be readily accessible for inspection and repair.

(*b*) In vessels having a double bottom or other extensive surfaces directly below the boiler, as in the case of keels and girders in wooden vessels, the distance between such surface and a boiler shall in no case be less than eight inches at the lowest part of a cylindrical boiler and not less than 18 inches under the pans of water-tube boilers.

(*c*) In certain types of vessels where the boiler foundation forms the ashpit, such foundations shall be efficiently ventilated, except in cases where the ashpit is partially filled with water at all times.

(*d*) The pans of oil-burning, water-tube boilers shall be arranged to prevent oil from leaking into the bilges and shall be lined with firebrick or other heat resisting material.

(*e*) In vessels constructed of wood or having wood structure adjacent to boilers or uptakes such structure shall be protected by noncombustible, nonconducting material covered with sheet metal, and the distance between the

wooden structure and the uptakes and funnels shall in no case be less than 12 inches.

(*f*) The distance between a boiler and a compartment containing fuel oil shall not be less than 24 inches at the back end of a boiler and 18 inches elsewhere, except that for a cylindrical part of a boiler or a knuckle in the casing of a water-tube boiler, these distances may be reduced to 18 and 12 inches, respectively, provided the requirements of Paragraph (*a*) are complied with.

(*g*) All oil-burning boilers shall be provided with oiltight drip pans under the burners and elsewhere where necessary to prevent oil draining into the bilges.

61.05-15 Boiler uptakes. (*a*) Where dampers are installed in the uptakes or funnels, the arrangement shall be such that it will not be possible to shut off the gas passages from the operating boilers.

(*b*) All main and auxiliary boilers shall be fitted with separate gas passages from each boiler.

61.05-20 Machinery guards. Gears, couplings, flywheels, and all machinery capable of injuring personnel shall be provided with adequate covers or guards.

61.05-25 Means of stopping machinery. (*a*) Machinery driving forced and induced draft fans, fuel oil transfer pumps, fuel oil unit pumps and other similar fuel pumps shall be fitted with remote controls from a readily accessible position outside of the space concerned so that they may be stopped in the event of fire occurring in the compartment in which they are located. These controls shall be suitably protected against accidental operation or tampering.

SUBPART 61.10—INITIAL AND PERIODIC VESSEL INSPECTION

61.10-1 Scope. (*a*) Initial and periodic inspection and tests shall be made of the main and auxiliary machinery, boilers and equipment as prescribed in this part. The inspections and tests shall be such as to insure that the main and auxiliary machinery, boilers and their appurtenances, and equipment are in satisfactory operating condition and fit for the service for which they are intended.

61.10-5 Requirements for steam-propelled motorboats. (*a*) The requirements covering design of the propelling engine, boiler, and the auxiliary machinery, and the inspection thereof on all motorboats which are more than 40 feet in length and which are propelled by machinery driven by steam shall be in accordance with the applicable provisions of this subchapter.

(*b*) If the engines, boilers, and auxiliary machinery are found to be in safe operating condition at the initial or annual inspection, the Officer in Charge, Marine Inspection, shall issue a letter to that effect, and such letter shall be posted on the vessel under glass.

SUBPART 61.15—TESTS AND INSPECTIONS OF MACHINERY AND EQUIPMENT

61.15-5 Tests and inspections of steering gear. (*a*) Steering gear shall be tested and inspected by the inspector at the regular annual or biennial inspection and oftener if necessary.

(*b*) All devices employed in the change-over from automatic to manual operation shall be examined and tested.

61.15-10 Trial-trip observance. The operation of main and auxiliary engines, boilers, steering gear and auxiliaries shall be observed on the trial trip of each new vessel and all deficiencies which affect the safety of the vessel shall be corrected to the satisfaction of the Officer in Charge, Marine Inspection.

61.15-15 Tail shaft survey. (*a*) The requirements in this section apply only to ocean aud coastwise vessels.

(*b*) Every vessel having the tail shaft fitted with a continuous liner or having shafts of material resistive to corrosive attack of sea water, or where pressure luhrication is used, shall have the tail shaft drawn at least once in every three years; in all other cases the shaft shall be drawn at least once in every two years, or whenever deemed necessary by the Officer in Charge, Marine Inspection. However, if the circumstances warrant it, the Coast Guard District Commander may extend this time to the next regular drydocking period, but not to exceed four months: *Provided*, That when it is shown that a vessel has had a long period of lay-up, the Coast Guard District Commander may grant an extension equal to the time the vessel has been out of commission, but in no case shall the extension exceed one year.

(*c*) Where the propelling machinery is located amidships the after bearing shall be rebushed when it is worn down to ¼ inch clearance for shafts of 9 inches or less in diameter, 5/16 inch clearance for shafts exceeding 9 inches but not exceeding 12 inches in diameter and ⅜ inch clearance for shafts exceeding 12 inches diameter. Where the propelling machinery is located aft the maximum clearance shall be one grade (1/16 inch) less than the above clearance.

61.15-16 Drydock examination. When any vessel is drydocked, examination shall be made of the propeller, stern bushing, sea connections, and fastenings if deemed necessary by the inspector.

SUBPART 61.20—TESTS AND INSPECTION OF BOILERS

61.20–1 Boilers under construction. (*a*) When one or more boilers are under construction, manufacturers shall allow inspectors access to such boilers at such times as the inspectors shall deem necessary in order to determine by actual measurements that the boilers are being constructed in all respects in accordance with the approved design, and that the workmanship is good.

(*b*) Where boilers or pressure vessels are constructed in one inspection zone for installation on a vessel in another inspection zone, the Officer in Charge, Marine Inspection, in the former inspection zone shall, upon request of the Officer in Charge, Marine Inspection, in the latter inspection zone examine and report on such boilers or pressure vessels and ascertain that the proper materials are being used, and that the workmanship is good.

(*c*) For inspection of welded pressure vessels under construction, see Section 61.25–3.

61.20–5 Preparation of boilers for inspection and test. (*a*) It shall be the responsibility of the chief engineer to prepare the boilers for inspection. For internal inspection, manhole, and handhole plates, and washout plugs shall be removed as required by the inspector and the furnace and combustion chambers thoroughly cooled and cleaned. Portable obstructions shall be removed as necessary for proper access. In preparing the boilers for the hydrostatic test, they shall be filled with water at not less than 70 degrees F. and not more than 160 degrees F. for water-tube boilers and not more than 100 degrees F. for fire-tube boilers. The safety valves shall be secured by means of gags or clamps.

61.20–10 New boilers. (*a*) Each new boiler shall be hydrostatically tested after installation to 1½ times the maximum allowable pressure before the boilers are covered. All accessible parts of the boiler shall be examined while under test. After the test, the boiler shall be emptied, opened up and all interior surfaces shall be examined to ascertain that no defects have occurred due to the hydrostatic test.

(*b*) In addition to the hydrostatic tests prescribed in this section, automatically controlled packaged auxiliary boilers shall be subjected to the performance test specified in Subpart 162.026, of Subchapter Q (Specifications) of this chapter.

(*c*) Upon completion of the hydrostatic test and the boiler examination prescribed in Paragraph (*a*) of this section, and after the installation of the brick work and lagging, those boilers that are to be operated at a pressure equal to or in excess of 400 pounds per square inch gage, or at a steam temperature equal to or in excess of 700 degrees F., may, at the request of the owner or builder, be given an additional test under steam in accordance with the following:

(1) The steam pressure applied to the boilers and to the main and auxiliary steam piping shall not exceed 1¼ times the maximum allowable pressure. Sufficient steam is to be bled from the superheater outlet, either by operating auxiliary machinery, or discharging to the atmosphere, so that service temperatures will not be exceeded. For this test the regular safety valve springs should be replaced by springs designed to operate at the test pressure. After the conclusion of this test the test springs are to be replaced with springs designed to operate at the maximum allowable pressure.

(2) An examination shall be made of all parts of the system during the test to determine there is no evidence of weakness.

61.20–15 Boilers in service. (*a*) Power boilers, superheaters, economizers and low-pressure heating boilers shall be examined by an inspector at the regular annual or biennial inspection, and oftener if necessary, to determine that the complete unit is in a safe and satisfactory condition. Where hydrostatic tests are required, an inspection shall be made of all accessible parts while under pressure.

(*b*) Hydrostatic tests shall be applied to all boilers as provided in Table 61.20–15 (b). The owner, master, or person in charge of the vessel shall give an advance notice to the appropriate Officer in Charge, Marine Inspection, in order that an inspector will be assigned to witness the test and make the required inspection.

TABLE 61.20–15 (b)—HYDROSTATIC TESTS

Boiler	Passenger vessels	Cargo, tank and miscellaneous vessels
Fire tube	Annual	Annual.
Water tube	do	Quadrennial.

(*c*) Fire tube boilers which cannot be entered or which cannot be satisfactorily examined internally, all boilers of lap seam construction and all boilers to which extensive repairs have been made or the strength of which the inspector has any reason to question, shall be subjected to a hydrostatic test of 1½ times the maximum allowable pressure. All other boilers shall be subjected to a hydrostatic test of 1¼ times the maximum allowable pressure.

(*d*) In applying hydrostatic pressure to boilers, arrangements shall be made to prevent main and auxiliary stop valves from being sub-

jected at the same time to the hydrostatic pressure on one side and steam pressure on the other side.

(*e*) If the inspector has reason to believe that the boiler has deteriorated any appreciable extent under the bottom where it rests on saddles or foundations, he shall cause the boiler to be lifted to such position that it can be thoroughly examined, provided the examination cannot be made otherwise.

(*f*) The marine inspector may require any boiler to he drilled or gaged to determine the actual thickness at any time if doubt exists as to its safety. At the first inspection for certification after a Scotch, Western River, or other fire tube or flue boiler has been installed for 10 years, and at such other times as the inspector shall deem necessary, such boilers shall be drilled or gaged at or near the waterline and bottom, and at such other places as the inspector considers necessary, for the purpose of gaging the shell to determine the extent of deterioration. Alternatively, a method of nondestructive examination such as the use of ultrasonic or other acceptable means may be used. Prior to the use of nondestructive methods of examination by the above procedure, it shall be demonstrated by the user, in the presence of a marine inspector on specimens similar to those to be examined, that consistent results having an accuracy of plus or minus 4 percent of the measurements secured by micrometers, are obtainable. If the thickness found by actual measurement is less than the original thickness, the maximum allowable pressure shall be recalculated using the thinnest portion of the shell or head material as the minimum thickness to be used in the calculations, and the maximum allowable pressure thus determined shall not exceed the pressure permitted by the application of the boiler design formulas. For the purpose of such recalculations, the design formulas specified in this subchapter in effect at the time the boilers were originally contracted for or built shall be used. The design formulas specified in Subchapter G (Marine Engineering Installations Contracted for Prior to July 1, 1935) of this chapter may be used for boilers made or contracted for prior to July 1, 1935, or alternatively, the design formulas given in this subchapter may be used.

61.20–20 Boiler mountings and attachments. (*a*) All valves and boiler mountings and attachments shall be opened up and examined by the marine inspector after each four years of service.

(*b*) All boiler mounting studs or bolts shall be examined after each 8 years of service.

(*c*) (1) Boiler mountings shall be removed from the boiler for examination after each eight years of service where any of the following conditions exist:

(*i*) Boilers having boiler mountings attached directly to the boiler plating by screwed studs and nuts.

(*ii*) Boilers having boiler mountings attached to a reinforcing pad by screwed studs and nuts; and this pad is attached directly to the boiler plating.

(*iii*) Boilers having boiler mountings so installed that a satisfactory examination of these mountings or of their attaching studs cannot be made by removing the bonnet and internal parts of the valve.

(2) Where boiler mountings or valves are attached to boiler nozzles and a satisfactory internal examination of these mountings or valves and their attaching studs, bolts, or other means of attachment, can be performed by opening up the valves, such mountings or valves need not be removed from the boiler unless in the opinion of the Officer in Charge, Marine Inspection, such action is necessary.

(*d*) The Officer in Charge, Marine Inspection, may require the examinations prescribed in this section to be made at more frequent intervals, if in his opinion such action is necessary to be assured of the safety of the boiler and its attachments.

(*e*) Water columns, gage glasses, and gage cocks shall be examined to determine that they are in satisfactory working order.

(*f*) Steam gages on boilers or main steam lines shall be examined and checked for accuracy.

(*g*) The marine inspector shall examine the fusible plugs.

61.20–25 Boilers of foreign-built vessels admitted to American registry. (*a*) Where foreign-built vessels are admitted to American registry the Officer in Charge, Marine Inspection, shall endeavor to secure drawings from which the boilers were constructed and a record of the chemical and physical properties of the material entering into the construction of the boilers. Before a certificate of inspection of a vessel is issued by any Officer in Charge, Marine Inspection, the requirements of this section shall be met.

(*b*) The drawings if available shall be examined to determine the maximum allowable pressure in accordance with the regulations in this subchapter, and the test reports of the material shall be carefully checked to determine whether the material used in the construction of the boilers is safe.

(*c*) The boiler or boilers shall be measured in order to obtain accurate data, which data shall be embodied in the report of the inspector

making the examination. All plates shall be drilled and gaged by the inspector to determine the actual thickness, and upon the thickness thus obtained the maximum allowable pressure shall be based. The furnaces shall be trammed to ascertain if there is any distortion. The safety valves on the boiler and its superheater shall be Coast Guard approved safety valves designed, constructed and flowtested in conformance with Subpart 162.001 of Subchapter Q (Specifications) of this chapter. The safety valves and mountings shall be thoroughly examined to determine if they are in good working condition and if their capacity is ample.

(*d*) Each section of the steam pipe shall be drilled and gaged, and, where bends occur in the piping, they shall be drilled in the outer wall of the bends to determine the thickness thereof.

(*e*) When the inspection is completed and steam is raised on the boilers, an accumulation test shall be conducted, where required, in accordance with the provisions of Section 52.65–5 of this subchapter to establish the fact that the safety valves have ample relieving capacity.

(*f*) Where drawings of the boilers and test reports of the material entering into their construction cannot be obtained, the maximum allowable pressure shall be based on the actual thickness of material found and an assumed tensile strength not to exceed 60,000 pounds per square inch, together with the general condition of the boilers: *Provided*, That the maximum allowable pressure thus obtained shall not exceed in any case the maximum pressure allowed by the certificate issued by the government under whose flag the vessel formerly operated.

SUBPART 61.25—TESTS AND INSPECTIONS OF PRESSURE VESSELS

61.25–1 Scope. For exemption of certain pressure vessels from shop inspection, see Section 54.01–1 of this subchapter.

61.25–3 Welded pressure vessels under construction. (*a*) The manufacturer shall submit Class I welded pressure vessels for shop inspection at such stages of partial completion as may be requested by the inspector.

(*b*) The first inspection of Class II welded pressure vessels shall be performed during the welding of the longitudinal joint. At this time the inspector shall check the material and fit-up of the work, and ascertain that only welders who have passed the required tests are employed.

(*c*) A second inspection of Class II welded pressure vessels shall be made during the welding of the circumferential joints. At this time the inspector shall check any new material being used which may not have been examined at the time of the first inspection, also the fit-up of the vessel at this stage of fabrication, and in addition, observe the welding to ascertain that only welders who have passed the required tests are employed.

(*d*) For Class III welded pressure vessels, one inspection shall be made during the welding of the longitudinal joint. If there is no longitudinal joint, the inspection shall be made during the welding of a circumferential joint. At this time the inspector shall check the material and fit-up of the work and see that only welders who have passed the required tests are employed.

61.25–5 New pressure vessels. (*a*) Except as otherwise provided for in this section, upon completion of a new pressure vessel one of the following applicable hydrostatic tests shall be made in the presence of an inspector:

(1) Riveted construction: 1½ times the maximum allowable pressure (see Section 61.25–10).

(2) Welded and brazed construction: 1½ times the maximum allowable pressure (see Section 61.25–15).

(3) Cast construction: two times the maximum allowable pressure.

(*b*) Pressure vessels containing refrigerants shall be leak-tested with gas after installation to the design pressures specified in Section 55.13–5 of this subchapter.

(*c*) Hydraulic accumulators used in engine starting systems shall be leak-tested to the design pressure after installation.

(*d*) Pressure vessels designed and/or supported so that they cannot be safely filled with water, or which cannot be dried and are to be used in a service where traces of the testing medium cannot be tolerated, shall be pneumatically tested in accordance with Section 61.25–16.

61.25–10 Hydrostatic test of riveted pressure vessels. (*a*) Riveted pressure vessels shall be hydrostatically tested to not less than 1½ times the maximum allowable pressure for a sufficient time to permit an inspection of all joints and connections.

(*b*) The tightness of the rivets and the riveted joints shall be tested by tapping the heads with a rivet-testing hammer.

(*c*) Loose, cracked, and burned rivets shall be replaced.

(*d*) The inspector shall examine the butt straps and ends of shell plates forming the longitudinal joints to ascertain that they are formed to the proper curvature and that the butt straps are properly fitted at the girth joint intersections.

61.25–15 Hydrostatic test of welded and brazed pressure vessels. (*a*) All welded or brazed pressure vessels shall satisfactorily pass the hydrostatic test prescribed by this section, excepting those unfired pressure vessels noted under Section 61.25–16.

(*b*) The hydrostatic test pressure shall be at least equal to 1½ times the maximum allowable pressure stamped on the pressure vessel, multiplied by the ratio of the stress value "*S*" at the test temperature to the stress value "*S*" at the design temperature for the materials of which the pressure vessel is constructed. The values for "*S*" shall be taken from Table 52.05–10(a) in Section 52.05–10 for ferrous materials and Table 54.03–10(c) in Section 54.03–10 for nonferrous materials. The value of "*S*" at test temperature shall be that taken for the material at the tabulated value of temperature closest to the test temperature. The value of "*S*" at design temperature shall be as interpolated from the appropriate table. No ratio less than one shall be used. The design shall consider the combined stress during hydrostatic testing due to pressure and the support reactions. This stress shall not exceed 90 percent of the yield stress of the material at the test temperature. In addition, the adequacy of the supporting structure, during hydrostatic testing, shall be considered in the design.

(*c*) The hydrostatic test pressure shall be applied for a sufficient period of time to permit a thorough examination of all joints and connections. The test shall not he conducted until the vessel and liquid are at approximately the same temperature.

(*d*) Pinholes, cracks, or other defects detected during the hydrostatic test or upon examination shall be repaired as required by Part 58 of this chapter.

(*e*) Vessels requiring stress relieving shall be stress-relieved after any welding repairs have been made.

(*f*) After repairs have been made the vessel shall again be tested in the regular way, and if it passes the test, the inspector shall accept it. If it does not pass the test, the inspector can order supplementary repairs, or, if in his judgment the vessel is not suitable for service, he may permanently reject it.

61.25–16 Pneumatic testing of pressure vessels. (*a*) Pneumatic testing of welded pressure vessels shall be permitted only for those units which are so designed and/or supported that they cannot be safely filled with water, or which cannot be dried and are to be used in a service where traces of the testing medium cannot be tolerated.

(*b*) Proposals to pneumatically test shall be submitted to tbe Commandant for approval.

(*c*) Pneumatic testing shall be limited to unfired pressure vessels designed and constructed to the requirements of Class I pressure vessels.

(*d*) The pneumatic test shall be 1.25 (1¼) times the maximum allowable pressure of the vessel.

(*e*) The pneumatic test of pressure vessels shall be accomplished as follows:

(1) The pressure on the vessel shall be gradually increased to not more than half the test pressure.

(2) The pressure will then be increased at steps of approximately one-tenth the test pressure, until the test pressure has been reached.

(3) The pressure will then be reduced to maximum allowable pressure of the vessel to pernit examination.

(*f*) Pressure vessels pneumatically tested shall also be leak-tested. The test shall be capable of detecting leakage consistent with the design requirements of the pressure vessel. Details of the leak test shall be submitted to the Commandant for approval.

(*g*) After satisfactory completion of the pneumatic pressure test, the vessel may be stamped in accordance with Section 61.40–5. A marine inspector shall observe the pressure vessel in a loaded condition at the first opportunity following the pneumatic test. The tank supports and saddles, connecting piping, and insulation if provided shall be examined to determine they are satisfactory and that no leaks are evident.

(*h*) The pneumatic test is inherently more hazardous than a hydrostatic test, and suitable precautions shall be taken to protect personnel and adjacent property.

61.25–20 Pressure vessels in service. (*a*) At each initial and subsequent inspection for certification the marine inspector shall examine or test all unfired pressure vessels to the extent necessary to determine that their condition is satisfactory and that they are fit for service intended.

(*b*) Unfired pressure vessels which are fitted with manholes or other inspection openings, so they can be satisfactory examined internally, except as otherwise exempted by provisions of this section, shall be opened biennially at the regular annual or biennal inspection and thoroughly examined internally and externally. Such pressure vessels are not required to be hydrostatically tested unless defects are found which in the marine inspector's opinion may impair the safety of the pressure vessel. In this case a hydrostatic test shall be applied

at a pressure equal to 1¼ times the maximum allowable pressure.

(c) Tubular heat exchangers, hydraulic accumulators, and those pressure vessels used in refrigeration service shall be examined under operating conditions at the regular annual or biennial inspection.

(d) All unfired pressure vessels, other than those exempt by the provisions of this section, shall be subjected to a hydrostatic test 1¼ times the maximum allowable pressure biennially at the regular annual or biennial inspection.

(e) The following unfired pressure vessels will not normally be subjected to a hydrostatic test:

(1) Tubular heat exchangers.

(2) Pressure vessels used in refrigeration service.

(3) Hydraulic accumulators.

(4) Unfired pressure vessels which have been satisfactorily examined internally by a marine inspector and in which no defects have been found which impair the safety of the pressure vessel.

(5) Unfired pressure vessels which have an internal volume of not more than 5 cubic feet and a maximum allowable pressure of not more than 100 pounds per square inch.

(6) Compression tanks containing water under pressure, including those containing an aircushion, subject to pressures not exceeding 100 pounds per square inch and temperatures not exceeding 200 degrees F., except those fitted with permanent air charging lines.

(7) All unfired pressure vessels having a maximum allowable working pressure not exceeding 15 pounds per square inch.

(8) Pressure vessels containing mediums at or below pressures and temperatures specified in Table 61.25–20(e).

(9) Pressure vessels which have been pneumatically tested in accordance with Section 61.25–16.

TABLE 61.25–20(e)

Service	Pressure p.s.i.	Temperature ° F.
Steam, gas, or vapors	15	
Fuel oil	100	150
Lubricating oil	100	200
Liquids, except fuel oil, and lubricating oil	100	200

(f) Unfired pressure vessels containing liquefied compressed gases or hazardous liquids shall be inspected and tested as required by the applicable regulations published in Subchapter D (Tank Vessels) and Subchapter N (Dangerous Cargoes) of this chapter.

(g) Bulk storage tanks containing refrigerated liquefied CO_2 gas for use on board vessels as a fire extinguishing agent shall be subjected to a hydrostatic test at the periodic inspection period on the eighth year of the installation and at eight-year intervals thereafter. The hydrostatic test pressure shall be 1½ times the allowable pressure. At the conclusion of the hydrostatic test, the tank shall be drained and an internal examination made. Portions of the jacket and lagging on the underside of the tank shall be removed at the time of the hydrostatic test as deemed necessary by the marine inspector so as to determine the external condition of the tank.

(h) (1) Pressure vessels which have been pneumatically tested shall be thoroughly examined internally and externally biennially at the regular annual or biennial inspection, except in those instances where the inspection interval is prescribed otherwise by the specific regulations applicable to the product carried in Subchapter D (Tank Vessels), Subchapter I (Cargo and Miscellaneous Vessels), or Subchapter N (Dangerous Cargoes) of this chapter. For those tanks the design of which precludes a thorough internal or external examination, the thickness shall be determined by nondestructive method acceptable to the Officer in Charge, Marine Inspection.

(2) Such pressure vessels in service are not required to be pneumatically tested unless repairs have been made to them, or unless defects are found which in the opinion of the marine inspector, may impair the safety of the pressure vessel. If required, the pneumatic test shall be conducted in accordance with Section 61.25–16.

SUBPART 61.30—TESTS AND INSPECTION OF PIPING, VALVES, AND FITTINGS

61.30–1 Scope. In conducting hydrostatic tests on piping, the required test pressure shall be maintained for a sufficient length of time to permit an inspection to be made of all joints and connections, and the setting of the relief valve or safety valve will be considered as establishing the maximum allowable pressure of the system.

61.30–5 Shop test. (a) The manufacturer shall test all valves and pipe fittings, except pipe flanges, wrought steel welding fittings and welding necks, to a hydrostatic shell pressure as follows;

(1) For steam ratings:

(i) Bronze, malleable iron and cast iron—2 times the primary pressure rating marked on the valve or fitting.

(ii) Steel—The respective test pressure as prescribed in the American Standard for Steel Pipe Flanges and Flanged Fittings (ASA B16.5).

(2) For liquid or gas service not exceeding 150 degrees F.:

(*i*) Bronze or malleable iron—1½ times the secondary pressure rating marked on the valve or fitting.

(*b*) Special valves, such as manifolds, scuppers, seacocks and appurtenances, shall be tested to twice the design pressure stamped thereon.

(*c*) Special welded pipe fittings fabricated with a longitudinal joint which are not manufactured in conformance with the A.S.T.M. Standard specified in Subpart 51.46 of this subchapter shall be tested as required by Section 56.01–85 of this subchapter.

(*d*) Hydraulic piping assemblies and associated hydraulic equipment components, including hydraulic steering gear, in lieu of being tested at the time of installation, may be shop tested by the manufacturer to 1½ the maximum allowable pressure of the system. The required test pressure shall be maintained for a sufficient amount of time to check all components for strength and porosity and to permit an inspection to be made of all connections.

61.30–10 Installation test. (*a*) The following piping systems shall be hydrostatically tested in the presence of a marine inspector at a pressure of 1½ times the maximum allowable pressure:

(1) Class I steam, feed-water and blowoff piping. Where piping is attached to boilers by welding without practical means of blanking off for testing, the piping shall be subjected to the same hydrostatic pressure to which the boilers are tested. The maximum allowable pressures of boiler feed-water and blowoff piping shall be the design pressures specified in Subparagraphs 55.10–10(*a*)(3) and 55.10–15(*b*) in Part 55 of this subchapter.

(2) Fuel oil discharge piping between the pumps and the burners, but not less than 500 pounds per square inch.

(3) High-pressure piping for tank-cleaning operations.

(4) Flammable or corrosive liquids and compressed gas cargo piping, but not less than 150 pounds per square inch.

(5) Any Class I piping not specifically listed in this paragraph.

(6) Cargo oil piping.

(7) Firemains, but not less than 150 pounds per square inch.

(8) Fuel oil transfer and filling piping.

(9) Class I compressed air piping.

(*b*) Refrigeration piping shall be leak-tested to the design pressures as specified in Section 55.13–5 of this subchapter.

(*c*) Hydraulic piping assemblies and associated hydraulic equipment components which have been tested in conformance with Paragraph 61.30–5(*d*) and so certified by the manufacturer, may be tested after installation as a complete assembly by stalling the driven unit in a safe and satisfactory manner and by blowing the relief valves. Otherwise, these systems shall be hydrostatically tested in the presence of an inspector at a pressure of 1½ times the maximum allowable pressure.

(*d*) Piping systems not specifically listed in this section shall be tested under working conditions.

(*e*) Arc- or gas-welded pipe joints of Class I piping which are not examined by radiography shall be given a hammer test as required by Section 61.25–15.

61.30–15 Piping in service. (*a*) Main steam piping shall be subjected to a hydrostatic test equal to 1¼ times the maximum allowable pressure at the same periods prescribed for boilers in Section 61.20–15. The hydrostatic test shall be applied from the boiler drum to the throttle valve. If the covering of the piping is not removed, the test pressure shall be maintained on the piping for a period of ten minutes, and, if any evidence of moisture or leakage is detected, the covering shall be removed and the piping thoroughly examined.

(*b*) Steam piping subject to main boiler pressure and exceeding three inches in diameter, except as otherwise provided for in Paragraph (*a*) of this section, shall be subjected to a hydrostatic test pressure of 1¼ times the maximum allowable pressure after each four years of service. If the covering of the piping is not removed, the test pressure shall be maintained on the piping for a period of ten minutes, and, if any evidence of moisture or leakage is detected, the covering shall be removed and the piping thoroughly examined.

(*c*) The setting of safety valves or relief valves on reduced pressure lines, evaporators, feed water heaters, and other pressure vessels shall be checked by the inspector at each regular annual or biennial inspection.

61.30–20 Sea chests, sea valves and strainers. (*a*) Sea chests, sea valves, sea strainers and bilge injection valves shall be opened up for examination at the time of drydocking if deemed necessary by an inspector.

SUBPART 61.35—PROOF HYDROSTATIC TESTS

61.35–1 Hydrostatic tests of boilers and appurtenances to determine pressure rating—(a) Scope.

(1) Where it is necessary to test a pressure vessel, or appurtenance, or any pressure part thereof, to determine a pressure rating in accordance with the provisions of Section 52.01–70 of this subchapter the procedure specified in this subpart shall be adhered to as closely as practicable.

(2) This method of test is applicable only to materials having a definite proportional or elastic limit such as carbon and alloy steels. It is not applicable to materials with indefinite or indeterminate proportional limits such as cast iron and most nonferrous materials. The principle upon which the test is based assumes that the most highly stressed point in the pressure part will be subjected to a permanent set when the stress at this location reaches the proportional or elastic limit. Since the stress will be directly proportional to the hydrostatic pressure, the determination of the pressure which stresses the weakest point to the proportional limit will permit a calculation of the maximum allowable pressure that will result in a safe stress for the material from which the part is made at the maximum operating temperature.

(b) Materials. The structure shall be made from material conforming to the requirements of the appropriate subpart of Part 51 of this subchapter.

(c) Workmanship. The dimensions, thickness, and physical properties of the structure to be tested shall not vary materially from those actually used. If possible, the structure to be tested may be selected at random from a quantity of such intended for use.

(d) Preparation for test. (1) It is necessary to test only the weakest point of the structure but several points may be checked to make certain that the weakest one is included. The less definite the location of the weakest point, the more points shall be checked.

(2) The movement of the reference points may be measured with reference to a fixed surface, or two reference points may be located on opposite sides of a symmetrical structure and the total deformation between those two points measured.

(3) Indicating micrometer gages accurate to 0.001 inch are most suitable for measuring deformation of the structure at the reference points although any form of accurate micrometer may be used.

(4) A hand-test pump is satisfactory as a source of hydrostatic pressure. Either a test gage or a reliable gage which has been calibrated with a test gage shall be attached to the structure.

(5) The maximum hydrostatic pressure that shall be provided will vary from two or three times the expected maximum allowable pressure for carbon-steel structures.

(6) The location of the weakest point of the structure may be determined by applying a thin coating of plaster of paris or similar material, and noting where the surface coating starts to break off under hydrostatic test. The coating shall be allowed to dry before the test is started.

(e) Hydrostatic tests. (1) The first application of hydrostatic pressure shall be approximately the expected maximum allowable pressure, or the tests may be arranged with a view to making not less than 10 applications of pressure in approximately equal increments between the initial test pressure and the final test pressure.

(2) When each increment of pressure has been applied, the valve between the pump and the structure under test shall be closed and the pressure gage watched to see that the pressure is maintained and no leakage occurs. The total deformation at the reference points shall be measured and recorded and the hydrostatic pressure also recorded. The pressure shall then be released and each point checked for any permanent deformation which may be recorded. Only one application of each increment of pressure is necessary. The pressure shall be increased by substantially uniform increments, and readings taken until the elastic limit of the structure has obviously been exceeded.

(3) The pressure part shall not have been subjected to a pressure greater than twice the maximum allowable pressure prior to making the proof hydrostatic test.

61.35–5 Proportional limit method—(a) Physical characteristics of metal. (1) The proportional limit of the material should he determined in accordance with A. S. T. M. Specification E8, Methods of Tension Testing of Metallic Materials. This test shall be made from a number of specimens cut from the part tested, in order to assure that the average proportional limit of the material in the part tested is used to calculate the allowahle pressure.

(2) The specimens shall be cut from a location where the stress during the test has not exceeded the proportional limit, so that the specimens will be representative of the material as tested. The specimens shall not be cut with a flame torch.

(b) Plotting curves. In plotting curves, a single cross-section sheet may be used for each reference point of the structure. A scale of 1 inch=0.01 inch deformation, and a scale of at least one inch equals the approximate test

pressure increments have been found satisfactory. Plot two curves for each reference point, one showing total deformation under pressure and one showing permanent deformation when the pressure is removed.

(c) Determining proportional limit of pressure part. In determining the proportional limit of pressure parts, the following procedure shall be employed:

(1) Locate the proportional limit on each curve of total deformation as the point at which the total deformation ceases to be proportional directly to the hydrostatic pressure. Draw a straight line that will pass through the average of the points that lie approximately in a straight line. The proportional limit will occur at the value of hydrostatic pressure where the average curve through the points deviates from the straight line.

(2) In pressure parts such as headers, where a series of similar weak points occur, the average hydrostatic pressure corresponding to the proportional limits of the similar points may be used.

(3) The proportional limit obtained from the curve of total deformation may be checked from the curve of permanent deformation by locating the point where the permanent deformation begins to increase regularly with further increases in pressure. Permanent deformations of a low order that occur prior to the point actually corresponding to the proportional limit of the structure, resulting from the equalization of stresses and irregularities in the material, may be disregarded.

(4) It should be made certain that the curves show the deformation of the structure and not slip or displacement of reference surfaces, gauges, or the structure.

(d) Determining maximum allowable pressure. (1) Having determined the hydrostatic pressure when the proportional limit of the weakest point of the vessel was reached, the corresponding maximum allowable pressure may be determined by formula (1):

$$P=\frac{HS}{E} \qquad (1)$$

where:

P=maximum allowable pressure, in p.s.i.

H=hydrostatic pressure at the proportional limit of the pressure part, in p.s.i.

S=maximum allowable stress, 80 percent of the values, as given in Table 52.05–10(a).

E=average proportional limit of the material, in p.s.i.

(2) For carbon steel material, complying with the material specifications in Part 51 of this subchapter and with a minimum tensile strength not over 62,000 pounds per square inch, the proportional limit may be assumed to be two-fifths of the average tensile strength of the specified range. Where no range is specified, the average tensile strength may be assumed as 5,000 pounds per square inch greater than the minimum. This alternate procedure will eliminate the necessity for cutting tensile specimens and determining the actual proportional limit above the normal value. The pressure part shall be normalized after forging or forming.

(e) Retests. A retest will be allowed on an additional similar vessel if errors or irregularities are obvious in the results.

SUBPART 61.40—MARKINGS

61.40–1 Boilers. (*a*) Upon satisfactory completion of the tests and inspection of a new boiler the following data shall be stamped on the front head of fire-tube boilers and on the drum head of water-tube boilers:

---------- (Name of fabricator and serial number)

---------- p.s.i. (Maximum allowable pressure)

---------- p.s.i. (Hydro test pressure)

---------- p.s.i. (Steam test pressure)

---------- (U.S.C.G. No.)

---------- (C.G. Symbol)

---------- (Inspector's initials)

---------- (Month and year fabricated)

(*b*) The inscription on the boiler and the boiler nameplate, as required in Paragraph (*a*) of this section, shall contain the following entry for steam tests: "Steam test ---------- p.s.i.," which shall follow the notation for hydrostatic test.

(*c*) The data shall be legibly stamped and shall not be obliterated during the life of the boiler. In the event that the portion of the boiler upon which the data is stamped is to be insulated or otherwise covered, the data shall be transferred to a metal nameplate which shall be attached to the boiler casing or the uptake. The nameplate shall be maintained in a legible condition so that the data can be easily read.

61.40–5 Unfired pressure vessels. (*a*) After a marine inspector has examined a new pressure vessel subject to inspection and has determined that the vessel has been constructed in accordance with the applicable parts of this subchapter,

and the vessel has satisfactorily withstood the required tests, the following data shall be stamped thereon:

(Name and address of fabricator)

(Maximum allowable pressure) p.s.i.

(Hydro test pressure) p.s.i.

(O.C.M.I. No., inspector's initials, and C.G. symbol)

(Mfr. serial No.)

(Month and year)

(Riveted, brz., welded (class))

(b) Those pressure vessels which must be pneumatically tested shall be stamped with "Pneumatic test pressure _____ p.s.i.".

SUBPART 61.45—OFFICIAL FORMS

61.45–1 Scope. This subpart includes descriptions of the official forms required to be submitted to the Coast Guard by the regulations in this subchapter. Copies of the forms may be obtained upon request from the nearest Officer in Charge, Marine Inspection, or the Commandant (MMT), United States Coast Guard, Washington, D.C., 20226.

61.45–5 Form CG–2935: boiler data report; manufacturer's certification. The manufacturer of each boiler to be used on vessels subject to inspection by the Coast Guard shall submit to the Officer in Charge, Marine Inspection, at or nearest the place where the manufacturer's plant is located, a data report in triplicate on Form CG–2935 together with a certification that the data is correct and that the material and fabrication of this boiler comply with all the regulations applicable thereto.

61.45–10 Form CG–2936: unfired pressure vessel data report; manufacturer's certification. The manufacturer of unfired pressure vessels to be used on vessels subject to inspection by the Coast Guard shall submit to the Officer in Charge, Marine Inspection, at or nearest the place where the manufacturer's plant is located a data report in triplicate on Form CG–2936 together with a certification that the data is correct and that the material and fabrication comply with all the regulations applicable thereto.

61.45–15 Form CG–935A: affidavit of manufacturer of Class B material or appliances. The manufacturer of either Class B materials or appliances for use on vessels subject to inspection by the Coast Guard and to the regulations in this subchapter shall submit to the Commandant (MMT), United States Coast Guard, Washington, D.C., 20226, an affidavit on Form CG–935A certifying that certain product(s) of his manufacture furnished directly or through agents or dealers for use on vessels subject to inspection by the Coast Guard will comply with all regulations applicable thereto.

APPENDIX

CHANGES MADE IN TEXT SINCE LAST EDITION

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COAST GUARD DISTRICT COMMANDERS AND MERCHANT MARINE ACTIVITIES

District	Title	City	State	Address
1st	Commander, 1st Coast Guard District	Boston	Massachusetts, 02109	1400 Customhouse.
	Chief, Merchant Marine Safety Division	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	427 Commercial St.
	do	Portland	Maine, 04112	P.O. Box 108, Pearl Street Station.
	do	Providence	Rhode Island, 02903	409 Federal Bldg.
2d	Commander, 2d Coast Guard District	St. Louis	Missouri, 63103	Federal Bldg., 1520 Market St.
	Chief, Merchant Marine Safety Division	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Do.
	do	Cairo	Illinois, 62914	P.O. Box 391.
	do	Dubuque	Iowa, 52003	Box 695.
	do	Cincinnati	Ohio, 45202	Room 8413, Federal Office Bldg., 550 Main St.
	do	Louisville	Kentucky, 40202	254 Francis Bldg., 4th and Chestnut Sts.
	do	Memphis	Tennessee, 38103	856 Federal Bldg., 167 North Main St.
	do	Nashville	Tennessee, 37203	670 U.S. Court House, 801 Broadway.
	do	Pittsburgh	Pennsylvania, 15222	1215 Park Bldg.
	do	Huntington	West Virginia, 25701	328 Post Office and Federal Court House Bldg., 5th Ave. and 9th St.
3d	Commander, 3d Coast Guard District	New York	New York, 10004	Customhouse.
	Chief, Merchant Marine Safety Division	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Room 720, Customhouse.
	do	Albany	New York, 12207	313 Federal Bldg.
	do	Philadelphia	Pennsylvania, 19106	Customhouse.
5th	Commander, 5th Coast Guard District	Portsmouth	Virginia, 23705	Federal Bldg., 431 Crawford St.
	Chief, Merchant Marine Safety Division	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Room 202, Federal Bldg.
	do	Wilmington	North Carolina, 28401	101-105 Customhouse.
	do	Baltimore	Maryland, 21202	Customhouse.
7th	Commander, 7th Coast Guard District	Miami	Florida, 33130	Room 1203, Federal Bldg., 51 SW. 1st Ave.
	Chief, Merchant Marine Safety Division	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Room 1202, Federal Bldg., 51 SW. 1st Ave.
	do	Tampa	Florida, 33601	Room 210, 500 Zack St., P.O. Box 3172.
	do	Charleston	South Carolina, 29403	625 Federal Bldg., 334 Meeting St.
	do	Savannah	Georgia, 31402	P.O. Box 191.
	do	Jacksonville	Florida, 32201	210 Federal Bldg., P.O. Box 4968.
	do	San Juan	Puerto Rico, 00904	302 Federal Bldg., P.O. Box 3666.
8th	Commander, 8th Coast Guard District	New Orleans	Louisiana, 70130	332 B Customhouse, 423 Canal St.
	Chief, Merchant Marine Safety Division	do	do	401 Customhouse, 423 Canal St.
	Officer in Charge, Marine Inspection	do	do	310 Customhouse, 423 Canal St.
	do	Mobile	Alabama, 36602	563 Federal Bldg.
	do	Port Arthur	Texas, 77641	General Delivery.
	do	Galveston	Texas, 77550	232 Customhouse.
	do	Corpus Christi	Texas, 78401	101 Federal Bldg.
	do	Houston	Texas, 77011	7300 Wingate St.
9th	Commander, 9th Coast Guard District	Cleveland	Ohio, 44113	Main Post Office Bldg., West 3d and Prospect Sts.
	Chief, Merchant Marine Safety Division	do	do	Do.
	Officer in Charge, Marine Inspection	do	Ohio, 44114	1055 E. Ninth St.
	do	Buffalo	New York, 14203	440 Federal Bldg., 121 Ellicott St.
	do	Oswego	New York, 13126	205 Federal Bldg.
	do	Detroit	Michigan, 48226	424 Federal Bldg.
	do	Duluth	Minnesota, 55802	311 Federal Bldg.
	do	Toledo	Ohio, 43604	5101 Federal Bldg., 234 Summit St.
	do	Saint Ignace	Michigan, 49781	Municipal Bldg.
	do	Chicago	Illinois, 60617	10101 S. Ewing Ave.
	do	Ludington	Michigan, 49431	P.O. Box 308.
	do	Milwaukee	Wisconsin, 53203	Room 400, 135 West Wells St.
11th	Commander, 11th Coast Guard District	Long Beach	California, 90802	Heartwell Bldg., 19 Pine Ave.
	Chief, Merchant Marine Safety Division	do	do	Do.
	Officer in Charge, Marine Inspection	Wilmington	California, 90744	(Los Angeles-Long Beach) Center Bldg., 750 N. Broad Ave.
	do	San Diego	California, 92101	Room 12A, Broadway Pier.
12th	Commander, 12th Coast Guard District	San Francisco	California, 94126	630 Sansome St.
	Chief, Merchant Marine Safety Division	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Station B, Box 2029.
13th	Commander, 13th Coast Guard District	Seattle	Washington, 98104	618 2d Ave.
	Chief, Merchant Marine Safety Division	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Do.
	do	Portland	Oregon, 97204	Room 202, Lincoln Bldg., 208 SW. 5th Ave.
14th	Commander, 14th Coast Guard District	Honolulu	Hawaii, 96814	1347 Kapiolani Blvd.
	Chief, Merchant Marine Safety Division	do	Hawaii, 96813	610 Fort St.
	Officer in Charge, Marine Inspection	do	do	Do.
	do	Guam		Marianas Islands.
17th	Commander, 17th Coast Guard District	Juneau	Alaska, 99801	P.O. Box 2631.
	Chief, Merchant Marine Safety Division	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Do.
	do	Anchorage	Alaska 99501	P.O. Box 1286.

MERCHANT MARINE DETAILS	LOCAL ADDRESSES
LONDON	Commander, Coast Guard Activities, Europe, Staff Box 5, 7, North Audley Street, LONDON, W. 1., England.
BREMEN	Merchant Marine Detail Officer, USCG, American Consulate General, 1, Praesident Kennedy Platz, BREMEN, Germany.
NAPLES	Merchant Marine Detail Officer, USCG, American Consulate General, Piazza Principe di Napoli, NAPLES, Italy.
ATHENS	Merchant Marine Detail Officer, USCG, American Embassy, ATHENS, Greece.
ROTTERDAM	Merchant Marine Detail Officer, USCG, American Consulate General, Vlasmarkt 1, ROTTERDAM, Netherlands.
YOKOHAMA	Merchant Marine Detail Officer, USCG, North Pier, YOKOHAMA, Japan.