AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

structure, without any auxiliary or temporary supports.

[CGFR 68–82, 33 FR 18828, Dec. 18, 1968, as amended by USCG–2003–16630, 73 FR 65171, Oct. 31, 2008]

§ 54.30–15 Requirement for analysis and computation.

(a) A stress analysis must be performed to determine if the tank may be exposed to excessive loadings during the mechanical stress relief process. This analysis should include consideration of the local stresses in way of saddles or other supporting structure and additional bending stresses due to the weight of the pressurizing liquid particularly in areas of high stress concentration. While it is necessary that the general stress level during the process be in excess of the normal working level, the calculated maximum stress during test must not exceed 90 percent of the yield strength of the material at test temperature. The supporting structure must be analyzed to verify its adequacy.

(b) In all cases where the tanks are mechanically stress relieved in place in the ship or barge and the tanks are designed to carry cargoes with a specific gravity less than 1.05, the ship or barge must be shown to have adequate stability and buoyancy, as well as strength to carry the excess weight of the tank during the stress relief procedure.

PART 56—PIPING SYSTEMS AND APPURTENANCES

Subpart 56.01—General

Sec.

56.01–1 Scope (replaces 100.1).
56.01–2 Incorporation by reference.
56.01–3 Power boilers, external piping, and appurtenances (Replaces 100.1.1, 100.1.2, 122.1, 132 and 133).
56.01–5 Adoption of ASME B31.1 for power piping, and other standards.
56.01–10 Plan approval.

Subpart 56.04—Piping Classification

56.04–1 Scope.
56.04–2 Piping classification according to service.
56.04–10 Other systems.

Subpart 56.07—Design

56.07–5 Definitions (modifies 100.2).
56.07–10 Design conditions and criteria (modifies 101–104.7).

Subpart 56.10—Components

56.10–1 Selection and limitations of piping components (replaces 105 through 108).
56.10–5 Pipe.

Subpart 56.15—Fittings

56.15–1 Pipe joining fittings.
56.15–5 Fluid-conditioner fittings.
56.15–10 Special purpose fittings.

Subpart 56.20—Valves

56.20–1 General.
56.20–5 Marking (modifies 107.2).
56.20–7 Ends.
56.20–9 Valve construction.
56.20–15 Valves employing resilient material.
56.20–20 Valve bypasses.

Subpart 56.25—Pipe Flanges, Blanks, Flange Facings, Gaskets, and Bolting

56.25–5 Flanges.
56.25–7 Blanks.
56.25–10 Flange facings.
56.25–15 Gaskets (modifies 108.4).
56.25–20 Bolting.

Subpart 56.30—Selection and Limitations of Piping Joints

56.30–1 Scope (replaces 110 through 118).
56.30–3 Piping joints (reproduces 110).
56.30–5 Welded joints.
56.30–10 Flanged joints (modifies 104.5.1(a)).
56.30–15 Expanded or rolled joints.
56.30–20 Threaded joints.
56.30–25 Flared, flareless, and compression fittings.
56.30–27 Caulked joints.
56.30–30 Brazed joints.
56.30–35 Gasketed mechanical couplings.
56.30–40 Flexible pipe couplings of the compression or slip-on type.

Subpart 56.35—Expansion, Flexibility and Supports

56.35–1 Pipe stress calculations (replaces 119.7).
56.35–10 Nonmetallic expansion joints (replaces 119.5.1).
56.35–15 Metallic expansion joints (replaces 119.5.1).

Subpart 56.50—Design Requirements Pertaining to Specific Systems

56.50–1 General (replaces 122).

56.50–10 Special gauge requirements.
56.50–15 Steam and exhaust piping.
56.50–20 Pressure relief piping.
56.50–25 Safety and relief valve escape piping.
56.50–30 Boiler feed piping.
56.50–35 Condensate pumps.
56.50–40 Blowoff piping (replaces 122.1.4).
56.50–45 Circulating pumps.
56.50–50 Bilge and ballast piping.
56.50–55 Bilge pumps.
56.50–57 [Reserved]
56.50–60 Systems containing oil.
56.50–65 Burner fuel-oil service systems.
56.50–70 Gasoline fuel systems.
56.50–75 Diesel fuel systems.
56.50–80 Lubricating-oil systems.
56.50–85 Tank-vent piping.
56.50–90 Sounding devices.
56.50–95 Overboard discharges and shell connections.
56.50–96 Keel cooler installations.
56.50–97 Piping for instruments, control, and sampling (modifies 122.3).
56.50–103 Fixed oxygen-acetylene distribution piping.
56.50–105 Low-temperature piping.
56.50–110 Diving support systems.

Subpart 56.60—Materials

56.60–1 Acceptable materials and specifications (replaces 123 and Table 126.1 in ASME B31.1).
56.60–2 Limitations on materials.
56.60–3 Ferrous materials.
56.60–5 Steel (High temperature applications).
56.60–10 Cast iron and malleable iron.
56.60–15 Ductile iron.
56.60–20 Nonferrous materials.
56.60–25 Nonmetallic materials.

Subpart 56.65—Fabrication, Assembly, and Erection

56.65–1 General (modifies 127 through 135).

Subpart 56.70—Welding

56.70–1 General.
56.70–3 Limitations.
56.70–5 Material.
56.70–10 Preparation (modifies 127.3).
56.70–15 Procedure (modifies 127.4).
56.70–20 Qualification, general.

Subpart 56.75—Brazing

56.75–5 Filler metal (modifies 128.2).
56.75–10 Joint clearance.
56.75–15 Heating.
56.75–20 Brazing qualification.
56.75–25 Detail requirements.
56.75–30 Pipe joining details.

Subpart 56.80—Bending and Forming

56.80–5 Bending (modifies 129).
56.80–10 Forming (reproduces 129.2).
56.80–15 Heat treatment of bends and formed components.

Subpart 56.85—Heat Treatment of Welds

56.85–5 Heating and cooling method.
56.85–10 Preheating.
56.85–15 Postweld heat treatment.

Subpart 56.90—Assembly

56.90–1 General.
56.90–5 Bolting procedure.
56.90–10 Threaded piping (modifies 135.5).

Subpart 56.95—Inspection

56.95–1 General (replaces 136).
56.95–5 Rights of access of marine inspectors.
56.95–10 Type and extent of examination required.

Subpart 56.97—Pressure Tests

56.97–1 General (replaces 137).
56.97–5 Pressure testing of nonstandard piping system components.
56.97–25 Preparation for testing (modifies 137.2).
56.97–30 Hydrostatic tests (modifies 137.4).
56.97–35 Pneumatic tests (modifies 137.5).
56.97–38 Initial service leak test (modifies 137.7).
56.97–40 Installation tests.

AUTHORITY: 33 U.S.C. 1321(j), 1509; 43 U.S.C. 1333; 46 U.S.C. 3306, 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; E.O. 12777, 56 FR 54757, 3 CFR, 1991 Comp., p. 351; DHS Delegation No. 00170.1, Revision No. 01.4.

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, unless otherwise noted.

Subpart 56.01—General

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50126, June 12, 2024, unless otherwise noted.

§ 56.01–1 Scope (replaces 100.1).

(a) This part contains requirements for the various ships' and barges' piping systems and appurtenances.

(b) The respective piping systems installed on ships and barges must have the necessary pumps, valves, regulation valves, safety valves, relief valves, flanges, fittings, pressure gages, liquid level indicators, thermometers, etc.,

for safe and efficient operation of the vessel.

(c) Piping for industrial systems on mobile offshore drilling units need not fully comply with the requirements of this part but must meet subpart 58.60 of this subchapter.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 73–251, 43 FR 56799, Dec. 4, 1978]

§ 56.01–2 Incorporation by reference.

Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, the Coast Guard must publish a document in the FEDERAL REGISTER and the material must be available to the public. All approved incorporation by reference (IBR) material is available for inspection at the U.S. Coast Guard and the National Archives and Records Administration (NARA). Contact U.S. Coast Guard Headquarters at: Commandant (CG–ENG), Attn: Office of Design and Engineering Standards, U.S. Coast Guard Stop 7509, 2703 Martin Luther King Jr. Avenue SE, Washington, DC 20593–7509; phone (202) 372–1375; email *typeapproval@uscg.mil*. For information on the availability of this material at NARA, visit *www.archives.gov/federal-register/cfr/ibr-locations* or email *fr.inspection@nara.gov*. The material may be obtained from the following sources:

(a) *American Petroleum Institute (API)*, 200 Massachusetts Avenue NW, Washington, DC 20002–5571; 202–682–8000; *APIPubs@api.org; www.api.org*.

(1) API Standard 607, Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats, Seventh Edition, June 2016 (''API 607''); IBR approved for § 56.20–15(b).

(2) [Reserved]

(b) *American Society of Mechanical Engineers* (*ASME*), Two Park Avenue, New York, NY 10016–5990; 800–843–2763; *CustomerCare@asme.org*; *www.asme.org*.

(1) ANSI B1.20.3–1976 (Reaffirmed 2013), Dryseal Pipe Threads (Inch), adopted November 18, 1976 (''ASME B1.20.3''); IBR approved for § 56.60–1, table 2.

(2) ASME BPVC.I–2019, 2019 ASME Boiler and Pressure Vessel Code, Section I, Rules for Construction of Power Boilers, 2019 Edition, issued July 1, 2019 (''Section I of the ASME BPVC''); IBR approved for §§ 56.15–1(c); 56.60–1(a); 56.70–15(b); 56.95–10(c).

(3) ASME BPVC.VIII.1–2019, 2019 ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, 2019 Edition, issued July 1, 2019 (''Section VIII of the ASME BPVC''); IBR approved for §§ 56.15–1(c); 56.25–5; 56.30–10(b); 56.60–1(a) and table 1; 56.60–2 table 1; 56.60–15(a) and (b); 56.95–10(c).

(4) ASME BPVC.IX–2019, 2019 ASME Boiler and Pressure Vessel Code, Section IX, Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators, 2019 Edition, issued July 1, 2019 (''Section IX of the ASME BPVC''); IBR approved for §§ 56.70–5(a); 56.70–20(a); 56.75–20(a).

(5) ASME B1.1–2003 (reaffirmed), Unified Inch Screw Threads (UN and UNR Thread Form), issued September 30, 2004 (''ASME B1.1''); IBR approved for §§ 56.25–20(d); 56.60–1 table 2.

(6) ASME B1.20.1–2013, Pipe Threads, General Purpose (Inch), issued November 15, 2013 (''ASME B1.20.1''); IBR approved for § 56.60–1 table 2.

(7) ASME B16.1–2015, Gray Iron Pipe Flanges and Flanged Fittings, Classes 25, 125, and 250, issued December 28, 2015 (''ASME B16.1''); IBR approved for §§ 56.60–1 table 2; 56.60–10(a).

(8) ASME B16.3–2016, Malleable Iron Threaded Fittings, Classes 150 and 300, issued November 30, 2016 (''ASME B16.3''); IBR approved for § 56.60–1 table 2.

(9) ASME B16.4–2016, Gray Iron Threaded Fittings, Classes 125 and 250, issued November 11, 2016 (''ASME B16.4''); IBR approved for § 56.60–1 table 2.

(10) ASME B16.5–2017, Pipe Flanges and Flanged Fittings, NPS ½ Through NPS 24 Metric/Inch Standard, issued November 20, 2017, (''ASME B16.5''); IBR approved for §§ 56.25–20(a); 56.30–10(b); 56.60–1 table 2.

(11) ASME B16.11–2016, Forged Fittings, Socket-Welding and Threaded, issued January 1, 2017 including errata

(''ASME B16.11''); IBR approved for §§ 56.30–5(c); 56.60–1 tables 1 and 2.

(12) ASME B16.14–2013, Ferrous Pipe Plugs, Bushings, and Locknuts with Pipe Threads, issued November 15, 2013 (''ASME B16.14''); IBR approved for § 56.60–1 table 2.

(13) ASME B16.15–2013, Cast Copper Alloy Threaded Fittings, Classes 125 and 250, issued December 6, 2013 (''ASME B16.15''); IBR approved for § 56.60–1 table 2.

(14) ASME B16.20–2012, Metallic Gaskets for Pipe Flanges, Ring-Joint, Spiral-Wound, and Jacketed, issued June 25, 2013 (''ASME B16.20''); IBR approved for § 56.60–1 table 2.

(15) ASME B16.21–2016, Nonmetallic Flat Gaskets for Pipe Flanges, issued December 9, 2016 (''ASME B16.21''); IBR approved for § 56.60–1 table 2.

(16) ASME B16.23–2016, Cast Copper Alloy Solder Joint Drainage Fittings: DWV, issued January 16, 2017 (''ASME B16.23''); IBR approved for § 56.60–1 table 2.

(17) ASME B16.25–2012, Buttwelding Ends, issued December 20, 2012 (''ASME B16.25''); IBR approved for §§ 56.30–5(b); 56.60–1 table 2; 56.70–10(a).

(18) ASME B16.29–2012, Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV, issued September 26, 2012 (''ASME B16.29''); IBR approved for § 56.60–1 table 2.

(19) ASME B16.34–2017, Valves—Flanged, Threaded, and Welding End, issued August 23, 2017 (''ASME B16.34''); IBR approved for § 56.60–1 table 2.

(20) ASME B18.2.1–2012, Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series), issued April 24, 2013 (''ASME B18.2.1''); IBR approved for §§ 56.25–20(b); 56.60–1 table 2.

(21) ASME B18.2.2–2015, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series), issued November 30, 2015 (''ASME B18.2.2''); IBR approved for §§ 56.25–20(b) and (c); 56.60–1 table 2.

(22) ASME B31.1–2016, Power Piping, ASME Code for Pressure Piping, B31, issued June 30, 2016 (''ASME B31.1''); IBR approved for §§ 56.01–3(b); 56.01–5(a) and (b); 56.07–5(a); 56.07–10(a), (d), (e), and (f); 56.10–1(b); 56.10–5(c); 56.15–1(c); 56.25–7; 56.30–1; 56.30–5(c) and (d); 56.30–20(d); 56.35–1(b); 56.50–1 introductory text; 56.50–40(a); 56.50–70(a); 56.50–97(a); 56.60–1 tables 1 and 2; 56.65–1; 56.70–5(b); 56.70–10(b); 56.70–15(b), (c), (d), and (g); 56.80–5; 56.80–15(d); 56.85–10; 56.85–15; 56.95–1; 56.95–10(a); 56.97–1(a).

(23) ASME B31.3–2018, Process Piping, ASME Code for Pressure Piping, B31, issued August 30, 2019 (''ASME B31.3''); IBR approved for § 56.60–1 tables 1 and 2.

(24) ASME B36.10M–2015 Welded and Seamless Wrought Steel Pipe, issued August 31, 2015 (''ASME B36.10M''); IBR approved for §§ 56.07–5(c); 56.30–20(d); 56.60–1 table 2.

(25) ASME B36.19M–2004 Stainless Steel Pipe (Reaffirmed 2015), issued October 25, 2004 (''ASME B36.19M''); IBR approved for §§ 56.07–5(c); 56.60–1 table 2.

(26) ASME BPVC.II.A–2021/SA–675, 2021 ASME Boiler and Pressure Vessel Code: Section II—Materials; Part A-Ferrous Material Specifications (SA–451 to End), Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties, 2021 Edition, issued July 1, 2021 (''ASME SA–675''); IBR approved for § 56.60–2 table 1.

(c) *ASTM International*, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428–2959; 610–832–9500; *service@astm.org; www.astm.org*.

(1) ASTM A36/A36M–14, Standard Specification for Carbon Structural Steel, approved December 1, 2014 (''ASTM A36/A36M''); IBR approved for § 56.30–10(b).

(2) ASTM A47/A47M–99 (Reapproved 2014), Standard Specification for Ferritic Malleable Iron Castings, approved April 1, 2014, (''ASTM A47/A47M''); IBR approved for § 56.60–1 table 1.

(3) ASTM A53/A53M–12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless, approved March 1, 2012 (''ASTM A53/A53M''); IBR approved for §§ 56.10–5(b); 56.60–1 table 1.

(4) ASTM A126–04 (Reapproved 2014), Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings, approved April 1, 2014 (''ASTM A126''); IBR approved for § 56.60–1 table 1.

(5) ASTM A135/A135M–19, Standard Specification for Electric-Resistance-Welded Steel Pipe, approved May 1,

2019 (''ASTM A135/A135M''); IBR approved for § 56.60–1 table 1.

(6) ASTM A197/A197M–00 (Reapproved 2015), Standard Specification for Cupola Malleable Iron, approved November 1, 2015 (''ASTM A197/A197M''); IBR approved for § 56.60–1 table 1.

(7) ASTM A210/A210M–19, Standard Specification for Seamless Medium-Carbon Steel Boiler and Superheater Tubes, approved May 1, 2019 (''ASTM A210/A210M''); IBR approved for § 56.60–1 table 1.

(8) ASTM A268/A268M–10 (Reapproved 2016), Standard Specification for Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service, approved September 1, 2016 (''ASTM A268/A268M''); IBR approved for § 56.60–1 table 1.

(9) ASTM A276/A276M–17, Standard Specification for Stainless Steel Bars and Shapes, approved March 15, 2017 (''ASTM A276/A276M''); IBR approved for § 56.60–2 table 1.

(10) ASTM A312/A312M–17, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes, approved March 15, 2017 (''ASTM A312/A312M''); IBR approved for §§ 56.50–105 table 2; 56.60–1 table 1.

(11) ASTM A333/A333M–16, Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service and Other Applications with Required Notch Toughness, approved March 1, 2016 (''ASTM A333/A333M''); IBR approved for §§ 56.50–105 table 2; 56.60–1 table 1.

(12) ASTM A334/A334M–04a (Reapproved 2016), Standard Specification for Seamless and Welded Carbon and Alloy-Steel Tubes for Low-Temperature Service, approved March 1, 2016 (''ASTM A334/A334M''); IBR approved for §§ 56.50–105 table 2; 56.60–1 table 1.

(13) ASTM A350/A350M–17, Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components, approved September 1, 2017 (''ASTM A350/A350M''); IBR approved for § 56.50–105 table 2.

(14) ASTM A352/A352M–17, Standard Specification for Steel Castings, Ferritic and Martensitic, for Pressure-Containing Parts, Suitable for Low-Temperature Service, approved November 1, 2017 (''ASTM A352/A352M''); IBR approved for § 56.50–105 table 2.

(15) ASTM A358/A358M–15, Standard Specification for Electric-Fusion-Welded Austenitic Chromium-Nickel Stainless Steel Pipe for High-Temperature Service and General Applications, approved September 1, 2015 (''ASTM A358/A358M''); IBR approved for § 56.60–1 table 1.

(16) ASTM A376/A376M–17, Standard Specification for Seamless Austenitic Steel Pipe for High-Temperature Service, approved September 1, 2017 (''ASTM A376/A376M''); IBR approved for §§ 56.60–1(a); 56.60–2(c).

(17) ASTM A403/A403M–16, Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings, approved May 1, 2016 (''ASTM A403/A403M''); IBR approved for § 56.60–1 table 1.

(18) ASTM A420/A420M–16, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service, approved May 1, 2016 (''ASTM A420/A420M''); IBR approved for §§ 56.50–105 table 2; 56.60–1 table 1.

(19) ASTM A522/A522M–14, Standard Specification for Forged or Rolled 8 and 9% Nickel Alloy Steel Flanges, Fittings, Valves, and Parts for Low-Temperature Service, approved October 1, 2014 (''ASTM A522/A522M''); IBR approved for § 56.50–105 table 2.

(20) ASTM A575–96 (Reapproved 2013), Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades, approved April 1, 2013 (''ASTM A575''); IBR approved for § 56.60–2 table 2.

(21) ASTM A576–17, Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, approved November 1, 2017 (''ASTM A576''); IBR approved for § 56.60–2 table 1.

(22) ASTM B16/B16M–10 (Reapproved 2015), Standard Specification for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines, approved May 1, 2015 (''ASTM B16/B16M''); IBR approved for § 56.60–2 table 1.

(23) ASTM B21/B21M–20, Standard Specification for Naval Brass Rod, Bar, and Shapes, approved April 1, 2020 (''ASTM B21/B21M''); IBR approved for § 56.60–2 table 1.

(24) ASTM B26/B26M–18, Standard Specification for Aluminum-Alloy

Sand Castings, approved May 15, 2018 (''ASTM B26/B26M''); IBR approved for § 56.60–2 table 1.

(25) ASTM B42–20, Standard Specification for Seamless Copper Pipe, Standard Sizes, approved April 1, 2020 (''ASTM B42''); IBR approved for § 56.60–1 table 1.

(26) ASTM B43–15, Standard Specification for Seamless Red Brass Pipe, Standard Sizes, approved October 1, 2015 (''ASTM B43''); IBR approved for § 56.60–1 table 1.

(27) ASTM B68/B68M–19, Standard Specification for Seamless Copper Tube, Bright Annealed, approved April 1, 2019 (''ASTM B68/B68M''); IBR approved for § 56.60–1 table 1.

(28) ASTM B75/B75M–19, Standard Specification for Seamless Copper Tube, approved April 1, 2019 (''ASTM B75/B75M''); IBR approved for § 56.60–1 table 1.

(29) ASTM B85/B85M–18, Standard Specification for Aluminum-Alloy Die Castings, approved May 1, 2018 (''ASTM B85/B85M''); IBR approved for § 56.60–2 table 1.

(30) ASTM B96/B96M–16, Standard Specification for Copper-Silicon Alloy Plate, Sheet, Strip, and Rolled Bar for General Purposes and Pressure Vessels, approved April 1, 2016 (''ASTM B96/B96M''); IBR approved for § 56.60–2 table 1.

(31) ASTM B111/B111M–18a, Standard Specification for Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock, approved October 1, 2018 (''ASTM B111/B111M''); IBR approved for § 56.60–1 table 1.

(32) ASTM B124/B124M–18, Standard Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes, approved March 15, 2018 (''ASTM B124/B124M''); IBR approved for § 56.60–2 table 1.

(33) ASTM B161–05 (Reapproved 2019), Standard Specification for Nickel Seamless Pipe and Tube, approved April 1, 2019 (''ASTM B161''); IBR approved for § 56.60–1 table 1.

(34) ASTM B165–19, Standard Specification of Nickel-Copper Alloy Seamless Pipe and Tube, approved November 1, 2019 (''ASTM B165''); IBR approved for § 56.60–1 table 1.

(35) ASTM B167–18, Standard Specification for Nickel-Chromium-Aluminum Alloys (UNS N06699), Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06603, N06690, N06693, N06025, N06045, and N06696), Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617), Nickel-Iron-Chromium-Tungsten Alloy (UNS N06674), and Nickel-Chromium-Molybdenum-Copper Alloy (UNS N06235) Seamless Pipe and Tube, approved December 1, 2018 (''ASTM B167''); IBR approved for § 56.60–1 table 1.

(36) ASTM B171/B171M–18, Standard Specification for Copper-Alloy Plate and Sheet for Pressure Vessels, Condensers, and Heat Exchangers, approved October 1, 2018 (''ASTM B171/B171M''); IBR approved for § 56.60–2 table 1.

(37) ASTM B210/B210M–19a, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes, approved November 1, 2019 (''ASTM B210/B210M''); IBR approved for § 56.60–1 table 1.

(38) ASTM B234–17, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Surface Condensers, Evaporators, and Heat Exchangers, approved October 1, 2017 (''ASTM B234''); IBR approved for § 56.60–1 table 1.

(39) ASTM B241/B241M–16, Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube, approved February 1, 2016 (''ASTM B241/B241M''); IBR approved for § 56.60–1 table 1.

(40) ASTM B280–18, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service, approved March 1, 2018 (''ASTM B280''); IBR approved for § 56.60–1 table 1.

(41) ASTM B283/B283M–18, Standard Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed), approved March 1, 2018 (''ASTM B283/B283M''); IBR approved for § 56.60–2 table 1.

(42) ASTM B315–19, Standard Specification for Seamless Copper Alloy Pipe and Tube, approved April 1, 2019 (''ASTM B315''); IBR approved for § 56.60–1 table 1.

(43) ASTM B361–16, Standard Specification for Factory-Made Wrought Aluminum and Aluminum-Alloy Welding Fittings, approved May 1, 2016

(''ASTM B361''); IBR approved for § 56.60–1 table 1.

(44) ASTM B858–06 (Reapproved 2018), Standard Test Method for Ammonia Vapor Test for Determining Susceptibility to Stress Corrosion Cracking in Copper Alloys, approved March 1, 2018 (''ASTM B858''); IBR approved for § 56.60–2 table 1.

(45) ASTM E23–18, Standard Test Methods for Notched Bar Impact Testing of Metallic Materials, approved June 1, 2018 (''ASTM E23''); IBR approved for § 56.50–105(a).

(46) ASTM F1006–86 (Reapproved 2018), Standard Specification for Entrainment Separators for Use in Marine Piping Applications, approved September 1, 2018 (''ASTM F1006''); IBR approved for § 56.60–1 table 2.

(47) ASTM F1007–18, Standard Specification for Pipeline Expansion Joints of the Packed Slip Type for Marine Application, approved May 1, 2018 (''ASTM F1007''); IBR approved for § 56.60–1 table 2.

(48) ASTM F1020–86 (Reapproved 2018), Standard Specification for Line-Blind Valves for Marine Applications, approved March 1, 2018 (''ASTM F1020''); IBR approved for § 56.60–1 table 2.

(49) ASTM F1120–87 (Reapproved 2015), Standard Specification for Circular Metallic Bellows Type Expansion Joints for Piping Applications, approved May 1, 2015 (''ASTM F1120''); IBR approved for § 56.60–1 table 2.

(50) ASTM F1123–87 (Reapproved 2015), Standard Specification for Non-Metallic Expansion Joints, approved May 1, 2015 (''ASTM F1123''); IBR approved for § 56.60–1 table 2.

(51) ASTM F1139–88 (Reapproved 2015), Standard Specification for Steam Traps and Drains, approved May 1, 2015 (''ASTM F1139''); IBR approved for § 56.60–1 table 2.

(52) ASTM F1155–10 (Reapproved 2015), Standard Practice for Selection and Application of Piping System Materials, approved May 1, 2015 (''ASTM F1155''); IBR approved for §§ 56.50–60(d); 56.50–105 table 2; 56.60–1 tables 1 and 2; 56.60–15(a) and (b).

(53) ASTM F1172–88 (Reapproved 2015), Standard Specification for Fuel Oil Meters of the Volumetric Positive Displacement Type, approved May 1, 2015 (''ASTM F1172''); IBR approved for § 56.60–1 table 2.

(54) ASTM F1173–01 (Reapproved 2018), Standard Specification for Thermosetting Resin Fiberglass Pipe and Fittings to be Used for Marine Applications, approved March 1, 2018 (''ASTM F1173''); IBR approved for § 56.60–1 table 2.

(55) ASTM F1199–88 (Reapproved 2015), Standard Specification for Cast (All Temperatures and Pressures) and Welded Pipe Line Strainers (150 psig and 150 °F Maximum), approved May 1, 2015 (''ASTM F1199''); IBR approved for § 56.60–1 table 2.

(56) ASTM F1200–88 (Reapproved 2016), Standard Specification for Fabricated (Welded) Pipe Line Strainers (Above 150 psig and 150 °F), approved September 1, 2016 (''ASTM F1200''); IBR approved for § 56.60–1 table 2.

(57) ASTM F1201–88 (Reapproved 2016), Standard Specification for Fluid Conditioner Fittings in Piping Applications above 0 °F, approved September 1, 2016 (''ASTM F1201''); IBR approved for § 56.60–1 table 2.

(58) ASTM F1387–19, Standard Specification for Performance of Piping and Tubing Mechanically Attached Fittings, approved September 15, 2019 (''ASTM F1387''); IBR approved for § 56.30–25(a).

(59) ASTM F1476–07 (Reapproved 2013), Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications, approved October 1, 2013 (''ASTM F1476''); IBR approved for § 56.30–35(a).

(60) ASTM F1548–01 (Reapproved 2018), Standard Specification for the Performance of Fittings for Use with Gasketed Mechanical Couplings Used in Piping Applications, approved March 1, 2018 (''ASTM F1548''); IBR approved for § 56.30–35(a).

(d) *Expansion Joint Manufacturers Association Inc. (EJMA)*, 25 North Broadway, Tarrytown, NY 10591; 914–332–0040; *www.ejma.org*.

(1) Standards of the Expansion Joint Manufacturers Association, Tenth Edition (with errata), 2016; IBR approved for § 56.60–1table 2.

(2) [Reserved]

(e) *Fluid Controls Institute Inc. (FCI)*, 1300 Sumner Avenue, Cleveland, Ohio,

44115; 216–241–7333; *www.fluidcontrolsinstitute.org*.

(1) ANSI/FCI 69–1–2017, Pressure Rating Standard for Steam Traps, 2017 (''FCI 69–1''); IBR approved for § 56.60–1table 2.

(2) [Reserved]

(f) *International Maritime Organization (IMO Publications Section)*, 4 Albert Embankment, London SE1 7SR, United Kingdom; +44 (0) 20 7735 7611; *sales@imo.org*; *www.imo.org*.

(1) Resolution A.753(18) Guidelines for the Application of Plastic Pipes on Ships, adopted on 4 November 1993 (''IMO Resolution A.753(18)''); IBR approved for § 56.60–25(a).

(2) Resolution MSC.313(88), Amendments to the Guidelines for the Application of Plastic Pipes on Ships, adopted November 26, 2010 (''IMO Resolution MSC.313(88)''); IBR approved for § 56.60–25(a).

(3) SOLAS, Consolidated text of the International Convention for the Safety of Life at Sea, 1974, and its Protocol of 1988: articles, annexes and certificates, Consolidated Edition, January 1, 2020 (''SOLAS''); IBR approved for § 56.50–50(a).

(g) *International Organization for Standardization (ISO)*, Chemin de Blandonnet 8, CP 401–1214, Vernier, Geneva, Switzerland; +41 22 749 01 11; *central@iso.org*; *www.iso.org*.

(1) ISO 15540:2016(E) Ships and Marine Technology—Fire resistance of non-metallic hose assemblies and non-metallic compensators—Test methods, Second Edition, July 15, 2016 (''ISO 15540''); IBR approved for § 56.60–25(b).

(2) [Reserved]

(h) Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS), 127 Park Street NE, Vienna, VA 22180–4601; 703–281–6613; *www.msshq.org*.

(1) MSS SP–6–2017, Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings, published March 2017 (''MSS SP–6''); IBR approved for §§ 56.25–10(a); 56.60–1 table 2.

(2) MSS SP–9–2013, Spot Facing for Bronze, Iron and Steel Flanges, published March 2013 (''MSS SP–9''); IBR approved for § 56.60–1 table 2.

(3) ANSI/MSS SP–25–2018, Standard Marking System for Valves, Fittings, Flanges and Unions, published September 2018 (''MSS SP–25''); IBR approved for §§ 56.15–1(e); 56.20–5; 56.60–1 table 2.

(4) MSS SP–45–2003, Bypass and Drain Connections, 2008 Edition, originally approved July 1953, reaffirmed 2008, (''MSS SP–45''); IBR approved for §§ 56.20–20(a); 56.60–1(b).

(5) MSS SP–51–2012, Class 150LW Corrosion Resistant Flanges and Cast Flanged Fittings, published May 2012 (''MSS SP–51''); IBR approved for § 56.60–1 table 2.

(6) MSS SP–53–2012, Quality Standard for Steel Castings and Forgings for Valves, Flanges, Fittings, and Other Piping Components-Magnetic Particle Examination Method, published December 2012 (''MSS SP–53''); IBR approved for § 56.60–1 table 2.

(7) ANSI/MSS SP–55–2011, Quality Standard for Steel Castings for Valves, Flanges, Fittings and Other Piping Components-Visual Method for Evaluation of Surface Irregularities, published October 2011 (''MSS SP–55''); IBR approved for § 56.60–1 table 2.

(8) ANSI/MSS SP–58–2009, Pipe Hangers and Supports-Materials, Design, Manufacture, Selection, Application, and Installation, published October 2011 (''MSS SP–58''); IBR approved for § 56.60–1 table 2.

(9) MSS SP–61–2019, Pressure Testing of Valves, published December 2019 (''MSS SP–61''); IBR approved for § 56.60–1 table 2.

(i) *SAE International (SAE)*, 400 Commonwealth Drive, Warrendale, PA 15096; 724–776–4841; *customerservice@sae.org*; *www.sae.org*.

(1) SAE J1475 JUN2014, Hydraulic Hose Fitting for Marine Applications, stabilized June 2014 (''SAE J1475''); IBR approved for § 56.60–25(b).

(2) J1942 MAR2019, Hose and Hose Assemblies for Marine Applications, revised March 2019 (''SAE J1942''); IBR approved for § 56.60–25(b).

[USCG–2003–16630, 73 FR 65171, Oct. 31, 2008, as amended by USCG–2009–0702, 74 FR 49228, Sept. 25, 2009; USCG–2012–0832, 77 FR 59777, Oct. 1, 2012; USCG–2012–0866, 78 FR 13250, Feb. 27, 2013; USCG–2013–0671, 78 FR 60148, Sept. 30, 2013; USCG–2012–0196, 81 FR 48251, July 22, 2016]

§ 56.01–3 Power boilers, external piping, and appurtenances (Replaces 100.1.1, 100.1.2, 122.1, 132 and 133).

(a) Power boiler external piping and components must meet the requirements of this part and §§ 52.01–105, 52.01–110, 52.01–115, and 52.01–120 of this subchapter.

(b) Specific requirements for external piping and appurtenances of power boilers, as defined in Secs. 100.1.1 and 100.1.2, appearing in the various paragraphs of ASME B31.1 (incorporated by reference; see § 56.01–2), are not adopted unless specifically indicated elsewhere in this part.

[CGD 77–140, 54 FR 40602, Oct. 2, 1989; 55 FR 39968, Oct. 1, 1990; USCG–2003–16630, 73 FR 65174, Oct. 31, 2008]

§ 56.01–5 Adoption of ASME B31.1 for power piping, and other standards.

(a) Piping systems for ships and barges must be designed, constructed, and inspected in accordance with ASME B31.1 (incorporated by reference; see § 56.01–2), as limited, modified, or replaced by specific requirements in this part. The provisions in the appendices to ASME B31.1 are adopted and must be followed when the requirements of ASME B31.1 or the rules in this part make them mandatory. For general information, table 1 to § 56.01–5(a) lists the various paragraphs and sections in ASME B31.1 that are limited, modified, replaced, or reproduced by rules in this part.

TABLE 1 TO § 56.01–5(a)—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF ASME B31.1 FOR PRESSURE AND POWER PIPING

TABLE 1 TO § 56.01–5(a)—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF ASME B31.1 FOR PRESSURE AND POWER PIPING

Section or paragraph in ASME B31.1 and disposition	Unit in this part
100.1 replaced by	56.01–1.
100.2 modified by	56.07–5.
101 through 104.7 modified by	56.07–10.
101.2 modified by	56.07–10(a), (b).
101.5 replaced by	56.07–10(c).
102.2 modified by	56.07–10(d).
102.3 and 104.1.2 modified by	56.07–10(e).
104.3 modified by	56.07–10(f).
104.4 modified by	56.07–10(e).
104.5.1 modified by	56.30–10.
105 through 108 replaced by	56.10–1 through 56.25–20.
110 through 118 replaced by	56.30–1 through 56.30–35.
119.5.1 replaced by	56.35–10, 56.35–15.
119.7 replaced by	56.35–1.
122.1.4 replaced by	56.50–40.
122.3 modified by	56.50–97.
122.6 through 122.10 replaced by	56.50–1 through 56.50–80.
123 replaced by	56.60–1.
Table 126.1 is replaced by	56.30–5(c)(3), 56.60–1.
127 through 135 replaced by	56.65–1, 56.70–10 through 56.90–10.
136 replaced by	56.95–1 through 56.95–10.
137 replaced by	56.97–1 through 56.97–40.

(b) When a section or paragraph of the regulations in this part relates to material in ASME B31.1, the relationship with ASME B31.1 will appear immediately after the heading of the section or at the beginning of the paragraph as follows:

(1) (Modifies ____.) This indicates that the material in ASME B31.1 so numbered for identification is generally applicable but is being altered, amplified, or augmented.

(2) (Replaces ____.) This indicates that the material in ASME B31.1 so numbered for identification does not apply.

(3) (Reproduces ____.) This indicates that the material in ASME B31.1 so numbered for identification is being identically reproduced for convenience, not for emphasis.

(c) As stated in §56.01–2, the standards of the American National Standards Institute (ANSI) and ASME specifically referred to in this part must be the governing requirements for the matters covered unless specifically limited, modified, or replaced by other rules in this subchapter. See §56.60–1(b) for the other adopted commercial standards applicable to piping systems that also constitute this subchapter.

[USCG–2003–16630, 73 FR 65175, Oct. 31, 2008]

§56.01–10 Plan approval.

(a) Plans and specifications for new construction and major alterations showing the respective piping systems must be submitted, as required by subpart 50.20 of this subchapter.

(b) Piping materials and appliances, such as pipe, tubing, fittings, flanges, and valves, except safety relief valves covered in part 162 of subchapter Q of this chapter, are not required to be specifically approved by the Commandant, but must comply with the applicable requirements for materials, construction, markings, and testing. These materials and appliances must be certified as described in part 50 of this subchapter. Drawings listing material specifications and showing details of welded joints for pressure-containing appurtenances of welded construction must be submitted in accordance with paragraph (a) of this section.

(c)(1) Prior to installation aboard ship, diagrams of the following systems must be submitted for approval:

(i) Steam and exhaust piping.

(ii) Boiler feed and blowoff piping.

(iii) Safety valve escape piping.

(iv) Fuel oil service, transfer, and filling piping. (Service includes boiler fuel and internal combustion engine fuel piping.)

(v) Fire extinguishing systems including fire main and sprinkler piping, inert gas and foam.

(vi) Bilge and ballast piping.

(vii) Tank cleaning piping.

(viii) Condenser circulating water piping.

(ix) Vent, sound, and overflow piping.

(x) Sanitary drains, soil drains, deck drains, and overboard discharge piping.

(xi) Internal combustion engine exhaust piping. (Refer to part 58 of this subchapter for requirements.)

(xii) Cargo piping.

(xiii) Hot water heating systems if the temperature is greater than 121 °C (250 °F).

(xiv) Compressed air piping.

(xv) Fluid power and control systems (hydraulic, pneumatic). (Refer to subpart 58.30 of this subchapter for specific requirements.)

(xvi) Lubricating oil piping.

(xvii) Refrigeration and air conditioning piping. (Refer to part 58 of this subchapter for specific requirements.)

(2) Arrangement drawings of the following systems must also be submitted prior to installation:

(i) All Classes I, I–L, and II–L systems.

(ii) All Class II firemain, foam, sprinkler, bilge and ballast, vent sounding and overflow systems.

(iii) Other Class II systems only if specifically requested or required by regulations in this subchapter.

(d)(1) The drawings or diagrams must include a list of material, furnishing pipe diameters, wall thicknesses, design pressure, fluid temperature, applicable ASTM material or ANSI component specification, type, size, design standard, and rating of valves, flanges, and fittings.

(2) Pump rated capacity and pump shutoff head must appear on piping diagrams. Pump characteristic curves must be submitted for all pumps in the firemain and foam systems. These curves need not be submitted if the following information is shown on the drawing:

(i) Rated capacity and head at rated capacity.

(ii) Shutoff head.

(iii) Head at 150 percent rated capacity.

(3) Standard drawings of the following fabrication details must be submitted:

(i) Welding details for piping connections.

(ii) Welding details for nonstandard fittings (when appropriate).

(e) Plans of piping for industrial systems on mobile offshore drilling units must be submitted under subpart 58.60 of this subchapter.

(f) Where piping passes through watertight bulkheads and/or fire boundaries, plans of typical details of piping penetrations must be submitted.

(g) Arrangement drawings specified in paragraph (c)(2) of this section are not required if—

(1) The location of each component for which there is a location requirement (*i.e.*, shell penetration, fire station, foam monitor, etc.) is indicated on the piping diagram;

(2) The diagram includes, or is accompanied by and makes reference to, a material schedule which describes components in sufficient detail to substantiate their compliance with the regulations of this subchapter;

(3) A thermal stress analysis is not required; and

(4) A dynamic analysis is neither required nor elected in lieu of allowable stress reduction.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGFR 72–59R, 37 FR 6189, Mar. 25, 1972; CGD 73–251, 43 FR 56799, Dec. 4, 1978, CGD 77–140, 54 FR 40602, Oct. 2, 1989; CGD 95–012, 60 FR 48049, Sept. 18, 1995]

Subpart 56.04—Piping Classification

§ 56.04–1 Scope.

Piping is classified as shown in table 1 to § 56.04–1.

TABLE 1 TO § 56.04–1—PIPING CLASSIFICATIONS

Service	Class	Section in this part
Normal	I, II	56.04–2
Low temperature	I-L, II-L	56.50–105

[CGD 72–206R, 38 FR 17229, June 29, 1973, as amended by CGD 77–140, 54 FR 40602, Oct. 2, 1989; CGD 95–012, 60 FR 48049, Sept. 18, 1995; USCG–2020–0634, 89 FR 50131, June 12, 2024]

§ 56.04–2 Piping classification according to service.

The designation of classes according to service is found in table 1 to § 56.04–2.

TABLE 1 TO § 56.04–2—PRESSURE PIPING CLASSIFICATION

Service	Class [1]	Pressure (p.s.i.g.)		Temp. (°F)
Class B and C poisons [2]	I	any	and	0 and above.
	I-L	any	and	below 0.
	II	(3)	(3)	(3)
	II-L	(3)	(3)	(3)
Gases and vapors [2]	I	above 150	or	above 650.
	I-L	above 150	and	below 0.
	II	150 and below	and	0 to 650.
	II-L	150 and below	and	below 0.
Liquefied flammable gases [2]	I	above 150	and	0 and above. [1]
	I-L	above 150	and	below 0.
	II	150 and below	and	0 and above.
	II-L	150 and below	and	below 0.
Molten sulphur	I	above 225	or	above 330.
	II	225 and below	and	330 and below.
Cargo liquids Grades A through D [2]	I	above 225	or	above 150.
	I-L	above 225	and	below 0.
	II	225 and below	and	0 to 150.
	II-L	225 and below	and	below 0.
Cargo liquids Grade E	I	above 225	or	above 400.
	I-L	above 225	and	below 0.
	II	225 and below	and	0 to 400.
	II-L	225 and below	and	below 0.
Water	I	above 225	or	above 350.
	II	225 and below	and	350 and below.
Fuels (Bunker, diesel, gasoline, etc.)	I	above 150	or	above 150.
	II	150 and below	and	150 and below.
Lubricating oil	I	above 225	or	above 400.
	II	225 and below	and	400 and below.
Asphalt	I	above 225	or	above 400.

TABLE 1 TO § 56.04–2—PRESSURE PIPING CLASSIFICATION—Continued

Service	Class [1]	Pressure (p.s.i.g.)		Temp. (°F)
	II	225 and below	and	400 and below.
Heat transfer oil	I	above 225	or	above 400.
	II	225 and below	and	400 and below.
Hydraulic fluid	I	above 225	or	above 400.
	II	225 and below	and	400 and below.
Flammable or combustible dangerous cargoes.	Refer to specific requirements of part 40 of this chapter.			
Other dangerous cargoes.	Refer to specific requirements of part 98 of this chapter.			

[1] Where doubt exists as to proper classification, refer to the Commandant for resolution.
[2] For definitions, see parts 30, 151, and 154 of this chapter. Note that the category "B and C" poisons is not used in the rules applying to self-propelled vessels (part 153 of this chapter).
[3] Not permitted except inside cargo tanks approved for Class B and C poisons.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 73–254, 40 FR 40164, Sept. 2, 1975; CGD 73–96, 42 FR 49024, Sept. 26, 1977; USCG–2020–0634, 89 FR 50131, June 12, 2024]

§ 56.04–10 Other systems.

Piping systems and appurtenances not requiring plan approval may be accepted by the marine inspector if:

(a) The system is suitable for the service intended,

(b) There are guards, shields, insulation and similar devices where needed for protection of personnel,

(c) Failure of the systems would not hazard the vessel, personnel or vital systems, and

(d) The system is not manifestly unsafe.

[CGD 77–140, 54 FR 40602, Oct. 2, 1989]

Subpart 56.07—Design

§ 56.07–5 Definitions (modifies 100.2).

(a) *Piping.* The definitions contained in 100.2 of ASME B31.1 (incorporated by reference; see § 56.01–2) apply, as well as the following:

(1) The word *piping* within the meaning of the regulations in this subchapter refers to fabricated pipes or tubes with flanges and fittings attached, for use in the conveyance of vapors, gases or liquids, regardless of whether the diameter is measured on the inside or the outside.

(2) [Reserved]

(b) *Nominal diameter.* The term *nominal diameter* or *diameter* as used in this part, means the commercial diameter of the piping, i.e., pipe size.

(c) *Schedule.* The word *Schedule* when used in this part generally relates to the wall thickness of piping, and refers to specific values as given in ASME B36.10M and B36.19M (both incorporated by reference; see § 56.01–2).

(d) *Fittings and appurtenances.* The word *fitting* and the phrase *fittings and appurtenances* within the meaning of the regulations in this subchapter refer to pressure containing piping system components other than valves and pipe. This includes piping system components whose function is to join branches of the system (such as tees, wyes, elbows, unions, bushings, etc.) which are referred to as pipe joining fittings, as well as components which operate on the fluid contained in the system (such as traps, drains, strainers, separators, filters, meters, etc.), which are referred to as ''fluid conditioner'' fittings. Thermometer wells and other similar fittings which form part of the pressure barrier of any system are included under this heading. Expansion joints, slip joints, rotary joints, quick disconnect couplings, etc., are referred to as special purpose fittings, and may be subject to such special design and testing requirements as prescribed by the Commandant. Refer to subpart 56.15 for design requirements for fittings.

(e) *Nonstandard fittings.* ''Nonstandard fitting'' means a component of a piping system which is not fabricated under an adopted industry standard.

(f) *Vital systems.* (1) Vital systems are those systems that are vital to a vessel's survivability and safety. For the purpose of this subchapter, the following are vital systems:

(i) Systems for fill, transfer, and service of fuel oil;

(ii) Fire-main systems;

(iii) Fixed gaseous fire-extinguishing systems;

(iv) Bilge systems;

(v) Ballast systems;

(vi) Steering systems and steering-control systems;

(vii) Propulsion systems and their necessary auxiliaries and control systems;

(viii) Ship's service and emergency electrical-generation systems and their auxiliaries vital to the vessel's survivability and safety;

(ix) Any other marine-engineering system identified by the cognizant OCMI as crucial to the survival of the vessel or to the protection of the personnel aboard.

(2) For the purpose of this subchapter, a system not identified by paragraph (1) of this definition is a non-vital system.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 77–140, 54 FR 40602, Oct. 2, 1989; USCG–2003–16630, 73 FR 65175, Oct. 31, 2008; USCG–2020–0634, 89 FR 50131, June 12, 2024]

§ 56.07–10 Design conditions and criteria (modifies 101–104.7).

(a) *Maximum allowable working pressure.* (1) The maximum allowable working pressure of a piping system must not be greater than the internal design pressure defined in 104.1.2 of ASME B31.1 (incorporated by reference; see § 56.01–2).

(2) Where the maximum allowable working pressure of a system component, such as a valve or a fitting, is less than that computed for the pipe or tubing, the system pressure must be limited to the lowest of the component maximum allowable working pressures.

(b) *Relief valves.* (Modifies 101.2.)

(1) Every system, which may be exposed to pressures higher than the system's maximum allowable working pressure, must be safeguarded by appropriate relief devices. Relief valves are required at pump discharges except for centrifugal pumps so designed and applied that a pressure in excess of the maximum allowable working pressure for the system cannot be developed.

(2) The relief valve setting must not exceed the maximum allowable working pressure of the system. Its relieving capacity must be sufficient to prevent the pressure from rising more than 20 percent above the system maximum allowable working pressure. The rated relieving capacity of safety and relief valves used in the protection of piping systems only must be based on actual flow test data and the capacity must be certified by the manufacturer at 120 percent of the set pressure of the valve.

(3) Relief valves must be certified as required in part 50 of this subchapter for valves, and must also meet the requirements of § 54.15–10 of this subchapter.

(c) *Ship motion dynamic effects.* (Replaces 101.5.3.) Piping system designs must account for the effects of ship motion and flexure, including weight, yaw, sway, roll, pitch, heave, and vibration.

(d) *Ratings for pressure and temperature.* (Modifies 102.2.) The material in 102.2 of ASME B31.1 applies, with the following exceptions:

(1) The details of components not having specific ratings as described in 102.2.2 of ASME B31.1 must be furnished to the Marine Safety Center for approval.

(2) Boiler blowoff piping must be designed in accordance with § 56.50–40.

(e) *Pressure design.* (Modifies 102.3, 104.1.2, and 104.4.)

(1) Materials for use in piping must be selected as described in § 56.60–1(a). Tabulated values of allowable stress for these materials must be measured as indicated in 102.3.1 of ASME B31.1.

(2) Allowable stress values, as found in the ASME BPVC, which are restricted in application by footnote or are italicized must not be used. Where multiple stresses are listed for a material, the lowest value of the listing must be used unless otherwise approved by the Commandant. In all cases, the temperature is understood to be the actual temperature of the component.

(3) Where the operator desires to use a material not listed, permission must be obtained from the Commandant. Requirements for testing found in subpart 56.97 may affect design and should be

considered. Special design limitations may be found for specific systems. Refer to subpart 56.50 for specific requirements.

(f) *Intersections.* (Modifies 104.3.) The material in 104.3 of ASME B31.1 is applicable with the following additions:

(1) Reinforcement calculations where applicable shall be submitted.

(2) Wherever possible the longitudinal joint of a welded pipe should not be pierced.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; 37 FR 16803, Aug. 19, 1972; CGD 73–254, 40 FR 40164, Sept. 2, 1975; CGD 77–140, 54 FR 40602, Oct. 2, 1989; CGD 95–012, 60 FR 48050, Sept. 18, 1995; CGD 95–028, 62 FR 51200, Sept. 30, 1997; USCG–1998–4442, 63 FR 52190, Sept. 30, 1998; USCG–2003–16630, 73 FR 65175, Oct. 31, 2008; USCG–2020–0634, 89 FR 50131, June 12, 2024]

Subpart 56.10—Components

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50131, June 12, 2024, unless otherwise noted.

§ 56.10–1 Selection and limitations of piping components (replaces 105 through 108).

(a) Pipe, tubing, pipe joining fittings, and piping system components, must meet material and standard requirements of subpart 56.60 and must meet the certification requirements of part 50 of this subchapter.

(b) The requirements in this subpart and in subparts 56.15 through 56.25 must be met instead of those in 105 through 108 in ASME B31.1 (incorporated by reference; see § 56.01–2); however, certain requirements are marked ''reproduced.''

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; USCG–2003–16630, 73 FR 65175, Oct. 31, 2008]

§ 56.10–5 Pipe.

(a) *General.* Pipe and tubing must be selected as described in table 1 to § 56.60–1.

(b) *Ferrous pipe.* ASTM A53/A53M (incorporated by reference, see § 56.01–2) furnace welded pipe must not be used for combustible or flammable liquids within machinery spaces. (See §§ 30.10–15 and 30.10–22 of this chapter for definitions of combustible and flammable liquids.)

(c) *Nonferrous pipe.* (See also § 56.60–20.)

(1) Copper and brass pipe for water and steam service may be used for design pressures up to 250 psig and for design temperatures to 406 °F.

(2) Copper and brass pipe for air may be used in accordance with the allowable stresses of the materials found from table 1 to § 56.60–1.

(3) Copper-nickel alloys may be used for water and steam service within the design limits of stress and temperature indicated in ASME B31.1 (incorporated by reference; see § 56.01–2).

(4) Copper tubing may be used for instrument service up to 1,000 psig.

(5) Copper, brass, or aluminum pipe or tube must not be used for flammable fluids except where specifically permitted by this part.

(6) Aluminum-alloy pipe or tube along with similar junction equipment may be used within the limitation stated in 124.7 of ASME B31.1 and paragraph (c)(5) of this section.

(d) *Nonmetallic pipe.* Plastic pipe may be used subject to the conditions described in § 56.60–25.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGFR 72–59R, 37 FR 6189, Mar. 25, 1972; CGD 77–140, 54 FR 40602, Oct. 2, 1989; CGD 95–028, 62 FR 51200, Sept. 30, 1997; USCG–2000–7790, 65 FR 58460, Sept. 29, 2000; USCG–2003–16630, 73 FR 65175, Oct. 31, 2008]

Subpart 56.15—Fittings

SOURCE: CGD 77–140, 54 FR 40602, Oct. 2, 1989, as amended by USCG–2020–0634, 89 FR 50131, June 12, 2024, unless otherwise noted.

§ 56.15–1 Pipe joining fittings.

(a) Pipe joining fittings meeting the standards specified in this part and certified in accordance with subpart 50.25 of this subchapter are acceptable for use in piping systems.

(b) Threaded, flanged, socket-welding, butt-welding, and socket-brazing pipe joining fittings, made in accordance with the applicable standards in tables 1 and 2 to § 56.60–1 and of materials complying with subpart 56.60, may be used in piping systems within the

material, size, pressure, and temperature limitations of those standards and within any further limitations specified in this subchapter. Fittings must be designed for the maximum pressure to which they may be subjected, but in no case less than 50 psig.

(c) Pipe joining fittings not accepted for use in piping systems in accordance with paragraph (b) of this section must meet the following:

(1) All pressure-containing materials must be accepted in accordance with § 56.60–1.

(2) The maximum allowable working pressure may be determined by—

(i) Calculations comparable to those of ASME B31.1 (incorporated by reference; see § 56.01–2) or Section VIII of the ASME BPVC (incorporated by reference; see § 56.01–2);

(ii) Subjecting a representative model to a proof test or experimental stress analysis described in paragraph A–22 of Section I of the ASME BPVC (incorporated by reference; see § 56.01–2); or

(iii) Other means specifically accepted by the Marine Safety Center.

(3) Fittings must be tested in accordance with § 56.97–5.

(4) If welded, fittings must be welded in accordance with subpart 56.70 and part 57 of this chapter or by other processes specifically approved by the Marine Safety Center. In addition, for fittings to be accepted for use in piping systems in accordance with this paragraph, the following requirements must be met:

(i) For fittings sized three inches and below—

(A) The longitudinal joints must be fabricated by either gas or arc welding;

(B) One fitting of each size from each lot of 100 or fraction thereof must be flattened cold until the opposite walls meet without the weld developing any cracks;

(C) One fitting of each size from each lot of 100 or fraction thereof must be hydrostatically tested to the pressure required for a seamless drawn pipe of the same size and thickness produced from equivalent strength material, as determined by the applicable pipe material specification; and

(D) If a fitting fails to meet the test in paragraph (c)(4)(i)(B) or (C) of this section, no fitting in the lot from which the test fitting was chosen is acceptable.

(ii) For fittings sized above three inches—

(A) The longitudinal joints must be fabricated by arc welding;

(B) For pressures exceeding 150 psig, each fitting must be radiographically examined as specified in Section VIII of the ASME BPVC;

(C) For pressures not exceeding 150 psig, the first fitting from each size in each lot of 20 or fraction thereof must be examined by radiography to ensure that the welds are of acceptable quality;

(D) One fitting of each size from each lot of 100 or fraction thereof must be hydrostatically tested to the pressure required for a seamless drawn pipe of the same size and thickness produced from equivalent strength material, as determined by the applicable pipe material specification; and

(E) If a fitting fails to meet the test in paragraph (c)(4)(ii)(C) or (D) of this section, no fitting in the lot from which the test fitting was chosen is acceptable.

(d) Single welded butt joints without the use of backing strips may be employed in the fabrication of pipe joining fittings of welded construction provided radiographic examination indicates that complete penetration is obtained.

(e) Each pipe joining fitting must be marked in accordance with MSS SP–25 (incorporated by reference; see § 56.01–2).

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

§ 56.15–5 Fluid-conditioner fittings.

(a) Fluid-conditioner fittings meeting the standards of this part and certified in accordance with subpart 50.25 of this subchapter are acceptable for use in piping systems.

(b) Fluid-conditioner fittings made in accordance with the applicable standards listed in table 2 to § 56.60–1 and of materials complying with subpart 56.60 of this part, may be used within the material, size, fluid, pressure, and temperature limitations of those standards

and within any further limitations specified in this subchapter.

(c) The maximum allowable working pressure may be determined in accordance with § 56.15–1(c).

(d) If nonstandard fluid-conditioner fittings are welded, they must be welded in accordance with subpart 56.70 of this part and part 57 of this subchapter or by other processes specifically approved by the Marine Safety Center.

(e) Heat exchangers having headers and tubes, and brazed boiler steam air heaters, are not considered fluid-conditioner fittings and must meet the requirements in part 54 of this subchapter regardless of size. For brazed boiler steam air heaters, see also § 56.30–30(b)(1)t.

[CGD 77–140, 54 FR 40602, Oct. 2, 1989, as amended by CGD 83–043, 60 FR 24772, May 10, 1995; USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

§ 56.15–10 Special purpose fittings.

(a) Special purpose fittings made in accordance with the applicable standards listed in table 2 to § 56.60–1 of this part and of materials complying with subpart 56.60, may be used within the material, size, pressure, and temperature limitations of those standards and within any further limitations specified in this subchapter.

(b) Nonstandard special purpose fittings must meet the requirements of §§ 56.30–25, 56.30–40, 56.35–10, or 56.35–15, as applicable.

Subpart 56.20—Valves

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50131, June 12, 2024, unless otherwise noted.

§ 56.20–1 General.

(a) Valves certified in accordance with subpart 50.25 of this subchapter are acceptable for use in piping systems.

(b) Non-welded valves complying with the standards listed in § 56.60–1 may be used within the specified pressure and temperature ratings of those standards, provided the limitations of § 56.07–10(c) are applied. Materials must comply with subpart 56.60. Welded valves complying with the standards and specifications listed in § 56.60–1 may be used in Class II systems only unless they meet paragraph (c) of this section.

(c) All other valves must meet the following:

(1) All materials must be accepted in accordance with § 56.60–1.

(2) The maximum allowable working pressure may be determined by § 56.15–1(c)(2).

(3) Valves must be tested in accordance with the requirements of the applicable incorporated standard or subpart 56.97.

(4) If welded, valves must be welded in accordance with subpart 56.70 and part 57 of this subchapter or by other processes specifically approved by the Marine Safety Center.

[CGD 77–140, 54 FR 40604, Oct. 2, 1989; 55 FR 39968, Oct. 1, 1990; USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

§ 56.20–5 Marking (modifies 107.2).

Marking must be in accordance with MSS SP–25 (incorporated by reference; see § 56.01–2).

[USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

§ 56.20–7 Ends.

(a) Valves may be used with flanged, threaded, butt welding, socket welding or other ends in accordance with applicable standards as specified in subpart 56.60.

(b) [Reserved]

§ 56.20–9 Valve construction.

(a) Each valve must close with a right-hand (clockwise) motion of the handwheel or operating lever as seen by one facing the end of the valve stem. Each nonrising-stem valve, lever-operated valve, or other valve where, because of design, the position of the disc or closure mechanism is not obvious must be fitted with an indicator to show whether the valve is opened or closed. No such indicator is required for any valve located in a tank or similar inaccessible space when indicators are available at accessible sites. The operating levers of quarter-turn valves must be parallel to the fluid flow when open and perpendicular to the fluid flow when closed.

(b) Valves of Class I piping systems having diameters exceeding 2 inches

must have bolted, pressure seal, or breech lock bonnets and flanged or welding ends. Socket type welding ends must meet § 56.30–5(c) and § 56.30–10(b)(4). For diameters not exceeding 2 inches, screwed union bonnet or bolted bonnet, or bonnetless valves, which prevent the stem from screwing out of the body, may be employed. Outside screw and yoke design must be used for valves 3 inches and larger for pressures above 600 psig. Cast iron valves with screwed-in or screwed-over bonnets are prohibited. Union bonnet type cast iron valves must have the bonnet ring made of steel, bronze, or malleable iron.

(c) Valves must be designed for the maximum pressure to which they may be subjected, but in no case must the design pressure be less than 50 psig. The use of wafer type resilient seated valves is subject to the requirements of § 56.20–15.

(d) Disks or disk faces, seats, stems, and other wearing parts of valves must be made of material possessing corrosion and heat-resisting qualities suitable for the service conditions to which they may be subjected.

(e) Plug cocks must be constructed with satisfactory and positive means of preventing the plug from becoming loosened or removed from the body when the plug is operated.

(f) Cocks must be marked in a straight line with the body to indicate whether they are open or closed.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 77–140, 54 FR 40604, Oct. 2, 1989; CGD 95–012, 60 FR 48050, Sept. 18, 1995; USCG–2004–18884, 69 FR 58346, Sept. 30, 2004; USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

§ 56.20–15 Valves employing resilient material.

(a) A valve in which the closure is accomplished by resilient nonmetallic material instead of a metal-to-metal seat must comply with the design, material, construction, and testing for valves specified in this section.

(b) Valves employing resilient material are divided into three categories: Positive shutoff, Category A, and Category B, and must be tested and used as follows:

(1) *Positive shutoff valves.* The closed valve must pass less than 10 ml/hr (0.34 fluid oz/hr) of liquid, or less than 3 l/hr (0.11 cubic ft/hr) of gas per inch nominal pipe size through the line at full rated pressure after being subjected to the fire test requirements of API 607 (incorporated by reference; see § 56.01–2). Packing material must be fire resistant. Piping subject to internal head pressure from a tank containing oil must be fitted with positive shutoff valves located at the tank in accordance with § 56.50–60(d). Positive shutoff valves may be used in any location in lieu of a Category A or Category B valve.

(2) *Category A valves.* Category A valves may be used in any location except where positive shutoff valves are required by § 56.50–60(d). To be qualified as a Category A valve, the valve must meet the fire test and leakage requirements of API 607.

(i) Category A valves are required at vital piping system manifolds;

(ii) Category A valves must be used in isolation valves in cross-connects between two piping systems, at least one of which is a vital system, where failure of the valve in a fire would prevent the vital system(s) from functioning as designed; and

(iii) Category A valves must be used for valves providing closure for any opening in the shell of the vessel.

(3) *Category B valves.* The closed valve will not provide effective closure of the line or will permit appreciable leakage from the valve after the resilient material is damaged or destroyed. Category B valves are not required to be tested and may be used in any location except where a Category A or positive shutoff valve is required.

(c) Resiliently seated valves previously accepted by the Commandant or the Marine Safety Center may continue to be used within the service restrictions of their acceptance.

[CGD 95–028, 62 FR 51200, Sept. 30, 1997, as amended by USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

§ 56.20–20 Valve bypasses.

(a) Sizes of bypasses must be in accordance with MSS SP–45 (incorporated by reference; see § 56.01–2).

(b) Pipe for bypasses should be at least Schedule 80 seamless, and of a material of the same nominal chemical composition and physical properties as

that used for the main line. Lesser thickness may be approved depending on the installation and service conditions.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

Subpart 56.25—Pipe Flanges, Blanks, Flange Facings, Gaskets, and Bolting

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50131, June 12, 2024, unless otherwise noted.

§ 56.25–5 Flanges.

Each flange must conform to the design requirements of either the applicable standards of table 2 to § 56.60–1, or of those of Appendix 2 of Section VIII of the ASME BPVC (incorporated by reference; see § 56.01–2). Plate flanges must meet the requirements of § 56.30–10(b)(5). Flanges may be integral or may be attached to pipe by threading, welding, brazing, or other means within the applicable standards specified in table 2 to § 56.60–1.

[CGD 77–140, 54 FR 40605, Oct. 2, 1989, as amended by USCG–2002–13058, 67 FR 61278, Sept. 30, 2002; USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

§ 56.25–7 Blanks.

Each blank must conform to the design requirements of 104.5.3 of ASME B31.1 (incorporated by reference; see § 56.01–2).

[USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

§ 56.25–10 Flange facings.

Flange facings must be in accordance with the applicable standards listed in table 2 to § 56.60–1 and MSS SP–6 (incorporated by reference; see § 56.01–2).

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 77–140, 54 FR 40605, Oct. 2, 1989; USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

§ 56.25–15 Gaskets (modifies 108.4).

(a) Gaskets must be made of materials which are not injuriously affected by the fluid or by temperature.

(b) Each gasket must conform to the design requirements of the applicable standards of table 2 to § 56.60–1.

(c) Only metallic and suitable asbestos-free nonmetallic gaskets may be used on flat or raised face flanges if the expected normal operating pressure exceeds 720 psig or the operating temperature exceeds 750 °F.

(d) The use of metal and nonmetallic gaskets is not limited as to pressure provided the gasket materials are suitable for the maximum fluid temperatures.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 86–035, 54 FR 36316, Sept. 1, 1989; USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

§ 56.25–20 Bolting.

(a)(1) Bolts, studs, nuts, and washers must comply with applicable standards and specifications listed in § 56.60–1. Bolting must be in accordance with ASME B16.5 (incorporated by reference; see § 56.01–2).

(2) Bolts and studs must extend completely through the nuts.

(3) See § 58.30–15(c) of this subchapter for exceptions on bolting used in fluid power and control systems.

(b) Carbon steel bolts or bolt studs may be used if operating pressure does not exceed 300 psig and the operating temperature does not exceed 400 °F. Carbon steel bolts must have heavy hexagon heads in accordance with ASME B18.2.1 (incorporated by reference, see § 56.01–2) and must have heavy semifinished hexagonal nuts in accordance with ASME B18.2.2 (incorporated by reference, see § 56.01–2).

(c) Alloy steel stud bolts must be threaded full length and use heavy semifinished hexagonal nuts in accordance with ASME B18.2.2.

(d) Alloy bolts or studs and nuts are to be threaded in accordance with ASME B1.1 (incorporated by reference; see § 56.01–2), Class 2A external threads, and Class 2B internal threads (8-thread series 8UN for one inch and larger).

(e) (Reproduces 108.5.1.) Washers, when used under nuts, must be of forged or rolled material with steel

washers being used under steel nuts and bronze washers under bronze nuts.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 77–140, 54 FR 40605, Oct. 2, 1989; USCG–2000–7790, 65 FR 58460, Sept. 29, 2000; USCG–2003–16630, 73 FR 65176, Oct. 31, 2008]

Subpart 56.30—Selection and Limitations of Piping Joints

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50131, June 12, 2024, unless otherwise noted.

§ 56.30–1 Scope (replaces 110 through 118).

The selection and limitation of piping joints must be as required by this subpart rather than as required by 110 through 118 of ASME B31.1 (incorporated by reference; see § 56.01–2); however, certain requirements are marked ''reproduced'' in this subpart.

[USCG–2003–16630, 73 FR 65177, Oct. 31, 2008]

§ 56.30–3 Piping joints (reproduces 110).

The type of piping joint used must be suitable for the design conditions and must be selected with consideration of joint tightness, mechanical strength and the nature of the fluid handled.

§ 56.30–5 Welded joints.

(a) *General.* Welded joints may be used for materials for which welding procedures, welders, and welding machine operators have been qualified in accordance with part 57 of this subchapter.

(b) *Butt welds—general.* Butt welds may be made with or without backing or insert rings within the limitations established in § 56.70–15. When the use of backing rings will result in undesirable conditions such as severe stress concentrations, corrosion or erosion, then:

(1) The backing rings must be removed and the inside of the joint ground smooth, or

(2) The joint must be welded without backing rings, or

(3) Consumable insert rings must be used. Commonly used types of butt-welding end preparations are shown in ASME B16.25 (incorporated by reference; see § 56.01–2).

(4) Restrictions as to the use of backing rings appear for the low temperature piping systems and should be checked when designing for these systems.

(c) *Socket welds.* (Modifies 127.3.3A.)

(1) Each socket weld must conform to ASME B16.11 (incorporated by reference; see § 56.01–2), to applicable standards listed in table 2 to § 56.60–1, and to Figure 127.4.4C in ASME B31.1 (incorporated by reference; see § 56.01–2) as modified by § 56.30–10(b)(4).

(2) Restrictions on the use of socket welds appear in § 56.70–15(d)(3) for Class I service and in § 56.50–105 for low temperature service. See § 56.70–15(d)(4) for Class II service.

(d) *Fillet welds.* The size of a fillet weld is determined as shown in Figure 127.4.4A of ASME B31.1. Fillet-weld details for socket-welding components must meet § 56.30–5(c). Fillet-weld details for flanges must meet § 56.30–10 (see also § 56.70–15(d)(3) and (4) for applications of fillet welds).

(e) *Seal welds.* Seal welds may be used but must not be considered as contributing any strength to the joint.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 77–140, 54 FR 40605, Oct. 2, 1989; CGD 95–012, 60 FR 48050, Sept. 18, 1995; USCG–2003–16630, 73 FR 65177, Oct. 31, 2008]

§ 56.30–10 Flanged joints (modifies 104.5.1(a)).

(a) Flanged or butt-welded joints are required for Classes I and I–L piping for nominal diameters exceeding 2 inches, except as otherwise specified in this subchapter.

(b) Flanges may be attached by any method shown in figure 1 to § 56.30–10(b) or by any means approved by the Marine Safety Center. Pressure temperature ratings of the appropriate ASME standard must not be exceeded.

(1) *Figure 1 to § 56.30–10(b), Method 1.* Flanges with screw threads may be used in accordance with table 1 to § 56.30–20(c).

(2) *Figure 1 to § 56.30–10(b), Method 2.* ASME B16.5 (incorporated by reference; see § 56.01–2) Class 150 and Class 300 low-hubbed flanges with screw threads, plus the addition of a strength fillet weld of

the size as shown, may be used in Class I systems not exceeding 750°F or 4 NPS, in Class II systems, and in Class II–L systems not exceeding 1 NPS. If 100 percent radiography is required by §56.95–10 threaded flanges are not permitted and buttwelding flanges must be provided.

(3) *Figure 1 to §56.30–10(b), Method 3.* Slip-on flanges meeting ASME B16.5 may be used in piping systems of Class I, Class II, or Class II–L not to exceed the service pressure-temperature ratings, and not to exceed 4-inch Nominal Pipe Size (NPS) in systems of Class I and Class II–L. If 100 percent radiography is required by §56.95–10, slip-on flanges are not permitted and buttwelding flanges are required. Restrictions on the use of slip-on flanges appear in §56.50–105 for low-temperature piping systems.

(4) *Figure 1 to §56.30–10(b), Method 4.* ASME B16.5 socket welding flanges may be used in Class I or II–L systems not exceeding 3 NPS for class 600 and lower class flanges and 2 ½ NPS for class 900 and class 1500 flanges within the service pressure-temperature ratings of the standard. Whenever full radiography is required by §56.95–10 socket welding flanges are not permitted, and a butt weld type connection must be provided. For Class II piping, socket-welding flanges may be used without diameter limitation. Restrictions on socket welds appear in §56.50–105 for low temperature piping systems.

(5) *Figure 1 to §56.30–10(b), Method 5.* Flanges fabricated from steel plate meeting the requirements of part 54 of this subchapter may be used for Class II piping for pressures not exceeding 150 psig and temperatures not exceeding 450°F. Plate material listed in UCS–6(b) of Section VIII of the ASME BPVC (incorporated by reference; see §56.01–2) may not be used in this application, except that material meeting ASTM A36/A36M (incorporated by reference; see §56.01–2) may be used. The fabricated flanges must conform at least to the ASME B16.5 class 150-flange dimensions.

(6) *Figure 1 to §56.30–10 (b), Method 6.* Steel plate flanges meeting the material and construction requirements listed in paragraph (b)(5) of this section may be used for Class II piping for pressures not exceeding 150 psig or temperatures not exceeding 650°F. The flange must be attached to the pipe as shown by figure 1 to §56.30–10(b), Method 6.

(7) *Figure 1 to §56.30–10 (b), Method 7.* Lap joint flanges (Van Stone) may be used for Class I and Class II piping. The ends of the pipe must be heated from 1,650 to 1,900°F based on the size of the pipe. Extra thickness of metal built up in the end of the pipe must be machined to restore the pipe to its original diameter. The width of the lap flange must be at least three times the thickness of the pipe wall and the end of the pipe must be properly stress relieved after the flanging operation is completed. Manufacturers desiring to produce this type of joint must demonstrate to a marine inspector that they have the proper equipment and personnel to produce an acceptable joint.

(8) *Figure 1 to §56.30–10(b), Method 8.* Welding neck flanges may be used on any piping provided the flanges are butt-welded to the pipe. The joint must be welded as indicated by Figure 1 to §56.30–10(b), Method 8, and a backing ring employed which will permit complete penetration of the weld metal. If a backing ring is not used, refer to §56.30–5(b) for requirements.

(9) *Figure 1 to §56.30–10(b), Method 9.* Welding neck flanges may also be attached to pipe by a double-welded butt joint as shown by Figure 1 to §56.30–10(b), Method 9.

(10) *Figure 1 to §56.30–10 (b), Method 10.* Flanges may be attached by shrinking the flange on to the end of the pipe and flaring the end of the pipe to an angle of not less than 20°. A fillet weld of the size shown by figure 1 to §56.30–10(b), Method 10, must be used to attach the hub to the pipe. This flange is limited to a pressure of 300 psig and a temperature not exceeding of 500°F.

(11) *Figure 1 to §56.30–10(b), Method 11.* The flange of the type described and illustrated by figure 1 to §56.30–10(b), Method 10, except with the fillet weld omitted, may be used for Class II piping not exceeding 150 psig and temperatures not exceeding 450°F.

(12) *Figure 1 to §56.30–10(b), Method 12.* High-hub bronze flanges may be used for temperatures not exceeding 425°F.

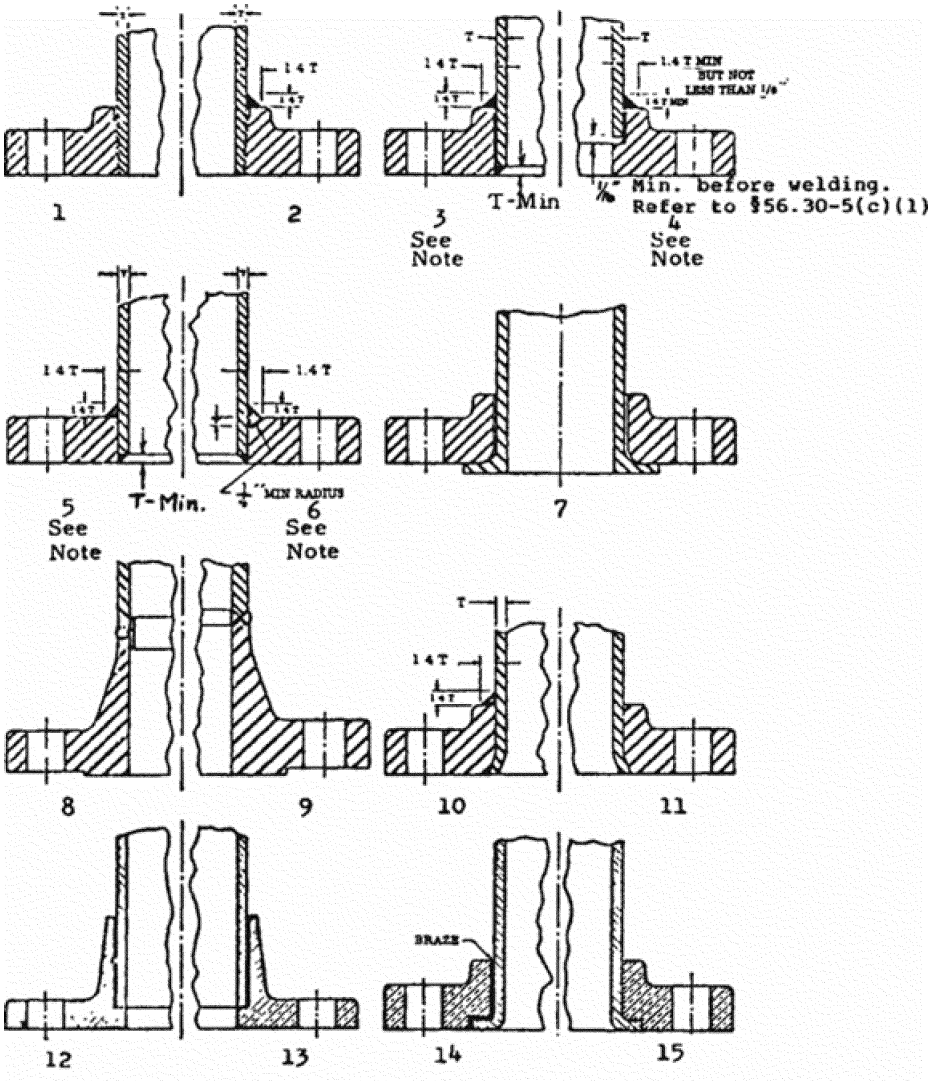
A preinserted ring of silver brazing alloy having a melting point not less than 1,000 °F must be inserted into the groove. A suitable flux must be applied to the surfaces to be joined to produce a satisfactory joint.

(13) *Figure 1 to § 56.30–10(b), Method 13.* The type of flange as described for Figure 1 to § 56.30–10(b), Method 12, may be employed and in lieu of an annular groove being machined in the hub of the flange for the preinserted ring of silver brazing alloy, a bevel may be machined on the end of the hub and the silver brazing alloy introduced from the end of the hub to attach the pipe to the flange.

(14) *Figure 1 to § 56.30–10(b), Method 14.* Flanges may be attached to nonferrous pipe by inserting the pipe in the flange and flanging the end of the pipe into the recess machined in the face of the flange to receive it. The pipe must be securely brazed to the wall of the flange.

(15) *Figure 1 to § 56.30–10(b), Method 15.* The flange of the type described and illustrated by Figure 1 to § 56.30–10(b), Method 14, except with the brazing omitted, may be used for Class II piping and where the temperature does not exceed 250 °F.

FIGURE 1 TO §56.30–10(B)—METHODS OF ATTACHMENT



NOTE 1 TO FIGURE 1 TO §56.30–10(B): ''T'' is the nominal pipe wall thickness used. Consult the text of paragraph (b) of this section for modifications on Class II piping systems. Fillet weld leg size need not exceed the thickness of the applicable ASME hub.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 77–140, 54 FR 40605, Oct. 2, 1989; USCG–2000–7790, 65 FR 58460, Sept. 29, 2000; USCG–2003–16630, 73 FR 65177, Oct. 31, 2008; 73 FR 76247, Dec. 16, 2008]

§ 56.30–15 Expanded or rolled joints.

(a) Expanded or rolled joints may be used where experience or test has demonstrated that the joint is suitable for the design conditions and where adequate provisions are made to prevent separation of the joint. Specific application for use must be made to the Commandant.

(b) [Reserved]

§ 56.30–20 Threaded joints.

(a) Threaded joints may be used within the limitations specified in subpart 56.15 of this chapter and within other limitations specified in this section.

(b) (Modifies 114.1.) All threads on piping components must be taper pipe threads in accordance with the applicable standard listed in table 2 to § 56.60–1. Threads other than taper pipe threads may be used for piping components where tightness of the joint depends on a seal weld or a seating surface other than the threads, and where experience or test has demonstrated that such threads are suitable.

(c) Threaded joints may not be used where severe erosion, crevice corrosion, shock, or vibration is expected to occur; or at temperatures over 925 °F. Size limitations are given in table 1 to § 56.30–20(c).

TABLE 1 TO § 56.30–20(c)—THREADED JOINTS[1] [2]

Maximum nominal size, inches	Maximum pressure, psig
Above 2″	(Not permitted in Class I piping service.)
Above 1″ up to 2″	600.
Above ¾″ up to 1″	1,200.
¾″ and below	1,500.

[1] Further restrictions on the use of threaded joints appear in the low temperature piping section.

[2] Threaded joints in hydraulic systems are permitted above the pressures indicated for the nominal sizes shown.

(d) No pipe with a wall thickness less than that of standard weight of ASME B36.10M (incorporated by reference; see § 56.01–2) steel pipe may be threaded. For restrictions on the use of pipe in steam service more than 250 psig or water service over 100 psig and 200 °F (93.3 °C), see part 104.1.2(c)(1) of ASME B31.1 (incorporated by reference; see § 56.01–2).

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 73–254, 40 FR 40164, Sept. 2, 1975; CGD 77–140, 54 FR 40606, Oct. 2, 1989; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§ 56.30–25 Flared, flareless, and compression fittings.

(a) This section applies to pipe fittings that are mechanically connected to pipe by such means as ferrules, flared ends, swaging, elastic strain preload, crimping, bite-type devices, and shape memory alloys. Fittings to which this section applies must be designed, constructed, tested, and marked in accordance with ASTM F1387 (incorporated by reference, see § 56.01–2). Previously approved fittings may be retained to the satisfaction of the Officer in Charge, Marine Inspection.

(b) Flared, flareless and compression fittings may be used within the service limitations of size, pressure, temperature, and vibration recommended by the manufacturer and as specified in this section.

(c) Flared, flareless, and compression type tubing fittings may be used for tube sizes not exceeding 50 millimeters (2 inches) outside diameter within the limitations of applicable standards and specifications listed in this section and § 56.60–1.

(d) Flareless fittings must be of a design in which the gripping member or sleeve must grip or bite into the outer surface of the tube with sufficient strength to hold the tube against pressure, but without appreciably distorting the inside tube diameter. The gripping member must also form a pressure seal against the fitting body.

(e) For fluid services, other than hydraulic systems, using a combustible fluid as defined in § 30.10–15 of this chapter and for fluid services using a flammable fluid as defined in § 30.10–22 of this chapter, flared fittings must be used; except that flareless fittings of the nonbite type may be used when the tubing system is of steel, nickel copper or copper nickel alloy. When using copper or copper zinc alloy, flared fittings are required. (See also § 56.50–70 for gasoline fuel systems, § 56.50–75 for diesel

fuel systems, and § 58.25–20 of this subchapter for hydraulic systems for steering gear.)

[CGD 95–027, 61 FR 26000, May 23, 1996; 61 FR 35138, July 5, 1996, as amended by USCG–1999–5151, 64 FR 67180, Dec. 1, 1999; USCG–2000–7790, 65 FR 58460, Sept. 29, 2000]

§ 56.30–27 Caulked joints.

Caulked joints may not be used.

[CGD 77–140, 54 FR 40606, Oct. 2, 1989]

§ 56.30–30 Brazed joints.

(a) *General (refer also to subpart 56.75).* The minimum socket depth must be sufficient for the intended service. Brazing alloy must either be end-fed into the socket or must be provided in the form of a preinserted ring in a groove in the socket. The brazing alloy must be sufficient to fill completely the annular clearance between the socket and the pipe or tube.

(b) *Limitations.* (1) Brazed socket-type joints must not be used on systems containing flammable or combustible fluids in areas where fire hazards are involved or where the service temperature exceeds 425 °F. Higher temperature service must be approved by the Commandant.

(2) Brazed joints depending solely upon a fillet, rather than primarily upon brazing material between the pipe and socket are not acceptable.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§ 56.30–35 Gasketed mechanical couplings.

(a) This section applied to pipe fittings that form a seal by compressing a resilient gasket onto the pipe joint primarily by threaded fasteners and where joint creep is only restricted by such means as machined grooves, centering pins, or welded clips. Fittings to which this section applies must be designed, constructed, tested, and marked in accordance with ASTM F1476 and ASTM F1548 (both incorporated by reference, see § 56.01–2). Previously approved fittings may be retained to the satisfaction of the Officer in Charge, Marine Inspection.

(b) Gasketed mechanical couplings may be used within the service limitations of pressure, temperature and vibration recommended by the manufacturer, except that gasketed mechanical couplings must not be used in—

(1) Any location where leakage, undetected flooding, or impingement of liquid on vital equipment may occur; or

(2) In tanks where the liquid conveyed in the piping system is not chemically compatible with the liquid in the tank.

(c) Gasketed mechanical couplings must not be used as expansion joints. Positive restraints must be included, where necessary, to prevent the coupling from creeping on the pipe and uncovering the joint. Bite-type devices are generally not accepted for this purpose. Machined grooves, centering pins, and welded clips are considered positive means of protection against creep.

[CGD 95–027, 61 FR 26001, May 23, 1996, as amended by USCG–1999–5151, 64 FR 67180, Dec. 1, 1999]

§ 56.30–40 Flexible pipe couplings of the compression or slip-on type.

(a) Flexible pipe couplings of the compression or slip-on type must not be used as expansion joints. To ensure that the maximum axial displacement (approximately 3/8″ maximum) of each coupling is not exceeded, positive restraints must be included in each installation.

(b) Positive means must also be provided to prevent the coupling from ''creeping'' on the pipe and uncovering the joint. Bite type devices are not generally accepted for this purpose. Machined grooves or centering pins are considered positive means.

(c) The installation must be such as to preclude appreciable difference in the vibration magnitudes of the pipes joined by the couplings. The couplings must not be used as a vibration damper. The vibration magnitude and frequency should not exceed that recommended by the coupling manufacturer.

(d) Flexible couplings made in accordance with the applicable standards listed in table 2 to § 56.60–1 and of materials complying with subpart 56.60 may be used within the material, size, pressure, and temperature limitations of those standards and within any further

limitations specified in this subchapter. Flexible couplings fabricated by welding must also comply with part 57 of this subchapter.

(e) Flexible couplings must not be used in cargo holds or in any other space where leakage, undetected flooding, or impingement of liquid on vital equipment may occur, or in tanks where the liquid conveyed in the piping system is not compatible with the liquid in the tank.

(f) Damaged or deteriorated gaskets must not be reinstalled.

(g) Each coupling must be tested in accordance with § 56.97–5.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 77–140, 54 FR 40606, Oct. 2, 1989]

Subpart 56.35—Expansion, Flexibility and Supports

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50131, June 12, 2024, unless otherwise noted.

§ 56.35–1 Pipe stress calculations (replaces 119.7).

(a) A summary of the results of pipe stress calculations for the main and auxiliary steam piping where the design temperatures exceed 800 °F must be submitted for approval. Calculations must be made in accordance with a method of stress analysis acceptable to the Marine Safety Center to determine the forces at all terminal connections, anchor, and junction points, as well as the resultant bending stress, longitudinal pressure stress, torsional stress, and combined expansion stress at all such points. The location of the maximum combined stress must be indicated in each run of pipe between anchor points.

(b) The Marine Safety Center (MSC) will give special consideration to the use of the full tabulated value of ''S'' in computing S_h and S_c where all material used in the system is subjected to further nondestructive testing specified by the MSC, and where the calculations prescribed in 119.6.4 and 102.3.2 of ASME B31.1 (incorporated by reference; see § 56.01–2) and § 56.07–10 are performed. The procedures for nondestructive testing and the method of stress analysis must be approved by the MSC before the submission of computations and drawings for approval.

[CGD 77–140, 54 FR 40607, Oct. 2, 1989, as amended by USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§ 56.35–10 Nonmetallic expansion joints (replaces 119.5.1).

(a) Nonmetallic expansion joints must conform to the standards listed in table 2 to § 56.60–1. Nonmetallic expansion joints may be used within their specified pressure and temperature rating in vital and nonvital machinery sea connections inboard of the skin valve. These joints must not be used to correct for improper workmanship or misalignment. Joint movements must not exceed the limits set by the joint manufacturer.

(b) [Reserved]

[CGD 77–140, 54 FR 40607, Oct. 2, 1989]

§ 56.35–15 Metallic expansion joints (replaces 119.5.1).

Metallic expansion joints must conform to the standards listed in table 2 to § 56.60–1 and may be used within their specified pressure and temperature rating.

[CGD 77–140, 54 FR 40607, Oct. 2, 1989]

Subpart 56.50—Design Requirements Pertaining to Specific Systems

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50131, June 12, 2024, unless otherwise noted.

§ 56.50–1 General (replaces 122).

The requirements in this subpart for piping systems apply instead of those in Section 122 of ASME B31.1 (incorporated by reference; see § 56.01–2). The following installation requirements are applicable to all systems:

(a) Where pipes and scuppers are carried through watertight or oiltight bulkheads, decks, or tank tops, or are carried through fire control bulkheads and decks, the integrity of the structure must be maintained. Lead or other heat sensitive materials must not be used in piping systems in bulkhead or deck penetrations where fire would impair the integrity of the penetration.

(For nonmetallic or plastic pipe installations, see §56.60–25(a).) Openings in structure through which pipes pass must be reinforced where necessary. Metallic materials having a melting point of 1,700°F or less are considered heat sensitive and if used must be suitably insulated.

(b)(1) Pipes piercing the collision bulkhead must be fitted with valves operable from above the bulkhead deck and the valve must be fitted inside the forepeak tank adjacent to the collision bulkhead. The pipe penetrating the collision bulkhead must be welded to the bulkhead on both sides. The valve body must be of steel or ductile cast iron.

(2) Passenger vessels must not have the collision bulkhead pierced below the margin line by more than one pipe conveying liquids in the forepeak tank.

(c) Valves and cocks not forming part of a piping system are not permitted in watertight subdivision bulkheads. However, sluice valves or gates in oiltight bulkheads of tank vessels may be used if approved by the Marine Safety Center.

(d) Piping must generally not be run over switchboards, and must be installed as far away from other electrical equipment as practicable. When such leads are necessary, provision must be made to prevent leakage from damaging the equipment.

(e) Stuffing boxes must not be used on deep tank bulkheads, double bottoms or in any position where they cannot be easily examined. This requirement does not apply to ore carriers operating on the Great Lakes or cargo lines of oil tankers.

(f) Piping systems must be installed so that under no condition will the operation of safety or relief valves be impaired.

(g)(1) Power actuated valves may be used if approved for the system by the Marine Safety Center. All power-actuated valves must have a backup manual means of operation.

(2)(i) Remote valve controls must be fitted with nameplates describing the applicable system.

(ii) Remote valve controls must be accessible under normal service conditions.

(iii) Remote valve controls, except reach rods, must be fitted with indicators that show whether the valves they control are open or closed. Valve position indicating systems must be independent of valve control systems.

(iv) Valve reach rods must be adequately protected.

(v) Solid reach rods must be used in tanks containing liquids, except that reach rods of constructed of extra-heavy pipe may be considered acceptable by the OCMI.

(3) Air-operated remote-control valves must be provided with self-indicating lines at the control boards that indicate the desired valve positions, such as open or closed.

(h) Suitable drains must be provided at low points of piping systems.

(i) Valves and cocks must be easily accessible. Valves attached to the shell of the vessel or to sea chests located below deck plating must be operable from above the deckplates.

(j) When welded fabrication is employed, a sufficient number of detachable joints must be provided to facilitate maintenance of machinery.

(k) Piping systems used where the fluid temperature exceeds 150°F must be suitably insulated as necessary to preclude injury to personnel.

(l) Where pipes are run through dry cargo spaces they must be protected from mechanical injury by a suitable enclosure or other means.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 77–140, 54 FR 40607, Oct. 2, 1989; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§56.50–10 Special gauge requirements.

(a) Where pressure-reducing valves are employed, a pressure gauge must be provided on the low-pressure side of the reducing station.

(b) Fuel oil service and transfer, fire, cargo, and boiler feed pumps must be provided with a discharge pressure gage. Additional information pertaining to fire pumps is in §34.10–5 of subchapter D, §76.10–5 of subchapter H, §95.10–5 of subchapter I, and §108.417 of subchapter IA, all of this chapter.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 73–251, 43 FR 56799, Dec. 4, 1978; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§ 56.50–15 Steam and exhaust piping.

(a) The design pressures of the steam piping connected to the boiler drum or to the superheater inlet header must not be less than the lowest pressure setting of any drum safety valve. The value of allowable stress for the material must not exceed that corresponding to the saturated steam temperature at drum pressure and must be selected as described in § 56.07–10(e).

(b) Main superheater outlet piping systems, desuperheater piping systems, and other auxiliary superheated piping systems led directly from the boiler superheater must be designed for a pressure not less than the pressure at which the superheater safety valve is set. In the case of a superheated safety valve that is drum pilot actuated, the design pressure of such piping systems must not be less than the pressure setting of the actuator valve on the drum. Valves and fittings must be selected for the above systems from the accepted standards in table 1 to 56.60–1, using the pressure-temperature rating in the standard.

(c) Steam stop valves in sizes exceeding 6 inches must be fitted with bypasses.

(d) In multiple boiler installations each boiler's main, auxiliary and desuperheater steam lines must be fitted with two valves, one a stop valve and one a stop check valve.

(e) Main and auxiliary steam stop valves must be readily accessible, operable by one person and arranged to seat against boiler pressure.

(f) The auxiliary steam piping of each vessel equipped with more than one boiler must be so arranged that steam for the whistle and vital auxiliary systems may be supplied from any power boiler.

(g) Steam and engine exhaust pipes must not be led through coal bunkers or dry cargo spaces.

(h)(1) Steam piping, with the exception of the steam heating system, must not be led through passageways, accommodation spaces, or public spaces unless the arrangement is specifically approved by the Marine Safety Center.

(2) The pressure in steam heating systems must not exceed 150 psig, and the steam pressure for accommodation and public space heating must not exceed 45 psig.

(3) Steam lines must be suitably located and shielded to minimize hazards to any personnel within the space.

(4) High temperature hot water for heating systems may not exceed 375 °F.

(i) Where the exhaust side of machinery is not designed for the full inlet pressure, the exhaust side must be protected from over pressure by one of the following means:

(1) A relief valve in the exhaust side with appropriate set pressure and sufficient capacity to prevent the exhaust side from overpressure.

(2) A sentinel valve or other warning device fitted on the exhaust side, together with a trip device, which will close the inlet valve.

(j) Shore steam connections must be fitted with a relief valve set at a pressure not exceeding the design pressure of the piping.

(k) Means must be provided for draining every steam pipe in which water hammer might occur.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGFR 72–59R, 37 FR 6189, Mar. 25, 1972; CGD 73–254, 40 FR 40165, Sept. 2, 1975; CGD 77–140, 54 FR 40607, Oct. 2, 1989; CGD 83–043, 60 FR 24772, May 10, 1995; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§ 56.50–20 Pressure relief piping.

(a) *General.* There must be no intervening stop valves between the pressure vessel or piping system being protected and its protective device or devices, except as authorized by the Marine Safety Center.

(b) *Discharge lines.* (Reproduces 122.6.2(d).) Discharge lines from pressure-relieving safety devices must be designed to facilitate drainage.

(c) *Stop valves.* Stop valves between the safety or relief valve and the point of discharge are not permitted, except as specifically approved by the Marine Safety Center.

(d) *Reference.* See also § 56.07–10(a) and (b) for specific requirements.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9979, June 17, 1970; CGD 77–140, 54 FR 40607, Oct. 2, 1989]

§ 56.50–25 Safety and relief valve escape piping.

(a) Escape piping from safety valves must have an area of not less than that of the combined areas of the outlets of all valves discharging thereto and must be led as near vertically as practicable to the atmosphere.

(b) Expansion joints or flexible pipe connections must be fitted in escape piping. The piping must be adequately supported so that no stress is transmitted to the safety valve body.

(c) Safety or relief valve discharges, when permitted to terminate in the machinery space, must be led below the floorplates or to a remote position.

(d) The back pressure effect of the escape piping on the operation of the relief device must be considered.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 77–140, 54 FR 40608, Oct. 2, 1989; CGD 95–012, 60 FR 48050, Sept. 18, 1995]

§ 56.50–30 Boiler feed piping.

(a) *General requirements.* (1) Steam vessels, and motor vessels fitted with steam driven electrical generators must have at least two separate means of supplying feed water for the boilers. All feed pumps must be fitted with the necessary connections for this purpose. The arrangement of feed pumps must be in accordance with paragraph (d) or (e) of this section.

(2) Feed pump supply to power boilers may utilize the group feed system or the unit feed system.

(3) Feed discharge piping from the pump up to, but not including the required stop and stop-check valves, must be designed for either the feed pump relief valve setting or the shutoff head of the pump if a relief valve is not fitted. (Refer to § 56.07–10(b) for specific requirements.) Feed piping from the boiler, to and including the required stop and stop-check valves (see paragraph (b) of this section), must have a design pressure which exceeds the maximum allowable working pressure of the boiler by either 25 percent or 225 psig, whichever is less. The value of allowable stress for design purposes must be selected as described in § 56.07–10(e) at a temperature not below that for saturated steam at the maximum allowable working pressure of the boiler.

(4) Feed pumps for water tube boilers must have freshwater connections only.

(b) *Feed valves.* (1) Stop and stop-check valves must be fitted in the main feed line and must be attached as closely as possible to drum inlets or to the economizer inlet.

(2) Auxiliary feed lines must be fitted with stop valves and stop-check valves.

(3) Boilers fitted with economizers must have a check valve fitted in the economizer discharge and located as close as possible to the drum feed inlet nozzle.

(c) *Feed water regulators and heaters.* (1) Where feed water regulators or feed water heaters are installed, an alternate means of operation with these devices bypassed must be provided.

(2) All feed water regulators installed in a unit feed system must be fitted with an external bypass.

(3) A feed water regulator may be interposed between the stop and stop-check valves in the feed lines.

(d) *Group feed system.* Group feed systems must be provided with pumps and piping as follows:

(1) Vessels having a feed pump attached to the main propulsion unit must be provided with at least one independently driven feed pump. Each of these pumps must be used exclusively for feed purposes and must be capable of supplying the operating boilers at their normal capacity. In addition, a second independently driven pump, capable of supplying such boilers at 75 percent of their normal capacity, must be provided.

(2) If two independently driven pumps are provided, each capable of supplying the boilers at their normal required operating capacity, and neither pump is used for other purposes, the third or emergency feed pump is not required.

(3) River or harbor steam vessels must have at least two means for feeding the boilers; one of which must be an independently driven pump, the other may be an attached pump, an additional independently driven pump, or an injector.

(e) *Unit feed system.* Unit feed systems must be provided with pumps and piping as follows:

(1) The unit feed system may be used on vessels having two or more boilers.

When the unit feed system is employed, each boiler must have its own independently driven main feed pump capable of supplying the boiler at its normal operating capacity. In addition, there must be an auxiliary independent feed pump of the same capacity that can be operated in place of and in conjunction with the main feed pump. In vessels with three or more boilers, not more than two boilers may be served by any one auxiliary pump. The auxiliary pump may be so interconnected that any pump can feed any boiler.

(2) In the unit feed system, a separate feed line must be provided for each boiler from its pumps. A separate auxiliary feed line is not required. The discharge from each pump and the feed supply to each boiler must be automatically controlled by the level of the water in that boiler. In addition to the automatic control, manual control must be provided.

(f) *Feedwater.* The feedwater must be introduced into a boiler as required by § 52.01–105(d) of this subchapter.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 95–028, 62 FR 51201, Sept. 30, 1997; USCG–2002–13058, 67 FR 61278, Sept. 30, 2002; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§ 56.50–35 Condensate pumps.

Two means must be provided for discharging the condensate from the main condenser, one of which must be independent of the main propelling machinery.

§ 56.50–40 Blowoff piping (replaces 122.1.4).

(a)(1) The owner or operator of a vessel must follow the requirements for blowoff piping in this section instead of the requirements in 122.1.4 of ASME B31.1 (incorporated by reference; see § 56.01–2).

(2) Where blowoff valves are connected to a common discharge from two or more boilers, a nonreturn valve must be provided in the line from each boiler to prevent accidental blowback in the event the boiler blowoff valve is left open.

(b) Blowoff must be designed for not less than 125 percent of the maximum allowable working pressure of the boiler, or the maximum allowable working pressure of the boiler plus 225 psig, whichever is less. The value of allowable stress for design purposes must be selected as described in § 56.07–10(e) at a temperature not below that of saturated steam at the maximum allowable working pressure of the boiler.

(c) Boiler blowoff piping which discharges above the lightest loadline of a vessel must be arranged so that the discharge is deflected downward.

(d) Globe valves must not be used for blowoff service.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 73–254, 40 FR 40165, Sept. 2, 1975; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§ 56.50–45 Circulating pumps.

(a) A main circulating pump and emergency means for circulating water through the main condenser must be provided. The emergency means may consist of a connection from an independent power pump fitted between the main circulating pump and the condenser.

(b) Independent sea suctions must be provided for the main circulating and the emergency circulating pumps.

(c) A cross connection between the circulating pumps in the case of multiple units will be acceptable in lieu of an independent power pump connection.

§ 56.50–50 Bilge and ballast piping.

(a)(1) The requirements of SOLAS Chapter II–1 regulation 35–1 (incorporated by reference, see § 56.01–2) for passenger and cargo ships are considered equivalent to this section.

(2) All vessels except unmanned barges must be provided with a satisfactory bilge pumping plant capable of pumping from and draining any watertight compartment except for ballast, oil, and water tanks. The bilge pumping system must be capable of operation under all practicable conditions after a casualty whether the ship is upright or listed.

(3) Arrangements must be made whereby water in the compartments will drain to the suction pipes. Where piping is led through the forepeak, see § 56.50–1(b).

(4) Where the vessel is to carry flammable liquids with a flashpoint below

23°C (74°F) in enclosed cargo spaces, the bilge-pumping system must be designed to ensure against inadvertent pumping of such liquids through machinery spaces.

(5) For vessels constructed on or after June 9, 1995, and on an international voyage, arrangements must meet the requirements of SOLAS Chapter II–1 regulation 35–1 to drain the enclosed cargo spaces on either the bulkhead deck of a passenger vessel or the freeboard deck of a cargo vessel.

(b) Passenger vessels must have provision made to prevent the compartment served by any bilge suction piping from being flooded in the event the pipe is severed or otherwise damaged by collision or grounding in any other compartment. Where the piping is located within one-fifth of the beam of the side of the vessel or is in a duct keel, a nonreturn valve must be fitted to the end of the pipe in the compartment, which it serves.

(c)(1) Each bilge suction must lead from a manifold unless otherwise approved by the Marine Safety Center. As far as practicable, each manifold must be in, or capable of remote operation from, the same space as the bilge pump. In either case, the manifold must be capable of being locally controlled from the floorplates. As far as practicable, each overboard-discharge valve for a bilge system must comply with the requirements governing location and accessibility for suction manifolds. Except as otherwise permitted by paragraph (c)(3) of this section for a vessel employing a common-rail bilge system, each bilge-manifold valve controlling a bilge suction from any compartment must be of the stop-check type.

(2) Each passenger vessel on an international voyage must comply with the provisions of SOLAS Chapter II–1, Regulation 35–1.

(3) A common-rail bilge system may be installed as an acceptable alternative to the system required by paragraph (c)(1) of this section, provided it satisfies all of the following criteria:

(i) The common-rail main runs inboard at least one-fifth of the beam of the vessel.

(ii) A stop-check valve or both a stop valve and a check valve are provided in each branch line and located inboard at least one-fifth of the beam of the vessel.

(iii) The stop valve or the stop-check valve is power-driven, is capable of remote operation from the space where the pump is, and is capable of manual operation.

(iv) The stop valve or the stop-check valve is accessible under all operating conditions, and the space used for access contains no expansion joint or flexible coupling that, upon failure, would cause flooding and prevent access to the valve.

(v) A port and a starboard suction serve each space protected unless, under the worst conditions of list and trim and with liquid remaining after pumping, the vessel's stability remains acceptable, in accordance with subchapter S of this chapter.

(vi) For each vessel designed for the carriage of combinations of both liquid and dry bulk cargoes, no bilge pump or piping is located in a machinery space other than in a pump room for cargo, and no liquid and other cargoes are carried simultaneously.

(vii) For each cargo vessel in Great Lakes service, each common-rail piping for the bilge and ballast system serving cargo spaces, if installed and if connected to a dedicated common-rail bilge system, must lead separately from a valved manifold located at the pump.

(d) The internal diameter of bilge suction pipes including strainers must be determined by formulas 1 and 2 to §56.50–50(d) introductory text, except that the nearest commercial size not more than one-fourth inch under the required diameter may be used.

FORMULA 1 TO §56.50–50(D) INTRODUCTORY TEXT

$$d = 1 + \sqrt{\frac{L(B+D)}{2500}} \quad (1) \quad (4) \quad (5)$$

FORMULA 2 TO § 56.50–50(D)
INTRODUCTORY TEXT

$$d = 1 + \sqrt{\frac{c(B+D)}{1500}} \quad (2) \quad (3) \quad (5)$$

(1) For suctions to each main bilge pump, use formula 1 to § 56.50–50(d) introductory text. For branch suctions to cargo and machinery spaces, use formula 2 to 56.50–50(d) introductory text.

(2) The following ''where'' clause applies to formulas 1 and 2 to § 56.50–50(d) introductory text:

where:

L = Length of vessel on loadwater line, in feet.
B = Breadth of vessel, in feet. (5)
D = Molded depth (in feet) to the bulkhead deck. (6)
c = Length of compartment, in feet.
d = Required internal diameter of suction pipe, in inches.

NOTE 1 TO PARAGRAPH (d)(2): For tank vessels, ''L'' may be reduced by the combined length of the cargo oil tanks.

NOTE 2 TO PARAGRAPH (d)(2): For bulk carriers with full depth wing tanks served by a ballast system where the beam of the vessel is not representative of the breadth of the compartment, ''B'' may be appropriately modified to the breadth of the compartment.

NOTE 3 TO PARAGRAPH (d)(2): In the calculation for a vessel with more than one hull, such as a catamaran, the breadth of the unit is the breadth of one hull.

NOTE 4 TO PARAGRAPH (d)(2): In the calculation for a mobile offshore drilling unit, ''L'' is reducible by the combined length of spaces that can be pumped by another piping system meeting this section and § 56.50–55, where ''L'' is the length of the unit at the waterline.

NOTE 5 TO PARAGRAPH (d)(2): For mobile offshore drilling units employing unusual hull forms, ''B'' may be modified to the average breadth rather than the maximum breadth.

NOTE 6 TO PARAGRAPH (d)(2): For each passenger vessel constructed on or after June 9, 1995, and being on an international voyage, D must be measured to the next deck above the bulkhead deck if an enclosed cargo space on the bulkhead deck that is internally drained in accordance with paragraph (a)(4) of this section extends the entire length of the vessel. Where the enclosed cargo space extends a lesser length, D must be taken as the sum of the molded depth (in feet) to the bulkhead deck plus lh/L where l and h are the aggregate length and height (in feet) of the enclosed cargo space.

(3) For vessels of 150 gross tons and over, no main suction piping must be less than 2.5 inches internal diameter. Branch piping need not be more than 4 inches and must not be less than 2 inches in diameter except for drainage of small pockets or spaces in which case 1.5-inch diameter may be used. For vessels less than 150 gross tons no bilge suction must be less than 1.5 inches internal diameter and branch piping must not be less than 1-inch nominal pipe size.

(4) For vessels of 65 feet in length or less and not engaged on an international voyage, the bilge pipe sizes computed by formulas 1 and 2 to § 56.50–50(d) introductory text are not mandatory, but in no case must the size be less than 1-inch nominal pipe size.

(5) The number, location, and size of bilge suctions in the boiler and machinery compartments must be determined when the piping plans are submitted for approval and must be based

upon the size of the compartments and the drainage arrangements.

(e) *Independent bilge suction.* One of the independent bilge pumps must have a suction of a diameter not less than that given by formula 2 to §56.50–50(d) introductory text that is led directly from the engine room bilge entirely independent of the bilge main, and on passenger vessels each independent bilge pump located in the machinery spaces must have such direct suctions from these spaces, except that not more than two pumps are required to have direct suctions from any one space. A suction that is led directly from a suitably located pump manifold may be considered to be independent of the bilge main. Where two direct suctions are required in any one compartment on passenger vessels, one suction must be located on each side of the compartment. If watertight bulkheads separate the engine and boiler rooms, a direct suction or suctions must be fitted to each compartment unless the pumps available for bilge service are distributed throughout these compartments, in which case at least one pump in each such compartment must be fitted with direct suction in its compartment. In a vessel with more than one hull, there must be one bilge pump that has an independent bilge suction in each hull. In a column stabilized mobile offshore drilling unit, the independent bilge suction must be from the pumproom bilge.

(f) *Emergency bilge suctions.* In addition to the independent bilge suction(s) required by paragraph (e) of this section, an emergency bilge suction must be provided in the machinery space for all self-propelled vessels as described in the following subparagraphs. Emergency suctions must be provided from pumps other than those required by §56.50–55(a). Such suctions must have nonreturn valves, and must meet the following criteria as appropriate:

(1) On passenger vessels propelled by steam and operating on an international voyage or on ocean, coastwise, or Great Lakes routes, the main circulating pump is to be fitted with a direct bilge suction for the machinery space. The diameter of such suctions must not be less than two-thirds the diameter of the main sea injection. Other independent power pumps in the machinery space may be approved by the Commandant if the main circulating pump is not suitable.

(2) On passenger vessels propelled by internal combustion engines and operating on an international voyage or on ocean, coastwise, or Great Lakes routes, the largest available pump in the engine room is to be fitted with the direct bilge suction in the machinery space. The area of the suction pipe is to be equal to the full suction inlet of the pump.

(3) Vessels over 180 feet in length which are not passenger vessels, and which operate on international voyages or in ocean, coastwise, or Great Lakes service, must be provided with a direct emergency bilge suction from any pump in the machinery space, except that a required bilge pump may not be used. The discharge capacity of the pump selected must exceed the capacity of the required main bilge pump and the area of the suction inlet is to be equal to the full suction inlet of the pump.

(4) Vessels under 180 feet in length need not provide an emergency bilge suction, except that passenger vessels must comply with the requirements of paragraphs (f)(1) and (2) of this section.

(5) Each vessel with more than one hull must have an emergency bilge suction in each hull.

(6) Each column stabilized mobile offshore drilling unit must have—

(i) An emergency bilge suction in each hull; and

(ii) A remote control for the emergency pump and associated valves that can be operated from the ballast control room.

(g) Each individual bilge suction must be fitted with a suitable strainer having an open area of not less than three times that of the suction pipe. In addition, a mud box or basket strainer must be fitted in an accessible position between the bilge suction manifold and the pump.

(h) Pipes for draining cargo holds or machinery spaces must be separate from pipes which are used for filling or emptying tanks where water or oil is carried. Bilge and ballast piping systems must be so arranged as to prevent oil or water from the sea or ballast

spaces from passing into cargo holds or machinery spaces, or from passing from one compartment to another, whether from the sea, water ballast, or oil tanks, by the appropriate installation of stop and non-return valves. The bilge and ballast mains must be fitted with separate control valves at the pumps. Piping for bilge and ballast must be arranged so as to prevent, by the appropriate installation of stop and non-return valves, oil or water from the sea or ballast spaces from passing into a cargo hold or machinery space, or from passing from one compartment to another, regardless of the source. The bilge and ballast mains must be fitted with separate control valves at the pumps.

(i) Ballast piping must not be installed to any hull compartment of a wood vessel. Where the carriage of liquid ballast in such vessels is necessary, suitable ballast tanks, structurally independent of the hull, must be provided.

(j) When dry cargo is to be carried in deep tanks, arrangement must be made for blanking-off the oil and ballast lines. The bilge suctions must be blanked-off when oil or ballast is carried.

(k) Where bilge and ballast piping are led through tanks, except ballast piping in ballast tanks, means must be provided to minimize the risk of flooding of other spaces due to pipe failure. In this regard, such piping may be in a watertight pipe tunnel, or the piping may be of Schedule 80 pipe wall thickness, fitted with expansion bends, with all joints welded. Alternative designs may be approved by the Marine Safety Center. Where a pipe tunnel is installed, the watertight integrity of the bulkheads must be maintained. No valve or fitting may be located within the tunnel if the pipe tunnel is not of sufficient size to afford access.

(l) When bilge pumps are utilized for other services, the piping must be so arranged that under any condition at least one pump will be available for drainage of the vessel through an overboard discharge, while the other pump(s) are being used for a different service.

(m) All bilge pipes used in or under fuel storage tanks or in the boiler or machinery space, including spaces in which oil settling tanks or oil pumping units are located, must be of steel or other acceptable material.

(n) Oil pollution prevention requirements for bilge and ballast systems are contained in 33 CFR part 155, subpart B.

NOTE 7 TO § 56.50–50: For the purposes of this section, a pumproom is a machinery space on a column stabilized mobile offshore drilling unit.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9979, June 17, 1970; CGD 73–58R, 39 FR 18767, May 30, 1974; CGD 79–165a, 45 FR 64188, Sept. 29, 1980; CGD 77–140, 54 FR 40608, Oct. 2, 1989; 55 FR 39968, Oct. 1, 1990; CGD 83–043, 60 FR 24772, May 10, 1995; CGD 95–028, 62 FR 51201, Sept. 30, 1997]

§ 56.50–55 Bilge pumps.

(a) *Self-propelled vessels.*

(1) Each self-propelled vessel must be provided with a power-driven pump, or pumps connected to the bilge main as required by table 1 to § 56.50–55(a).

TABLE 1 TO § 56.50–55(a)—POWER BILGE PUMPS REQUIRED FOR SELF-PROPELLED VESSELS

Vessel length, in feet	Passenger vessels[1]			Dry-cargo vessels[2]		Tank vessels	Mobile offshore drilling units
	International voyages[3]	Ocean, coast-wise and Great Lakes	All other waters	Ocean, coast-wise and Great Lakes	All waters	All waters	All waters
180′ or more	[4]3	[4]3	2	2	2	2	2
Below 180′ and exceeding 65′	[4]3	[5]2	[5]2	[5]2	[5]2	2	2
65′ or less	3	1	1	1	1	1	

[1] Small passenger vessels under 100 gross tons refer to subpart 182.520 of subchapter T of this chapter.

[2] Dry-bulk carriers having ballast pumps connected to the tanks outside the engine room and to the cargo hold may substitute the appropriate requirements for tank vessels.

[3] Not applicable to passenger vessels which do not proceed more than 20 mile from the nearest land, or which are employed in the carriage of large numbers of unberthed passengers in special trades.

[4] When the criterion numeral exceeds 30, an additional independent power-driven pump is required. (See part 171 of this chapter for determination of criterion numeral.)

[5] Vessels operating on lakes (including Great Lakes), bays, sounds, or rivers where steam is available, or where a suitable water supply is available from a power-driven pump, may substitute siphons or eductors for one of the required power-driven pumps, provided a siphon or eductor is permanently installed in each hold or compartment.

(b) *Nonself-propelled vessels.* (1) Ocean going sailing vessels and barges must be provided with pumps connected to the bilge main as required in table 2 to §56.50–55(b)(1).

TABLE 2 TO §56.50–55(b)(1)—BILGE PUMPS REQUIRED FOR NONSELF-PROPELLED VESSELS

Type of vessel	Waters navigated	Power pumps [1]	Hand pumps
Sailing	Ocean and coastwise	2	([2])
Manned barges	do	2	([2])
Manned barges	Other than ocean and coastwise	([3])	([3])
Unmanned barges	All waters	([3])	([3])
Mobile offshore drilling units	All waters	2	None.

[1] Where power is available, independent power bilge pumps must be installed as required and must be connected to the bilge main.
[2] Efficient hand pumps connected to the bilge main may be substituted for the power pumps. Where there is no common bilge main, one hand pump will be required for each compartment.
[3] Suitable hand or power pumps or siphons, portable or fixed, carried either on board the barge or on the towing vessel must be provided.

(2) The pumps and source of power for oceangoing sailing vessels and barges must be located above the bulkhead deck or at the highest convenient accessible level.

(3) Each hull of a vessel with more than one hull, such as a catamaran, must meet table 2 to §56.50–55(b)(1).

(c) *Capacity of independent power bilge pump.* (1) Each power bilge pump must develop a suction velocity of not less than 400 feet per minute and a corresponding capacity based on the size of bilge main piping required by §56.50–50(d)(1).

(2) Alternatively, the minimum pump capacity, Q, in m^3/hr may be based on the following formula:

Formula 1 to §56.50–55(c)(2)

$$Q = 5.75d^2/1000,$$

where

d = diameter of the main bilge suction piping, in mm.

(3) For vessels of less than 65 feet in length not engaged on international voyages, the pump must have a minimum capacity of 25 gallons per minute and need not meet the velocity requirement of this paragraph.

(d) *Priming.* Suitable means must be provided for priming centrifugal pumps which are not of the self-priming type.

(e) *Location.* (1) For self-propelled vessels, if the engines and boilers are in two or more watertight compartments, the bilge pumps must be distributed throughout these compartments. On other self-propelled vessels and mobile offshore drilling units, the bilge pumps must be in separate compartments to the extent practicable. When the location of bilge pumps in separate watertight compartments is not practicable, alternative arrangements may be considered by the Marine Safety Center.

(2) For non-self-propelled vessels requiring two bilge pumps, these pumps, insofar as practicable, must be located in separate watertight machinery spaces. When the location of bilge pumps in separate watertight compartments is not possible, the Marine Safety Center will consider alternate arrangements.

(3) The emergency bilge pumps must not be installed in a passenger ship forward of the collision bulkhead.

(4) Each hull of a vessel with more than one hull must have at least two means for pumping the bilges in each hull.

(f) *Other pumps.* Sanitary, ballast, and general service pumps having the required capacity may be accepted as independent power bilge pumps if connected to the bilge system.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 79–023, 48 FR 51007, Nov. 4, 1983; CGD 77–140, 54 FR 40608, Oct. 2, 1989; 55 FR 39968, Oct. 1, 1990; CGD 83–043, 60 FR 24773, May 10, 1995; USCG–2004–18884, 69 FR 58346, Sept. 30, 2004]

§ 56.50–57 [Reserved]

§ 56.50–60 Systems containing oil.

(a)(1) Oil-piping systems for cargo or fuel oil must be separate from other piping systems as far as practicable, and positive means must be provided to prevent interconnection in service.

(2) Fuel oil and cargo oil systems may be combined if the cargo oil systems contain only Grade E oils.

(3) Oil pumps must have no discharge connections to fire mains, boiler feed systems, or condensers.

(b) When oil needs to be heated to lower its viscosity, heating coils must be properly installed in each tank.

(1) Each drain from a heating coil as well as each drain from an oil heater must run to an inspection tank or other suitable oil detector.

(2) No part of the fuel-oil system containing heated oil under pressure exceeding 180 kPa (26 psi) may be placed in a concealed position so that defects and leakage cannot be readily observed. Each machinery space containing a part of the system must be adequately illuminated.

(c) Filling pipes may be led directly from the deck into the tanks or to a manifold in an accessible location permanently marked to indicate the tanks to which they are connected. A shutoff valve must be fitted at each filling end. Oil piping must not be led through accommodation spaces, except that fill piping not normally used at sea may pass through accommodation spaces if it is of steel construction, all welded, and not concealed.

(d) Piping subject to internal head pressure from oil in the tank must be fitted with positive shutoff valves located at the tank.

(1) Valves installed on the outside of the oil tanks must be made of steel, ductile cast iron ASTM F1155 (incorporated by reference; see § 56.01–2), or a ductile nonferrous alloy having a melting point above 1,700 °F and must be arranged with a means of manual control locally at the valve and remotely from a readily accessible and safe location outside of the compartment in which the valves are located.

(i) In the special case of a deep tank in any shaft tunnel, piping tunnel, or similar space, one or more valves must be fitted on the tank. In the event of fire, the flow of oil from the tank may be stopped by means of an additional valve on the piping outside the tunnel or similar space. Any such additional valve installed inside a machinery space must be capable of being operated from outside this space.

(ii) [Reserved]

(2) If valves are installed on the inside of the tank, they may be made of cast iron and arranged for remote control only. Additional valves for local control must be located in the space where the system exits from the tank or adjacent tanks. Valves for local control outside the tanks must meet paragraph (d)(1) of this section.

(3) Power operated valves installed to comply with the requirements of this section must meet the following requirements:

(i) Valve actuators must be capable of closing the valves under all conditions, except during physical interruption of the power system (for example, from cable breakage or tube rupture). Fluid power actuated valves, other than those opened against spring pressure, must be provided with an energy storage system which is protected, as far as practicable, from fire and mechanical damage. The energy storage system must be used for no other purpose and must have sufficient capacity to cycle all connected valves from the initial valve position to the opposite position and return. The cross connection of this system to an alternate power supply will be given special consideration by the Marine Safety Center.

(ii) The valve must have a local power actuator to both open and close the valve, unless local manual opening operation will not prevent remote closing of the valve.

(iii) The positioning of the valve by either the local or remote power actuators must not void the ability of the other actuator to close the valve.

(iv) The valve must be provided with a means of emergency manual operation to both open and close the valve regardless of the status of the power operating system. Such manual operation may interfere with the power operation, and if so, must be protected by means of covers, locking devices, or

other suitable means. Instructions and warnings regarding the emergency system must be conspicuously posted at the valve.

(4) Remote operation for shutoff valves on small independent oil tanks will be specially considered in each case where the size of tanks and their location may warrant the omission of remote operation.

(e) Fuel oil tanks overhanging boilers are prohibited.

(f) Valves for drawing fuel or draining water from fuel are not permitted in fuel oil systems except that a single valve may be permitted in the case of diesel driven machinery if suitably located within the machinery space away from any potential source of ignition. Such a valve must be fitted with a cap or a plug to prevent leakage.

(g) Test cocks must not be fitted to fuel oil or cargo oil tanks.

(h) Oil piping must not run through feed or potable water tanks. Feed or potable water piping must not pass through oil tanks.

(i) Where flooding equalizing cross-connections between fuel or cargo tanks are required for stability considerations, the arrangement must be approved by the Marine Safety Center.

(j) Piping conveying oil must be run away from hot surfaces wherever possible. Where such leads are unavoidable, only welded joints are to be used, or alternatively, suitable shields are to be fitted in the way of flanged or mechanical pipe joints when welded joints are not practicable. Piping that conveys fuel oil or lubricating oil to equipment and is in the proximity of equipment or lines having an open flame or having parts operating above 500 °F must be of seamless steel. (See § 56.50–65.)

(k) Oil piping drains, strainers, and other equipment subject to normal oil leakage must be fitted with drip pans or other means to prevent oil draining into the bilge.

(l) Where oil piping passes through a non-oil tank without stop valves complying with paragraph (d) of this section installed at all tank penetrations, the piping must comply with § 56.50–50(k).

(m) Each arrangement for the storage, distribution, and use of oil in a pressure-lubrication system must—

(1) Comply with § 56.50–80; and

(2) In a machinery space, meet the applicable requirements of paragraphs (b)(2) and (d) of this section and §§ 56.50–85(a)(11), 56.50–90(c) and (d), and 58.01–55(f) of this subchapter. No arrangement need comply with § 56.50–90 (c)(1) and (3) if the sounding pipe is fitted with an effective means of closure, such as a threaded cap or plug or other means acceptable to the Officer in Charge, Marine Inspection.

(n) Each arrangement for the storage, distribution, and use of any flammable oil employed in a fluid power, control, or heating system must—

(1) Comply with subpart 58.30 of this subchapter; and

(2) Where means of ignition are present, meet the applicable requirements of §§ 56.50–85(a)(11), 56.50–90 (c) and (d), and 58.01–55(f) of this subchapter. Each pipe and its valves and fittings must be of steel or other approved material, except that the use of flexible piping or hose is permitted in accordance with §§ 56.35–10, 56.35–15, and 56.60–25(c).

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9979, June 17, 1970; CGD 73–254, 40 FR 40165, Sept. 2, 1975; CGD 77–140, 54 FR 40609, Oct. 2, 1989; 55 FR 39968, Oct. 1, 1990; CGD 83–043, 60 FR 24774, May 10, 1995; USCG–2000–7790, 65 FR 58460, Sept. 29, 2000; USCG–2004–18884, 69 FR 58346, Sept. 30, 2004; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§ 56.50–65 Burner fuel-oil service systems.

(a) All discharge piping from the fuel oil service pumps to burners must be seamless steel with a thickness of at least Schedule 80. Short lengths of steel, or annealed copper nickel, nickel copper, or copper pipe and tubing may be used between the fuel oil burner front header manifold and the atomizer head to provide flexibility. All material used must meet the requirements of subpart 56.60. The use of non-metallic materials is prohibited. Flexible metallic tubing may be used when approved by the Marine Safety Center. Tubing fittings must be of the flared type except that flareless fittings of the nonbite type may be used when the

tubing is steel, nickel copper or copper nickel.

(b)(1) All vessels having oil fired boilers must have at least two fuel service pumps, each of sufficient capacity to supply all the boilers at full power, and arranged so that one may be overhauled while the other is in service. If installed, fuel oil heaters must be so arranged that any heater may be overhauled while the other is in service. Suction and discharge strainers must be capable of being cleaned without interrupting the oil supply.

(2) All auxiliary boilers, except those furnishing steam for vital equipment and fire extinguishing purposes, may be equipped with a single fuel oil service pump. Such pumps need not be fitted with discharge strainers.

(3) Strainers must be located so as to preclude the possibility of spraying oil on the burner or boiler casing, or be provided with spray shields. Coamings, drip pans, etc., must be fitted under fuel oil service pumps, heaters, etc., where necessary to prevent oil drainage to the bilge.

(4) Boilers burning fuel oils of low viscosity need not be equipped with fuel oil heaters.

(c) Piping between service pumps and burners must be located so as to be readily observable, and all bolted flange joints must be provided with a spray shield to deflect spray in case of a leak. Fuel pump or heater relief valves must discharge back to the settling tank or the suction side of the pump. The return line from the burners must be so arranged that the suction piping cannot be subjected to discharge pressure.

(d) If threaded-bonnet valves are employed, they must be of the union-bonnet type capable of being packed under pressure.

(e) Unions must not be used for pipe diameters of 1 inch and above.

(f) Boiler header valves of the quick closing type must be installed in the fuel supply lines as close to the boiler front header as practicable. The location is to be accessible to the operator or remotely controlled.

(g) Bushings and street ells are not permitted in fuel oil discharge piping.

(h) Each fuel-oil service pump must be equipped with controls as required by § 58.01–25 of this subchapter.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 77–140, 54 FR 40609, Oct. 2, 1989; CGD 83–043, 60 FR 24774, May 10, 1995; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§ 56.50–70 Gasoline fuel systems.

(a) *Material.* (1) Fuel supply piping to the engines must be of seamless drawn annealed copper pipe or tubing, nickel copper, or copper nickel pipe or tubing meeting the requirements of subpart 56.60.

(2) Thicknesses of tubing walls must not be less than the larger of that shown in table 1 to § 56.50–70(a) or that required by § 56.07–10(e) and 104.1.2 of ASME B31.1 (incorporated by reference; see § 56.01–2).

(3) Tubing fittings must be of nonferrous drawn or forged metal and of the flared type except that the flareless fittings of the nonbite type may be used when the tubing system is of nickel copper or copper nickel. Tubing must be cut square and flared by suitable tools. Tube ends must be annealed before flaring. Pipe fittings must be of nonferrous material. Pipe thread joints must be made tight with a suitable compound.

(4) Valves for fuel lines must be of nonferrous material of the union bonnet type with ground seats except that cocks may be used if they are the solid bottom type with tapered plugs and union bonnets.

TABLE 1 TO § 56.50–70(a)—TUBING WALL THICKNESS

Outside diameter of tubing in inches	Thickness	
	B.W.G.	Inch
1/8, 3/16, 1/4	#21	0.032
5/16, 3/8	#20	.035
7/16, 1/2	#19	.042

(b) *Installation.* (1) All fuel pipes, pipe connections, and accessories must be readily accessible, protected against mechanical injury, and effectively secured against excessive movement and vibration by the use of soft nonferrous metal liners or straps. Where passing through steel decks or bulkheads, fuel lines must be protected by close fitting

ferrules or stuffing boxes. Refer to §56.30–25 for tubing joint installations.

(2) A short length of suitable metallic or nonmetallic flexible tubing or hose, or a loop of annealed copper tubing, must be installed in the fuel-supply line at or near the engine to prevent damage by vibration.

(i) If nonmetallic flexible hose is used, it must meet the requirements of §56.60–25(b) for fuel service.

(ii) Flexible hose connections should maintain metallic contact (continuity) between the sections of the fuel-supply lines; however, if they do not, the fuel tank must be grounded.

(c) *Shutoff valves.* Shutoff valves of a suitable type must be installed in the fuel supply lines, one as close to the tank as practicable. Where fuel tanks are installed below the weather deck, arrangements must be provided for operating all shutoff valves at the tanks from outside the compartments in which they are located. The operating gear for the shutoff valves at the tanks must be accessible and suitably marked.

(d) *Strainers.* A suitable twin strainer must be fitted in the fuel supply line in the engine compartment. A drip pan must be fitted under the strainer.

(e) *Outlets and drains.* Outlets in fuel lines for drawing gasoline for any purpose are prohibited. However, fuel tank openings fitted with a threaded plug or cap can be used for cleaning purposes.

(f) *Fuel suction connections.* All fuel suction and return lines must enter the top of the fuel tanks and connections must be fitted into spuds. Such lines must extend nearly to the bottom of the tank.

(g) *Filling and sounding pipes.* Filling and sounding pipes must be so arranged that vapors or overflow when filling cannot escape to the inside of the vessel and will discharge overboard. Such pipes must terminate on the weather deck clear of any coamings and must be fitted with suitable shutoff valves. A corrosion-resistant flame screen of must be fitted in the throat of the filling pipe. Sounding pipes must be kept closed at all times except during sounding.

(h) *Vent pipes.* Each tank must be fitted with a vent, the cross-sectional area of which must not be less than that of the filling pipe. The vent pipes must terminate at least 2 feet above the weather deck and not less than 3 feet from any opening into living quarters or other below-deck space. The ends of vent pipes must terminate with U-bends and be fitted with flame screens or flame arresters. The flame screens must consist of a single screen of corrosion resistant wire of at least 30 by 30 mesh.

(i) *Gasoline tanks.* For requirements pertaining to independent gasoline fuel tanks see subpart 58.50 of this subchapter.

(j) *Fuel pump shutdown.* Each fuel pump must comply with §58.01–25 of this subchapter.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGFR 72–59R, 37 FR 6189, Mar. 25, 1972; CGD 83–043, 60 FR 24774, May 10, 1995; USCG–2002–13058, 67 FR 61278, Sept. 30, 2002; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§56.50–75 Diesel fuel systems.

(a) *Vessels greater than 100 gross tons.* (1) The diesel fuel system must comply with §§56.50–60, 56.50–85, and 56.50–90. The fuel supply piping to engines must be of seamless steel, annealed seamless copper or brass pipe or tubing, or of nickel copper or copper nickel alloy meeting the requirements of subpart 56.60 for materials and §56.50–70(a)(2) for thickness. Fuel oil service pumps must comply with §58.01–25 of this subchapter.

(2) The installation must comply with §56.50–70(b).

(3) Tubing connections and fittings must be drawn or forged metal of the flared type except that flareless fittings of the nonbite type may be used when the tubing system is steel, nickel-copper, or copper-nickel. When making flared tube connections the tubing must be cut square and flared by suitable tools. Tube ends must be annealed before flaring.

(b) *Vessels of 100 gross tons and less and tank barges*—(1) *Materials.* Fuel supply piping must be of copper, nickel copper, copper nickel, seamless steel, or other materials having a minimum wall thickness of 0.035 inch.

(2) *Tubing connections and fittings.* Tubing connections must comply with

the provisions of paragraph (a)(3) of this section.

(3) *Installation.* The installation of diesel fuel piping must comply with the requirements of § 56.50–70(b).

(4) *Shutoff valves.* Shutoff valves must be installed in the fuel supply lines, one as close to each tank as practicable, and one as close to each fuel pump as practicable. Valves must be accessible at all times.

(5) *Outlets and drains.* Valves for removing water or impurities from fuel oil systems will be permitted in the machinery space provided such valves are fitted with caps or plugs to prevent leakage.

(6) *Filling pipe.* Tank filling pipes must terminate on an open deck and must be fitted with suitable shutoff valves, deck plugs, or caps.

(7) *Vent pipes.* Each tank must be fitted with a vent pipe complying with § 56.50–85.

(8) *Independent diesel fuel tanks.* See subpart 58.50 of this subchapter for specific requirements.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 77–140, 54 FR 40610, Oct. 2, 1989]

§ 56.50–80 Lubricating-oil systems.

(a) The lubricating oil system must be designed to function satisfactorily when the vessel has a permanent 15° list and a permanent 5° trim. See § 58.01–40 of this subchapter for operational requirements for propulsion and vital machinery at vessel angles of inclination.

(b) When pressure or gravity-forced lubrication is employed for the main propelling machinery, an independent auxiliary lubricating pump must be provided.

(c) Oil coolers must be provided with two separate means of circulating water through the coolers.

(d) For internal combustion engine installations, the requirements of paragraphs (b) and (c) of this section do not apply to vessels in river and harbor service, nor to any vessel below 300 gross tons. For internal combustion engines, two separate means are to be provided for circulating coolant. One of those means must be independently driven and may consist of a connection from a pump of adequate size normally used for other purposes utilizing the required coolant. Oil filters must be provided on all internal combustion engine installations. On main propulsion engines fitted with full-flow type filters, the arrangement must be such that the filters may be cleaned without interrupting the oil supply except that such an arrangement is not required on vessels having more than one main propulsion engine.

(e) The lubricating oil piping must be independent of other piping systems and must be provided with necessary coolers, heaters, filters, etc., for proper operation. Oil heaters must be fitted with bypasses.

(f) Diesel engine lubrication systems must be so arranged that vapors from the sump tank may not be discharged back into the engine crank case of engines of the dry sump type.

(g) Steam turbine driven propulsion and auxiliary generating machinery depending on forced lubrication must be arranged to shut down automatically upon failure of the lubricating system.

(h) Sight-flow glasses may be used in lubricating-oil systems provided they can withstand exposure to a flame at a temperature of 927 °C (1,700 °F) for one hour, without appreciable leakage.

(i) Steam driven propulsion machinery must be provided with an emergency supply of lubricating oil that must operate automatically upon failure of the lubricating oil system. The emergency oil supply must be adequate to provide lubrication until the equipment comes to rest during automatic shutdown.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9979, June 17, 1970; CGD 81–030, 53 FR 17837, May 18, 1988; CGD 83–043, 60 FR 24774, May 10, 1995]

§ 56.50–85 Tank-vent piping.

(a) This section applies to vents for all independent, fixed, non-pressure tanks or containers or for spaces in which liquids, such as fuel, ship's stores, cargo, or ballast, are carried.

(1) The structural arrangement in double bottom and other tanks must be such as to permit the free passage of air and gases from all parts of the tanks to vent pipes.

(2) Tanks having a comparatively small surface, such as fuel oil settling

tanks, need be fitted with only one vent pipe, but tanks having a comparatively large surface must be fitted with at least two vent pipes. The vents must be located so as to provide venting of the tanks under any service condition.

(3) Vent pipes for fuel oil tanks must, wherever possible, have a slope of no less than 30°.

(4) Tank vents must extend above the weather deck, except vents from freshwater tanks, bilge oily-water holding tanks, bilge slop tanks, and tanks containing Grade E combustible liquids, such as lubricating oil, may terminate in the machinery space, provided—

(i) The vents are arranged to prevent overflow on machinery, electrical equipment, and hot surfaces;

(ii) Tanks containing combustible liquids are not heated; and

(iii) The vents terminate above the deep load waterline if the tanks have boundaries in common with the hull.

(5) Vents from oil tanks must terminate not less than three feet from any opening into living quarters.

(6) Vents extending above the freeboard deck or superstructure deck from fuel oil and other tanks must be at least Schedule 40 in wall thickness. Except for barges in inland service and for Great Lakes vessels, the height from the deck to any point where water may gain access through the vent to below deck must be at least 30 inches (760mm) on the freeboard deck and 17½ inches (450mm) on the superstructure deck. On Great Lakes vessels, the height from the deck to any point where water may gain access through the vent to below deck must be at least 30 inches (760mm) on the freeboard deck, 24 inches (610mm) on the raised quarterdeck, and 12 inches (305mm) on other superstructure decks. Where the height of vents may interfere with the working of the vessel, a lower height may be approved by the Marine Safety Center provided the vent cap is properly protected from mechanical damage. For barges in inland service, the vents must extend at least 6 inches above the deck.

(7) Satisfactory means, permanently attached, must be provided for closing the openings of all vents, except that barges in inland service may be exempted. Acceptable means of closure are:

(i) A ball check valve where the ball float, normally in the open position, will float up and close under the action of a submerging wave. The valve must be designed so that the effective clear discharge area through the valve with the float in the open position is not less than the inlet area of the vent pipe to which the valve is connected; or

(ii) Another suitable device acceptable to the Commanding Officer, Marine Safety Center.

(8) Vent outlets from all tanks which may emit flammable or combustible vapors, such as bilge slop tanks and contaminated drain tanks, must be fitted with a single screen of corrosion-resistant wire of at least 30 by 30 mesh, or two screens of at least 20 by 20 mesh spaced not less than one-half inch (13mm) nor more than 1½ inches (38mm) apart. The clear area through the mesh must not be less than the internal unobstructed area of the required pipe.

(9) Where vents are provided with flame screens, the closure device must be situated so as not to damage these screens.

(10) The diameter of each vent pipe must not be less than 1½ inches nominal pipe size for freshwater tanks, 2 inches nominal pipe size for water ballast tanks, and 2½ inches nominal pipe size for fuel oil tanks.

(11) (i) If a tank may be filled by a pressure head exceeding that for which the tank is designed, the aggregate cross-sectional area of the vents in each tank must be not less than the cross-sectional area of the filling line unless the tank is protected by overflows, in which case the aggregate cross-sectional area of the overflows must be not less than the cross-sectional area of the filling line.

(ii) Provision must be made to guard against liquids rising in the venting system to a height that would exceed the design head of a cargo tank or fuel-oil tank. It may be made by high-level alarms, overflow-control systems, or other, equivalent means.

(12) Vents from freshwater or water ballast tanks must not be connected to a common header with vents from oil or oily ballast tanks.

(b) Unless permitted by the Marine Safety Center, tank vents must remain within the watertight subdivision boundaries in which the tanks they vent are located. All tank vents that penetrate watertight subdivision bulkheads must terminate above the weather deck.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 77–140, 54 FR 40610, Oct. 2, 1989; CGD 83–043, 60 FR 24774, May 10, 1995; CGD 95–012, 60 FR 48050, Sept. 18, 1995]

§ 56.50–90 Sounding devices.

(a) Each tank must be provided with a suitable means of determining liquid level. Except for a main cargo tank on a tank vessel, each integral hull tank and compartment must be fitted with a sounding pipe or other level indicating device acceptable to the Marine Safety Center.

(b) Where sounding pipes terminate below the freeboard deck on cargo vessels, they must be fitted with gate valves. On passenger vessels, where sounding pipes terminate below the bulkhead deck, they must be fitted with gate valves.

(c) Except as allowed by this paragraph, on each vessel constructed on or after June 9, 1995, no sounding pipe used in a fuel-oil tank may terminate in any space where the risk of ignition of spillage from the pipe might arise. None may terminate in a space for passengers or crew. When the Commanding Officer, Marine Safety Center, determines it impracticable to avoid terminating a pipe in a machinery space, a sounding pipe may terminate in a machinery space if all the following requirements are met:

(1) The fuel-oil tank has an oil-level gauge complying with paragraph (d) of this section.

(2) Precautions are taken such as fitting an effective screen (shield) to prevent the fuel oil, in case of spillage through the end of the pipe, from coming into contact with a source of ignition.

(3) The end of the pipe is fitted with a self-closing blanking device.

(d) Other oil-level gauges may be used instead of sounding pipes if all the following requirements are met:

(1) In a passenger vessel, no such gauge may require penetration below the top of the tank, and neither the failure of a gauge nor an overfilling of the tank may permit release of fuel into the space.

(2) In a cargo vessel, neither the failure of such a gauge nor an overfilling of the tank may permit release of fuel into the space. The use of cylindrical gauge-glasses is prohibited. The use of oil-level gauges with flat glasses and self-closing valves between the gauges and fuel tanks is acceptable.

(e) The upper ends of sounding pipes must be closed by a screw cap or plug.

(f) On mobile offshore drilling units where installation of sounding pipes may not be practicable for some tanks, alternate means of determining liquid level may be used if approved by the Commandant.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 73–251, 43 FR 56800, Dec. 4, 1978; CGD 83–043, 60 FR 24774, May 10, 1995; CGD 95–028, 62 FR 51201, Sept. 30, 1997]

§ 56.50–95 Overboard discharges and shell connections.

(a)(1) All inlets and discharges led through the vessel's side must be fitted with efficient and accessible valves, located as close to the hull penetrations as is practicable.

(2) The number of scuppers, sanitary discharges, tank overflows, and other similar openings in the vessel's side must be reduced to a minimum, either by making each discharge serve for as many as possible of the sanitary and other pipes, or in any other satisfactory manner.

(3) In general, when the bulkhead deck is above the freeboard deck, the requirements of this section apply relative to the bulkhead deck. For vessels not assigned load lines, such as certain inland vessels and barges, the weather deck must be taken as the freeboard deck.

(b)(1) Scuppers and discharge pipes originating at any level and penetrating the shell either more than 17.5 inches (450mm) below the freeboard deck or less than 23.5 inches (600mm) above the summer load waterline must be provided with an automatic non-return valve at the shell. This valve, unless required by paragraph (b)(2) of this section, may be omitted if the piping is not less than Schedule 80 in wall

thickness for nominal pipe sizes through 8 inches, Schedule 60 for nominal pipe sizes above 8 inches and below 16 inches, and Schedule 40 for nominal pipe sizes 16 inches and above.

(2) Discharges led through the shell originating either from spaces below the freeboard deck, or from within enclosed superstructures and equivalent deckhouses on the freeboard deck as defined in §42.13–15(i) of subchapter E of this chapter, must be fitted with efficient and accessible valves for preventing water from passing inboard. Normally each separate discharge must have one automatic nonreturn valve with a positive means of closing it from a position above the freeboard deck. Where, however, the vertical upward distance from the summer load line to the inboard end of the discharge pipe through which flooding can take place exceeds 0.01L, the discharge may have two automatic nonreturn valves without positive means of closing, provided that the inboard valve is always accessible for examination under service conditions. Where that vertical distance exceeds 0.02L a single automatic nonreturn valve without positive means of closing is acceptable. In an installation where the two automatic nonreturn valves are used, the inboard valve must be above the tropical load line. The means for operating the positive action valve must be readily accessible and provided with an indicator showing whether the valve is open or closed. A notice must be posted at the operating station stating that the valve must not be closed except as required in an emergency.

(3) Where scuppers and drains are installed in superstructures or deckhouses not enclosed as defined in §42.13–15(j) of subchapter E of this chapter, they must be led overboard. Refer to paragraph (b)(1) of this section for any nonreturn valve requirement.

(c) Overflow pipes which discharge through the vessel's side must be located as far above the deepest load line as practicable and fitted with valves as required by paragraph (b) of this section. Two automatic nonreturn valves must be used unless it is impracticable to locate the inboard valve in an accessible position, in which case a nonreturn valve with a positive means of closure from a position above the freeboard deck will be acceptable. Overflows which extend at least 30 inches above the freeboard deck before discharging overboard may be fitted with a single automatic nonreturn valve at the vessel's side. Overflow pipes which serve as tank vents must not be fitted with positive means of closure without the specific approval of the Marine Safety Center. Overflow pipes may be vented to the weather.

(d)(1) Sea inlets and discharges, such as used in closed systems required for the operation of main and auxiliary machinery, as in pump connections or scoop injection heat exchanger connections, need not meet the requirements of paragraphs (b)(1) and (2) of this section but instead must be fitted with a shutoff valve located as near the shell plating as practicable, and may be locally controlled if the valve is located in a manned machinery space. These controls must be readily accessible above the floor plates. Manned machinery spaces include the main machinery space and are either attended by the crew or are automated in accordance with part 62 of this subchapter to be comparable to an attended space.

(2) In unmanned machinery spaces, all machinery inlets and discharges as described in paragraph (d)(1) of this section must be remotely operable from a position above the freeboard deck unless otherwise approved and must meet the access and marking requirements of paragraph (b)(2) of this section.

(e)(1) Pipes terminating at the shell plating must be fitted with bends or elbows between the outboard openings and the first rigid connection inboard. In no case must such pipes be fitted in a direct line between the shell opening and the first inboard connection.

(2) Seachests and other hull fittings must be as short as possible and located so as to minimize the possibility of being blocked or obstructed.

(3) The thickness of inlet and discharge connections outboard of the shutoff valves, and exclusive of seachests, must be not less than that of Schedule 80 for nominal pipe sizes through 8 inches, Schedule 60 for nominal pipe sizes above 8 inches and below

16 inches, and Schedule 40 for nominal pipe sizes 16 inches and above.

(f) Valves required by this section and piping system components outboard of such required valves must be of a steel, bronze, or ductile cast iron specification listed in table 1 to § 56.60–1. Lead or other heat sensitive materials having a melting point of 1,700 °F or less must not be used. Brittle materials such as cast iron must not be used in such service. Where nonmetallic materials are used in a piping system, and shell closures are required by this section, a positive closure metallic valve is required (see also § 56.60–25).

(g) The inboard openings of ash and rubbish-chute discharges must be fitted with efficient covers. If the inboard opening is located below the freeboard deck, the cover shall be watertight, and in addition, an automatic nonreturn valve must be fitted in the chute in any easily accessible position above the deepest load line. Means must be provided for securing both the cover and the valve when the chute is not in use. When ash-ejectors or similar expelling devices located in the boiler room have the inboard openings below the deepest load line, they must be fitted with efficient means for preventing the accidental admission of water. The thickness of pipe for ash ejector discharge must be not less than Schedule 80.

(h) Where deck drains, soil lines, and sanitary drains discharge through the shell in way of cargo tanks on tank vessels, the valves required by this section must be located outside the cargo tanks. These valves must meet the material requirements of paragraph (f) of this section. The piping led through such tanks must be fitted with expansion bends where required, and must be of steel pipe having a wall thickness of not less than Schedule 60, except that the Commandant will consider the use of suitable corrosion-resistant material of lesser thickness. All pipe joints within the tanks must be welded. Soil lines and sanitary drains which pass through cargo tanks must be provided with nonreturn valves with positive means of closing or other suitable means for preventing the entrance of gases into living quarters.

(i) Sea valves must not be held open or closed with locks.

[CGFR 68–82, 33 FR 18843; Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9979, June 17, 1970; CGFR 72–59R, 37 FR 6189, Mar. 25, 1972; CGD 81–030, 53 FR 17837, May 18, 1988; CGD 77–140, 54 FR 40610, Oct. 2, 1989]

§ 56.50–96 Keel cooler installations.

(a) Keel cooler installations must meet the requirements of § 56.50–95(d)(1) and (2), (e)(3), and (f) except that shutoff or isolation valves will not be required for the inlet and discharge connections if:

(1) The installation is forward of the collision bulkhead; or,

(2) The installation is integral with the ship's hull such that the cooler tubes are welded directly to the hull of the vessel with the hull forming part of the tube and satisfies all of the following:

(i) The cooler structure is fabricated from material of the same thickness and quality as the hull plating to which it is attached except that in the case of half round pipe lesser thickness may be used if specifically approved by the Commandant. In any case the structure, with the exception of the hull proper, need not exceed three-eighths inch in thickness.

(ii) The flexible connections and all openings internal to the vessel, such as expansion tank vents and fills, in the installation are above the deepest load line and all piping components are Schedule 80 or thicker below the deepest load line.

(iii) Full penetration welds are employed in the fabrication of the structure and its attachment to the hull.

(iv) The forward end of the structure must be faired to the hull such that the horizontal length of the fairing is no less than four times the height of the structure, or be in a protected location such as inside a bow thruster trunk.

(b) [Reserved]

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 72–59R, 37 FR 6189, Mar. 25, 1972; CGD 77–140, 54 FR 40611, Oct. 2, 1989]

§ 56.50–97 Piping for instruments, control, and sampling (modifies 122.3).

(a) Piping for instruments, control, and sampling must comply with paragraph 122.3 of ASME B31.1 (incorporated by reference; see § 56.01–2) except that:

(1) Soldered type fittings may not be used.

(2) The outside diameter of takeoff connections may not be less than 0.840 inches for service conditions up to 900 psig or 800 °F, and 1.050 inches for conditions that exceed either of these limits.

(b) [Reserved]

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 73–254, 40 FR 40165, Sept. 2, 1975; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008]

§ 56.50–103 Fixed oxygen-acetylene distribution piping.

(a) This section applies to fixed piping installed for the distribution of oxygen and acetylene carried in cylinders as vessels stores.

(b) The distribution piping must include a means, located as close to the supply cylinders as possible, of regulating the discharge pressure from the supply cylinders.

(c) Acetylene distribution piping and pipe fittings must be seamless steel. Copper alloys containing less than 65 percent copper may be used in connection with valves, regulators, gages, and other equipment used with acetylene.

(d) Oxygen distribution piping and pipe fittings must be seamless steel or copper.

(e) When more than two cylinders are connected to a manifold, the supply pipe between each cylinder and manifold must be fitted with a non-return valve.

(f) Except for the cylinder manifolds, acetylene is not to be piped at a pressure in excess of 100 kPa (14.7 psig).

(g) Pipe joints on the low-pressure side of the regulators must be welded.

(h) Branch lines must not run through unventilated spaces or accommodation spaces.

(i) Relief valves or rupture discs must be installed as relief devices in the piping system if the maximum design pressure of the piping system can be exceeded. The relief device set pressure must not exceed the maximum design pressure of the piping system. Relief devices must discharge to a location in the weather at least 3 m (10 ft) from sources of ignition or openings to spaces or tanks.

(j) Outlet stations are to be provided with suitable protective devices which will prevent the back flow of gas into the supply lines and prevent the passage of flame into the supply lines.

(k) Shutoff valves must be fitted at each outlet.

[CGD 95–028, 62 FR 51201, Sept. 30, 1997]

§ 56.50–105 Low-temperature piping.

(a) *Class I–L.* Piping systems designated to operate at temperatures below 0 °F and pressures above 150 psig must be of Class I–L. Exceptions to this rule may be found in the individual requirements for specific commodities in subchapters D, I, and O of this chapter. The following requirements for Class I–L piping systems must be satisfied:

(1) *Materials.* All materials used in low temperature piping systems must be selected from among those specifications listed in table 2 to § 56.50–105 and must satisfy all of the requirements of the specifications, except that:

(i) The minimum service temperature as defined in § 54.25–10(a)(2) of this subchapter must not be colder than that shown in table 2 to § 56.50–105; and

(ii) The material must be tested for low temperature toughness per ASTM E23 (incorporated by reference, see § 56.01–2), Figure 4. The toughness testing requirements of subpart 54.05 of this subchapter must be satisfied for each particular product form. Charpy V-notch tests must be conducted at temperatures not warmer than 10 °F below the minimum service temperature of the design, except that for service temperatures of −320 °F and below, the impact test may be conducted at the service temperature. The minimum average energy must not be less than that shown in table 2 to § 56.50–105. In the case of steels conforming to the specifications of table 1 to § 54.25–20(a) of this subchapter the minimum lateral expansion must not be less than that required in § 54.25–20 of this subchapter. The minimum energy permitted for a single specimen and the minimum

subsize energies must be those obtained by multiplying the average energy shown in table 2 to § 56.50–105 by the applicable fraction shown in table 1 to § 56.50–105(a)(1)(ii).

TABLE 1 TO § 56.50–105(a)(1)(ii)—CHARPY V-NOTCH ENERGY MULTIPLYING FACTORS

Charpy V-notch specimen size [1]	Factor for minimum energy, average of 3 specimens [1]	Factor for minimum energy single specimen [1]
10 × 10 mm	1	2/3
10 × 7.5 mm	5/6	5/9
10 × 5.0 mm	2/3	4/9
10 × 2.5 mm	1/2	1/3

[1] Straight line interpolation for intermediate values is permitted.

(iii) Steels differing in chemical composition, mechanical properties, or heat treatments from those specified may be specially approved by the Marine Safety Center. Similarly, aluminum alloys and other materials not covered in table 2 to § 56.50–105 may be specifically approved by the Marine Safety Center.

(2) *Piping weldments.* Piping weldments must be fabricated to satisfy the requirements of § 57.03–1(b) of this subchapter in addition to subpart 56.70. Toughness testing of production weldments for low temperature piping systems and assemblies is not required.

(3) *Postweld heat treatment.* All piping weldments must be postweld heat treated for stress relief in accordance with the procedures of subpart 56.85.

(4) *Nonacceptable joints.* Single welded butt joints with backing ring left in place, socket welds, slip-on flanges, pipe joining sleeves, and threaded joints must not be used, except in small diameter instrument lines.

(5) *Other requirements.* All other requirements of this part for Class I piping apply to Class I–L piping. Pressure testing must comply with subpart 56.97, and nondestructive testing of circumferentially welded joints must comply with § 56.95–10. Seamless tubular products must be used except that, when the service pressure does not exceed 1724 kPa (250 psi), the Marine Safety Center, may give special consideration to appropriate grades of piping and tubing that are welded without the addition of filler metal in the root pass. Each production procedure and quality-control program for welded products must be acceptable to the Officer in Charge, Marine Inspection.

(b) *Class II–L.* Piping systems designed to operate at temperatures below 0 °F and pressures not higher than 150 psig must be of Class II–L. Exceptions to this rule may be found in the individual requirements for specific commodities in subchapter D and subchapter I, both of this chapter. The following requirements for Class II–L piping systems must be satisfied:

(1) Materials must be the same as those required by paragraph (a)(1) of this section except that pipe and tubing of appropriate grades welded without the addition of a filler metal may be used. The Commandant may give special consideration to tubular products welded with the addition of filler metal.

(2) Piping weldments must be fabricated to satisfy the requirements of § 57.03–1(b) of this subchapter in addition to subpart 56.70. Toughness testing of production weldments for low temperature piping systems and assemblies is not required.

(3) All piping weldments must be postweld heat treated for stress relief in accordance with the procedures of subpart 56.85.

(4) Socket welds in nominal sizes above 3 inches, slip-on flanges in nominal sizes above 4 inches, and threaded joints in sizes above 1 inch must not be used.

(5) Pressure testing must comply with subpart 56.97, and nondestructive testing of welded joints must comply with § 56.95–10.

(6) All other requirements contained in this part for Class II piping are applicable to Class II–L systems, except that § 56.70–15(b)(3)(iv) does not apply.

TABLE 2 TO §56.50–105—ACCEPTABLE MATERIALS AND TOUGHNESS TEST CRITERIA

Product form	ASTM specification [1]	Grade [2]	Minimum service temperature	Minimum avg Charpy V notch energy
Pipe		1	−30 °F	20 ft. lb.
		3	−150 °F	25 ft. lb.
Tube (carbon and low alloy steels).	A333/A333M and A334/A334M.	4 (A333 only)	−100 °F	25 ft. lb.
		6	−30 °F	20 ft. lb.
		7	−100 °F	25 ft. lb.
		8	−320 °F	Refer to §54.25–20 of this subchapter.
Pipe (Austenitic stainless steel).	A312/A312M	All grades	No limit	Austenitic stainless steel piping need be impact tested only when toughness tests are specified in subpart 54.25 of this subchapter for plating of the same alloy designation. When such toughness tests are required, the minimum average energy is 25 ft. lb.
Wrought welding fittings (carbon and low alloy steels).	A420/A420M	WPL1	−30 °F	20 ft. lb.
		WPL3	−150 °F	25 ft. lb.
		WPL4	−100 °F	25 ft. lb.
Forged or rolled flanges, forged fittings, valves, and pressure parts (carbon and low alloy steels).	A350/A350M [3]	LF1	−30 °F	20 ft. lb.
		LF2	−30 °F	20 ft. lb.
		LF3	−150 °F	25 ft. lb.
		LF4	−100 °F	25 ft. lb.
Forged or rolled flanges, forged fittings, valves, and pressure parts (high alloy steels).	F1155	Austenitic grades only (304, 304H, 304L, 310, 316, 316H, 316L, 321, 321H, 347, 347H, 348, 348H).	No limit	These products need be impact tested only when toughness tests are specified in subpart 54.25 of this subchapter for plating of the same alloy designation. When such toughness tests are required, the minimum average energy is 25 ft. lb.
Forged flanges, fittings, and valves (9% nickel).	A522/A522M	9% Ni	−320 °F	Refer to §54.25–20 of this subchapter.
Castings for valves and pressure parts (carbon and low alloy steels).	A352/A352M [3]	LCB	−30 °F	20 ft. lb.
		LC1	−50 °F	20 ft. lb.
		LC2	−100 °F	25 ft. lb.
		LC3	−150 °F	25 ft. lb.
Castings for valves and pressure parts (high alloy steel).	F1155	Austenitic grades CF3, CF3A, CF8, CF8A, CF3M, CF8M, CF8C, CK20 only.	No limit, except −325 °F for grades CF8C and CK20.	No toughness testing required except for service temperatures colder than −425 °F for grades CF3, CF3A, CF8, CF8A, CF3M, and CF8M. 25 ft. lb. average must be attained in these tests.
Bolting	F1155	L7, L9, L10, L43	−150 °F	20 ft. lb.

TABLE 2 TO § 56.50–105—ACCEPTABLE MATERIALS AND TOUGHNESS TEST CRITERIA—Continued

Product form	ASTM specification [1]	Grade [2]	Minimum service temperature	Minimum avg Charpy V notch energy
		B8D, B8T, B8F, B8M.	−325 °F	No test required.
		2B8, B8C	No limit	No test required, except for service temperatures colder than −425 °F. In such case the minimum average energy is 25 ft. lb.
		4	−150 °F	20 ft. lb.
Nuts, bolting	F1155	8T, 8F	−325 °F	No test required.
		8, 8C	No limit	Same requirement as comparable grades (B8, B8C) of bolting listed above.

[1] Any repair method must be acceptable to the Commandant (CG–ENG), and welding repairs as well as fabrication welding must be in accordance with part 57 of this subchapter.

[2] The acceptability of several alloys for low temperature service is not intended to suggest acceptable resistance to marine corrosion. The selection of alloys for any particular shipboard location must take corrosion resistance into account and be approved by the Marine Safety Center.

[3] Quench and temper heat treatment may be permitted when specifically authorized by the Commandant. In those cases, the minimum average Charpy V-notch energy must be specially designated by the Commandant.

Note 1 to table 2 to § 56.50–105: The ASTM standards listed in this table are incorporated by reference, see § 56.01–2.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 72–59R, 37 FR 6189, 6190, Mar. 25, 1972; CGD 73–254, 40 FR 40165, Sept. 2, 1975; CGD 79–108, 43 FR 46545, Oct. 10, 1978; CGD 74–289, 44 FR 26008, May 3, 1979; CGD 77–140, 54 FR 40611, Oct. 2, 1989; CGD 83–043, 60 FR 24775, May 10, 1995; USCG–2000–7790, 65 FR 58460, Sept. 29, 2000; USCG–2003–16630, 73 FR 65178, Oct. 31, 2008; USCG–2009–0702, 74 FR 49228, Sept. 25, 2009; USCG–2012–0832, 77 FR 59777, Oct. 1, 2012]

§ 56.50–110 Diving support systems.

(a) In addition to the requirements of this part, piping for diving installations which is permanently installed on the vessel must meet the requirements of subpart B of part 197 of this chapter.

(b) Piping for diving installations not permanently installed on the vessel need not meet the requirements of this part, but must meet the requirements of subpart B of part 197 of this chapter.

(c) Piping internal to a pressure vessel for human occupancy (PVHO) need not meet the requirements of this part, but must meet the requirements of subpart B of part 197 of this chapter.

[CGD 76–009, 43 FR 53683, Nov. 16, 1978]

Subpart 56.60—Materials

§ 56.60–1 Acceptable materials and specifications (replaces 123 and Table 126.1 in ASME B31.1).

(a)(1) The material requirements in this subpart must be followed in lieu of those in 123 in ASME B31.1 (incorporated by reference; see § 56.01–2).

(2) Materials used in piping systems must be selected from:

(i) The pipe, tubing, and fitting specifications that appear in table 1 to § 56.60–1or the accepted materials for use as piping system components that appear in table 1 to § 56.60–2;

(ii) ASTM F1155 (incorporated by reference; see § 56.01–2); or

(iii) The material specifications of Sections I or VIII of the ASME BPVC (both incorporated by reference; see § 56.01–2) if not prohibited by a regulation of this subchapter.

(3) Materials conforming to specifications not described in paragraph (a)(2) of this section must receive the specific approval of the Marine Safety Center.

(4) Materials listed in Table 126.1 of ASME B31.1 are not accepted unless specifically permitted by this paragraph.

(b) Components made in accordance with the commercial standards listed

in table 2 to § 56.60–1 and made of materials complying with paragraph (a) this section may be used in piping systems within the limitations of the standards and within any further limitations specified in this subchapter.

TABLE 1 TO § 56.60–1—ADOPTED SPECIFICATIONS AND STANDARDS

ASTM standards	ASME standards	Notes
Pipe, seamless:		
F1155 Carbon steel	B31.1.	
F1155 Ferritic alloy steel	B31.1.	
A376/A376M Austenitic alloys	B31.1	(1).
Pipe, seamless and welded:		
A53/A53M	B31.1	(2 3 4).
A312/A312M Austenitic steel (welded with no filler metal).	B31.1, B31.3	(1 4).
A333/A333M Low temperature steel pipe.	Sec. VIII of the BPVC, B31.3	(5 6).
Pipe, welded:		
F1155 Electric-Fusion welded Arc-welded steel.	See footnote 7	(7).
A135/A135M ERW pipe	B31.1	(3).
F1155 Electric-fusion welded arc-welded steel pipe.	B31.1	(8).
A358/A358M Electric fusion welded pipe, high temperature, austenitic.	B31.1	(1 4 9).
Pipe, forged and bored:		
A358/A358M Ferritic alloy	B31.1.	
Tube, seamless:		
F1155 Seamless Cold-drawn Low Carbon steel heat exchanger and condenser tubes.	UCS23, Sec. VIII of the BPVC	(10).
F1155 Seamless Carbon steel boiler tubes.	PG23.1, Sec. I of the BPVC	(10).
A210/A210M Medium carbon boiler tubes.	PG23.1, Sec. I of the BPVC.	
F1155 Seamless Ferritic and Austenitic Alloy-Steel Boiler tubes.	PG23.1, Sec. I of the BPVC	(1).
Tube, seamless and welded:		
A268/A268M Seamless and ERW ferritic stainless tubing.	PG23.1, Sec. I of the BPVC	(4).
A334/A334M Seamless and welded carbon and alloy-steel tubes for low-temperature service.	UCS23, Sec. VIII of the BPVC	(4 5).
Tube, welded:		
F1155 ERW Carbon steel and carbon manganese boiler tubes.	PG23.1, Sec. I of the BPVC	(10 Grade A) (4).
F1155 ERW Carbon steel heat exchanger and condenser tubes.	UCS27, Sec. VIII of the BPVC.	
F1155 Welded austenitic boiler and heat exchanger tubes.	PG23.1, Sec. I of the BPVC	(1 4).
Wrought fittings (factory made):		
F1155 Carbon steel and alloy steel for moderate and high temperature service.	Conforms to applicable American National Standards (B16.11).	(11).
A403/A403M Austenitic alloys	. . . . . do	(11).
A420/A420M Low temperature carbon and steel alloy.	. . . . . do	(11).
Castings,12 iron:		
A47/A47M Malleable iron	Conform to applicable American National Standards or refer to UCI–23 or UCD–23, Sec. VIII of the BPVC.	(13).
A126 Gray iron	. . . . . do	(13).
A197/A197M Malleable iron	. . . . . do	(13).
F1155 Ferritic Ductile iron	UCD–23, Sec. VIII of the BPVC	(13).
F1155 Ductile iron castings	See footnote 18	(18).
Nonferrous Materials 14		
Pipe, seamless:		
B42 Copper	UNF23, Sec. VIII of the BPVC	(15).
B43 Red brass	. . . . . do.	
B241/B241M Aluminum alloy	. . . . . do.	
Pipe and tube, seamless:		
B161 Nickel	. . . . . do.	
B165 Nickel-copper	. . . . . do.	

TABLE 1 TO § 56.60–1—ADOPTED SPECIFICATIONS AND STANDARDS—Continued

ASTM standards	ASME standards	Notes
B167 Ni-Cr-Fe	. . . . . do.	
B315 Copper-silicon	. . . . . do.	
Tube, seamless:		
B68/B68M Copper	See footnote 16	(15 16 17).
B75/B75M Copper	UNF23, Sec. VIII of the BPVC	(15).
F1155 Seamless Copper water tube	See footnote 16	(15 16).
B111/B111M Copper and copper alloy	UNF23, Sec. VIII of the BPVC.	
B210/B210M Aluminum alloy, drawn	. . . . . do.	
B234 Aluminum alloy, drawn	. . . . . do.	
B280 Copper tube for refrigeration service.	See footnote 16	(15 16).
Welding fittings:		
B361 Wrought aluminum welding fittings.	Must meet ASME Standards.	

[1] For austenitic materials where two sets of stresses appear, use the lower values.
[2] Type F (Furnace welded, using open hearth, basic oxygen, or electric furnace only) limited to Class II applications with a maximum service temperature of 450 °F. Type E (ERW grade) limited to maximum service temperature of 650 °F, or less.
[3] Electric resistance welded pipe or tubing of this specification may be used to a maximum design pressure of 350 psig.
[4] Refer to limitations on use of welded grades given in § 56.60–2(b).
[5] Use generally considered for Classes I–L and II–L applications. For Class I–L service only, the seamless grade is permitted. For other service refer to footnote 4 and to § 56.50–105.
[6] Furnace lap or furnace butt grades only. Limited to Class II applications only where the maximum service temperature is 450 °F, or less.
[7] Limited to Class II applications only where maximum service temperature is 300 °F or less for straight seam, and 200 °F or less for spiral seam.
[8] Limited to Class II applications where the maximum service temperature is 300 °F or less for straight seam and 200 °F or less for spiral seam.
[9] For Class I applications only the Class I Grade of the specification may be used.
[10] When used in piping systems, a certificate must be furnished by the manufacturer certifying the mechanical properties at room temperature. Without this certification, use is limited to applications within heat exchangers.
[11] Hydrostatic testing of these fittings is not required but all fittings must be capable of withstanding a hydrostatic test of 1.5 times the design pressure.
[12] Other acceptable iron castings are in UCI–23 and UCD–23 of Section VIII of the ASME BPVC. (See also §§ 56.60–10 and 56.60–15.) Acceptable castings of materials other than cast iron may be found in Sections I or VIII of the ASME BPVC.
[13] Acceptable when complying with ANSI standards. Ductile iron is acceptable for temperatures not exceeding 650 °F. For pressure temperature limitations refer to UCD–3 of Section VIII of the ASME BPVC. Other grades of cast iron are acceptable for temperatures not exceeding 450 °F. For pressure temperature limitations refer to UCI–3 of Section VIII of the ASME BPVC.
[14] For limitations in use refer to §§ 56.10–5(c) and 56.60–20.
[15] Copper pipe must not be used for hot oil systems except for short flexible connections at burners. Copper pipe must be annealed before installation in Class I piping systems. See also §§ 56.10–5(c) and 56.60–20.
[16] The stress values must be taken from UNF23 of Section VIII of the ASME BPVC for B75 annealed and light drawn temper as appropriate.
[17] B68 is acceptable if provided with a mill hydrostatic or eddy current test.
[18] Limited to pipe fittings and valves. See § 56.60–15(d) for additional information.

Note 1 to table 1 to § 56.60–1: Table 1 to § 56.60–1 replaces Table 126.1 in ASME B31.1 and sets forth specifications of pipes, tubing, and fittings intended for use in piping-systems. The first column lists acceptable standards from ASTM (all incorporated by reference; see § 56.01–2); the second lists those from ASME (all incorporated by reference; see § 56.01–2). The Coast Guard will consider use of alternative pipes, tubing, and fittings when it receives certification of their mechanical properties.

Note 2 to table 1 to § 56.60–1: When using 104.1.2 in ASME B31.1 to compute wall thickness, the stress shown here must be applied as though taken from the stress tables. An additional factor of 0.8 may be required by § 56.07–10(c) and (e).

TABLE 2 TO § 56.60–1—ADOPTED STANDARDS APPLICABLE TO PIPING SYSTEMS

[Replaces Table 126.1]

American Society of Mechanical Engineers (ASME) International [1]	
ASME B1.1	Unified Inch Screw Threads (UN and UNR Thread Form).
ASME B1.20.1	Pipe Threads, General Purpose (Inch).
ASME B1.20.3	Dryseal Pipe Threads (Inch).
ASME B16.1	Gray Iron Pipe Flanges and Flanged Fittings, Classes 25, 125, 250.
ASME B16.3	Malleable Iron Threaded Fittings, Classes 150 and 300.
ASME B16.4	Gray Iron Threaded Fittings, Classes 125 and 250.
ASME B16.5	Pipe Flanges and Flanged Fittings NPS ½ Through NPS 24 Metric/Inch Standard.[3]
ASME B16.11	Forged Fittings, Socket-Welding and Threaded.
ASME B16.14	Ferrous Pipe Plugs, Bushings, and Locknuts with Pipe Threads.
ASME B16.15	Cast Copper Alloy Threaded Fittings, Classes 125 and 250.

TABLE 2 TO § 56.60–1—ADOPTED STANDARDS APPLICABLE TO PIPING SYSTEMS—Continued

[Replaces Table 126.1]

ASME B16.20	Metallic Gaskets for Pipe Flanges, Ring-Joint, Spiral-Wound, and Jacketed.
ASME B16.21	Nonmetallic Flat Gaskets for Pipe Flanges.
ASME B16.23	Cast Copper Alloy Solder Joint Drainage Fittings: DWV.[4]
ASME B16.25	Buttwelding Ends.
ASME B16.29	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings-DWV.[4]
ASME B16.34	Valves—Flanged, Threaded, and Welding End.[3]
ASME B18.2.1	Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).
ASME B18.2.2	Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).
ASME B31.1	Power Piping, ASME Code for Pressure Piping, B31.
ASME B31.3	Process Piping, ASME Code for Pressure Piping, B31.
ASME B36.10M	Welded and Seamless Wrought Steel Pipe.
ASME B36.19M	Stainless Steel Pipe.
ASTM International (ASTM) [1]	
ASTM F1006	Standard Specification for Entrainment Separators for Use in Marine Piping Applications.[4]
ASTM F1007	Standard Specification for Pipeline Expansion Joints of the Packed Slip Type for Marine Application.
ASTM F1020	Standard Specification for Line-Blind Valves for Marine Applications.
ASTM F1120	Standard Specification for Circular Metallic Bellows Type Expansion Joints for Piping Applications.[4]
ASTM F1123	Standard Specification for Non-Metallic Expansion Joints.
ASTM F1139	Standard Specification for Steam Traps and Drains.
ASTM F1155	Standard Practice for Selection and Application of Piping System Materials.[2]
ASTM F1172	Standard Specification for Fuel Oil Meters of the Volumetric Positive Displacement Type.
ASTM F1173	Standard Specification for Thermosetting Resin Fiberglass Pipe and Fittings to be Used for Marine Applications.
ASTM F1199	Standard Specification for Cast (All Temperature and Pressures) and Welded Pipe Line Strainers (150 psig and 150 Degrees F Maximum).
ASTM F1200	Standard Specification for Fabricated (Welded) Pipe Line Strainers (Above 150 psig and 150 Degrees F).
ASTM F1201	Standard Specification for Fluid Conditioner Fittings in Piping Applications above 0 Degrees F.
Expansion Joint Manufacturers Association Inc. [1]	
Fluid Controls Institute Inc..	Standards of the Expansion Joint Manufacturers Association, 2016
FCI 69–1	Pressure Rating Standard for Steam Traps.
Manufacturers' Standardization Society of the Valve and Fittings Industry, Inc. [1]	
MSS SP–6	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings.
MSS SP–9	Spot Facing for Bronze, Iron and Steel Flanges.

TABLE 2 TO § 56.60–1—ADOPTED STANDARDS APPLICABLE TO PIPING SYSTEMS—Continued

[Replaces Table 126.1]

MSS SP–25	Standard Marking System for Valves, Fittings, Flanges and Unions.
MSS SP–45	Bypass and Drain Connections.
MSS SP–51	Class 150LW Corrosion Resistant Flanges and Cast Flanged Fittings.[4]
MSS SP–53	Quality Standard for Steel Castings and Forgings for Valves, Flanges and Fittings and Other Piping Components—Magnetic Particle Examination Method.
MSS SP–55	Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components—Visual Method for Evaluation of Surface Irregularities.
MSS SP–58	Pipe Hangers and Supports—Materials, Design Manufacture, Selection, Application, and Installation.
MSS SP–61	Pressure Testing of Valves.

[1] All standards incorporated by reference; see § 56.01–2.
[2] In addition, for bronze valves, adequacy of body shell thickness must be satisfactory to the Marine Safety Center. Refer to § 56.60–10 of this part for cast-iron valves.
[3] Mill or manufacturer's certification is not required, except where a needed portion of the required marking is deleted because of size or is absent because of age of existing stocks.
[4] Because this standard offers the option of several materials, some of which are not generally acceptable to the Coast Guard, compliance with the standard does not necessarily indicate compliance with these rules. The marking on the component or the manufacturer or mill certificate must indicate the specification or grade of the materials as necessary to fully identify the materials. The materials must comply with the requirements in this subchapter governing the particular application.

[USCG–2020–0634, 89 FR 50150, June 12, 2024]

§ 56.60–2 Limitations on materials.

The following restrictions apply to the use of welded pipe and tubing specifications when utilized in piping systems, and not when utilized in heat exchanger, boiler, pressure vessel, or similar components:

(a) *Longitudinal joint.* Wherever possible, the longitudinal joint of a welded pipe must not be pierced with holes for branch connections or other purposes.

(b) *Class II.* Use unlimited except as restricted by maximum temperature or pressure specified in table 1 to § 56.60–1 or by the requirements contained in § 56.10–5(b).

(c) *Class I.* (1) For those specifications in which a filler metal is used, the following applies to the material as furnished prior to any fabrication:

(i) For use in service above 800 °F full welding procedure qualifications by the Coast Guard are required. See part 57 of this subchapter.

(ii) Ultrasonic examination as required by item S–6 in ASTM A376 (incorporated by reference; see § 56.01–2) must be certified as having been met in all applications except where 100 percent radiography is a requirement of the particular material specification.

(2) For those specifications in which no filler material is used in the welding process, the ultrasonic examination as required by item S–6 in ASTM A376 must be certified as having been met for service above 800 °F.

TABLE 1 TO § 56.60–2—ADOPTED SPECIFICATIONS NOT LISTED IN THE ASME BPVC

ASTM specifications	Supplementary requirements
Bar stock:	
A276 (Grades 304–A, 304L–A, 310–A, 316–A, 316L–A, 321–A, 347–A, and 348–A).	Allowable stresses must be the same as those listed in UCS23 of Section VIII of the ASME BPVC for the corresponding SA–182 material.
A575 and A576 (Grades 1010–1030).	Allowable stresses must be the same as in UCS23 of Section VIII of the ASME BPVC for ASME SA–675. Physical testing must be performed the same as for ASME SA–675, except that the bend test is not required.
Bar stock:	
B16[2] (soft and half hard tempers).	An ammonia vapor test in accordance with ASTM B858 must be performed on a representative model of each finished product design.

TABLE 1 TO § 56.60–2—ADOPTED SPECIFICATIONS NOT LISTED IN THE ASME BPVC—Continued

ASTM specifications	Supplementary requirements
B21 (alloys A, B, and C) ...	Allowable stresses must be the same as those listed in UNF23 of Section VIII of the ASME BPVC for SB–171, naval brass.
B124:	
Alloy 377[2]	An ammonia vapor test in accordance with ASTM B858 must be performed on a prototype for each product design. Tension tests must be performed to determine tensile strength, yield strength, and elongation. Minimum values must be those listed in Table 3 of ASTM B283
Alloy 464	Physical testing, including mercurous nitrate test, must be performed as for material manufactured to ASTM B21. Allowable stresses must be the same as those listed in UNF23 of Section VIII of the ASME BPVC for SB–171, naval brass.
Alloy 655	Physical testing must be performed as for material manufactured to ASTM B96. Allowable stresses must be the same as those listed in UNF23 of Section VIII of the ASME BPVC for SB–96 and must be limited to a maximum allowable temperature of 212 °F.
Alloy 642	An ammonia vapor test, in accordance with ASTM B858 must be performed on a prototype of each product design. Physical testing must be performed as for material manufactured to ASTM B171, alloy D. Allowable stresses must be the same as those listed in UNF23 of Section VIII of the ASME BPVC for SB–171, aluminum bronze D.
Alloy 630	An ammonia vapor test, in accordance with ASTM B858 must be performed on a prototype of each product design. Physical testing must be performed as for material manufactured to ASTM B171, alloy E. Allowable stresses must be the same as those listed in UNF23 of Section VIII of the ASME BPVC for SB–171, aluminum bronze, alloy E.
Alloy 485	Physical testing, including mercurous nitrate test, must be performed as for material manufactured to ASTM B21. Allowable stresses must be the same as those listed in UNF23 of Section VIII of the ASME BPVC for SB–171, naval brass.
Forgings:	
B283[2] (forging brass)	An ammonia vapor test, in accordance with ASTM B858, must be performed on a prototype for each product design. Tension tests must be performed to determine tensile strength, yield strength, and elongation. Minimum values must be those listed in Table 3 of ASTM B283.
Castings:	
B26[2 3]	Tension tests must be performed to determine tensile strength, yield strength, and elongation. Minimum values must be those listed in Table X–2 of ASTM B85.
B85[2 3]	Tension tests must be performed to determine tensile strength, yield strength, and elongation. Minimum values must be those listed in Table X–2 of ASTM B85.

[1] For limitations in use refer to § 56.60–5.
[2] Limited to air and hydraulic service with a maximum design temperature of 150 °F. The material must not be used for saltwater service or other fluids that may cause dezincification or stress corrosion cracking.
[3] Those alloys with a maximum copper content of 0.6 percent or less are acceptable under this specification. Cast aluminum must not be welded or brazed.

Note 1 to table 1 to § 56.60–2: This table 1 to § 56.60–2 is a listing of adopted bar stock and nonferrous forging and casting specifications not listed in the ASME BPVC. Particular attention should be given to the supplementary testing requirements and service limitations contained in the table and footnotes. All ASTM and ASME standards referred to in this table 1 to § 56.60–2 are incorporated by reference (see § 56.01–2).

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 72–104R, 37 FR 14233, July 18, 1972; CGD 73–248, 39 FR 30839, Aug. 26, 1974; CGD 73–254, 40 FR 40165, Sept. 2, 1975; CGD 77–140, 54 FR 40612, Oct. 2, 1989; CGD 95–012, 60 FR 48050, Sept. 18, 1995; CGD 95–027, 61 FR 26001, May 23, 1996; CGD 95–028, 62 FR 51201, Sept. 30, 1997; USCG–1998–4442, 63 FR 52190, Sept. 30, 1998; USCG–1999–5151, 64 FR 67180, Dec. 1, 1999; USCG–2003–16630, 73 FR 65182, Oct. 31, 2008; USCG–2020–0634, 89 FR 50153, June 12, 2024]

§ 56.60–3 Ferrous materials.

(a) Ferrous pipe used for saltwater service must be protected against corrosion by hotdip galvanizing or by the use of extra heavy schedule material.

(b) (Reproduces 124.2.C.) Carbon or alloy steel having carbon content of more than 0.35 percent must not be used in welded construction, nor be shaped by oxygen-cutting process or other thermal-cutting process.

[CGD 73–254, 40 FR 40165, Sept. 2, 1975, as amended by USCG–2003–16630, 73 FR 65183, Oct. 31, 2008; USCG–2020–0634, 89 FR 50153, June 12, 2024]

§ 56.60–5 Steel (High temperature applications).

(a) (Reproduces 124.2.A.) Upon prolonged exposure to temperatures above 800 °F (427 °C), the carbide phase of plain carbon steel, plain nickel-alloy steel,

carbon-manganese-alloy steel, manganese-vanadium-alloy steel, and carbon-silicon steel may convert to graphite.

(b) (Reproduces 124.2.B.) Upon prolonged exposure to temperatures above 875 °F (468 °C), the carbide phase of alloy steels, such as carbon-molybdenum, manganese-molybdenum-vanadium, manganese-chromium-vanadium, and chromium-vanadium, may convert to graphite.

(c) The design temperature of a piping system employing one or more of the materials listed in paragraphs (a) and (b) of this section must not exceed the lowest graphitization temperature specified for materials used.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 72–104R, 37 FR 14233, July 18, 1972; CGD 73–248, 39 FR 30839, Aug. 26, 1974; CGD 73–254, 40 FR 40165, Sept. 2, 1975; USCG–2003–16630, 73 FR 65183, Oct. 31, 2008; USCG–2020–0634, 89 FR 50153, June 12, 2024]

§ 56.60–10 Cast iron and malleable iron.

(a) The low ductility of cast iron and malleable iron should be recognized and the use of these metals where shock loading may occur should be avoided. Cast iron and malleable iron components must not be used at temperatures above 450 °F. Cast iron and malleable iron fittings conforming to the specifications of table 1 to § 56.60–1 may be used at the pressure limits of the applicable standards at temperatures not exceeding 450 °F. Valves of either of these materials may be used if they conform to the standards for class 125 and class 250 flanges and flanged fittings in ASME B16.1 (incorporated by reference; see § 56.01–2).

(b) Cast iron and malleable iron must not be used for valves or fittings in lines carrying flammable or combustible fluids which are directly connected to, or in the proximity of, equipment or other lines having open flame, or any parts operating at temperatures above 500 °F. Cast iron must not be used for hull fittings, or in systems conducting lethal products.

NOTE 1 TO PARAGRAPH (B): For definitions of flammable or combustible fluids, see §§ 30.10–15 and 30.10–22 of subchapter D of this chapter.

(c) Malleable iron and cast-iron valves and fittings, designed, and marked for Class 300 refrigeration service, may be used for such service up to a pressure limitation of 300 psig. Malleable iron flanges of this class may also be used in sizes 4 inches and smaller (oval and square design).

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9978, June 17, 1970; CGD 73–254, 40 FR 40165, Sept. 2, 1975; CGD 77–140, 54 FR 40612, Oct. 2, 1989; CGD 95–027, 61 FR 26001, May 23, 1996; USCG–2003–16630, 73 FR 65183, Oct. 31, 2008; USCG–2020–0634, 89 FR 50153, June 12, 2024]

§ 56.60–15 Ductile iron.

(a) Ductile cast iron components made of material conforming to ASTM F1155 (incorporated by reference, see § 56.01–2) may be used within the service restrictions and pressure-temperature limitations of UCD–3 of Section VIII of the ASME BPVC (incorporated by reference; see § 56.01–2).

(b) Ductile iron castings conforming to ASTM F1155 may be used in hydraulic systems at pressures in excess of 7500 kPa (1000 psi) gage, provided the following:

(1) The castings receive a ferritizing anneal when the as-cast thickness does not exceed 1 inch;

(2) Large castings for components, such as hydraulic cylinders, are examined as specified for a casting quality factor of 90 percent in accordance with UG–24 of Section VIII of the ASME BPVC; and

(3) The castings are not welded, brazed, plugged, or otherwise repaired.

(c) After machining, ductile iron castings must be hydrostatically tested to twice their maximum allowable working pressure and must show no leaks.

(d) Ductile iron castings exhibiting less than 12 percent elongation in 50 millimeters (2 inches) when subjected to a tensile test must meet the requirements for cast iron in this part.

[CGD 77–140, 54 FR 40612, Oct. 2, 1989, as amended by CGD 95–027, 61 FR 26001, May 23, 1996; USCG–2000–7790, 65 FR 58460, Sept. 29, 2000; USCG–2003–16630, 73 FR 65183, Oct. 31, 2008; USCG–2020–0634, 89 FR 50153, June 12, 2024]

§ 56.60–20 Nonferrous materials.

Nonferrous materials listed in this subpart may be used in piping systems under the following conditions (see also § 56.10–5(c)):

(a) The low melting points of many nonferrous metals and alloys, such as aluminum and aluminum alloys, must be recognized. These types of heat sensitive materials must not be used to conduct flammable, combustible, or dangerous fluids, or for vital systems unless approved by the Marine Safety Center.

NOTE 1 TO PARAGRAPH (A): For definitions of flammable or combustible fluids, see §§ 30.10–15 and 30.10–22 of this chapter or parts 151–154 of this subchapter. Dangerous fluids are those covered by regulations in part 98 of this chapter.

(b) The possibility of galvanic corrosion due to the relative solution potentials of copper and aluminum and their alloys should be considered when used in conjunction with each other or with steel or with other metals and their alloys when an electrolyte is present.

(c) A suitable thread compound must be used in threaded joints in aluminum pipe to prevent seizing. Pipe in the annealed temper should not be threaded.

(d) The corrosion resistance of copper bearing aluminum alloys in a marine atmosphere is poor and alloys with copper contents exceeding 0.6 percent should not be used. Refer to table 1 to § 56.60–2 for further guidance.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 77–140, 54 FR 40612, Oct. 2, 1989; CGD 95–027, 61 FR 26001, May 23, 1996; USCG–2020–0634, 89 FR 50153, June 12, 2024]

§ 56.60–25 Nonmetallic materials.

(a) Plastic pipe installations must be in accordance with IMO Resolution A.753(18) and IMO Resolution MSC.313(88) (both incorporated by reference, see § 56.01–2) and the following supplemental requirements.

(1) Plastic pipe and associated fittings must be approved to approval series 164.141 as follows:

(i) All piping, except pipe used on open decks, in cofferdams, void spaces, or ducts, must meet the flame spread requirements of Appendix 3 of IMO Resolution A.753(18).

(ii) Where fire endurance is required in Appendix 4 of IMO Resolution A.753(18) the pipe must, at a minimum, be approved as meeting the fire endurance level required in Appendix 4. Ratings of ''0'' in Appendix 4 indicate that no fire endurance test is required. Ratings of ''N/A'' or ''X'' indicate that plastic pipe is not permitted.

(iii) Piping in accommodation, service and control spaces must be approved for use in those spaces.

(2) Plastic pipe that has not been approved for use in accommodation, service and control spaces is permitted in a concealed space in an accommodation, service or control space, such as behind ceilings or linings or between double bulkheads if:

(i) The piping is enclosed in a trunk or duct constructed of ''A'' class divisions; or

(ii) An approved smoke detection system is fitted in the concealed space and each penetration of a bulkhead or deck and each installation of a draft stop is made in accordance with IMO Resolution A.753(18) and IMO Resolution MSC.313(88) to maintain the integrity of fire divisions.

(3) Requests for the use of plastic pipe for non-vital systems, as defined in § 56.07–5, containing non-flammable or non-combustible liquids in locations that do not require fire endurance testing, as indicated in Appendix 4 of IMO Resolution A.753(18), must be submitted to the Marine Safety Center for review. The proposed piping must meet the following requirements:

(i) The length of pipe must be 30 inches or less;

(ii) The pipe must be contained within the space and does not penetrate any bulkhead, overhead or deck; and

(iii) Material specifications must be provided with the installation proposal.

(4) Plastic pipe fitting and bonding techniques must follow the manufacturer's installation guidelines. Bonders must hold certifications required by the manufacturer's guidelines and provide documentation of current certification to the Marine Inspector when requested.

(5) Systems identified by § 56.97–40(a)(1) through (c) that contain plastic piping must be tested to 1.5 MAWP as required by § 56.97–40(a).

(6) Plastic pipe used outboard of the required metallic shell valve in any piping system penetrating the vessel's shell (see § 56.50–95(f)) must have the same fire endurance as the metallic shell valve. Where the shell valve and the plastic pipe are in the same unmanned space, the valve must be operable from above the freeboard deck.

(7) Pipe that is to be used for potable water must bear the appropriate certification mark of a nationally-recognized, ANSI-accredited, third-party certification laboratory.

(8) Plastic pipe must also comply with appropriate requirements for specific uses and arrangements of pipe given elsewhere in this part.

(b)(1) Nonmetallic flexible hose must be in accordance with SAE J1942 (incorporated by reference; see § 56.01–2) and may be installed only in vital and nonvital fresh and saltwater systems, nonvital pneumatic systems, lube oil and fuel systems, and fluid power systems.

(2) Nonmetallic flexible hose may be used in vital fresh and saltwater systems at a maximum service pressure of 1,034 kPa (150 psi). Nonmetallic flexible hose may be used in lengths not exceeding 76 cm (30 inches) where flexibility is required, subject to the limits in paragraphs (a)(1) through (4) of this section. Nonmetallic flexible hose may be used for plastic pipe in duplicate installations in accordance with this paragraph (b).

(3) Nonmetallic flexible hose may be used for plastic pipe in non-vital fresh and saltwater systems and non-vital pneumatic systems, subject to the limits of paragraphs (a)(1) through (4) of this section. Unreinforced hoses are limited to a maximum service pressure of 345 kPa (50 psi); reinforced hoses are limited to a maximum service pressure of 1,034 kPa (150 psi).

(4) Nonmetallic flexible hose may be used in lube oil, fuel oil and fluid power systems only where flexibility is required and in lengths not exceeding 30 inches.

(5) Nonmetallic flexible hose must have factory-assembled end fittings requiring no further adjustment or field attachable fittings. Hose end fittings must comply with SAE J1475 (incorporated by reference, see § 56.01–2). Field attachable fittings must be installed following the manufacturer's recommended practice. A hydrostatic test of each hose assembly must be conducted in accordance with § 56.97–5.

(6) The fire-test procedures of ISO 15540 (incorporated by reference; see § 56.01–2) are an acceptable alternative to those procedures of SAE J1942. All other tests of SAE J1942 are still required.

(c) Plastic valves, fittings, and flanges must be designed, fabricated, tested, and installed to satisfy the requirements for plastic pipe contained in this section.

(d) Requests to use nonmetallic materials other than those specified in this section must be submitted to the Commandant for consideration.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 56.60–25, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.govinfo.gov*.

Subpart 56.65—Fabrication, Assembly, and Erection

SOURCE: USCG–2020–0634, 89 FR 50155, June 12, 2024, unless otherwise noted.

§ 56.65–1 General (modifies 127 through 135).

The requirements for fabrication, assembly, and erection in subparts 56.70 through 56.90 must apply in lieu of 127 through 135 of ASME B31.1 (incorporated by reference; see § 56.01–2). Those paragraphs reproduced are so noted.

Subpart 56.70—Welding

SOURCE: USCG–2020–0634, 89 FR 50155, June 12, 2024unless otherwise noted.

§ 56.70–1 General.

The following generally applies to all types of welding processes. Alternatives must be approved by the Marine Safety Center.

§ 56.70–3 Limitations.

Backing strips used at longitudinal welded joints must be removed.

§56.70–5 Material.

(a) *Filler metal*. All filler metal, including consumable insert material, must comply with the requirements of Section IX of the ASME BPVC (incorporated by reference; see §56.01–2) and §57.02–5 of this subchapter.

(b) *Backing rings*. Backing rings must comply with section 127.2.2. of ASME B31.1 (incorporated by reference; see §56.01–2).

§56.70–10 Preparation (modifies 127.3).

(a) *Butt welds*—(1) *End preparation*. (i) Oxygen or arc cutting is acceptable only if the cut is reasonably smooth and true, and all slag is cleaned from the flame cut surfaces. Discoloration which may remain on the flame cut surface is not considered to be detrimental oxidation.

(ii) Butt-welding end preparation dimensions contained in ASME B16.25 (incorporated by reference; see §56.01–2) or any other end preparation that meets the procedure qualification requirements are acceptable.

(iii) If piping component ends are bored, such boring must not result in the finished wall thickness after welding being less than the minimum design thickness. Where necessary, weld metal of the appropriate analysis may be deposited on the inside or outside of the piping component to provide sufficient material for machining to insure satisfactory fitting of rings.

(iv) If the piping component ends are upset, they may be bored to allow for a completely recessed backing ring, provided the remaining net thickness of the finished ends is not less than the minimum design thickness.

(2) *Cleaning*. Surfaces for welding must be clean and must be free from paint, oil, rust, scale, or other material which is detrimental to welding.

(3) *Alignment*. The inside diameters of piping components to be joined must be aligned as accurately as practicable. Alignment must be preserved during welding. Where ends are to be joined and the internal misalignment exceeds 1/16-inch, it is preferred that the component with the wall extending internally be internally trimmed (see Fig. 127.3) so that adjoining internal surfaces are approximately flush. However, this trimming must not reduce a piping component wall thickness below the minimum design thickness and the change in the contour may not exceed 30°.

(4) *Spacing*. The root opening of the joint must be as given in the procedure specification.

(b) *Fillet welds*. Piping components that are to be joined utilizing fillet welds must be prepared in accordance with applicable provisions and requirements of this section. For typical details, see Figures 127.4.4A and 127.4.4C of ASME B31.1 (incorporated by reference; see §56.01–2) and §56.30–10(b). See §56.30–5(d) for additional requirements.

§56.70–15 Procedure (modifies 127.4).

(a) *General*. (1) Qualification of welders and welding procedures is required and must comply with the requirements of part 57 of this subchapter.

(2) Sections must be welded insofar as possible in the fabricating shop. Welding must not be done in severe weather conditions. Prior to welding Class I piping or low temperature piping, the fabricator must request a marine inspector to visit their plant to examine their fabricating equipment and to witness the qualification tests required by part 57 of this subchapter. One test specimen must be prepared for each process and welding position to be employed in the fabrication.

(b) *Girth butt welds*. (1) Girth butt welds must be complete penetration welds and may be made with a single vee, double vee, or other suitable type of groove, with or without backing rings or consumable inserts.

(2) Girth butt welds in Class I, I–L, and II–L piping systems must be double welded butt joints or equivalent single welded butt joints for pipe diameters exceeding three-fourth inch nominal pipe size. The use of a single welded butt joint employing a backing ring (note restrictions in paragraph (b)(3)(iv) of this section) on the inside of the pipe is an acceptable equivalent for Class I and Class II–L applications, but not permitted for Class I–L applications. Single welded butt joints employing either an inert gas for first pass backup or a consumable insert ring may be considered the equivalent of a double welded butt joint for all

classes of piping and is preferable for Class I–L and II–L systems where double butt welds cannot be used. A first pass inert gas backup is intended to mean that the inside of the pipe is purged with inert gas and that the root is welded with the inert gas metal arc (mig) or inert gas tungsten arc (tig) processes. For single welded joints, where possible, the inside of the joint must be examined visually to assure full penetration. Radiographic examination of at least 20 percent of single welded joints to check for penetration is required for all Class I and Class I–L systems regardless of size following the requirements of §56.95–10. Ultrasonic testing may be utilized in lieu of radiographic examination if the procedures are approved.

(3) For Class II piping, the type of joints must be similar to Class I piping, with the following exceptions:

(i) Single-welded butt joints may be employed without the use of backing rings in all sizes provided that the weld is chipped or ground flush on the root side of the weld.

(ii) For services such as vents, overflows, and gravity drains, the backing ring may be eliminated, and the root of the weld need not be ground.

(iii) Square-groove welds without edge preparation may be employed for butt joints in vents, overflows, and gravity drains where the pipe wall thickness does not exceed three-sixteenth inch.

(iv) The crimped or forged backing ring with continuous projection around the outside of the ring is acceptable only for Class II piping. The projection must be completely fused.

(4) Tack welds that become part of the finished weld must be made by a qualified welder. Tack welds that have cracked must be removed.

(5) When components of different outside diameters are welded together, the weld joint must be filled to the outside surface of the component having the larger diameter. There must be a gradual transition, not exceeding a slope of 1:3, in the weld between the two surfaces. To avoid unnecessary weld deposit, the outside surface of the component having the larger diameter must be tapered at an angle not to exceed 30 degrees with the axis of the pipe. (See Fig. 127.4.2 of ASME B31.1 (incorporated by reference; see §56.01–2).)

(6) As-welded surfaces are permitted; however, the surface of the welds must be sufficiently free from coarse ripple, grooves, overlaps, abrupt ridges and valleys to meet the following:

(i) The condition of finished welds must be suitable for radiographic and other nondestructive examinations when required by §56.95–10. In those cases where there is a question regarding the surface condition on the interpretation of a radiographic film, the film must be compared to the actual weld surface for interpretation and determination of acceptability.

(ii) Reinforcements are permitted in accordance with table 1 to §56.70–15.

(iii) Undercuts must not exceed 1/32-inch and must not encroach on the minimum required section thickness.

(iv) If the surface of the weld requires grinding to meet the above criteria, care must be taken to avoid reducing the weld or base material below the minimum required thickness.

(7) The type and extent of examination required for girth butt welds is specified in §56.95–10.

(8) Sections of welds that are shown by radiography or other examination to have any of the following type of imperfections must be judged unacceptable and must be repaired as provided in paragraph (f) of this section:

(i) Any type of crack or zone of incomplete fusion or penetration.

(ii) Any slag inclusion or porosity greater than specified as acceptable in PW–51 of Section I of the ASME BPVC (incorporated by reference; see §56.01–2).

(iii) Undercuts in the external surfaces of butt welds more than 1/32-inch deep.

(iv) Concavity on the root side of full penetration girth butt welds where the resulting weld thickness is less than the minimum pipe wall thickness required by this subchapter. Weld reinforcement up to a maximum of 1/32-inch thickness may be considered as pipe wall thickness in such cases.

(c) *Longitudinal butt welds.* Longitudinal butt welds in piping components not made in accordance with the standards and specifications listed in §56.60–

1 must meet the requirements of paragraph 127.4.3 of ASME B31.1 (incorporated by reference; see §56.01–2).

(d) *Fillet welds.* (1) Fillet welds may vary from convex to concave. The size of a fillet weld is determined as shown in Figure 127.4.4A in ASME B31.1. Fillet weld details for socket-welding components must meet §56.30–5(c). Fillet weld details for flanges must meet §56.30–10(c). Fillet weld details for flanges must meet §56.30–10.

(2) The limitations on cracks and undercutting set forth in paragraph (b)(8) of this section for girth welds are also applicable to fillet welds.

(3) Class I piping not exceeding 3 inches nominal pipe size and not subject to full radiography by §56.95–10 may be joined by sleeves fitted over pipe ends or by socket type joints. Where full radiography is required, only butt type joints may be used. The inside diameter of the sleeve must not exceed the outside diameter of the pipe or tube by more than 0.080 inch. Fit between socket and pipe must conform to applicable standards for socket weld fittings. Depth of insertion of pipe or tube within the socket or sleeve must not be less than three-eighths inch. The fillet weld must be deposited in a minimum of two passes, unless specifically approved otherwise. Requirements for joints employing socket weld and slip-on flanges are in §56.30–10.

(4) Sleeve and socket type joints may be used in Class II piping systems without restriction as to size of pipe or tubing joined. The fillet welds must be deposited in a minimum of two passes, unless specifically approved otherwise. Requirements for joints employing socket weld and slip-on flanges are in §56.30–10.

(e) *Seal welds.* (1) Where seal welding of threaded joints is performed, threads must be entirely covered by the seal weld.

(2) The limitation on cracks and undercutting set forth in paragraph (b)(8) of this section for girth welds are also applicable to seal welds.

(f) *Weld defect repairs.* (1) All defects in welds requiring repair must be removed by a flame or arc-gouging, grinding, chipping, or machining. Repair welds must be made in accordance with the same procedures used for original welds, or by another welding process if it is a part of a qualified procedure, recognizing that the cavity to be repaired may differ in contour and dimensions from the original joint. The types, extent, and method of examination and limits of imperfections of repair welds must be the same as for the original weld.

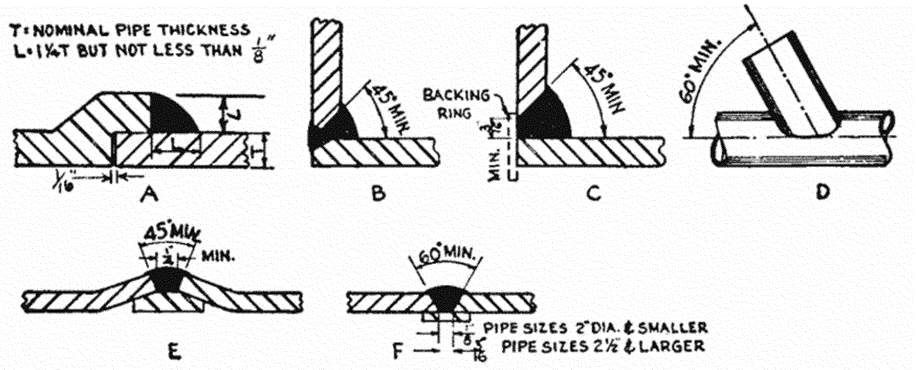
(2) Preheating may be required for flame-gouging or arc-gouging certain alloy materials of the air hardening type in order to prevent surface checking or cracking adjacent to the flame or arc-gouged surface.

(g) *Welded branch connections.* (1) Figures 127.4.8A, B, and C of ASME B31.1 show typical details of branch connections with and without added reinforcement. See also figure 1 to §§56.70–15(g)(3) for additional pipe connections.

(2) Figure 127.4.8D of ASME B31.1 shows basic types of weld attachments used in the fabrication of branch connections. The location and minimum size of these attachment welds must conform to the requirements of this paragraph. Weld sizes must be calculated in accordance with 104.3.1 of ASME B31.1, but must not be less than the sizes shown in Figure 127.4.8D and F of ASME B31.1.

(3) The notations and symbols used in this paragraph and in Figure 127.4.8D and F of ASME B31.1 are as follows:

FIGURE 1 TO § 56.70–15(G)(3)—ACCEPTABLE TYPES OF WELDED PIPE CONNECTIONS



t_n = nominal thickness of branch wall less corrosion allowance, inches.
t_c = the smaller of ¼ inch or $0.7t_n$.
t_e = nominal thickness of reinforcing element (ring or saddle), inches (t_e = 0 if there is no added reinforcement).
t_{min} = the smaller of t_n or t_e.
t_w = dimension of partial penetration weld, inches.

(4) Branch connections (including specially made, integrally reinforced branch connection fittings) that abut the outside surface of the run wall, or that are inserted through an opening cut in the run wall, shall have opening and branch contour to provide a good fit and shall be attached by means of full penetration groove welds except as otherwise permitted in paragraph (g)(7) of this section. The full penetration groove welds shall be finished with cover fillet welds having a minimum throat dimension not less than $2t_c$. The limitation as to imperfection of these groove welds shall be as set forth in 127.4.2(C) of ASME B31.1 for girth welds.

(5) In branch connections having reinforcement pads or saddles, the reinforcement shall be attached by welds at the outer edge and at the branch periphery as follows:

(i) If the weld joining the added reinforcement to the branch is a full penetration groove weld, it shall be finished with a cover fillet weld having a minimum throat dimension not less than t_c the weld at the outer edge, joining the added reinforcement to the run, shall be a fillet weld with a minimum throat dimension of 0.5 t_e.

(ii) If the weld joining the added reinforcement to the branch is a fillet weld, the throat dimension shall not be less than 0.7 t_{min}. The weld at the outer edge joining the outer reinforcement to the run shall also be a fillet weld with a minimum throat dimension of 0.5 t_e.

(6) When rings or saddles are used, a vent hole shall be provided (at the side and not at the crotch) in the ring or saddle to reveal leakage in the weld between branch and main run and to provide venting during welding and heat-treating operations. Rings or saddles may be made in more than one piece if the joints between the pieces have strength equivalent to ring or saddle parent metal and if each piece is provided with a vent hole. A good fit shall be provided between reinforcing rings or saddles and the parts to which they are attached.

(7) Branch connections 2 in. NPS and smaller that do not require reinforcement may be constructed as shown in Fig. 127.4.8F of ASME B31.1. This construction is limited to use in Class I and II piping systems at a maximum design temperature of 750 °F or a maximum pressure of 1025 psi.

(h) *Heat treatment.* Heat treatment for welds shall be in accordance with subpart 56.85.

TABLE 1 TO § 56.70–15—REINFORCEMENT OF GIRTH AND LONGITUDINAL BUTT WELDS

Thickness (in inches) of base metal	Maximum thickness (in inches) of reinforcement for design temperature		
	Below 0 °F or above 750 °F	350° to 750 °F	0 °F and above but less than 350 °F
Up to 1/8, inclusive	1/16	3/32	3/16
Over 1/8 to 3/16, inclusive	1/16	1/8	3/16
Over 3/16 to 1/2, inclusive	1/16	5/32	3/16
Over 1/2 to 1, inclusive	3/32	3/16	3/16
Over 1 to 2, inclusive	1/8	1/4	1/4
Over 2	5/32	(1)	(1)

[1] The greater of 1/4 in. or 1/8 times the width of the weld in inches.

Notes:

[1] For double welded butt joints, this limitation on reinforcement given above applies separately to both inside and outside surfaces of the joint.

[2] For single welded butt joints, the reinforcement limits given above apply to the outside surface of the joint only.

[3] The thickness of weld reinforcement is based on the thickness of the thinner of the materials being joined.

[4] The weld reinforcement thicknesses must be determined for the higher of the abutting surfaces involved.

[5] For boiler external piping use the column titled "Below 0 °F or above 750 °F" for weld reinforcement thicknesses.

§ 56.70–20 Qualification, general.

(a) Qualification of welding procedures and welders is required, and must comply with the requirements of Section IX of the ASME BPVC (incorporated by reference; see § 56.01–2) as modified by part 57 of this subchapter.

(b) Each butt-welded joint of Class I of Class I–L piping must be marked with the welder's identification symbol. Dies must not be used to mark the pipe where the pressure exceeds 600 psig or the temperature exceeds 750 °F or in Class I–L systems.

Subpart 56.75—Brazing

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50158, June 12, 2024, unless otherwise noted.

§ 56.75–5 Filler metal (modifies 128.2).

(a) The filler metal used in brazing must be a nonferrous metal or alloy having a melting point above 1,000 °F and below that of the metal being joined. The filler metal must flow freely within the desired temperature range and, in conjunction with a suitable flux or controlled atmosphere, must wet and adhere to the surfaces to be joined. Prior to using a particular brazing material in a piping system, the requirements of § 56.60–20 should be considered.

(b) The brazing material used must have a shearing strength of at least 10,000 psig. The maximum allowable working pressure for brazing piping must be determined by this part.

(c) Fluxes that are fluid and chemically active at the brazing temperature must be used when necessary to prevent oxidation of the filler metal and of the surfaces to be joined and to promote free flowing of the filler metal.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 77–140, 54 FR 40615, Oct. 2, 1989; USCG–2003–16630, 73 FR 65184, Oct. 31, 2008]

§ 56.75–10 Joint clearance.

The clearance between surfaces to be joined must be no larger than is necessary to allow complete capillary distribution of the brazing alloy or solder.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2003–16630, 73 FR 65184, Oct. 31, 2008]

§ 56.75–15 Heating.

(a) The joint must be brought to brazing temperature in as short a time as possible to minimize oxidation.

(b) [Reserved]

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2003–16630, 73 FR 65184, Oct. 31, 2008]

§ 56.75–20 Brazing qualification.

(a) The qualification of the performance of brazers and brazing operators must be in accordance with the requirements of Part C, Section IX of the ASME Code (incorporated by reference; see § 56.01–2) and part 57 of this subchapter.

(b) Manufacturers shall perform those tests required by paragraph (a) of this section prior to performing production brazing.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2003–16630, 73 FR 65184, Oct. 31, 2008]

§ 56.75–25 Detail requirements.

(a) Pipe may be fabricated by brazing when the temperature to which such connections may be subjected does not exceed 425 °F. (For exception refer to § 56.30–30(b)(1).)

(b) The surfaces to be brazed must be clean and free from grease, oxides, paint, scale, and dirt of any kind.

(c) After the parts to be joined have been thoroughly cleaned the edges to be brazed must be given an even coating of flux prior to heating the joint as a protection against oxidation.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2003–16630, 73 FR 65184, Oct. 31, 2008]

§ 56.75–30 Pipe joining details.

(a) *Silver brazing.* (1) Circumferential pipe joints may be either of the socket or butt type. When butt joints are employed the edges to be joined must be cut or machined square and the edges must be held closely together to insure a satisfactory joint.

(b) *Copper-alloy brazing.* (1) Copper-alloy brazing may be employed to join pipe, valves, and fittings. Circumferential joints may be either of the butt or socket type. Where butt joints are employed, the included angle must be not less than 90° where the wall thickness is three-sixteenths of an inch or greater. The annular clearance of socket joints must be held to small clearances.

(2) Copper pipe fabricated with longitudinal joints for pressures not exceeding that permitted by the regulations in this subchapter may have butt, lapped, or scarfed joints. If of the latter type, the kerf of the material must be not less than 60°.

(c) *Brazing, general.* (1) Heat must be applied evenly and uniformly to all parts of the joint in order to prevent local overheating.

(2) The members to be joined must be held firmly in place until the brazing alloy has set so as to prevent any strain on the joint until the brazing alloy has thoroughly solidified. The brazing must be done by placing the flux and brazing material on one side of the joint and applying heat until the brazing material flows entirely through the lap and shows uniformly along the seam on the other side of the joint. Sufficient flux must be used to cause the brazing material to appear promptly after reaching the brazing temperature.

Subpart 56.80—Bending and Forming

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50158, June 12, 2024, unless otherwise noted.

§ 56.80–5 Bending (modifies 129).

Pipe may be bent by any hot or cold method and to any radius that will result in a bend surface free of cracks, as determined by a method of inspection specified in the design, and substantially free of buckles. Such bends must meet the design requirements of 102.4.5 and 104.2.1 of ASME B31.1 (incorporated by reference; see § 56.01–2). This does not prohibit the use of bends designed as creased or corrugated. If doubt exists as to the wall thickness being adequate, Class I piping having diameters exceeding 4 inches must be nondestructively examined by the use of ultrasonics or other acceptable method. The nondestructive method must be employed where the design temperature exceeds 750 °F.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9979, June 17, 1970; USCG–2003–16630, 73 FR 65185, Oct. 31, 2008]

§ 56.80–10 Forming (reproduces 129.2).

(a) Piping components may be formed (swaging, lapping, or upsetting of pipe ends, extrusion of necks, etc.) by any suitable hot or cold working method, providing such processes result in formed surfaces which are uniform and free of cracks or other defects, as determined by methods of inspection specified in the design.

(b) [Reserved]

§ 56.80–15 Heat treatment of bends and formed components.

(a) Carbon-steel piping that has been heated to at least 1,650 °F (898 °C) for bending or other forming requires no subsequent heat treatment.

(b) Ferritic alloy steel piping which has been heated for bending or other forming operations must receive a stress relieving treatment, a full anneal, or a normalize and temper treatment, as specified by the design specification before welding.

(c) Cold bending and forming of carbon steel having a wall thickness of three-fourths of an inch and heavier, and all ferritic-alloy pipe in nominal pipe sizes of 4 inches and larger, or one-half-inch wall thickness or heavier, will require a stress-relieving treatment.

(d) Cold bending of carbon-steel and ferritic-alloy steel pipe in sizes and wall thicknesses less than specified in 129.3.3 of ASME B31.1 (incorporated by reference; see § 56.01–2) may be used without a postheat treatment.

(e) For other materials the heat treatment of bends and formed components must be such as to ensure pipe properties that are consistent with the original pipe specification.

(f) All scale must be removed from heat treated pipe prior to installation.

(g) Austenitic stainless-steel pipe that has been heated for bending or other forming may be used in the ''as-bent'' condition unless the design specification requires post-bending heat treatment.

[CGFR 68–62, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9979, June 17, 1970; CGD 73–254, 40 FR 40166, Sept. 2, 1975; USCG–2003–16630, 73 FR 65185, Oct. 31, 2008]

Subpart 56.85—Heat Treatment of Welds

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50158, June 12, 2024, unless otherwise noted.

§ 56.85–5 Heating and cooling method.

Heat treatment may be accomplished by a suitable heating method that will provide the desired heating and cooling rates, the required metal temperature, metal temperature uniformity, and temperature control.

[USCG–2003–16630, 73 FR 65185, Oct. 31, 2008]

§ 56.85–10 Preheating.

The minimum welding preheat procedures and temperatures must be as stated in section 131 and Table 131.4.1 of ASME B31.1 (incorporated by reference; see § 56.01–2).

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9980, June 17, 1970; CGD 72–104R, 37 FR 14234, July 18, 1972; CGD 72–206R, 38 FR 17229, June 29, 1973; CGD 73–254, 40 FR 40166, Sept. 2, 1975; CGD 77–140, 54 FR 40615, Oct. 2, 1989; USCG–2003–16630, 73 FR 65185, Oct. 31, 2008]

§ 56.85–15 Postweld heat treatment.

Postweld heat treatment procedures and temperatures must be as stated in Section 132 and Table 132 of ASME B31.1 (incorporated by reference; see § 56.01–2).

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 72–206R, 38 FR 17229, June 29, 1973; CGD 73–254, 40 FR 40167, Sept. 2, 1975; USCG–2003–16630, 73 FR 65185, Oct. 31, 2008]

Subpart 56.90—Assembly

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50158, June 12, 2024, unless otherwise noted.

§ 56.90–1 General.

The assembly of the various piping components, whether done in a shop or as field erection, must be done so that the completely erected piping conforms with the requirements of the regulations in this subchapter.

§ 56.90–5 Bolting procedure.

(a) All flanged joints must be fitted up so that the gasket contact faces bear uniformly on the gasket and then must be made up with relatively uniform bolt stress.

(b) When bolting gasketed flanged joints, the gasket must be properly compressed in accordance with the design principles applicable to the type of gasket used.

(c) Steel to cast iron flanged joints shall be assembled with care to prevent damage to the cast iron flange in accordance with § 56.25–10.

(d) All bolts must be engaged so that there is visible evidence of complete threading through the nut or threaded attachment.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2003–16630, 73 FR 65185, Oct. 31, 2008]

§ 56.90–10 Threaded piping (modifies 135.5).

(a) Any compound used in threaded joints must be suitable for the service conditions and must not react unfavorably with either the service fluid or the piping materials.

(b) Threaded joints that are to be seal welded must be made up without any thread compound.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2003–16630, 73 FR 65185, Oct. 31, 2008]

Subpart 56.95—Inspection

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50158, June 12, 2024, unless otherwise noted.

§ 56.95–1 General (replaces 136).

(a) The provisions in this subpart apply to inspection in lieu of 136 of ASME B31.1 (incorporated by reference; see § 56.01–2).

(b) Prior to initial operation, a piping installation must be inspected to assure compliance with the engineering design, and with the material, fabrication, assembly, and test requirements of ASME B31.1, as modified by this subchapter. This inspection is the responsibility of the owner or operator and may be performed with an engineering organization employed by the owner, together with the marine inspector.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9979, June 17, 1970; USCG–2003–16630, 73 FR 65185, Oct. 31, 2008]

§ 56.95–5 Rights of access of marine inspectors.

Marine inspectors must have rights of access to any place where work concerned with the piping is being performed. This includes manufacture, fabrication, assembly, erection, and testing of the piping or system components. Marine inspectors must have access to review all certifications or records pertaining to the inspection requirements of § 56.95–1, including certified qualifications for welders, welding operators, and welding procedures.

§ 56.95–10 Type and extent of examination required.

(a) *General.* The types and extent of nondestructive examinations required for piping must be in accordance with this section and Table 136.4 of ASME B31.1 (incorporated by reference; see § 56.01–2). In addition, a visual examination must be made.

(1) 100 percent radiography is required for all Class I, I–L, and II–L piping with wall thickness equal to or greater than 10 mm (0.393 in.).

NOTE 1 TO PARAGRAPH (a)(1): Throughout this this section, where for some reason, such as joint configuration, radiography is not applicable, another approved examination may be utilized.

(2) Nondestructive examination is required for all Class II piping equal to or greater than 18 inches nominal diameter regardless of wall thickness. Any test method acceptable to the Officer in Charge, Marine Inspection may be used.

(3) Nondestructive examinations of other piping systems are required only when deemed necessary by the Officer in Charge, Marine Inspection (OCMI).

(b) *Visual examination.* Visual examination consists of observation by the marine inspector either before, during, or after manufacture, fabrication, assembly, or test. All welds, pipe and piping components must comply with the limitations on imperfections specified in the product specification or with the limitations on imperfections specified in § 56.70–15(b)(7) and (8), and (c), as applicable.

(c) *Nondestructive types of examinations*—(1) *100 Percent radiography.* Where 100 percent radiography is required, each weld in the piping must be completely radiographed. If a butt weld is examined by radiography, for either random or 100 percent radiography, the method used must be as follows:

(i) X-ray or gamma ray method of radiography may be used. The selection of the method must be dependent upon its adaptability to the work being radiographed. The procedure to be followed must be as indicated in PW–51 of

Section I of the ASME BPVC (incorporated by reference; see § 56.01–2).

(ii) If a piping component or a weld other than a butt weld is radiographed, the method used must be in accordance with UW–51 of Section VIII of the ASME BPVC (incorporated by reference; see § 56.01–2).

(2) *Random radiography*. Where random radiography is required, one or more welds may be completely or partially radiographed. Random radiography is desirable in field welding, where conditions such as position, temperatures, and cleanliness are not as controlled as in shop welding. It may be employed whenever an Officer in Charge, Marine Inspection questions a pipe weld not otherwise required to be tested. The standards of acceptance are the same as for 100 percent radiography.

(3) *Ultrasonic*. Where 100 percent ultrasonic testing is specified, the entire surface of the weld being inspected must be covered using careful methods to be sure that a true representation of the actual conditions is obtained. The procedures to be used must be submitted to the Commandant for approval.

(4) *Liquid penetrant*. Where liquid penetrant examination is required, the entire surface of the weld being examined must be covered. The examination must be performed in accordance with appendix VIII to Section VIII of the ASME BPVC. The following standards of acceptance must be met:

(i) All linear discontinuities and aligned penetrant indications revealed by the test must be removed. Aligned penetrant indications are those in which the average of the center-to-center distances between any one indication and the two adjacent indications in any straight line is less than three-sixteenths inch. All other discontinuities revealed on the surface need not be removed unless the discontinuities are also revealed by radiography, in which case the pertinent radiographic specification applies.

(ii) [Reserved]

(5) *Magnetic particle*. Where magnetic particle testing is required, the entire surface of the weld being examined must be covered. The testing must be performed in accordance with Appendix VI to Section VIII of the ASME BPVC. The following standards of acceptance are required for welds. All linear discontinuities and aligned indications revealed by the test must be removed. Aligned indications are those in which the average of the center-to-center distances between any one indication and the two adjacent indications in any straight line is less than three-sixteenths inch. All other revealed discontinuities need not be removed unless the discontinuities are also revealed by radiography, in which case the requirements of paragraph (c)(1) of this section must be met.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 72–206R, 38 FR 17229, June 29, 1973; CGD 78–108, 43 FR 46546, Oct. 10, 1978; CGD 77–140, 54 FR 40615, Oct. 2, 1989; CGD 95–028, 62 FR 51202, Sept. 30, 1997; USCG–2000–7790, 65 FR 58460, Sept. 29, 2000; USCG–2003–16630, 65185, Oct. 31, 2008]

Subpart 56.97—Pressure Tests

SOURCE: CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50158, June 12, 2024, unless otherwise noted.

§ 56.97–1 General (replaces 137).

(a) *Scope*. The requirements in this subpart apply to pressure tests of piping in lieu of 137 of ASME B31.1 (incorporated by reference; see § 56.01–2). Those paragraphs reproduced are so noted.

(b) *Leak tightness*. It is mandatory that the piping constructed demonstrates leak tightness. Except where otherwise permitted, this requirement must be met by a hydrostatic leak test prior to initial operations. Where a hydrostatic test is not practicable, a pneumatic test (§ 56.97–35) or initial service leak test (§ 56.97–38) may be substituted if approved by the Commandant.

(1) At no time during the hydrostatic test may any part of the piping system be subjected to a stress greater than 90 percent of its yield strength (0.2 percent offset) at test temperature.

(2) Pneumatic tests may be used in lieu of the required hydrostatic test (except as permitted in paragraph (b)(3) of this section), only when—

(i) Piping subassemblies or systems are so designed or supported that they cannot be safely filled with water; or

NOTE 1 TO PARAGRAPH (b)(2)(i): These tests may be made with the item being tested partially filled with water, if desired.

(ii) Piping systems are to be used in services where traces of water cannot be tolerated and, whenever possible, the piping subassemblies or system have been previously hydrostatically tested to the pressure required in § 56.97–30(e).

(3) A pneumatic test at a pressure not to exceed 25 psig may be applied before a hydrostatic or a pneumatic test as a means of locating major leaks. The preliminary pneumatic test must be carried out in accordance with the requirements of § 56.97–35.

NOTE 2 TO PARAGRAPH (b)(3): Compressed gas is hazardous when used as a testing medium. It is, therefore, recommended that special precautions for protection of personnel be taken whenever gas under pressure is used as the test medium.

[CGD 73–254, 40 FR 40167, Sept. 2, 1975, as amended by USCG–2003–16630, 73 FR 65185, Oct. 31, 2008]

§ 56.97–5 Pressure testing of nonstandard piping system components.

(a) All nonstandard piping system components such as welded valves and fittings, nonstandard fittings, manifolds, seacocks, and other appurtenances must be hydrostatically tested to twice the rated pressure stamped thereon, except that no component should be tested at a pressure causing stresses in excess of 90 percent of its yield strength.

(b) Items for which an accepted standard appears in table 2 to § 56.60–1 need not be tested as described in paragraph (a) of this section, but need only meet the test required in the applicable standard.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGD 77–140, 54 FR 40615, Oct. 2, 1989]

§ 56.97–25 Preparation for testing (modifies 137.2).

(a) *Exposure of joints.* All joints including welds must be left uninsulated and exposed for examination during the test.

(b) *Addition of temporary supports.* Piping systems designed for vapor or gas may be provided with additional temporary supports, if necessary.

(c) *Restraint or isolation of expansion joints.* Expansion joints must be provided with temporary restraint, if required for the additional pressure load under test.

(d) *Isolation of equipment not subjected to pressure test.* Equipment that is not to be subjected to the pressure test must be isolated by a blank flange or equivalent means.

(e) *Treatment of flanged joints containing blinds.* Flanged joints at which blinds are inserted to blank off other equipment during the test need not be tested.

(f) *Precautions against test medium expansion.* If a pressure test is to be maintained for a period of time and the test medium in the system is subject to thermal expansion, precautions must be taken to avoid excessive pressure. A small relief valve set to 1 1/3 times the test pressure is recommended during the pressure test.

[CGD 73–254, 40 FR 40167, Sept. 2, 1975]

§ 56.97–30 Hydrostatic tests (modifies 137.4).

(a) *Provision of air vents at high points.* Vents must be provided at all high points of the piping subassembly or system in the position in which the test is to be conducted to purge air pockets while the component or system is filling.

(b) *Test medium and test temperature.* (1) Water will be used for a hydrostatic leak test unless another medium is approved by the Commandant.

(2) The temperature of the test medium will be that of the available source unless otherwise approved by the Commandant upon review of the metallurgical aspects of the piping materials with respect to its brittle fracture properties.

(c) *Check of test equipment before applying pressure.* The test equipment must be examined before pressure is applied to ensure that it is tight and that all low-pressure filling lines and other items that should not be subjected to the test pressure have been disconnected or isolated by valves or other suitable means.

(d) *Examination for leakage after application of pressure.* Following the application of the hydrostatic test pressure for a minimum of 10 minutes (see paragraph (g) of this section), examination for leakage must be made of all joints, connections and of all regions of high stress, such as regions around openings and thickness-transition sections.

(e) *Minimum required hydrostatic test pressure.* Except as otherwise permitted in paragraph (f) of this section or §56.97–40, piping systems must be subjected to a hydrostatic test pressure that at every point in the system is not less than 1.5 times the maximum allowable working pressure.

(f) *Maximum permissible hydrostatic test pressure.* (1) When a system is tested hydrostatically, the test pressure must not exceed the maximum test pressure of any component such as vessels, pumps, or valves in the system.

(2) At no time during the hydrostatic test may any part of the piping system be subjected to a stress greater than 90 percent of its yield strength (0.2 percent offset) at test temperature.

(g) *Hydrostatic test pressure holding time.* The hydrostatic test pressure must be maintained for a minimum total time of 10 minutes and for such additional time as may be necessary to conduct the examination for leakage required by paragraph (d) of this section.

[CGD 73–254, 40 FR 40167, Sept. 2, 1975, as amended by USCG–2003–16630, 73 FR 65185, Oct. 31, 2008]

§56.97–35 Pneumatic tests (replaces 137.5).

(a) *General Requirements.* When a pneumatic test is performed, it must be conducted in accordance with the requirements of this section.

(b) *Test medium and test temperature.* (1) The gas used as the test medium must not be flammable nor toxic.

(2) The temperature of the test medium will be that of the available source unless otherwise approved by the Commandant.

(c) *Check of test equipment before applying pressure.* The test equipment must be examined before pressure is applied to ensure that it is tight and that all items that should not be subjected to the test pressure have been disconnected or isolated by valves or other suitable means.

(d) *Procedure for applying pressure.* The pressure in the system must gradually be increased to not more than one-half of the test pressure, after which the pressure is increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached.

(e) *Examination for leakage after application of pressure.* Following the application of pressure for the time specified in paragraph (h) of this section, examination for leakage in accordance with §56.97–30(d) must be conducted.

(f) *Minimum required pneumatic test pressure.* Except as provided in paragraph (g) of this section or §56.97–40, the pneumatic test pressure may not be less than 1.20 nor more than 1.25 times the maximum allowable working pressure of the piping subassembly system.

(g) *Maximum permissible pneumatic test pressure.* When a system is tested pneumatically, the test pressure may not exceed the maximum test pressure of any component such as vessels, pumps or valves in the system.

(h) *Pneumatic test pressure holding time.* The pneumatic test pressure must be maintained for a minimum total time of 10 minutes and for such additional time as may be necessary to conduct the examination for leakage required in §56.97–30(d).

[CGD 73–254, 40 FR 40168, Sept. 2, 1975]

§56.97–38 Initial service leak test (modifies 137.7).

(a) An initial service leak test and inspection is acceptable when other types of test are not practical or when leak tightness is conveniently demonstrable due to the nature of the service. One example is piping where shut-off valves are not available for isolating a line. Others may be systems for service water, condensate, plant and instrument air, etc., where checking out of pumps and compressors afford ample opportunity for leak tightness inspection prior to full-scale operation.

(b) The piping system must be gradually brought up to design pressure. After inspection of the piping system has proven that the installation is complete and all joints are leak-tight,

the piping has met the requirements of § 56.97–1.

[CGD 73–254, 40 FR 40168, Sept. 2, 1975]

§ 56.97–40 Installation tests.

(a) The following piping systems must be hydrostatically leak tested in the presence of a marine inspector at a pressure of 1.5 times the maximum allowable working pressure of the system:

(1) Class I steam, feedwater, and blowoff piping. Where piping is attached to boilers by welding without practical means of blanking off for testing, the piping must be subjected to the same hydrostatic pressure to which the boiler is tested. The maximum allowable working pressures of boiler feedwater and blowoff piping must be the design pressures specified in §§ 56.50–30(a)(3) and 56.50–40(b) of this subpart, respectively.

(2) Fuel oil discharge piping between the pumps and the burners.

(3) Flammable or corrosive liquids and compressed gas cargo piping, but not less than 150 psig.

(4) Any Class I, I–L, II–L piping.

(5) Cargo oil piping.

(6) Firemains.

(7) Fuel oil transfer and filling piping.

(8) Class I compressed air piping.

(9) Fixed oxygen-acetylene system piping.

(b) Installation testing requirements for refrigeration, fluid power, and liquefied petroleum gas cooking and heating systems may be found in part 58 of this subchapter.

(c) Class II piping systems must be tested under working conditions as specified in the section on initial service leak test, § 56.97–38.

[CGFR 68–82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69–127, 35 FR 9980, June 17, 1970; CGD 72–206R, 38 FR 17229, June 29, 1973 CGD 73–254, 40 FR 40168, Sept. 2, 1975; CGD 95–028, 62 FR 51202, Sept. 30, 1997]

PART 57—WELDING AND BRAZING

Subpart 57.01—Scope

Sec.

57.01–1 Qualifications and production tests.

Subpart 57.02—General Requirements

57.02–1 Incorporation by reference.
57.02–2 Adoption of section IX of the ASME Code.
57.02–3 Performance qualifications issued by other agencies.
57.02–4 Fabricator's responsibility.
57.02–5 Filler metals.

Subpart 57.03—Procedure Qualifications

57.03–1 General requirements.

Subpart 57.04—Procedure Qualification Range

57.04–1 Test specimen requirements and definition of ranges (modifies QW 202, QW 210, QW 451, and QB 202).

Subpart 57.05—Performance Qualifications

57.05–1 General.
57.05–2 Transfer of performance qualifications.
57.05–3 Limited space qualifications.
57.05–4 Welder qualification by procedure tests.
57.05–5 Low temperature application.

Subpart 57.06—Production Tests

57.06–1 Production test plate requirements.
57.06–2 Production test plate interval of testing.
57.06–3 Method of performing production testing.
57.06–4 Production testing specimen requirements.
57.06–5 Production toughness testing.

AUTHORITY: 46 U.S.C. 3306, 3703, E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; 49 CFR 1.46.

SOURCE: CGFR 68–82, 33 FR 18872, Dec. 18, 1968, as amended by USCG–2020–0634, 89 FR 50162, June 12, 2024, unless otherwise noted.

Subpart 57.01—Scope

§ 57.01–1 Qualifications and production tests.

(a) (Replaces QW 100 and QB 100.) The regulations in this part apply to the qualification of welding procedures, welders, and brazers, and to production tests for all types of manual and machine arc and gas welding and brazing processes.

(b) (Modifies QW 305 and QB 305.) Operators of fully automatic welding and