

## DEPARTMENT OF HOMELAND SECURITY

### Coast Guard

46 CFR Parts 50, 52, 53, 54, 56, 57, 58, 59, 61, 62, 63, and 64

[Docket No. USCG–2020–0634]

RIN 1625–AC72

### Updates to Marine Engineering Standards

**AGENCY:** Coast Guard, DHS.

**ACTION:** Final rule.

**SUMMARY:** The Coast Guard is updating marine engineering standards that are incorporated by reference and eliminating outdated or unnecessarily prescriptive regulations in the Code of Federal Regulations. This regulatory action is consistent with the standards currently used by industry and supports the Coast Guard’s maritime safety mission.

**DATES:** This final rule is effective September 10, 2024. The incorporation by reference of certain material listed in this rule is approved by the Director of the Federal Register beginning September 10, 2024. The incorporation by reference of certain material listed in this rule was approved by the Director of the Federal Register as of October 1, 1990.

**ADDRESSES:** To view documents mentioned in this preamble as being available in the docket, go to [www.regulations.gov](http://www.regulations.gov), type USCG–2020–0634 in the search box and click “Search.” Next, in the Document Type column, select “Supporting & Related Material.”

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#### I. Abbreviations

- ABS American Bureau of Shipping
- ABYC American Boat and Yacht Council
- ACP Alternative Compliance Program
- ANSI American National Standards Institute
- API American Petroleum Institute
- ASME American Society of Mechanical Engineers
- ASTM ASTM International
- BLS Bureau of Labor Statistics
- BPVC Boiler and Pressure Vessel Code
- BSEE Bureau of Safety and Environmental Enforcement
- CFR Code of Federal Regulations
- CG–5PS U.S. Coast Guard Commercial Regulations and Standards Directorate
- CG–ENG U.S. Coast Guard Office of Design and Engineering Standards
- DHS Department of Homeland Security
- FR Federal Register
- GS General Schedule
- IBR Incorporation by Reference
- IMO International Maritime Organization
- ISO International Organization for Standardization
- MISLE Marine Information for Safety and Law Enforcement
- MSC Marine Safety Center
- MSS Manufacturers Standardization Society of the Valve and Fitting Industry, Inc.
- MTN Marine Safety Center Technical Note
- NAICS North American Industry Classification System
- NOSAC National Offshore Safety Advisory Committee
- OCS Outer Continental Shelf
- OCSNCOE Outer Continental Shelf National Center of Expertise
- OFR Office of the Federal Register
- OMB Office of Management and Budget
- OPM Office of Personnel Management
- PV Pressure Vessel
- RA Regulatory Analysis
- § Section
- SAE SAE International
- SBA Small Business Administration
- SOLAS International Convention for Safety of Life at Sea
- U.S.C. United States Code

#### II. Background, Basis, and Purpose

This rule incorporates by reference updated marine engineering standards in Title 46 of the Code of Federal Regulations (CFR) subchapter F, including standards for boilers, pressure vessels, auxiliary machinery, piping, valves, and fittings, for various types of vessels. The rule also adds a limited number of alternative standards and eliminates outdated or unnecessarily prescriptive regulations.

The Office of Management and Budget (OMB) directs, via OMB Circular A–119, that federal agencies use industry-based voluntary consensus standards in lieu of government-unique requirements, where appropriate. The Coast Guard actively participates in the development of industry standards for safety of marine equipment at the International Maritime Organization (IMO), the International Organization for Standardization (ISO), ASTM International (ASTM), American Society of Mechanical Engineers (ASME), and other standards-setting bodies that belong to the American National Standards Institute (ANSI). Recently published editions of these standards provide necessary updates to materials, testing practices, and technologies, enhancing safety and compliance.

The Coast Guard has statutory authority to issue regulations under Title 43, United States Code (U.S.C.), section 1333(d), 46 U.S.C. 3306 and 3703, and the Department of Homeland Security (DHS) Delegation No. 00170.1, Revision No. 01.3, paragraph (II)(92)(b), which delegates authority under these statutes to the Commandant of the Coast Guard. Title 43 of the U.S.C., section 1333(d) grants the Secretary the authority to promulgate and enforce regulations with respect to lights and other warning devices, safety equipment, and other matters relating to the promotion of safety of life and property on artificial islands, installations, and other devices. Title 46 of the U.S.C., section 3306(a)(1), authorizes the Secretary to prescribe regulations for the design, construction, alteration, repair, and operation of vessels subject to inspection, including equipment, appliances, propulsion machinery, auxiliary machinery, boilers, unfired pressure vessels, piping, and electric installations. Additionally, 46 U.S.C. 3703(a) grants the Secretary authority to regulate tank vessels regarding the construction, alteration, repair, maintenance, operation, and equipping of vessels that may be necessary for increased protection against hazards to life and property, for navigation and vessel safety, and for

enhanced protection of the marine environment.

On October 19, 2021, the Coast Guard published a notice of proposed rulemaking (NPRM) titled “Updates to Marine Engineering Standards,” (86 FR 57896) requesting comments on the proposed changes implemented by this final rule, including several updates to the standards incorporated by reference. A detailed description of the background and proposed changes is available in that NPRM.

### III. Discussion of Comments

During the 60-day comment period for the NPRM, beginning on October 19, 2021, the Coast Guard received a comment requesting an extension of the comment period. The Coast Guard granted this request, and, on December 20, 2021, published an extension of the comment period (86 FR 71864), for 45 days, until February 3, 2022. During the extended comment period, we received two comments. The comments can be viewed in the docket following the instructions in the **ADDRESSES** section of this preamble. We summarize the comments and our responses in the following sections, starting with general comments then moving to specific comments.

#### A. General Comments on the Proposed Rule

We received two comments supporting<sup>1</sup> the update of many of the standards proposed for incorporation by reference (IBR) in subchapter F, emphasizing the importance of “referencing the latest editions of widely used consensus standards.” Both comments also supported the addition of alternative standards and the elimination of outdated or unnecessarily prescriptive regulations. We thank the commenters for their support of this update to subchapter F.

#### B. Editorial Comments on the Proposed Rule

*Comment:* Two commenters recommended that, for the sake of clarity, proposed 46 CFR 56.60–1(a)(2) be turned into a multiple-paragraph list. The same commenters stated that the reference to table 56.60–1(b) in § 56.60–1(b) appears erroneous and should probably refer to table 2 to § 56.60–1.

*Response:* We agree and have reorganized § 56.60–1(a)(2) so that it

now constitutes new § 56.60–1(a)(2) through (4). We have revised the table reference in § 56.60–1(b) to conform with other updates to table numbering as proposed in the NPRM.

#### C. Substantive Comments on Standards Within the Proposed Rule

*Comment:* Two commenters recommended that the Coast Guard continue the IBR of ASME B16.10, Face-to-Face and End-to-End Dimensions of Valves, which we proposed to remove in the NPRM.

*Response:* Because ASME B16.10 is already referenced in ASTM F1155, which we proposed for IBR in the NPRM, in practice ASME B16.10 will continue to be incorporated by reference even if it is not specifically mentioned. Specifically incorporating ASME B16.10 is redundant when the standard and its requirements are provided within ASTM F1155.

*Comment:* Two commenters recommended the following standards be incorporated by reference in Part 56:

- American Petroleum Institute (API) standard API Spec 6D, Specification for Pipeline and Piping Valves, 25th Edition;
- ASTM B148–18, Standard Specification for Aluminum-Bronze Sand Castings; and
- ASTM D2996–17, Standard Specification for Filament-Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.

*Response:* Because ASTM D2996 is already referenced within ASTM F1155, which we incorporate by reference by means of this final rule, it is not necessary to duplicate the reference. With regards to ASTM B148 and API Spec 6D, these standards are neither currently referenced within subchapter F, nor were they proposed for IBR in the NPRM. We recognize that there are numerous national and international standards that provide similar requirements and equivalent performance for the same equipment or system. Naval architects and system designers may submit for approval components designed to alternative standards that provide an equivalent level of safety in accordance with the provisions of 46 CFR 50.20–30.

*Comment:* We received two comments recommending against incorporating by reference API Recommended Practice 14C, Analysis, Design, Installation, and Testing of Safety Systems for Offshore Production Facilities, Eighth Edition, February 2017 (which would update the current incorporation by reference within subchapter F of an earlier edition of this standard), and API STD 53, Well Control Equipment Systems for Drilling

Wells, 5th Edition (which would replace a superseded standard currently incorporated by reference within subchapter F). The commenters expressed concern that, since the June 4, 2013, Memorandum of Agreement between the Coast Guard and the Bureau of Safety and Environmental Enforcement (BSEE) designates BSEE as the lead agency for safety and operations on outer continental shelf (OCS) facilities, and the referenced standards are already included in BSEE regulations, including them in subchapter F as well could create a risk of edition conflict between BSEE and the Coast Guard. For the same reason, the commenter recommended removing the entirety of subpart 58.60—Industrial Systems and Components on Mobile Offshore Drilling Units (MODUs), and using the standards incorporated by reference in 30 CFR 250.198 for industrial systems and components as well as marine systems and components for all oil and gas facilities on the OCS.

*Response:* We have elected to retain these standards in subchapter F and not remove subpart 58.60 from the CFR, in order to maintain clarity regarding requirements for engineering systems. The ship and facility marine engineering and electrical systems that the Coast Guard regulates interface with industrial systems under the jurisdiction of BSEE. The Coast Guard and BSEE have a shared mission of ensuring safety on the OCS. We work together closely to ensure our requirements are not in conflict.

*Comment:* We received a comment regarding the IBR of the American Bureau of Shipping (ABS) standard, ABS Rules for Building and Classing Marine Vessels, 2020, Part 4, Vessel Systems and Machinery, which we proposed in the NPRM as an update of the earlier 2003 standard already incorporated in subchapter F. The commenter argued that “incorporating the classification rules of [ABS] in subchapter F (and 46 CFR Chapter I) uses the rules of one classification society to set a regulatory baseline, which could competitively disadvantage other societies and deprive the industry of knowledge and innovation available in other societies’ rules.”

*Response:* We appreciate the comment, but do not agree. Many vessels normally subject to the regulations of subchapter F are enrolled in the Alternate Compliance Program (ACP), where the rules of any recognized classification society may be used in lieu of the requirements of subchapter F. Given that the rules of other recognized classification societies are already in wide use through the ACP

<sup>1</sup> One commenter provided a lengthy statement detailing its full support of the proposed updates, while the other commenter endorsed the first commenter’s statement. When we use “both comments” we mean either both comments explicitly, or the first comment as supported by the second.

and will remain so, the IBR of the ABS standards will not disadvantage other classification societies or interfere with the sharing of expertise throughout the industry. We discussed this in depth in “Discussion of Proposed Rule” in the NPRM.<sup>2</sup>

#### D. Comments Recommending Additional Regulatory Action

*Comment:* Two commenters recommended updating 33 CFR subchapter N to clarify the applicability of the rule to existing and new floating OCS facilities, nearly all of which are not, properly speaking, “vessels” or “ships.” The commenters also recommended that the Coast Guard act on the March 28, 2018, National Offshore Safety Advisory Committee (NOSAC) Production Subcommittee Final Report on [U.S. Coast Guard] Regulatory Reform recommendation that “The Coast Guard should issue NOSAC a new Task Statement to evaluate the suitability of the regulations in 46 CFR Subchapter F (Marine Engineering) and 46 CFR Subchapter J (Electrical Engineering) to floating OCS facilities.”<sup>3</sup> The commenters suggested that, since floating OCS facilities are not, properly speaking, “vessels” or “ships,” the application of subchapter F to such facilities has led to multiple requests for equivalencies and alternatives, and that while the Coast Guard has attempted to address this via policy letter,<sup>4</sup> this policy letter only applies to floating OCS facilities classed with a classification society.

The commenters suggested that, at a minimum, the Coast Guard should update 33 CFR 143.120 to establish the date on which this rule would apply to a new floating OCS facility.

*Response:* An update to 33 CFR subchapter N regarding its applicability to floating OCS facilities and a statement on the same issue to NOSAC are outside the scope of this rulemaking but could be addressed in a future rulemaking. We encourage questions regarding the applicable regulations for floating OCS facilities to be sent either to the Coast Guard’s Eighth District Outer Continental Shelf Division Staff (website: <https://www.atlanticarea.uscg.mil/D8/OCS>) or the Outer Continental Shelf National Center of Expertise (OCSNCOE) (website: <https://www.dco.uscg.mil/OCSNCOE>). As to an update to 33 CFR 143.120, the date that 33 CFR subchapter N requires compliance with subchapter F is the effective date, 90 days after the publication of this final rule.

*E. Comments Recommending Additional Non-Regulatory Action*

#### E. Comments Recommending Additional Non-Regulatory Action

*Comment:* Two commenters supported the proposed IBR of ASTM F1155–10 (Reapproved 2015), Standard Practice for Selection and Application of Piping System Materials, but also recommended the Coast Guard’s Marine Safety Center (MSC) cancel Marine Safety Center Technical Note (MTN) 02–10, Material Selection for Vital Piping Systems, as superseded by the adoption of this standard.

*Response:* We generally agree, but we note that ASTM F1155 has application to all shipboard piping systems, while MTN 02–10 is focused on “vital” shipboard systems. MTN 02–10 will be reviewed and revised if necessary.

#### F. Comments on the Regulatory Analysis (RA)

*Comment:* Two comments expressed concern that table 3 of the RA did not specifically address floating OCS facilities and did not provide enough clarity to determine if floating OCS facilities were included within the table. The commenters recommended that the Coast Guard undertake changes to the Marine Information for Safety and Law Enforcement (MISLE) system and its internal documentation to eliminate any confusion regarding the inclusion or exclusion of floating OCS facilities, not only for the purpose of this rule but also for future Coast Guard regulatory actions.

*Response:* We agree with these comments. In our MISLE database, floating production systems are listed as being inspected under 46 CFR subchapter I–A; this is incorrect, and, as a result, we overstated the number of MODUs in the RA, which lowered the population of vessels in the “Industrial Vessel” category. After further analysis we revised the population of MODUs to one, because we incorrectly classified the remainder based on the subchapter inspection field in MISLE. The Coast Guard will amend its MISLE database to correctly label these vessels.

While we did update table 4 of the RA in response to public comments, we did not receive feedback from the public that would impact our estimate of the number of equivalency requests that are submitted to the Coast Guard on an annual basis. Therefore, the regulatory assessment of costs, cost savings, and benefits of the NPRM remain

unchanged, other than the use of more current economic data, where available.

*Comment:* We also received two related comments regarding the number of specific vessel types, suggesting that the listing of 110 MODUs in table 3 of the RA was not accurate and that there are fewer than 5 U.S.-flagged MODUs in active service.

*Response:* We agree with these comments. As stated above, in the RA for the proposed rule, we incorrectly labeled “floating production systems” and counted them as MODUs. This overstated the number of MODUs because these systems are incorrectly listed in MISLE as being inspected under title 46 CFR subchapter I–A. After further analysis, we revised the population of MODUs for the final rule to one, because we incorrectly classified the rest based on the subchapter inspection field in MISLE. Floating production systems are facilities certificated and inspected under 33 CFR subchapter N and not vessels inspected under 46 CFR subchapter I. We overestimated the number of affected vessels in the proposed rule; therefore, in this final rule we revise the number of vessels in the subchapter I from 6,086 down to 623. Because we updated the entire population for this final rule, the total number of vessels and facilities is revised down from 16,148 in the proposed rule to 5,655 (see table 4 in this document).

## IV. Discussion of Rule

### A. General Discussion

In order to decrease the likelihood of introducing errors, to improve efficiency during the publication process, and to meet drafting and formatting requirements for publication, we are revising or revising and republishing entire sections, subparts, and parts, as appropriate. Except as explained as a change in this preamble, the individual (piecemeal) changes are detailed in the proposed rule, published on October 19, 2021 (86 FR 57896).

In general, the rule makes the following changes:

1. Corrections—we amend several sections to correct inadvertent errors or deletions. We also remove material that is obsolete or superfluous, and update contact information for Coast Guard offices and standards organizations.

2. Stylistic Revisions—we revise the language of some sections, primarily for greater clarity. This includes revising sentences containing the word “shall” to use “must” or another grammatically equivalent word or phrase in accordance with plain language guidelines. We also standardize terms

<sup>2</sup> 86 FR 57896, 57897.

<sup>3</sup> <https://homeport.uscg.mil/Lists/Content/Attachments/35215/Production%20final%20report.pdf>. (last visited May 12, 2023).

<sup>4</sup> <https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/5ps/Design%20and%20Engineering%20Standards/docs/CG-ENG%20PolicyLetter%2001-13.pdf> (last visited May 12, 2023).



TABLE 1—REASON FOR CHANGE—CFR PART OR SECTION AFFECTED—Continued

Reason for change	Section
	<p>54.30–15(b), 56.01–1(b), redesignated 56.01–2(b), redesignated 56.01–2(b)(1), redesignated 56.01–2(c)(1), redesignated 56.01–2(c)(2), redesignated 56.01–2(c)(3), redesignated 56.01–2(c)(7), redesignated 56.01–2(c)(8), redesignated 56.01–2(c)(9), redesignated 56.01–2(c)(10), redesignated 56.01–2(c)(11), redesignated 56.01–2(c)(12), redesignated 56.01–2(c)(14), redesignated 56.01–2(c)(15), redesignated 56.01–2(c)(16), redesignated 56.01–2(c)(17), redesignated 56.01–2(c)(18), redesignated 56.01–2(c)(19), redesignated 56.01–2(c)(20), redesignated 56.01–2(c)(21), redesignated 56.01–2(c)(22), redesignated 56.01–2(c)(23), redesignated 56.01–2(c)(24), redesignated 56.01–2(c)(25), redesignated 56.01–2(d)(1), redesignated 56.01–2(d)(3), redesignated 56.01–2(d)(4), redesignated 56.01–2(d)(5), redesignated 56.01–2(d)(6), redesignated 56.01–2(d)(7), redesignated 56.01–2(d)(8), redesignated 56.01–2(d)(9), redesignated 56.01–2(d)(10), redesignated 56.01–2(d)(11), redesignated 56.01–2(d)(12), redesignated 56.01–2(d)(13), redesignated 56.01–2(d)(14), redesignated 56.01–2(d)(15), redesignated 56.01–2(d)(16), redesignated 56.01–2(d)(17), redesignated 56.01–2(d)(18), redesignated 56.01–2(d)(19), redesignated 56.01–2(d)(20), redesignated 56.01–2(d)(21), redesignated 56.01–2(d)(22), redesignated 56.01–2(d)(23), redesignated 56.01–2(d)(24), redesignated 56.01–2(d)(25), redesignated 56.01–2(d)(26), redesignated 56.01–2(d)(27), redesignated 56.01–2(d)(28), redesignated 56.01–2(d)(29), redesignated 56.01–2(d)(30), redesignated 56.01–2(d)(31), redesignated 56.01–2(d)(32), redesignated 56.01–2(d)(33), redesignated 56.01–2(d)(34), redesignated 56.01–2(d)(35), redesignated 56.01–2(d)(36), redesignated 56.01–2(d)(37), redesignated 56.01–2(d)(38), redesignated 56.01–2(d)(39), redesignated 56.01–2(d)(40), redesignated 56.01–2(d)(41), redesignated 56.01–2(d)(42), redesignated 56.01–2(d)(43), redesignated 56.01–2(d)(44), redesignated 56.01–2(d)(45), redesignated 56.01–2(d)(46), redesignated 56.01–2(d)(47), redesignated 56.01–2(d)(48), redesignated 56.01–2(d)(49), redesignated 56.01–2(d)(50), redesignated 56.01–2(d)(51), redesignated 56.01–2(d)(52), redesignated 56.01–2(d)(53), redesignated 56.01–2(d)(54), redesignated 56.01–2(d)(55), redesignated 56.01–2(d)(57), redesignated 56.01–2(d)(58), redesignated 56.01–2(d)(59), redesignated 56.01–2(d)(60), redesignated 56.01–2(d)(61), redesignated 56.01–2(d)(62), redesignated 56.01–2(d)(63), redesignated 56.01–2(d)(64), redesignated 56.01–2(e)(1), redesignated 56.01–2(f)(1), redesignated 56.01–2(g)(1), redesignated 56.01–2(h)(1), redesignated 56.01–2(i)(1), redesignated 56.01–2(j)(1), redesignated 56.01–2(j)(2), redesignated 56.01–2(j)(3), redesignated 56.01–2(j)(4), redesignated 56.01–2(j)(5), redesignated 56.01–2(j)(6), redesignated 56.01–2(j)(7), redesignated 56.01–2(j)(8), redesignated 56.01–2(j)(9), redesignated 56.01–2(k)(1), redesignated 56.01–2(k)(2), 56.01–10(a), 56.01–10(b), 56.01–10(c)(1), 56.01–10(c)(2), 56.01–10(d)(1), 56.01–10(d)(2), 56.01–10(d)(3), 56.01–10(e), 56.04–1, 56.04–2, 56.07–10(a)(2), 56.07–10(b)(1), 56.07–10(b)(2), 56.07–10(b)(3), 56.07–10(c), 56.07–10(e)(2), 56.07–10(f)(1), 56.10–1(a), 56.10–5(a), 56.10–5(b), 56.10–5(c)(5), 56.15–5(a), 56.15–5(b), 56.15–5(e), 56.20–5, 56.20–7, 56.20–9(b), 56.20–9(c), 56.20–9(d), 56.20–9(e), 56.20–9(f), 56.20–15(a), 56.20–15(b), 56.20–20(a), 56.25–10, 56.25–15(a), 56.25–20(e), 56.30–3, 56.30–5(b)(1), 56.30–5(b)(2), 56.30–5(e), 56.30–10(b), 56.30–27, 56.30–30(a), 56.30–30(b)(1), redesignated 56.30–40(c), redesignated 56.30–40(f), redesignated 56.30–40(g), 56.35–1(a), 56.50–1(a), 56.50–1(b)(1), 56.50–1(b)(2), 56.50–1(d), 56.50–1(e), 56.50–1(f), 56.50–1(g)(3), 56.50–1(h), 56.50–1(i), 56.50–1(j), 56.50–1(k), 56.50–1(b), 56.50–15(a), 56.50–15(b), 56.50–15(c), 56.50–15(d), 56.50–15(g), 56.50–15(j), 56.50–20(b), 56.50–25(a), 56.50–25(b), 56.50–25(c), 56.50–25(d), 56.50–30(a)(1), 56.50–30(a)(3), 56.50–30(a)(4), redesignated 56.50–30(b)(2), redesignated 56.50–30(b)(3), 56.50–30(c)(1), 56.50–30(c)(2), 56.50–30(d), 56.50–30(d)(1), 56.50–30(d)(3), 56.50–30(e), 56.50–30(e)(1), 56.50–30(e)(2), 56.50–30(f), 56.30–35, 56.50–40(a)(2), 56.50–40(b), 56.50–40(c), 56.50–40(d), 56.50–45(a), 56.50–45(b), redesignated 56.50–50(a)(2), redesignated 56.50–50(a)(3), 56.50–50(d), 56.50–50(d)(3), 56.50–50(d)(4), 56.50–50(d)(5), 56.50–50(f)(1), 56.50–50(f)(4), 56.50–50(g), 56.50–50(i), 56.50–50(j), 56.50–50(l), 56.50–50(m), 56.50–55(b)(1), 56.50–55(b)(2), 56.50–55(d), 56.50–55(e)(2), 56.50–55(e)(3), 56.50–60(a)(1), 56.50–60(d)(3)(i), 56.50–60(d)(3)(ii), 56.50–60(d)(3)(iii), 56.50–60(d)(3)(iv), 56.50–60(f), 56.50–65(c), 56.50–60(d), 56.50–60(e), 56.50–60(f), 56.50–70(a)(1), 56.50–70(a)(3), 56.50–70(a)(4), 56.50–70(b)(1), 56.50–70(c), 56.50–70(d), 56.50–70(f), 56.50–70(g), 56.50–70(h), 56.50–75(a)(1), 56.50–75(a)(2), 56.50–75(a)(3), 56.50–75(b)(1), 56.50–75(b)(2), 56.50–75(b)(3), 56.50–75(b)(4), 56.50–75(b)(6), 56.50–75(b)(7), 56.50–80(a), 56.50–80(b), 56.50–80(c), 56.50–80(d), 56.50–80(e), 56.50–80(f), 56.50–80(g), 56.50–85(a)(1), 56.50–85(a)(2), 56.50–85(a)(3), 56.50–85(a)(7), 56.50–85(a)(7)(i), 56.50–85(a)(9), redesignated 56.50–85(a)(12), 56.50–90(b), 56.50–90(e), 56.50–95(a)(1), 56.50–95(a)(2), 56.50–95(a)(3), 56.50–95(b)(2), 56.50–95(b)(3), 56.50–95(d)(1), 56.50–95(d)(2), 56.50–95(e)(1), 56.50–95(e)(2), 56.50–95(f), 56.50–95(g), 56.50–95(h), 56.50–96(a), 56.50–97, 56.50–103(b), 56.50–103(e), 56.50–103(g), 56.50–103(h), 56.50–103(i), 56.50–103(k), 56.50–105(a), 56.50–105(a)(1), 56.50–105(a)(1)(i), 56.50–105(a)(1)(ii), 56.50–105(a)(2), 56.50–105(a)(3), 56.50–105(a)(4), 56.50–105(b), 56.50–105(b)(2), 56.50–105(b)(3), 56.50–105(b)(4), 56.50–105(b)(6), 56.50–110(b), 56.60–1(a)(1), 56.60–1(b), 56.60–2(a), 56.60–2(b), 56.60–2(c)(1)(ii), 56.60–2(c)(2), 56.60–3(b), redesignated 56.60–5(c), 56.60–10(a), 56.60–10(b), 56.60–25, 56.65–1, 56.70–5(b), 56.70–10(a)(1)(iii), 56.70–10(a)(2), 56.70–10(a)(4), 56.70–15(a)(1), redesignated 56.70–15(a)(2), 56.70–15(b)(2), 56.70–15(b)(3), 56.70–15(b)(4), 56.70–15(b)(8), 56.70–15(e)(1), 56.70–15(f)(1), 56.70–15(g)(2), 56.70–15(g)(4), 56.70–15(g)(5), 56.70–15(g)(5)(ii), 56.70–15(g)(6), 56.70–15(h), 56.70–20(a), 56.70–20(b), 56.75–5(b), redesignated 56.75–10, 56.75–15(a), 56.75–20(a), 56.75–20(b), 56.75–25(c), 56.75–30(a)(1), 56.75–30(b)(1), 56.75–30(b)(2), 56.75–30(c)(1), 56.75–30(c)(2), 56.80–5, 56.80–15(b), 56.80–15(f), 56.90–1, 56.90–5(a), 56.90–5(c), 56.90–5(c), 56.90–10(a), 56.90–10(b), 56.95–1(a), 56.95–1(b), 56.95–10(a), 56.95–10(b), 56.95–10(c)(1), 56.95–10(c)(1)(i), 56.95–10(c)(1)(ii), 56.95–10(c)(3), 56.95–10(c)(4), 56.95–10(c)(4)(i), 56.95–10(c)(5), 56.97–40(a), 56.97–40(a)(1), 56.97–40(c), 57.01–1(a), 57.02–1(a), 57.02–2(a), 57.02–4(a), 57.02–4(b), 57.04–1, 57.05–1, 57.05–2, 57.05–3, 57.05–5, 57.06–1(a), 57.06–1(b), 57.06–1(c), 57.06–2(a), 57.06–2(a)(1), 57.06–2(a)(2), 57.06–2(b), 57.06–2(c), 57.06–3(a), 57.06–3(b), 57.06–3(d), 57.06–3(e), 57.06–4(a), 57.06–4(b), 57.06–4(c), 57.06–4(d), 57.06–4(e), 57.06–4(f), 57.06–4(f)(1), 57.06–4(f)(2), 57.06–4(g), 57.06–4(h), 57.06–4(i), 57.06–5(a), 57.06–5(b), 58.01–10(b), 58.01–20, 58.01–30, 58.01–50, 58.01–55, 58.03–1(a), 58.03–1(b)(1), 58.03–1(c)(1), redesignated 58.03–1(d)(1), redesignated 58.03–1(d)(2), redesignated 58.03–1(e)(1), redesignated 58.03–1(e)(2), redesignated 58.03–1(e)(3), redesignated 58.03–1(e)(4), redesignated 58.03–1(f)(1), redesignated 58.03–1(f)(2), redesignated 58.03–1(f)(3), redesignated 58.03–1(f)(4), redesignated 58.03–1(f)(5), redesignated 58.03–1(f)(6), redesignated 58.03–1(f)(7), redesignated 58.03–1(f)(8), redesignated 58.03–1(f)(9), redesignated 58.03–1(g)(1), redesignated 58.03–1(g)(2), redesignated 58.03–1(h)(1), redesignated 58.03–1(i)(1), redesignated 58.03–1(i)(2), 58.05–1(b), 58.05–5(a), 58.10–5(a), 58.10–5(b)(1), 58.10–5(c), 58.10–5(d)(1)(i), 58.10–10(a), 58.10–15(a), 58.10–15(b), 58.10–15(c)(1), 58.10–15(c)(2), 58.10–15(c)(3), 58.10–15(e), 58.10–15(f)(1), 58.10–15(f)(2), 58.10–15(f)(3), 58.10–15(g), 58.10–15(h), 58.16–1(c), 58.16–10(a)(1), 58.16–10(a)(3), redesignated 58.16–10(b)(2), redesignated 58.16–10(b)(3), 58.16–10(d), 58.16–10(e), 58.16–15(a), 58.16–15(b), 58.16–15(c), 58.16–15(d), 58.16–15(e), 58.16–16(a), 58.16–16(b), 58.16–16(c), 58.16–17(a), 58.16–17(b), 58.16–17(c), 58.16–18(a)(1), 58.16–18(a)(2), 58.16–18(a)(3), 58.16–18(a)(4), 58.16–18(a)(5), 58.16–18(b)(1), 58.16–18(b)(2), 58.16–18(c), 58.16–18(d), 58.16–19(a)(1), 58.16–19(a)(2), 58.16–19(b), 58.16–20(a), 58.16–20(b), 58.16–25(a), 58.16–30(a), 58.16–30(b), 58.16–30(c), 58.16–30(d), 58.16–30(e), 58.16–30(f), 58.16–30(g), 58.16–35(a), 58.16–35(b), 58.16–35(c), 58.16–35(d), 58.16–35(e), 58.20–1(b), 58.20–5(a), 58.20–10(a), 58.20–10(b), 58.20–10(c), 58.20–15(a), 58.20–15(b), 58.20–15(c), 58.20–20(a), 58.20–20(b), 58.20–20(c), 58.20–25(a), 58.20–25(b), 58.25–5, 58.25–10, 58.25–20, 58.25–25(a), 58.25–25(e), 58.25–60, 58.25–65(a), 58.30–1(a), 58.30–5(b), 58.30–5(c), 58.30–10(b), 58.30–10(c), 58.30–10(d), 58.30–10(e), 58.30–15(b), 58.30–15(c), 58.30–15(d), 58.30–15(e), 58.30–15(f), 58.30–20(b), 58.30–20(c), 58.30–20(d), 58.30–25(b), 58.30–25(c), 58.30–30(c), 58.30–30(d), 58.30–30(e), 58.30–35(a), 58.30–35(b), 58.30–35(c), 58.30–35(c)(1), 58.30–35(c)(2), 58.30–35(c)(3), 58.30–35(d), 58.30–50, 58.50–1(b), 58.50–1(c), 58.50–5(a)(1), 58.50–5(a)(2), 58.50–5(a)(3), 58.50–5(a)(4), 58.50–5(a)(5), 58.50–5(a)(6), 58.50–5(a)(7), 58.50–5(a)(8), 58.50–5(b)(1), 58.50–5(b)(2), 58.50–5(b)(3), 58.50–5(b)(4), 58.50–5(c)(1), 58.50–5(c)(2), 58.50–5(c)(3), 58.50–10(a)(2), 58.50–10(a)(3), 58.50–10(a)(5), 58.50–10(a)(6), 58.50–10(a)(7), 58.50–10(a)(8), 58.50–10(a)(9),</p>

TABLE 1—REASON FOR CHANGE—CFR PART OR SECTION AFFECTED—Continued

Reason for change	Section
	58.50–10(b)(1), 58.50–10(b)(2), 58.50–10(b)(3), 58.50–10(b)(4), 58.50–10(b)(5), 58.50–10(c)(1), 58.50–10(c)(2), 58.50–10(c)(3), 58.50–15, 58.60–7, 59.01–2(a), 59.01–2(b)(1), 59.01–2(b)(2), 59.01–2(b)(3), 59.01–2(b)(4), 59.01–5(a), 59.01–5(b), 59.01–5(c), 59.01–5(d), 59.10–1(b), 59.10–1(d), 59.10–5(h), 59.10–5(i), 59.10–5(j), 59.10–5(k), 59.10–5(l), 59.10–10(a)(1), 59.10–10(a)(2), 59.10–10(a)(3), 59.10–10(d), 59.10–10(e), 59.10–10(f), 59.10–15(a), 59.10–15(b), 59.10–20(a), 59.10–20(b), 59.10–25, 59.10–30, 59.10–35(a), 59.10–35(b), 59.10–35(c), 59.10–35(d), 59.15–1(a), 59.15–1(a)(1), 59.15–1(a)(2), 59.15–1(d), 59.15–5(b), 59.15–10(a), 59.15–10(c), 59.20–1, 61.01–1(a), 61.01–1(b), 61.03–1(a), 61.03–1(b), 61.05–1, 61.05–5(a), 61.05–5(b), 61.05–10(b), 61.05–10(c), 61.05–10(d), 61.05–10(e), 61.05–10(f), 61.05–10(g), 61.05–15(a), 61.05–15(e), 61.05–20, redesignated 61.10–5(g)(1), 61.15–1, 61.15–5(a), 61.15–5(c), 61.15–10(a), 61.15–15(a), 61.20–1(b), 61.20–3(a), 61.20–5(a), 61.20–5(b), 61.20–17(b), 61.20–23(c), 61.30–5, 61.30–20, 61.35–3, 61.40–1(b), 62.01–3, 62.01–5(d), 62.05–1(a), 62.05–1(b)(1), 62.10–1, 62.15–1, 62.20–1, 62.20–5(a), 62.25–25(d), 62.35–1(a), 62.35–10(b), 62.35–15(a)(2), 62.35–35, 62.35–40, 62.35–50, 62.50–30, 63.15–1, 63.15–3, 63.15–7, 63.25–3, 63.25–7, 63.25–9, 64.2(a), 64.2(b), 64.5, 64.11, 64.13, 64.21, 64.25, and 64.31.
<i>Updated cross-references</i> .....	§§ 50.10–30(c)(1), 50.30–1(c), 52.25–1. 53.01–5(a), 54.01–1(b)(1), 54.01–1(c)(1) 54.01–1(c)(2), 54.01–1(c)(3), 54.01–1(c)(4), 54.01–1(c)(5), 54.01–1(d)(1), 54.01–2(a), 54.01–5(a), 54.01–5(b), 54.01–5(d)(5), 54.05–15, 54.05–20, 54.10–20(a)(2), 56.10–5(a), 56.15–5(b), redesignated 56.15–10(a), redesignated 56.15–10(b), 56.25–10, 56.30–5(c)(1), 56.30–10(b), 56.30–20(b), 56.30–20(c), redesignated 56.35–10(a), 56.35–15, 56.50–55(a), 56.50–55(a)(1), 56.50–55(b)(1), 56.50–70(a), 56.50–70(a)(2), 56.50–105(a)(1), 56.50–105(a)(1)(i), 56.50–105(a)(1)(ii), 56.50–105(a)(1)(iii), 56.60–1(a)(2)(i), 56.60–1(b), 56.60–2(b), 56.70–15(b)(6)(ii), 56.70–15(g), 56.97–5(b), 57.02–1(b), 57.02–2(a), 57.03–1(b), 58.16–7, 58.50–15, 59.01–2(b)(1), 59.01–2(b)(2), 59.01–2(b)(3), 59.01–2(b)(4), 59.15–1(e), 61.05–10(a), 62.35–1(a), 63.15–1(a), 63.15–3(d), 63.15–7(d), and 63.25–7(a).
<i>Updated industry standards</i> .....	§§ 52.01–1(b)(1), 53.01–1(b)(1), 53.01–1(b)(2), 53.01–1(c)(1), 53.01–1(c)(2), 54.01–1(b)(1), 54.01–1(c)(1), 54.01–1(c)(2), 54.01–1(c)(3), 54.01–1(c)(4), 54.01–1(c)(5), 54.01–1(d)(1), 54.01–1(e)(1), 54.01–2, 56.01–2, 56.50–60(d)(1), 56.50–60(d)(2), 56.50–105, 56.60–1, 56.60–15(a), 56.60–15(b), 57.02–1(b), 58.01–50, 58.10–5(d)(1), 59.01–2(b)(1), 59.01–2(b)(2), 59.01–2(b)(3), 59.01–2(b)(4), 62.05–1(b)(1), 62.25–30(a)(1), 62.25–30(a)(2), 62.25–30(a)(3), 62.25–30(a)(5), 62.35–5(d), 62.35–35, 62.35–50, 62.50–30(c), 63.05–1(a)(1), 63.05–1(b)(1), 63.05–1(c)(1), 63.05–1(d)(2), 63.05–1(e)(1), 63.05–1(e)(3), 63.05–1(f)(1), 63.05–1(f)(2), 63.05–1(f)(3), 63.05–1(f)(4), and 63.25–3(a).

*B. Standards Incorporated by Reference To Be Updated or Added*

Following this paragraph, we include an alphabetical list of the standards we are updating or adding, each with a listing of the sections in which they appear in 46 CFR. For each standard listed, we describe the topics covered by the standard, the changes to the standard, any difference between the older edition of standards currently included within the CFR via IBR and the edition adopted, and a list of subparts or sections that reference the standard.

- ABS Rules for Building and Classing Marine Vessels, Part 4, Vessel Systems and Machinery, January 2020. This standard updates the 2003 standard, incorporated by reference in §§ 58.01–5, 58.05–1, 58.10–15, 58.20–5, 58.25–5, 62.25–30, 62.35–5, 62.35–35, 62.35–40, 62.35–50, and 62.50–30. In 2020, ABS changed the name of the Steel Vessel Rules to Marine Vessel Rules. All parts and sections contain the same information along with updates to reflect the current technologies for commercial vessels. The rules contain a comprehensive set of construction and maintenance requirements for ships and offshore facilities.
- ABYC P–1–14, Installation of Exhaust Systems for Propulsion and Auxiliary Engines, reaffirmed 2014. This American Boat and Yacht Council (ABYC) standard updates the 1973 standard, incorporated by reference at § 58.10–5. It contains the rules and guidance for the safe installation and operation of exhaust systems for propulsion and auxiliary engines.

Updates to the standard are editorial (non-substantive) in nature.

- ANSI Z21.22–2015, Relief valves for hot water supply systems, July 2015. This standard updates the 1986 edition incorporated by reference at § 63.25–3. This standard establishes requirements for relief valves for hot water systems. It has been regularly revised to accommodate technological developments, to address administrative requirements, to incorporate interpretations, and to clarify the standard intent. It is the internationally accepted standard.
- API RP 14C, Analysis, Design, Installation, and Testing of Safety Systems for Offshore Production Facilities, Eighth Edition, February 2017 with errata 1 May 2018. This standard updates the 1986 edition incorporated by reference in § 58.60–9. This document presents provisions for designing, installing, and testing both process safety and non-marine emergency support systems on an offshore production facility. The updates made to the standard are editorial in nature.
- API STD 53, Well Control Equipment Systems for Drilling Wells, Fifth Edition, December 2018. This standard replaces API Recommended Practice 53 (API RP 53), the second edition of which is currently incorporated by reference at § 58.60–7. API STD 53 promotes best safety practices for the oil and gas industry during drilling operations, principally focusing on blowout prevention.
- API STD 607, Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats, Seventh Edition,

June 2016. This standard replaces the fourth edition of API STD 607 (1993), incorporated by reference at § 56.20–15. This standard specifies fire type-testing of valves that contain nonmetallic materials and pressure-containing capabilities after the fire test.

- ASME Boiler and Pressure Vessel Code, Section I, Rules for Construction of Power Boilers, 2019 Edition, issued July 1, 2019. The 2001 edition is currently incorporated by reference at §§ 52.01–2, 52.01–5, 52.01–50, 52.01–90, 52.01–95, 52.01–100, 52.01–105, 52.01–110, 52.01–115, 52.01–120, 52.01–135, 52.01–140, 52.01–145, 52.05–1, 52.05–15, 52.05–20, 52.05–30, 52.05–45, 52.15–1, 52.15–5, 52.20–1, 52.20–25, 52.25–3, 52.25–5, 52.25–7, 52.25–10, 53.01–10, 56.15–1, 56.15–5, 56.20–1, 56.60–1, 56.70–15, 56.95–10, 58.30–15, and 59.10–5. By means of this rule, we remove the references at §§ 56.15–5 and 56.20–1 and add a reference at § 52.01–3(g). This portion of the ASME Boiler and Pressure Vessel Code (BPVC) provides rules for construction of power boilers, electric boilers, miniature boilers, and high temperature water boilers to be used in stationary service, and includes power boilers used in locomotive, portable, and traction service. Every 2 years, the code is revised to accommodate technological developments, to address administrative requirements, to incorporate interpretations, and to clarify the intent of the code. It is the internationally accepted authoritative standard for design and construction of boilers. Incorporating the latest edition simplifies regulatory compliance and

ensures the latest industry practices based on changes in technology are addressed and the highest possible level of safety is required. The 2019 standard updates the code by developing a new non-mandatory appendix for fabrication of dissimilar metal welds for creep strength enhanced ferritic steel to austenitic materials, rewriting section PW-38, incorporating non-mandatory appendix A-100, including detailed rules for preheating and inter-pass temperatures and interruption of welding and preheat, and adding a new figure for code jurisdictional limits for piping for fire-tube boilers.

- ASME Boiler and Pressure Vessel Code, Section IV, Rules for Construction of Heating Boilers, 2019 Edition, issued July 1, 2019. The 2004 edition is currently incorporated by reference at §§ 53.01-3, 53.01-5, 53.01-10, 53.05-1, 53.05-2, 53.05-3, 53.05-5, 53.10-1, 53.10-3, 53.10-10, 53.10-15, and 53.12-1. This code contains requirements, specific prohibitions, and non-mandatory guidance for construction of heating boilers. It has been regularly revised to accommodate technological developments, address administrative requirements, incorporate interpretations, and clarify the intent of the code. It is the internationally accepted authoritative standard for the design and construction of heating boilers. Incorporating the latest edition ensures compliance with current industry practices. The 2019 code updates Section IV by adding stress values to Table HF-30001 and adding language to various parts to allow for electronic signatures.

- ASME Boiler and Pressure Vessel Code, Section VII, Recommended Guidelines for the Care of Power Boilers, 2019 Edition, issued July 1, 2019. The 2001 edition is currently incorporated by reference at § 59.01-5. This code contains requirements, specific prohibitions, and non-mandatory guidance for construction of power boilers. It has been regularly revised to accommodate technological developments, address administrative requirements, incorporate interpretations, and clarify the intent of the code. It is the internationally accepted authoritative standard for the operating, maintaining, examining, and care of power boilers. Incorporating the latest edition ensures compliance with current industry practices. The changes made to the standard are structural and stylistic.

- ASME Boiler and Pressure Vessel Code, Section VIII, Rules for Construction of Pressure Vessels, 2019 Edition, issued July 1, 2019. The 1998 edition is currently incorporated by

reference at §§ 54.01-2, 54.01-5, 54.01-15, 54.01-18, 54.01-25, 54.01-30, 54.01-35, 54.03-1, 54.05-1, 54.10-1, 54.10-3, 54.10-5, 54.10-10, 54.10-15, 54.15-1, 54.15-5, 54.15-10, 54.15-13, 54.20-1, 54.20-3, 54.25-1, 54.25-3, 54.25-8, 54.25-10, 54.25-15, 54.25-20, 54.30-3, 54.30-5, 54.30-10, 56.15-1, 56.15-5, 56.20-1, 56.25-5, 56.30-10, 56.30-30, 56.60-1, 56.60-2, 56.60-15, 56.95-10, 58.30-15, 59.10-5, and 59.10-10. By means of this rule, we remove the references at §§ 54.01-15, 56.15-5, 56.20-1, and 56.30-30, replacing the 1989 version in the other sections. The 1989 edition is also incorporated by reference at §§ 64.5, 64.11, 64.13, 64.21, 64.25, and 64.31, and reference is made to the use of a constant from the 1974 edition in a calculation at § 64.63. We remove the reference to the 1974 edition of the standard in § 64.63 (while still retaining the value of the constant), but maintain references to the 1989 edition in these sections since part 64 is applicable only to marine portable tanks for which the MSC received an application on or before May 1, 1991. This code contains requirements, specific prohibitions, and non-mandatory guidance for the construction of pressure vessels. It has been regularly revised to accommodate technological developments, address administrative requirements, incorporate interpretations, and clarify the intent of the code. It is the internationally accepted authoritative standard for the design and construction of heating boilers. Incorporating the latest edition ensures compliance with current industry practices. The 2019 edition allows for additional design methods from Div. 2 to be used in Div. 1 by creating new appendix 46. Revisions were also made for clarity.

- 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. This standard updates the 1989 edition currently incorporated at §§ 56.70-5, 56.70-20, 56.75-20, 57.02-2, 57.02-3, 57.02-4, 57.03-1, 57.04-1, 57.05-1, 57.06-1, 57.06-4, and 59.10-5. By means of this rule, we incorporate this standard at § 56.85-10 and remove the references at § 57.02-3. This standard establishes the qualifications of welders, welding operators, brazers, and brazing operators, and the procedures employed in welding or brazing. It has been regularly revised to accommodate technological developments, address administrative requirements, incorporate

interpretations, and clarify the intent of the code. It is the internationally accepted authoritative standard for pressure vessels.

- ASME B1.1-2003 (Reaffirmed 2008), Unified Inch Screw Threads (UN and UNR Thread Form), issued September 30, 2004. This standard updates the 1982 edition, incorporated by reference at §§ 56.25-20 and 56.60-1, and specifies the thread form, series, class, allowance, tolerance, and designation for unified screw threads. The revision changes some of the values in tables provided in the standard. These changes in value were the result of the application of consistent eight decimal and round rules established in ASME B1.30-1992.

- ASME B1.20.1-2013, Pipe Threads, General Purpose (Inch), issued November 15, 2013. This standard updates the 1983 edition incorporated by reference at § 56.60-1, and covers the dimensions and gauging of pipe threads. The revisions to the standard include editorial changes, changes in calculations and figures, and clarification of figures.

- ANSI B1.20.3-1976 (Reaffirmed 2013), Dryseal Pipe Threads (Inch), November 18, 1976. This standard is incorporated by reference at § 56.60-1. We are updating the reaffirmation date of this standard to conform with its most recent reaffirmation. This document primarily provides specific dimensions for tapered pipe threads of various common sizes and has not changed substantially.

- ASME B16.1-2015, Gray Iron Pipe Flanges and Flanged Fittings, Classes 25, 125, and 250, issued December 28, 2015. This standard updates the 1998 standard for these fittings as incorporated by reference in §§ 56.60-1 and 56.60-10. It covers pressure-temperature ratings, markings, and materials for Classes 25, 125, and 250 gray iron pipe flanges and flanged fittings. Updates include editorial changes, revisions, and corrections to the 1998 edition.

- ASME B16.3-2016, Malleable Iron Threaded Fittings, Classes 150 and 300, issued November 30, 2016. This standard updates the 1998 edition incorporated by reference at § 56.60-1, and covers pressure-temperature ratings, dimensions, markings, and materials for Classes 150 and 300 malleable iron threaded fittings. Updates to the standard are editorial in nature, with changes made to update verbiage and readings.

- ASME B16.4-2016, Gray Iron Threaded Fittings, Classes 125 and 250, issued November 11, 2016. This standard updates the 1998 edition

incorporated by reference at § 56.60–1. It covers pressure-temperature ratings, markings, materials, dimensions, and tolerances for Classes 125 and 250 gray iron threaded fittings. The updates to this standard include metric system units and revisions to the text concerning dimensions and tolerance.

- ASME B16.5–2017, Pipe Flanges and Flanged Fittings, NPS ½ through NPS 24 Metric/Inch Standard, issued November 20, 2017. This standard updates the 2003 edition incorporated by reference at §§ 56.25–20, 56.30–10, and 56.60–1. It covers pressure-temperature ratings, materials, dimensions, tolerances, marking, testing, and methods of designing openings for pipe flanges and flanged fittings. The updates made to this standard include updating materials and requirements for forgings.

- ASME B16.11–2016, Forged Fittings, Socket-Welding and Threaded, issued January 20, 2017, including errata. This standard updates the 2001 edition incorporated by reference at §§ 56.30–5 and 56.60–1. It covers pressure-temperature ratings, materials, dimensions, tolerances, marking, and testing for forged fittings. Updates to the standard include the addition of another type of fitting, format and reference revisions, and updated marking requirements.

- ASME B16.14–2013, Ferrous Pipe Plugs, Bushings, and Locknuts with Pipe Threads, issued November 15, 2013. This standard updates the 1991 edition incorporated by reference at § 56.60–1. It covers pressure-temperature ratings, materials, dimensions, tolerances, marking, testing, and threading for various threaded ferrous pipe fittings. The updates to this standard were mostly editorial and conforming in nature, with revisions to section 8 requiring threads and gauging practices to conform to ASME B1.20.1 and other B16 standards.

- ASME B16.15–2013, Cast Copper Alloy Threaded Fittings, Classes 125 and 250, issued December 6, 2013. This standard updates the 1985 edition incorporated by reference at § 56.60–1. It covers pressure-temperature ratings, materials, dimensions, tolerances, marking, testing, and threading requirements for Classes 125 and 250 of cast copper alloy fittings. The standard was updated in 2004, and 2011, and the 2013 edition revises section 7, requiring threading and gauging practices be identical to ASME B1.20.1 and other B16 standards.

- ASME B16.20–2012, Metallic Gaskets for Pipe Flanges, Ring-Joint, Spiral-Wound, and Jacketed, issued June 25, 2013. This standard updates

the 1998 edition incorporated by reference at § 56.60–1. It covers materials, dimensions, tolerances, and markings for metal ring-joint gaskets, spiral-wound metal gaskets, metal-jacketed gaskets, and grooved metal gaskets with covering layers. The updates to the standard include minor revisions to the material requirements for spiral-wound gaskets, along with tables and figures.

- ASME B16.21–2016, Nonmetallic Flat Gaskets for Pipe Flanges, issued December 9, 2016. This standard updates the 2005 edition incorporated by reference at § 56.60–1. It covers types, sizes, materials, and dimensions for gaskets used with flanges. The 2016 edition primarily expands the scope of the standard to include values greater than size 12 NPS.

- ASME B16.23–2016, Cast Copper Alloy Solder Joint Drainage Fittings: DWV, issued January 16, 2017. This standard updates the 2002 edition incorporated by reference at § 56.60–1. It covers materials, dimensions, tolerances, and markings for cast copper alloy solder joint drainage fittings, designed for use in drain, waste, and vent systems. The updates in the 2016 edition are editorial in nature and not substantive.

- ASME B16.25–2012, Buttwelding Ends, issued December 20, 2012. This standard updates the 2003 edition incorporated by reference at §§ 56.30–5, 56.60–1, and 56.70–10. It covers the preparation of butt-welding ends of piping components to be joined into a piping system by welding and includes requirements for welding bevels for external and internal shaping of heavy-wall components, and for preparation of internal ends (including dimensions and tolerances). The updates to the standard are editorial in nature and include updated references and tables.

- ASME B16.29–2012, Wrought Copper Alloy Solder-Joint Drainage Fittings-DWV, issued September 26, 2012. This standard updates the 2007 edition currently incorporated at § 56.60–1. The standard covers the materials, marking, sizes, and dimensions for wrought copper and copper alloy solder-joint drainage fittings, and was updated editorially in 2012.

- ASME B16.34–2017, Valves—Flanged, Threaded, and Welding End, issued August 23, 2017. This standard updates the 1996 edition currently incorporated by reference at §§ 56.20–1 and 56.60–1. Through this rule, we remove the reference at § 56.20–1. This standard applies to new construction and covers pressure-temperature ratings, dimensions, tolerances, materials,

testing and marking for flanged, threaded, and welding end valves. The standard updates the materials manufactured list to include valves up to NPS 60, and changes were made to allowable materials.

- 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. This standard updates the 1996 edition incorporated by reference at §§ 56.25–20 and 56.60–1. It covers the dimensional requirements for nine product types of inch series bolts and screws recognized as American National Standard. The 2012 standard provides significant revisions to illustrations in tables 6, 7 and 8, which provided the wrong dimensions for several figures.

- ASME B18.2.2–2015, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Couplings Nuts (Inch Series), issued November 30, 2015. This standard updates the 1987 edition incorporated by reference at §§ 56.25–20 and 56.60–1. It covers complete general and dimensional data for various types of inch series hex and square nuts.

- ASME B31.1–2016, Power Piping, ASME Code for Pressure Piping, B31, issued June 30, 2016. This standard updates the 2001 edition currently incorporated by reference at §§ 56.01–3, 56.01–5, 56.07–5, 56.07–10, 56.10–1, 56.10–5, 56.15–1, 56.15–5, 56.20–1, 56.25–7, 56.30–1, 56.30–5, 56.30–10, 56.30–20, 56.35–1, 56.50–1, 56.50–15, 56.50–40, 56.50–65, 56.50–70, 56.50–97, 56.60–1, 56.65–1, 56.70–10, 56.70–15, 56.80–5, 56.80–15, 56.95–1, 56.95–10, and 56.97–1. By means of this rule, we add new references at §§ 56.70–5, 56.85–10, and 56.85–15, and remove the existing references at §§ 56.15–5, 56.20–1, 56.30–10, 56.50–15, and 56.50–65. This standard prescribes requirements for the design, materials, fabrication, inspection, operation, and maintenance of piping systems. The updates to the standard were numerous, with many revisions to nomenclature and additions to stress test values for several items in various tables.

- ASME B31.3–2018, Process Piping, ASME Code for Pressure Piping, B31, issued August 30, 2019. This standard updates the 1987 edition currently incorporated by reference at § 58.60–7, and by means of this rule is also adopted for § 56.60–1. ASME B31.3 is the industry standard for low temperature piping. It is a more appropriate reference for low temperature piping than ASME B31.1, which is the current main reference document for part 56. A specific



standard for low temperature piping is needed due to the increase in liquefied natural gas (LNG) as a ship fuel. LNG is cryogenic, necessitating the use of very specific materials.

- ASME B31.5–2016, Refrigeration Piping and Heat Transfer Components, ASME Code for Pressure Piping, B31, issued June 29, 2016. This standard updates the 1987 edition, incorporated by reference at § 58.20–5 and 58.20–20. It prescribes requirements for the materials, design, fabrication, assembly, test and inspection of refrigerant, heat transfer components, and secondary cooling piping for very low temperatures. The changes in the standard include editorial changes to sections and tables, as well as substantive revisions to technical requirements including materials, design, and fabrication.

- ASME B36.10M–2015, Welded and Seamless Wrought Steel Pipe, issued August 31, 2015. This standard updates the 2004 edition incorporated by reference at §§ 56.07–5, 56.30–20, and 56.60–1. This standard covers the standardization of dimensions of welded and seamless wrought steel pipe for high or low temperatures and pressure. The 2015 edition updates the standard with editorial changes and revisions.

- ASME CSD–1–2018, Controls and Safety Devices for Automatically Fired Boilers, issued October 12, 2018. This standard updates the 2004 edition incorporated by reference at §§ 63.10–1, 63.15–1, and 63.20–1. This standard establishes requirements for the assembly, installation, maintenance, and operation of controls and safety devices on automatically operated boilers. It has been regularly revised to accommodate technological developments, address administrative requirements, incorporate interpretations, and clarify the intent of the standard. It is the internationally accepted authoritative standard on controls and safety devices for pressure vessels.

- ASME BPVC.II.A–2021/SA–675–2021, 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. This standard replaces the 1998 edition incorporated by reference at § 56.60–2. The standard is identical to ASTM A675 in that it covers special quality carbon steel bars and bar size shapes to specific mechanical properties, most importantly, tensile strength. The current standard has minor technical

differences from the 1998 edition, such as minor changes to maximum carbon content of certain steel grades.

- ASTM A20/A20M–19, Standard Specification for General Requirements for Steel Plates for Pressure Vessels, approved May 1, 2019. The 1997 edition is incorporated by reference at §§ 54.05–10 and 54.25–10. This standard provides a group of common requirements that apply to rolled steel plates used for pressure vessels. It has been regularly updated to address advancements in steel plate chemical compositions, manufacturing processes, and material testing.

- ASTM A36/A36M–14, Standard Specification for Carbon Structural Steel, approved December 1, 2014. This standard updates the 1997 edition incorporated by reference at § 56.30–10. It covers “carbon steel shapes, plates, and bars of structural quality for use in rivet, bolted, or welded construction . . . for general purposes.” The updates to the standard include updates to material construction limits for plate products greater than 15 inches.

- ASTM A47/A47M–99 (Reapproved 2014), Standard Specification for Ferritic Malleable Iron Castings, approved April 1, 2014. This standard updates the 1995 edition incorporated by reference at § 56.60–1. This standard, which covers ferritic malleable castings for general engineering usage at temperatures from normal ambient to approximately 400 °C (750 °F), is routinely updated to reflect updates in technology and practices.

- ASTM A53/A53M–12, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated, Welded and Seamless, approved March 1, 2012. This standard updates the 1998 edition incorporated by reference at §§ 56.10–5 and 56.60–1. It covers seamless and welded black and hot-dipped galvanized steel pipes. The standard is updated to reflect changes in material composition for copper content of a type of pipe, as well as some editorial changes.

- ASTM A126–04 (Reapproved 2014), Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings, approved April 1, 2014. This standard updates the 1995 edition incorporated by reference at § 56.60–1. It covers three classes of gray iron for castings intended for use as valve pressure retaining parts, pipe fittings, and flanges. The standard is updated to reflect changes in material testing.

- ASTM A135/A135M–19, Standard Specification for Electric-Resistance-Welded Steel Pipe, approved May 1, 2019. This standard updates the 1997 edition incorporated by reference at

§ 56.60–1. It covers two grades of electric-resistance-welded steel pipe in NPS 2 to NPS 30 wall thickness. The standard has been updated to reflect changes in material testing and some editorial changes.

- ASTM A193/A193M–19, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High-Temperature or High Pressure Service and Other Special Purpose Applications, approved November 1, 2019. This standard updates the 1998 standard incorporated by reference at § 58.30–15. It covers alloy and stainless-steel bolting materials and components for pressure vessels, valves, flanges, and fittings for high temperature or high-pressure service. The updates to this standard are editorial in nature, with minor technical changes and changes in material testing and grading.

- ASTM A197/A197M–00 (Reapproved 2015), Standard Specification for Cupola Malleable Iron, approved November 1, 2015. This standard updates the 1992 edition incorporated by reference at § 56.60–1. It covers malleable irons for castings made by the cupola process. The standard has been updated to reflect changes in material testing, as well as making some editorial changes.

- ASTM A203/A203M–17, Standard Specification for Pressure Vessel Plates, Alloy Steel, Nickel, approved November 1, 2017. This standard updates the 1997 edition incorporated by reference at § 54.05–20. The standard covers nickel-alloy steel plates intended for pressure vessels. It has been revised twice since 1997 to update the chemical composition requirements of nickel-alloy steel and to eliminate prescriptive “current practice” thickness limits. Instead, thickness is only limited by the capacity of the composition to meet specified mechanical properties.

- ASTM A210/A210M–19, Standard Specification for Seamless Medium-Carbon Steel Boiler and Superheater Tubes, approved May 1, 2019. This standard updates the 1996 edition incorporated by reference at § 56.60–1. It covers minimum-wall-thickness, seamless medium-carbon steel, boiler flues, including safe ends, arch and stay tubes, and superheater tubes. The standard is updated to reflect changes in material testing and grading, as well as some editorial changes.

- 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. This standard updates the 1996 edition incorporated by reference at § 56.60–1. It covers

minimum-wall-thickness, stainless steel tubing for general corrosion-resisting and high-temperature service. The updated standard reflects changes in material testing and grading, as well as some editorial changes.

- ASTM A276/A276M-17, Standard Specification for Stainless Steel Bars and Shapes, approved March 15, 2017. This standard updates the 1998 edition incorporated by reference at § 56.60-2. It covers hot-finished or cold-finished bars except bars for forging. The updated standard reflects changes in material testing and grading, as well as some editorial changes.

- ASTM A312/A312M-17, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes, approved March 15, 2017. This standard updates the 1995 edition incorporated by reference at §§ 56.50-105 and 56.60-1. It covers seamless, straight-seam welded, and heavily cold worked welded austenitic stainless-steel pipe intended for high-temperature and general corrosive service. The standard is updated to reflect changes in material testing and grading, as well as some editorial changes.

- 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. This standard updates the 1994 edition incorporated by reference at §§ 56.50-105 and 56.60-1. It covers nominal (average) wall seamless and welded carbon and alloy steel pipe intended for use at low temperatures and in other applications requiring notch toughness. The standard is updated to reflect editorial revisions as well as changes in material grading and testing.

- 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. This standard updates the 1994 edition incorporated by reference at §§ 56.50-105 and 56.60-1. It covers nominal (average) wall seamless and welded carbon and alloy steel tubes intended for use at low temperatures and in other applications requiring notch toughness. The standard is updated to reflect editorial revisions as well as changes in material grading and testing.

- ASTM A350/A350M-17, Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components, approved September 1, 2017. This standard updates the 1997

edition incorporated by reference at § 56.50-105. It covers several grades of carbon and low-alloy steel forged or ring-rolled flanges, forged fittings and valves intended primarily for low-temperature service and requiring notch toughness testing. The standard is updated to reflect editorial revisions as well as changes in material grading and testing.

- 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. This standard updates the 1998 edition incorporated by reference at § 56.50-105. It covers steel castings for valves, flanges, fittings, and other pressure-containing parts. The standard is updated to reflect editorial revisions as well as changes in material grading and testing.

- 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. This standard updates the 1992 edition incorporated by reference at § 56.60-1. It covers the grades of alloy and stainless-steel piping suitable for corrosive or high-temperature service. The standard is updated to reflect editorial revisions as well as changes in material grading and testing.

- 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. This standard updates the 1992 edition incorporated by reference at § 56.60-1. It covers the grades of alloy and stainless-steel piping suitable for corrosive or high-temperature service. The standard is updated to reflect editorial revisions as well as changes in material grading and testing.

- ASTM A370-19, Standard Test Methods and Definitions for Mechanical Testing of Steel Products, approved July 1, 2019. We are incorporating this standard by reference at § 54.25-20. The standard covers procedures and definitions for the mechanical testing of steels, stainless steels, and related alloys. It has been revised almost annually since 1997 to address advancements in testing technology and practices.

- ASTM A376/A376M-17, Standard Specification for Seamless Austenitic Steel Pipe for High-Temperature Service, approved September 1, 2017. This standard updates the 1998 edition incorporated by reference at §§ 56.60-1 and 56.60-2. It covers grades of hydrogen and nitrogen for seamless austenitic steel pipes made for high-temperature service. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM A403/A403M-16, Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings, approved May 1, 2016. This standard updates the 1998 edition incorporated by reference at § 56.60-1. It covers wrought stainless steel fittings for pressure piping

applications. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM A420/A420M-16, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service, approved May 1, 2016. This standard updates the 1996 edition incorporated by reference at §§ 56.50-105 and 56.60-1. It covers fittings for use in pressure piping and pressure vessel service at low temperatures. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- 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. This standard updates the 1995 edition incorporated by reference at § 56.50-105. It covers 8- or 9-percent nickel-alloy steel forged or rolled flanges, fittings, valves, and parts intended for use in welded pressure vessels for low-temperature service. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM A575-96 (Reapproved 2013), Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades, approved April 1, 2013. This standard updates the 1996 (reapproved in 2007) edition incorporated by reference at § 56.60-2. It covers hot-wrought merchant quality steel bars produced to a chemical composition. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM A576-17, Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, approved November 1, 2017. This standard updates the 1990 edition (reapproved in 2012) incorporated by reference at § 56.60-2. It covers hot-wrought special quality steel bars. The standard is updated to reflect editorial revisions and corrections.

- 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. This standard updates the 1992 edition incorporated by reference at § 56.60-2. It establishes the requirements for free-cutting brass rod, bar, wire, and shapes of any specified cross section produced from copper alloy suitable for high-speed screw matching applications and moderate thread rolling. The standard is updated to reflect editorial revisions, as well as changes in material composition, grading, and testing.

- ASTM B21/B21M–20, Standard Specification for Naval Brass Rod, Bar, and Shapes, approved April 1, 2020. This standard updates the 1996 edition incorporated by reference at § 56.60–2. It establishes the requirements for naval brass rod, bar, and shapes produced from copper alloy, including dimensions, workmanship and appearance, testing methods, and performance requirements. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B26/B26M–18, Standard Specification for Aluminum-Alloy Sand Castings, approved May 15, 2018. This standard updates the 1997 edition incorporated by reference at § 56.60–2. It covers specifications for aluminum-alloy sand castings used in general purpose applications, including dimensions, workmanship and appearance, testing methods, and performance requirements. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B42–20, Standard Specification for Seamless Copper Pipe, Standard Sizes, approved April 1, 2020. This standard updates the 1996 edition incorporated by reference at § 56.60–1. It covers the requirements for seamless copper pipe in all nominal or standard pipe sizes, both regular and extra-strong, suitable for use in plumbing, boiler feed lines, and for similar purposes. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B43–15, Standard Specification for Seamless Red Brass Pipe, Standard Sizes, approved October 1, 2015. This standard updates the 1996 edition incorporated by reference at § 56.60–1. It covers grades of hydrogen and nitrogen for seamless austenitic steel pipes made for high-temperature service. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B68/B68M–19, Standard Specification for Seamless Copper Tube, Bright Annealed, approved April 1, 2019. This standard updates the 1995 edition incorporated by reference at § 56.60–1. It covers the requirements for bright annealed seamless copper tube suitable for use in refrigeration, oil lines, and gasoline lines, where tubing with an interior surface free from scale and dirt is required. This standard was updated in 2011. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B75/B75M–19, Standard Specification for Seamless Copper Tube,

approved April 1, 2019. This standard updates the 1997 edition incorporated by reference at § 56.60–1. It establishes the requirements for seamless round, rectangular, and square copper tube suitable for general engineering applications. This standard was updated in 2011. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B85/B85M–18, Standard Specification for Aluminum-Alloy Die Castings, approved May 1, 2018. This standard updates the 1996 edition incorporated by reference at § 56.60–2. It covers aluminum alloy die-castings for use in general-purpose applications, including dimensions, workmanship and appearance, testing methods, and performance requirements. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- 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. This standard updates the 1993 edition incorporated by reference at §§ 56.60–2 and 58.50–5. It establishes requirements for copper-silicon alloy plate, sheet, strip, and rolled bar for drawing, forming, stamping, bonding, and general engineering applications. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B111/B111M–18a, Standard Specification for Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock, approved October 1, 2018. This standard updates the 1995 edition incorporated by reference at § 56.60–1. It establishes the requirements for seamless tube and ferrule stock of copper and various copper alloys, including testing methods, material and manufacture, mechanical properties, and performance requirements. The standard is updated to reflect editorial revisions in the tables provided in the standard.

- ASTM B122/B122M–16, Standard Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip, and Rolled Bar, approved April 1, 2016. This standard updates the 1998 edition incorporated by reference at § 58.50–5. It establishes the requirements for copper-nickel-tin alloy, copper-nickel-zinc alloy (nickel silver), and copper-nickel alloy plate, sheet, strip, and rolled bar, including testing methods, material and manufacture, mechanical properties, and performance requirements. The updates to this standard are editorial in nature, with

minor technical changes, or changes in material testing and grading.

- ASTM B124/B124M–18, Standard Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes, approved March 15, 2018. This standard updates the 1996 edition incorporated by reference at § 56.60–2. It establishes the requirements for copper and copper alloy rod, bar, and shapes intended for hot forging, including testing methods, material and manufacture, mechanical properties, and performance requirements. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B127–19, Standard Specification for Nickel-Copper Alloy Plate, Sheet, and Strip, approved November 1, 2019. This standard updates the 1993 edition incorporated by reference at §§ 58.50–5 and 58.50–10. It covers the requirements for rolled nickel-copper alloy plate, sheet, and strip, including testing methods, material and manufacture, mechanical properties, and performance requirements. The updates to this standard are editorial in nature, with minor technical changes, or changes in material testing and grading.

- ASTM B152/B152M–19, Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar, approved October 1, 2019. This standard updates the 1997 edition incorporated by reference at § 58.50–5. It covers the requirements for copper sheet, strip, plate, and rolled bar, including testing methods, material and manufacture, mechanical properties, and performance requirements. The updates to this standard are editorial in nature, with minor technical changes, or changes in material testing and grading.

- ASTM B161–05 (Reapproved 2019), Standard Specification for Nickel Seamless Pipe and Tube, approved April 1, 2019. This standard updates the 1993 edition incorporated by reference at § 56.60–1. It covers the requirements for nickel and low-carbon nickel in the form of cold-worked seamless pipe and tubes, including testing methods, material and manufacture, mechanical properties, and performance requirements. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B165–19, Standard Specification for Nickel-Copper Alloy Seamless Pipe and Tube, approved November 1, 2019. This standard updates the 1993 edition incorporated by reference at § 56.60–1. It covers the requirements for nickel-copper alloy in the form of cold-worked seamless pipe and tubes, including testing methods, material and manufacture, mechanical properties, and performance

requirements. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- 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. This standard updates the 1997 edition incorporated by reference at § 56.60–1. It covers cold-worked annealed, hot-worked annealed, and hot-finished seamless pipe and tube intended for general corrosion-resistant and heat-resistant applications. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B171/B171M–18, Standard Specification for Copper-Alloy Plate and Sheet for Pressure Vessels, Condensers, and Heat Exchangers, approved October 1, 2018. This standard updates the 1995 edition incorporated by reference at § 56.60–2. It covers the requirements for copper-alloy plate, sheet, and circles cut from plate and sheet for pressure vessels, condensers, and heat exchangers, including testing methods, material and manufacture, mechanical properties, and performance requirements. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B209–14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate, approved November 1, 2014. This standard updates the 1996 edition incorporated by reference at §§ 58.50–5 and 58.50–10. It covers aluminum and aluminum-alloy flat sheet, coiled sheet, and plate, including testing methods, material and manufacture, mechanical properties, and performance requirements. The updates to this standard are editorial in nature, with minor technical changes, or changes in material testing and grading.

- ASTM B210/B210M–19a, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes, approved November 1, 2019. This standard updates the 1995 edition incorporated by reference at § 56.60–1. It covers aluminum and aluminum-alloy drawn seamless tubes in straight lengths and coils for general purpose and pressure application in alloys. The standard is updated to reflect editorial

revisions, as well as changes in material grading and testing.

- ASTM B234–17, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Surface Condensers, Evaporators, and Heat Exchangers, approved October 1, 2017. This standard updates the 1995 edition incorporated by reference at § 56.60–1. It covers aluminum-alloy drawn seamless round tube in straight lengths for use in surface condensers, evaporators, and heat exchangers. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B241/B241M–16, Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube, approved February 1, 2016. This standard updates the 1996 edition incorporated by reference at § 56.60–1. It covers aluminum and aluminum-alloy seamless pipe intended for pressure applications, and outlines the standard sizes and tempers necessary. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B280–18, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service, approved March 1, 2018. This standard updates the 1997 edition incorporated by reference at § 56.60–1. It establishes the requirements for seamless copper tube intended for use in the connection, repairs, or alterations of air conditioning or refrigeration units in the field. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM B283/B283M–18, Standard Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed), approved March 1, 2018. This standard updates the 1996 edition incorporated by reference at § 56.60–2. It establishes the requirements for copper and copper alloy die forgings produced by the hot-pressing method. The standard is updated to reflect editorial revisions, as well as changes in chemical compositions and material grading and testing.

- ASTM B315–19, Standard Specification for Seamless Copper Alloy Pipe and Tube, approved April 1, 2019. This standard updates the 1993 edition incorporated by reference at § 56.60–1. It establishes the requirements for seamless copper alloy tube intended for general engineering purposes. The standard is updated to reflect editorial revisions.

- ASTM B361–16, Standard Specification for Factory-Made Wrought

Aluminum and Aluminum-Alloy Welding Fittings, approved May 1, 2016. This standard updates the 1995 edition incorporated by reference at § 56.60–1. It covers factory-made wrought aluminum and aluminum-alloy welding fittings (butt-welding or socket-end parts). The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- 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. This standard updates the 1995 edition incorporated by reference at § 56.60–2. It describes a procedure to determine the presence of residual stress in wrought copper alloy products that may lead to stress corrosion cracking. The standard is updated to reflect editorial revisions, as well as changes in material testing.

- ASTM D92–18, Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester, approved July 1, 2018. This standard updates the 1997 edition incorporated by reference at § 58.30–10. It describes the determination of the flash point and fire point of petroleum products by manual or automated Cleveland open cup apparatus. The updates to this standard are editorial in nature, with minor technical changes, or changes in material testing and grading.

- ASTM D93–19, Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester, approved November 1, 2019. This standard updates the 1997 edition incorporated by reference at § 58.01–10. It covers the determination of the flash point of petroleum products in the temperature range from 40 °C to 370 °C by manual or automated Pensky-Martens closed-cup apparatus. The updates to this standard are editorial in nature, with minor technical changes, or changes in material testing and grading.

- ASTM D323–15a, Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method), approved June 1, 2015. This standard updates the 1994 edition incorporated by reference at § 58.16–5. It covers test method procedures for the determination of vapor pressure of gasoline, volatile crude oil, and other volatile petroleum products. The updates to this standard are editorial in nature, with minor technical changes, or changes in material testing and grading.

- ASTM D665–19, Standard Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water, approved December 1, 2019. This standard

updates the 1998 edition incorporated by reference at § 61.20–17. It covers test methods evaluating the ability of inhibited mineral oils, particularly steam-turbine oils, to aid in rust prevention of ferrous parts. The edits to this standard are editorial in nature.

- ASTM E23–18, Standard Test Methods for Notched Bar Impact Testing of Metallic Materials, approved June 1, 2018. This standard updates the 1996 edition incorporated by reference at §§ 54.05–5 and 56.50–105. It describes notched-bar impact testing of metallic materials. The standard is updated to reflect editorial revisions, as well as changes in material testing.

- ASTM E208–19, Standard Test Method for Conducting Drop-Weight Test to Determine Nil-Ductility Transition Temperature of Ferritic Steels, approved October 1, 2019. This standard updates the 1995 edition incorporated by reference at § 54.05–5. It describes methods of determining nil-ductile transition of ferritic steels. The standard has been revised three times since 1995 to address advancements in testing methods.

- ASTM F1006–86 (Reapproved 2018), Standard Specification for Entrainment Separators for Use in Marine Piping Applications, approved September 1, 2018. This standard updates the 1986 edition (reapproved in 2008) incorporated by reference at § 56.60–1. It covers the minimum requirements for the pressure-temperature rating, testing, and making of pressure-containing vessels for entrainment separators. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM F1007–18, Standard Specification for Pipeline Expansion Joints of the Packed Slip Type for Marine Application, approved May 1, 2018. This standard updates the 1986 edition (reapproved in 2007) incorporated by reference at § 56.60–1. It covers the design, manufacturing, and testing of packed slip tube expansion joints used in pipelines for thermal growth and contraction. The standard is updated to reflect editorial revisions, as well as changes in material grading and testing.

- ASTM F1020–86 (Reapproved 2018), Standard Specification for Line-Blind Valves for Marine Applications, approved March 1, 2018. This standard reapproves the 1986 edition (reapproved last in 2011) incorporated by reference at § 56.60–1. It provides the minimum requirements for design fabrication, pressure rating, and testing for line-blind valves.

- ASTM F1120–87 (Reapproved 2015), Standard Specification for Circular Metallic Bellows Type Expansion Joints for Piping Applications, approved May 1, 2015. This standard reapproves the 1987 edition (reapproved last in 2010) incorporated by reference at § 56.60–1. It establishes the requirements for design, manufacture, inspection, and testing of circular metallic bellows-type expansion joints for piping applications.

- ASTM F1123–87 (Reapproved 2015), Standard Specification for Non-Metallic Expansion Joints, approved May 1, 2015. This standard reapproves the 1987 edition (reapproved last in 2010) incorporated by reference at § 56.60–1. It provides the minimum requirements for construction, materials, performance, and dimensional requirements of arch-type non-metallic expansion joints.

- ASTM F1139–88 (Reapproved 2015), Standard Specification for Steam Traps and Drains, approved May 1, 2015. This standard reapproves the 1988 edition (reapproved last in 2010) incorporated by reference at § 56.60–1. It provides the minimum requirements for the design, fabrication, pressure rating, marking, and testing of steam traps and drains.

- ASTM F1155–10 (Reapproved 2015), Standard Practice for Selection and Application of Piping System Materials, approved May 1, 2015. ASTM F1155 specifies a list of acceptable material and design standards for many shipboard systems. This standard is currently not incorporated by reference in 46 CFR part 56 but, by means of this rule, will be incorporated by reference in §§ 56.50–60, 56.50–105, 56.60–1, and 56.60–15. Incorporating ASTM F1155 enables the removal of the following standards from Part 56:

- ASME B16.9, Factory-Made Wrought Steel Buttwelding Fittings.

- ASME B16.10, Face-to-Face and End-to-End Dimensions of Valves.

- ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.

- ASME B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

- ASME B16.24, Cast Copper Alloy Pipe Flanges, Flanged Fittings, and Valves Classes 150, 300, 600, 900, 1500, and 2500.

- ASME B16.42, Ductile Iron Pipe Flanges and Flanged Fittings Classes 150 and 300.

- ASTM A106/A106M, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.

- ASTM A139/A139M, Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over).

- ASTM A182/A182M, Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.

- ASTM A192/A192M, Standard Specification for Seamless Carbon Steel Boiler Tubes for High-Pressure Service.

- ASTM A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.

- ASTM A213/A213M, Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes.

- ASTM A214/A214M, Standard Specification for Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes.

- ASTM A234/A234M, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

- ASTM A249/A249M, Standard Specification for Welded Austenitic Steel Boiler, Superheater, Heat-Exchanger, and Condenser Tubes.

- ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

- ASTM A320/A320M, Standard Specification for Alloy/Steel Bolting Materials for Low-Temperature Service.

- ASTM A335/A335M, Standard Specification for Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service.

- ASTM A351/A351M, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.

- ASTM A395/A395M, Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

- ASTM A536, Standard Specification for Ductile Iron Castings.

- ASTM B88, Standard Specification for Seamless Copper Water Tube.

- ASTM F682, Standard Specification for Wrought Carbon Steel Sleeve-Type Pipe Couplings.

- MSS SP–44, Steel Pipe Line Flanges.

- MSS SP–67, Butterfly Valves.

- MSS SP–72, Ball Valves with Flanged or Butt-Welding Ends for General Service.

- MSS SP–83, Class 3000 and 6000 Pipe Unions, Socket Welding and Threaded (Carbon Steel, Alloy Steel, Stainless Steels, and Nickel Alloys).

- ASTM F1172–88 (Reapproved 2015), Standard Specification for Fuel Oil Meters of the Volumetric Positive Displacement Type, approved May 1, 2015. This standard reapproves the 1988 edition (reapproved last in 2010)

incorporated by reference at § 56.60–1. It provides the minimum requirements for the design, fabrication, pressure rating, marking, calibration and testing for fuel oil measurement meters of the volumetric, positive displacement type. Editorial corrections were made in the 2015 standard.

- ASTM F1173–01 (Reapproved 2018), Standard Specification for Thermosetting Resin Fiberglass Pipe Systems to be Used for Marine Applications, approved March 1, 2018. This standard reapproves the 1995 edition (reapproved last in 2010) incorporated by reference at § 56.60–1. It covers reinforced thermosetting resin pipe systems with nominal pipe sizes 1 through 48 in. (25 through 1200 mm). The update reflects editorial revisions, as well as changes in material grading and testing.

- 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. This standard reapproves the 1988 edition (reapproved last in 2010) incorporated by reference at § 56.60–1. It covers the minimum requirements for the design, fabrication, rating, marking, and testing of cast and welded pipe line strainers.

- ASTM F1200–88 (Reapproved 2016), Standard Specification for Fabricated (Welded) Pipe Line Strainers (Above 150 psig and 150 °F), approved September 1, 2016. This standard reapproves the 1988 edition (reapproved last in 2010) incorporated by reference at § 56.60–1. It covers the minimum requirements for the design, fabrication, rating, marking, and testing of welded pipe line strainers.

- ASTM F1201–88 (Reapproved 2016), Standard Specification for Fluid Conditioner Fittings in Piping Applications above 0 °F, approved September 1, 2016. This standard reapproves the 1988 edition (reapproved last in 2010) incorporated by reference at § 56.60–1. It provides the minimum requirements for pressure-retaining components of fluid conditioner fittings and addresses the pressure-retaining component design, fabrication, rating, marking, and testing.

- ASTM F1323–14, Standard Specification for Shipboard Incinerators, approved November 1, 2014. This standard updates the 2001 standard currently incorporated by reference at § 63.25–9. It establishes requirements for the design, manufacture, performance, operation, functioning, and testing of shipboard incinerators. The standard has been regularly revised to accommodate

technological developments, address administrative requirements, incorporate interpretations, and clarify the intent of the standard.

- ASTM F1387–19, Standard Specification for Performance of Piping and Tubing Mechanically Attached Fittings, approved September 15, 2019. This standard updates the 1993 edition currently incorporated by reference at § 56.30–25. It covers performance characteristics required for mechanically attached fillings used in piping and tubing systems. The changes made to the standard include updates to references, deleting cancelled United States Military Specifications and Standards, corrections to notes and tables, and clarifications on required testing.

- ASTM F1476–07 (Reapproved 2013), Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications, October 1, 2013. This standard reapproves the 2007 edition, which updated the 1995 edition incorporated by reference at § 56.30–35. It provides the performance characteristics and qualification tests required for gasketed mechanical couplings, including grooved-type mechanical couplings for grooved end pipe. The changes made to the standard in 2007 were mostly editorial in nature, with some changes to material testing and grading.

- ASTM F1548–01 (Reapproved 2018), Standard Specification for Performance of Fittings for Use with Gasketed Mechanical Couplings Used in Piping Applications, approved March 1, 2018. This standard reapproves the 2001 edition, which updated the 1994 edition incorporated by reference at § 56.30–35. It defines classification, materials, test requirements, inspection certification, marking and packing of fittings for use with gasketed mechanical couplings. The changes made to the standard in 1999 were editorial in nature, with some changes to material testing and grading.

- CGA S–1.2–2009, Pressure Relief Device Standards—Part 2—Portable Containers for Compressed Gases, Ninth Edition, 2009. This standard updates the 1979 edition incorporated by reference at § 54.15–10. It covers the recommended minimum requirements for pressure relief devices used on portable containers for compressed gases that comply with regulations of the U.S. Department of Transportation or the corresponding regulations of Transport Canada. The standard has been revised at least five times since 1979 to address advancements in technology and changes in U.S. and Canadian regulations.

- Standards of the Expansion Joint Manufacturers Association, Tenth Edition (with errata), 2016. This edition replaces the 1980 edition currently incorporated in § 56.60–1. This standard specifies the design and manufacturing requirements for expansion joints, including metallic bellows type, used in piping systems to accommodate pipe movements due to temperature expansion/contraction, and slight misalignments in joined piping sections.

- FCI 69–1, Pressure Rating Standard for Steam Traps, 2017. The 2017 edition replaces the edition currently incorporated at § 56.60–1. This standard covers the minimum design, fabrication, pressure rating and marking of pressure-containing housings for steam traps. Revisions to this standard consist mainly of editorial changes and modifications to definitions.

- International Convention for Safety of Life at Sea (SOLAS) Consolidated Edition 2020, Consolidated text of the International Convention for Safety of Life at Sea, 1974, and its Protocol of 1988: articles, annexes and certificates, 2020. This standard is not currently codified within 46 CFR part 56 or part 58, though its applicability to passenger vessels on international voyages is mentioned in § 56.50–50(c)(2). The CFR codifies language taken directly from SOLAS in a number of places in titles 33 and 46. Incorporating specific SOLAS regulations by reference, in § 56.50–50 for bilge systems and § 58.25–10 for steering gear, allows for an alternative to the prescriptive technical requirements of the CFR. SOLAS is an international maritime treaty that sets minimum safety standards in the construction, equipment, and operation of merchant ships. Incorporating SOLAS by reference requires no updates, merely the adoption of a standard already in practice.

- IMO Resolution MEPC.244(66), Standard Specification for Shipboard Incinerators, April 4, 2014. This standard is added as an alternate method of compliance to the requirements for shipboard incinerators in § 63.25–9. IMO MEPC.244(66) is the IMO's updated standard for shipboard incinerator design, defining the engineering requirements and environmental air emissions limits for ship incinerators.

- IMO Resolution MSC.337(91), Code on Noise Levels on Board Ships, November 30, 2012. This standard replaces the older IMO Resolution A.468(XII), Code on Noise Levels on Board Ships, incorporated by reference in § 58.01–50. The Code on Noise Levels on Board Ships is intended to provide

standards to prevent and mitigate the occurrence of hazardous noise levels on board ships, and to provide standards for an acceptable working and living environment for seafarers. The 2012 Code on Noise Levels on Board Ships reflects technology improvements and mandatory requirements not included in the older IMO Resolution, and is intended to provide the basis for a design standard.

- ISO 9096:2017(E), Stationary source emissions—Manual determination of mass concentration of particulate matter, Third Edition, September 2017. This standard updates the 2003 edition currently incorporated by reference at § 63.25–9. It establishes methods for measurement of particulate matter concentration in waste gases. The standard has been regularly revised to accommodate technological developments, address administrative requirements, incorporate interpretations, and clarify the standard intent. It is the internationally accepted standard.

- ISO 13617:2019(E), Ships and marine technology—Shipboard incinerators—Requirements, Third Edition, August 2019. This standard updates the 2001 edition currently incorporated by reference at § 63.25–9. It establishes the design, manufacture, performance, operation, functioning and testing of incinerators. The standard has been regularly revised to accommodate technological developments, address administrative requirements, incorporate interpretations, and clarify the standard intent. It is the internationally accepted standard.

- 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. This standard replaces the 1999 edition currently incorporated in § 56.60–25. It specifies the temperatures, duration, and pressure testing associated with fire tests used to qualify nonmetallic hose for use in ship piping systems.

- MSS SP–6–2017, Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings, approved January 2017, published March 2017. This standard updates the 2001 edition incorporated by reference at §§ 56.25–10 and 56.60–1. It pertains to the finish of gasket contact faces of pipe flanges and connecting-end flanges of valves and fittings. The changes made to the standard are largely editorial in nature; however, there are also some changes to definitions and material limitations.

- MSS SP–9–2013, Spot Facing for Bronze, Iron, and Steel Flanges,

approved October 2012, published March 2013. This standard updates the 2001 edition incorporated by reference at § 56.60–1. It applies to the spot facing for U.S. customary bolting of pipe flanges in bronze, gray iron, ductile iron, or settle. The changes made to the standard include both editorial and technical revisions, with some changes to material testing, design, and grading requirements.

- MSS SP–25 (ANSI/MSS SP–25–2018), Standard Marking System for Valves, Fittings, Flanges and Unions, approved March 2018, published September 2018. This standard updates the 1998 edition incorporated by reference at § 54.01–25 and the 2001 edition incorporated by reference at §§ 56.15–1, 56.20–5, and 56.60–1. It provides a marking system for new valves, fittings, flanges, and unions used in piping connections that include (but are not limited to) flanged, soldered, brazed, threaded, or welded joints. Markings are used for product identification and to assist in proper application. The standard has been revised three times since 1998 to address changes in industry practices.

- MSS SP–45–2003, Bypass and Drain Connections, 2008 Edition, originally approved July 1953, reaffirmed 2008. This document provides standard practices for design and installation of various types of drain and bypass valves, such as globe valves, gate valves and check valves. This standard reaffirms the 2003 edition incorporated by reference at §§ 56.20–20 and 56.60–1.

- MSS SP–51–2012, Class 150LW Corrosion Resistant Flanges and Cast Flanged Fittings, 2012 Revision, approved August 2011, published May 2012. This standard updates the 2003 edition incorporated by reference at § 56.60–1. It establishes the design dimensions, tolerances, and pressure-temperature ratings for flanged steel fittings for both Metric and Imperial units.

- MSS SP–53–2012, Quality Standard for Steel Castings and Forgings for Valves, Flanges, Fittings, and Other Piping Components—Magnetic Particle Examination Method, approved October 2012, published December 2012. This standard updates the 1995 edition incorporated by reference at § 56.60–1. It provides methods and acceptance standards for magnetic particle examination of ferritic steel valves, flanges, fittings, and other piping components by use of dry magnetic powder or wet magnetic particles. The changes made to the standard are editorial in nature, with some changes to material testing, design, and grading.

- MSS SP–55 (ANSI/MSS–SP–55–2011), Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components—Visual Method for Evaluation of Surface Irregularities, 2011 Revised Edition, approved August 2011, published October 2011. This standard updates the 2001 edition incorporated by reference at § 56.60–1. It describes common irregularities found in the castings of steel pipe fittings and flanges, as well as acceptable criteria for evaluating irregularities. The changes made to the standard are editorial in nature, with some changes to material testing, design, and grading.

- MSS SP–58 (ANSI/MSS SP–58–2009), Pipe Hangers and Supports—Materials, Design, Manufacture, Selection, Application, and Installation, approved May 2011, published October 2011. This standard updates the 1993 edition incorporated by reference at § 56.60–1. It specifies the design criteria and minimum strength requirements for hangers used to mount piping systems to ship bulkheads and decks. The changes made to the standard are editorial in nature, with some changes to material testing, design, and grading.

- MSS SP–61–2019, Pressure Testing of Valves, approved September 2019, published December 2019. This standard updates the 2003 edition incorporated by reference at § 56.60–1. It provides standardized technical requirements and acceptance criteria for the pressure testing of valves.

- NFPA 302, Fire Protection Standard for Pleasure and Commercial Motor Craft, 2020 Edition, approved August 25, 2019. This standard provides the minimum requirements on boats for the prevention of fire and explosion, mitigation of carbon monoxide hazards, and life safety in case of fire. It updates the 1989 standard incorporated by reference at § 58.10–5. The updates to this standard are editorial in nature with minor technical changes, and changes in material testing and grading.

- SAE J429 MAY2014, Mechanical and Material Requirements for Externally Threaded Fasteners, revised May 2014. This standard updates the 1989 standard incorporated by reference at § 58.30–15. It covers the mechanical and material requirements for inch-series steel bolts, screws, studs, screws for screw-and-washer assemblies, and U-bolts. The updates to this standard are editorial in nature, with minor technical changes, and changes in material testing and grading.

- SAE J1475 JUN2014, Hydraulic Hose Fittings for Marine Applications, stabilized June 2014. This standard updates the 1996 edition currently

incorporated in § 56.60–25. It covers the materials, design, and testing requirements for fittings used with flexible hose assemblies for use in ship piping systems. The updates to this document are primarily editorial in nature, with no substantive change to technical requirements.

- SAE J1928 JUN2018, Devices Providing Backfire Flame Control for Gasoline Engines in Marine Applications, revised June 2018. This standard updates the 1989 edition incorporated by reference at § 58.10–5. It covers the minimum requirements for design, construction, and testing of devices to prevent the propagation of backfire flame from a gasoline engine to the surrounding atmosphere. The updates to this standard are editorial in nature, with minor technical changes, and changes in material testing and grading.

- SAE J1942 MAR2019, Hose and Hose Assemblies for Marine Applications, revised March 2019. This standard updates the 1997 edition currently incorporated in § 56.60–25. It defines the design and testing requirements, including fire tests, for non-metallic flexible hose assemblies used in shipboard piping systems. Changes to this standard are administrative in nature, including updated testing frequency and record retention requirements.

- UL 174, Standard for Safety, Household Electric Storage Tank Water Heaters, Eleventh Edition, April 29, 2004, including revisions through December 15, 2016. This standard updates the 1996 edition incorporated by reference at §§ 53.01–10 and 63.25–3. It contains requirements and non-mandatory guidance for household electric storage tank water heaters. The standard has been regularly revised to accommodate technological developments, address administrative requirements, incorporate interpretations, and clarify the intent of the standard. Incorporating the latest edition ensures compliance with current industry practices.

- UL 296, Standard for Safety, Oil Burners, Eleventh Edition, February 24, 2017. This standard updates the 1993 edition currently incorporated by reference at § 63.15–5. It establishes requirements for oil burners intended for firing appliances and devices such as boilers, central, floor, wall, and special furnaces, storage tank water, air, and direct-fired air heater units. The standard has been regularly revised to accommodate technological developments, address administrative requirements, incorporate interpretations, and clarify the intent of

the standard. It is the internationally accepted standard.

- UL 343, Standard for Safety, Pumps for Oil-Burning Appliances, Ninth Edition, December 17, 2008, including revisions through June 12, 2013. This standard updates the 1997 edition currently incorporated by reference at § 63.15–3. It establishes requirements for pumps intended for use as part of oil-burning appliances or installed in fuel-oil piping systems serving equipment. The standard has been regularly revised to accommodate technological developments, address administrative requirements, incorporate interpretations, and clarify the standard intent. It is the internationally accepted standard.

- UL 1453, Standard for Safety, Electric Booster and Commercial Storage Tank Water Heaters, Sixth Edition, March 29, 2016, including revisions through March 9, 2017. This standard replaces the 1995 standard incorporated by reference at §§ 53.01–10 and 63.25–3. It contains requirements for electric booster water heaters, electric commercial storage tank water heaters, and remote-control assemblies for such heaters, rated 600 volts or less, that are over 120 gallons (454 L) in capacity, rated over 12 kilowatts, or are equipped with one or more temperature-regulating controls permitting water temperature of more than 85 °C (185 °F). The 2016 edition provides minor technical changes and has been edited for clarity.

#### C. Standards Previously Approved for Incorporation by Reference

The following standards were previously approved for incorporation by reference and the references are included in the regulatory text either because the current format of the reference does not comply with current OFR requirements (and is, therefore, revised to comply) or because the text being revised includes an existing reference to the standard. We do not change the existing IBR approval.

- ASME B36.19M–2004 Stainless Steel Pipe (Reaffirmed 2015), issued October 25, 2004, IBR approved for §§ 56.07–5 and 56.60–1.

- IMO Resolution A.467(XII), Guidelines for Acceptance of Non-Duplicated Rudder Actuators for Tankers, Chemical Tankers and Gas Carriers of 10,000 Tons Gross Tonnage and Above But Less Than 100,000 Tonnes Deadweight, 1981, IBR approved for § 58.25–60.

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

- IMO Resolution MEPC.76(40), Standard Specification for Shipboard Incinerators, September 25, 1997, IBR approved for § 63.25–9.

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

- The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), Annexes I, II, III, and V, 1978, IBR approved for § 63.25–9.

- ISO 10396: 2007(E), Stationary source emissions—Sampling for the automated determination of gas emission concentrations for permanently-installed monitoring systems, Second Edition, February 1, 2007, IBR approved for § 63.25–9.

#### D. Section-by-Section Analysis of Changes to the Regulatory Text

In addition to updating existing standards incorporated by reference, adding new standards, and removing obsolete standards, we modify technical regulatory text in the following sections of subchapter F. For the convenience of the reader, the list below does not detail purely stylistic revisions and corrections of drafting errors.

##### Part 50—General Provisions

###### *Section 50.05–5 Existing boilers, pressure vessels or piping systems.*

Modifying paragraph (b) to eliminate redundant text and more clearly describe the requirements for recalculating the maximum allowable working pressure.

###### *Section 50.05–20 Steam-propelled motorboats.*

Replacing the words “motorboats” and “motor boats” with the more current and universally used “vessels.”

###### *Section 50.10–23 Marine Safety Center.*

Modifying the contact information for the MSC and the details for electronically submitting documents.

###### *Section 50.20–5 Procedures for submittal of plans.*

Modifying the procedures for submitting plans to the Coast Guard by eliminating the requirements in paragraph (b) for plans to be submitted in triplicate, since most plans are electronically submitted, and by deleting unnecessary detail in paragraph (c).

###### *Section 50.20–10 Number of copies of plans required.*

Deleting this section. Submittal of plans is adequately addressed in § 50.20–5.

###### *Section 50.20–15 Previously approved plans.*



Deleting the unnecessary text “(including work accomplished under a different contract)” in paragraph (a).

*Section 50.20–30 Alternative materials or methods of construction.*

Modifying paragraph (a) to include the word “materials” and deleting paragraph (b). These changes improve the clarity of the section.

*Section 50.25–1 General.*

Deleting paragraph (e) as unnecessary because nonmetallic flexible hoses, including those intended for hydraulic service, are adequately addressed in § 56.60–25.

*Section 50.25–7 Testing of products required to be certified in presence of marine inspector.*

Deleting paragraphs (c) and (d) as unnecessary. When specific testing conditions are required, they are specified in the applicable standards or regulations.

#### Part 52—Power Boilers

Replacing the words “boiler pressure vessel code” with “BPVC” throughout all of part 52, as BPVC is recognized as the appropriate acronym for the ASME Boiler Pressure Vessel Code. Modifying various paragraphs throughout part 52 to delete text already addressed in ASME BPVC and to make stylistic changes for greater clarity and readability.

*Section 52.01–1 Incorporation by reference.*

Modifying paragraph (b) to update contact information for the ASME.

*Section 52.01–3 Definitions of terms used in this part.*

Deleting definitions listed in this section but not currently used in Part 52 and not needed going forward, as there is no need to define a term if it is not used later in the regulatory text. Deleted terms include: *High temperature water boiler, packaged boiler, Fired steam boiler, Hybrid boiler, Shell, Heads, Dished heads, Stayed heads, Water wall, Header, Domes, Steam chimneys, Corrugated furnace, Plain furnace, Combustion chamber, Separate combustion chamber, Common combustion chamber, Crown or top plate, Curved bottom plate, Combustion chamber tube sheet, Combustion chamber back sheet, Seamless tube, Electric resistance welded tube, Stay tube, Tube sheet, Ligament, Longitudinal ligament, Circumferential ligament, Diagonal ligament, Stays and supports, Solid screw staybolt, Welded collar, Hollow screw staybolt, Flexible staybolt, Sling stay, Crowfoot, Crowfoot stay, Diagonal stay, Gusset stay, Dog stay, Girder, Structural stiffeners, Reinforcement, Pressure loaded pilot actuated safety valve, Spring loaded*

*pilot actuated safety valve, Spring loaded pilot valve, Relief valve, Safety relief valve, Conventional safety relief valve, Balanced safety relief valve, Internal spring safety relief valve, Power actuated relief valve, Breaking pin device, Shear pin device, Frangible disk device, Bursting disk device, Feed valve, Salinometer cocks, Expanding, Beading, Bell mouthing, Telltale hole, Openings, Pressure, Absolute pressure, Internal pressure, and External pressure.* In addition, deleting Figure 52.01–3—*Acceptable Types of Boiler Stays*. Figure 52.01–3 is not necessary, as the ASME BPVC adequately defines the requirements for boiler-stayed surfaces.

*Section 52.01–50 Fusible plugs (modifies A–19 through A–21).*

Modifying various paragraphs in this section to delete references and text already addressed by the ASME BPVC or that are otherwise outdated.

*Section 52.01–55 Maximum allowable working pressure.*

Modifying various paragraphs in this section to delete references and text already addressed by the ASME BPVC or that are otherwise outdated.

*Section 52.01–90 Materials (modifies PG–5 through PG–13).*

Removing provisions from this section governing exceptions to the ASME BPVC standards for materials under pressure. The ASME BPVC adequately addresses materials for boiler design as written.

*Section 52.01–105 Piping, valves, and fittings (modifies PG–58 and PG–59).*

Modifying various paragraphs in this section to delete references and text already addressed by the ASME BPVC or that are otherwise outdated.

*Section 52.01–110 Water-level indicators, water columns, gauge-glass connections, gauge cocks, and pressure gauges (modifies PG–60).*

Modifying various paragraphs in this section to delete references and text already addressed by the ASME BPVC or that are otherwise outdated.

*Section 52.01–120 Safety valves and safety relief valves (modifies PG–67 through PG–73).*

Modifying various paragraphs in this section to delete references and text already addressed by the ASME BPVC or that are otherwise outdated.

*Section 52.01–130 Installation.*

Modifying various paragraphs in this section to delete references and text already addressed by the ASME BPVC or that are otherwise outdated.

*Section 52.01–135 Inspection and tests (modifies PG–90 through PG–100).*

Modifying various paragraphs in this section to delete references and text already addressed by the ASME BPVC or that are otherwise outdated.

*Section 52.05–20 Radiographic and ultrasonic examination (modifies PW–11 and PW–41.1).*

Modifying various paragraphs in this section to delete references and text already addressed by the ASME BPVC or that are otherwise outdated.

*Section 52.25–3 Feedwater heaters (modifies PFH–1).*

Modifying various paragraphs in this section to delete references and text already addressed by the ASME BPVC or that are otherwise outdated.

#### Part 53—Heating Boilers

Replacing the words “boiler pressure vessel code” with “BPVC” throughout part 53, as BPVC is recognized as the appropriate acronym for the ASME Boiler Pressure Vessel Code. Making stylistic changes throughout part 53 for greater clarity and readability.

*Section 53.01–1 Incorporation by reference.*

Modifying paragraph (b) to update contact information for the ASME, and modifying paragraph (c) to reflect Underwriters Laboratories change of name to UL Solutions and update the organization’s contact information.

*Section 53.01–10 Service restrictions and exceptions (replaces HG–101).*

Modifying paragraph (d) to remove exact temperature requirements and retaining a temperature range that will benefit industry.

Modifying paragraph (e)(1) to provide the correct citation for the ASME BPVC stamping and provide cites to the IBR.

#### Part 54—Pressure Vessels

Replacing the words “boiler pressure vessel code” with “BPVC” throughout all of part 54, as BPVC is recognized as the appropriate acronym for the ASME Boiler Pressure Vessel Code. Making stylistic changes throughout part 54 for greater clarity and readability.

*Section 54.01–1 Incorporation by reference.*

Modifying paragraphs (b), (c), (d), and (e) to update contact information for the ASME, ASTM, the Compressed Gas Association, and the Manufacturers Standardization Society of the Valve and Fitting Industry, Inc. (MSS), respectively.

*Section 54.01–15 Exemptions from shop inspection plan approval (modifies U–1(c)(2)).*

Deleting paragraph (a)(3)(i) because this section deals with internal pressure and the reference cited deals with external pressure.

*Section 54.01–18 Plan approval.*

Editing paragraph (a) to provide reference to new paragraph (c).

Adding paragraph (c) to identify which plans for Class I, II, and III

pressure vessels are not required to be submitted for approval.

*Section 54.10-3 Marine inspectors (replaces UG-90 and UG-91, and modifies UG-92 through UG-103).*

Editing the section heading to make it easier to find the regulation requiring stamping of the Coast Guard Symbol.

Modifying paragraph (b) to identify when shop inspection is required. Part 54 refers to shop inspection of pressure vessels under construction in several locations, but the term is not used here.

Adding new paragraph (c), redesignating existing paragraph (c) as new paragraph (d), and removing the requirement for stamping with the Coast Guard Symbol. The requirement for the use of the Coast Guard Symbol on pressure vessels is often misunderstood. By applying the symbol, the marine inspector is documenting that the pressure vessel meets Coast Guard requirements for pressure vessels on ships. Adding a paragraph clarifies which pressure vessels do not require stamping.

*Section 54.10-20 Marking and stamping.*

Modifying paragraph (a)(2) to clarify numbering requirements. The requirement for Coast Guard numbering of pressure vessels is often misunderstood. Numbering is only required when the Coast Guard has inspected the pressure vessel during construction (shop inspection).

#### Part 56—Piping Systems and Appurtenances

Making stylistic changes throughout part 56 for greater clarity and readability.

*Section 56.01-2 Incorporation by reference.*

Modifying paragraphs (a) through (i) to update contact information for the API, the ASME, ASTM, the Expansion Joint Manufacturers Association, the Fluid Controls Institute, IMO, ISO, the MSS, and SAE International (SAE), respectively.

*Section 56.07-5 Definitions (modifies 100.2).*

Clarifying the definition for piping “schedule” and deleting the definition for “plate flange,” as it does not require a definition.

*Section 56.07-10 Design conditions and criteria (modifies 101-104.7).*

Modifying paragraph (b) by deleting the last sentence within the parentheses. It is not necessary to refer to definitions in part 52 for this paragraph.

Modifying paragraph (d) by deleting text that was inadvertently repeated.

Modifying paragraph (e) by removing references to specific paragraphs and instead referring to the entire subpart.

*Section 56.10-5 Pipe.*

Adding text in paragraph (b) to clarify definitions of flammable and combustible materials, and removing redundant text from paragraph (c)(4).

*Section 56.15-1 Pipe joint fittings.*

Removing text in paragraph (c)(2) that is already adequately addressed by the incorporated ASME industry standard.

*Section 56.15-5 Fluid-conditioner fittings.*

Deleting text in paragraph (c), nonstandard fluid conditioner fittings, that is already adequately addressed by paragraph (b); generally, fluid conditioner fittings must meet the requirements of this section regardless of whether they are ‘standard’ or ‘nonstandard’, and must be appropriate for the fluid contained, and the temperature and pressure of the system. In addition, with advancements in manufacturing, there is no need to reference part 54 (pressure vessels), for fluid conditioner fittings in current paragraphs (c) and (d).

*Section 56.15-10 Special purpose fittings.*

Removing outdated text to clarify the requirements for special purpose fittings, and removing a cross-reference to a section of 46 CFR that has been removed.

*Section 56.20-1 General.*

Removing text that is redundant and that can be adequately replaced by the incorporated ASME standard.

*Section 56.20-5 Marking (modifies 107.2).*

Removing text that is redundant with current industry standards for marking.

*Section 56.20-9 Valve construction.*

Modifying paragraphs (a), (b), (c), (e), and (g) to reflect advancements in valve design technology that enable alternate methods to achieve a level of safety at least equivalent to what is provided by the current regulations, remove outdated CFR requirements, and remove text adequately addressed already by the incorporated ASME standard.

*Section 56.20-15 Valves employing resilient material.*

Deleting text that is no longer required and simplifying text to reflect current policy employed by the MSC to evaluate these types of valves. These valves are not required anywhere on ships, and this section only delineates the requirements for when they are installed.

*Section 56.25-5 Flanges.*

Removing text that is outdated or otherwise already adequately addressed by the incorporated standards in part 56.

*Section 56.25-10 Flange facings.*

Removing paragraph (b) as no longer necessary.

*Section 56.25-20 Bolting.*

Removing unnecessary text in paragraphs (b) and (c).

*Section 56.30-5 Welded joints.*

Removing text in paragraphs (c)(1), (c)(2) and (c)(3) as adequately addressed already by the incorporated ASME standard.

*Section 56.30-10 Flanged joints modifies 104.5.1(a).*

Removing text adequately addressed already by the incorporated standards in part 56.

*Section 56.30-20 Threaded joints.*

Removing text adequately addressed already by the incorporated standards in part 56.

*Section 56.30-25 Flared, flareless, and compression fittings.*

Removing unnecessary text.

*Section 56.30-30 Brazed joints.*

Removing text adequately addressed already by the incorporated standards in part 56.

*Section 56.30-35 Gasketed mechanical couplings.*

Removing unnecessary text in paragraph (a) and modifying text in paragraph (b)(1) for readability.

*Section 56.30-40 Flexible pipe couplings of the compression or slip-on type.*

Removing text in paragraphs (b) and (c) that is no longer necessary or is otherwise adequately addressed already by the incorporated standards in part 56.

*Section 56.35-10 Nonmetallic expansion joints.*

Removing the reference to part 50, as the appropriate standards are listed already in this part.

*Section 56.35-15 Metallic expansion joints (replaces 119.5.1).*

Removing the reference to part 50, as the appropriate standards are listed already in this part.

*Section 56.50-1 General (replaces 122).*

Deleting text in paragraphs (a), (b), (d), (g), and (i) that is unclear or outdated.

*Section 56.50-15 Steam and exhaust piping.*

Deleting text in paragraphs (b), (c), (f), (g), (j), and (k) that is unclear or outdated.

*Section 56.50-20 Pressure relief piping.*

Deleting text not necessary to the intent of the regulation.

*Section 56.50-25 Safety and relief valve escape piping.*

Deleting text in paragraphs (a), (c), and (d) that is outdated or redundant.

*Section 56.50-30 Boiler feed piping.*

Deleting text in paragraphs (b), (c), and (d) that is outdated or unclear and no longer necessary.

*Section 56.50–35 Condensate pumps.*

Deleting text that is outdated and no longer necessary.

*Section 56.50–40 Blowoff piping (replaces 122.1.4).*

Deleting text in paragraphs (b) and (d) that is outdated or redundant and no longer necessary.

*Section 56.50–45 Circulating pumps.*

Deleting text in paragraph (d) that is outdated or unclear.

*Section 56.50–50 Bilge and ballast piping.*

Modifying paragraph (a) to consider ships that meet SOLAS requirements for bilge systems as equivalent to this section.

Deleting outdated text in paragraphs (a), (b), (c), (d), (f), (h), (j), and (k).

*Section 56.50–55 Bilge pumps.*

Modifying paragraph (c) to add a pump capacity alternative formula.

*Section 56.50–57 Bilge piping and pumps, alternative requirements.*

Deleting this entire section as outdated, as it contains cross-references to sections already removed from the CFR (§§ 171.075 and 171.082).

*Section 56.50–60 Systems containing oil.*

Deleting or modifying text in paragraphs (a), (b), (c), (d), (m), and (n) that is outdated or unclear.

*Section 56.50–65 Burner fuel-oil service systems.*

Deleting or modifying text in paragraphs (a) and (b) that is outdated, unclear, or adequately addressed already by the incorporated standards in part 56.

*Section 56.50–70 Gasoline fuel systems.*

Deleting or modifying text in paragraphs (b), (c), (d), (e), and (g) that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

*Section 56.50–75 Diesel fuel systems.*

Deleting or modifying text in paragraphs (a) and (b) that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

*Section 56.50–80 Lubricating-oil systems.*

Deleting or modifying text in paragraphs (a), (d), and (h) that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

*Section 56.50–85 Tank-vent piping.*

Deleting or modifying text in paragraphs (a) and (b) that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

*Section 56.50–90 Sounding devices.*

Deleting or modifying text in paragraphs (a), (b), (c), (d), and (e) that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

*Section 56.50–95 Overboard discharges and shell connections.*

Deleting text in paragraphs (a), (b), (c), (d), (e), (f), (h), and (i) that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

*Section 56.50–105 Low-temperature piping.*

Deleting text in paragraph (a) that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

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

Adding ASTM F1155 as a reference in paragraph (a) for material standards applicable to certain marine engineering piping systems.

*Section 56.60–5 Steel (high temperature applications).*

Modifying paragraph (a) to align the CFR with the temperature requirements of the incorporated ASME standard.

*Section 56.70–5 Material.*

Deleting text in paragraph (b) that is outdated and aligning text with incorporated ASME standard.

*Section 56.70–10 Preparation (modifies 127.3).*

Deleting text in paragraphs (a) and (b) that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

*Section 56.70–15 Procedure.*

Deleting text in paragraphs (a), (b), (c), (d), and (g) that is outdated, unclear, unenforceable, or adequately addressed already by incorporated standards in this part.

*Section 56.80–5 Bending (modifies 129).*

Deleting text that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

*Section 56.85–15 Postheat treatment.*

Deleting text in paragraphs (a), (b), and (d) that is outdated, unclear, or adequately addressed already by incorporated standards in this part, and making additional changes as described in section IV.E of this preamble, “Additional Changes from the NPRM.”

*Section 56.90–5 Bolting procedure.*

Deleting text in paragraph (a) that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

*Section 56.90–10 Threaded piping (modifies 135.5).*

Deleting paragraph (c) as outdated and unnecessary.

*Section 56.95–1 General (replaces 136).*

Modifying paragraph (b) for readability.

*Section 56.97–1 General (replaces 137).*

Modifying paragraph (b) for readability.

*Section 56.97–25 Preparation for testing (reproduces 137.2).*

Modifying paragraphs (b) and (d) for readability.

*Section 56.97–35 Pneumatic tests (modifies 137.5).*

Modifying title of section to describe its relationship to the ASME BPVC more accurately, and removing unnecessary text in paragraph (b)(2).

*Section 56.97–38 Initial service leak test (reproduces 137.7).*

Modifying paragraph (a) for readability.

*Section 56.97–40 Installation tests.*

Deleting text in paragraph (a) that is outdated, unclear, or adequately addressed already by incorporated standards in this part.

**Part 57—Welding and Brazing**

Replacing the words “boiler pressure vessel code” with “BPVC” throughout part 57, as BPVC is recognized as the appropriate acronym for the ASME Boiler Pressure Vessel Code. Making stylistic changes throughout part 57 for greater clarity and readability.

*Section 57.01–1 Qualifications and production tests.*

Modifying the text in paragraph (a) to reflect updates in section numbering of the BPVC.

*Section 57.02–1 Incorporation by reference.*

Modifying paragraph (b) to update contact information for the ASME.

*Section 57.02–2 Adoption of Section IX of the ASME code.*

Modifying paragraph (a) to update and clarify the information provided in the section.

Modifying paragraph (a)(1) to delete unnecessary references to parts of the subchapter that have been removed.

Amending table 1 to § 57.02–2(a) to reflect updates in the section numbering of the BPVC.

*Section 57.02–3 Performance qualifications issued by other agencies.*

Deleting references to ASME BPVC paragraphs PG–91, N–612, HG–515.2, and UG–91 in paragraph (a) as unnecessary.

*Section 57.03–1 General requirements.*

Updating paragraph (a)(1) to reflect changes in the standard.

*Section 57.06–1 Production test plate requirements.*

Updating paragraph (c) to reflect current name of the relevant section of the ASME BPVC.

#### Part 58—Main and Auxiliary Machinery and Related Systems

Making stylistic changes throughout part 58 for greater clarity and readability.

##### *Section 58.01–5 Applicable standards.*

Updating the reference from ABS Steel Vessel Rules to ABS Marine Vessel Rules.

##### *Section 58.01–20 Machinery guards.*

Updating section for readability.

##### *Section 58.01–50 Machinery space, noise.*

Updating incorporated reference to reflect updated IMO Resolution (Noise Code).

##### *Section 58.03–1 Incorporation by reference.*

Modifying paragraphs (a) through (h) to update contact information for the ABYC, the ABS, the API, the ASME, ASTM, IMO, ISO, the National Fire Protection Association, and SAE, respectively.

##### *Section 58.05–1 Material, design and construction.*

Updating the reference from ABS Steel Vessel Rules to ABS Marine Vessel Rules, and making a further change as described in section IV.E of this preamble, “Additional Changes from the NPRM.”

##### *Section 58.16–5 Definition.*

Updating paragraph to correct grammar and make the text easier to read without impacting the public.

##### *Section 58.16–7 Use of liquefied petroleum gas.*

Updating incorrect CFR reference.

##### *Section 58.16–10 Approvals.*

Deleting the requirement in paragraph (a) that gas-consuming appliances be “of a type approved” by the Commandant. The requirement that the Commandant specifically “approve” all types of gas-consuming appliances is not necessary, since the Coast Guard verifies during plan review that appliances are tested and listed by third-party laboratories and meet the additional requirements of Subpart 58.16.

Changing the word “approved” to “accepted” in paragraph (c). Because this paragraph refers to another government agency’s requirements for safety-relief devices, and shipboard appliance installations are reviewed case by case, “acceptance” allows for more flexibility than “approval” when evaluating the overall installation for compliance.

##### *Section 58.16–30 Operating instructions.*

Updating paragraph (k) to make the text easier to read without impacting the public.

##### *Section 58.16–35 Markings.*

Deleting text in paragraph (a) that is redundant with paragraphs (b) and (c) of same section.

##### *Section 58.25–5 General.*

Making an editorial correction to ensure “control system” is a separate definition from “auxiliary steering gear”.

##### *Section 58.25–10 Main and auxiliary steering gear.*

Adding SOLAS regulations plus class rules as an equivalent standard.

##### *Section 58.25–20 Piping for steering gear.*

Eliminating redundant references to part 56 of this chapter.

##### *Section 58.25–25 Indicating and alarm systems.*

Deleting requirements in current paragraph (e) that are redundant with other paragraphs in same section.

##### *Section 58.25–40 Arrangement of the steering gear compartment.*

Deleting the Note following paragraph (a)(3) as unnecessary.

##### *Section 58.25–60 Non-duplicated hydraulic rudder actuators.*

Amending this section for readability.

##### *Section 58.25–75 Materials.*

Deleting paragraph (b) of this section as unnecessary.

##### *Section 58.25–85 Special requirements for tank vessels.*

Deleting certain text in paragraphs (c)(1) and (2) of this section as unenforceable.

Deleting paragraph (g) as this paragraph is applicable only to tank vessels of 40,000 gross tons or more constructed before 1984. Virtually all those vessels have been phased out of service due to the pollution prevention requirements in 33 CFR 157 for “double hulls” on tank vessels.

##### *Section 58.30–1 Scope.*

Deleting certain text in paragraph (a) as not applicable.

##### *Section 58.30–5 Design requirements.*

Removing unnecessary text from paragraph (a).

##### *Section 58.30–15 Pipe, tubing, valves, fittings, pumps, and motors.*

Deleting certain text in paragraphs (b) and (d) as redundant, given the incorporation of industry standards.

##### *Section 58.30–25 Accumulators.*

Deleting certain text in paragraphs (a) and (c) to make the text easier to read without impacting the public.

##### *Section 58.30–40 Plans.*

Removing requirements in paragraph (a) for material to be included with plan submissions that is no longer necessary.

##### *Section 58.50–1 General requirements.*

Modifying text to remove allowance for gasoline as a fuel for vessels constructed before 1935.

#### Part 59—Repairs to Boilers, Pressure Vessels and Appurtenances

Making stylistic changes throughout part 59 for greater clarity and readability.

##### *Section 59.01–2 Incorporation by reference.*

Modifying paragraph (b) to update contact information for the ASME.

##### *Section 59.10–1 Scope.*

Modifying paragraphs (b) and (c) to eliminate unnecessary requirements and to provide clarity for welding repairs.

##### *Section 59.10–5 Cracks.*

Modifying paragraphs (d) and (h) to eliminate unnecessary requirements and to provide clarity for repair of cracks in boiler and pressure vessels.

##### *Section 59.10–20 Patches in shells and tube sheets.*

Removing text in paragraphs (a) and (b) to make the text easier to read without impacting the public.

##### *Section 59.15–1 Furnace repairs.*

Modifying paragraphs (a), (b), (c) and (e) to eliminate unnecessary requirements and to provide clarity for furnace repairs.

#### Part 61—Periodic Tests and Inspections

Making stylistic changes throughout part 61 for greater clarity and readability.

##### *Section 61.03–1 Incorporation by reference.*

Modifying paragraph (b) to update the name, telephone number, and web address of ASTM International.

##### *Section 61.05–10 Boilers in service.*

Eliminating unnecessary and outdated text regarding boiler inspections from paragraphs (a) and (f).

##### *Section 61.10–5 Pressure vessels in service.*

Modifying paragraph (g) to provide inspection compliance options, in lieu of the hydrostatic test currently required by this paragraph, for bulk storage tanks containing refrigerated liquefied carbon dioxide for use aboard a vessel as a fire-extinguishing agent. The inspection options consist of performing a hydrostatic test or having an internal inspection. This is further explained in the regulatory language.

#### Part 62—Vital System Automation

Making stylistic changes throughout part 62 for greater clarity and readability.

##### *Section 62.05–1 Incorporation by reference.*

Modifying paragraph (b) to update the address for ABS.

##### *Section 62.35–5 Remote propulsion-control systems.*

Removing redundant text in paragraphs (c)(2) and (3) and correcting the title of the applicable ABS Rules in paragraph (d).

*Section 62.35–20 Oil-fired main boilers.*

Removing an outdated Note to paragraph (d)(1).

*Section 62.35–50 Tabulated monitoring and safety control requirements for specific systems.*

Deleting the requirements for main propulsion boiler supply casing and uptakes, burner flames, control power, and burner valves in Table 62.35–50. These components are required to comply with the same requirements in Section 4–9–6 of the ABS Marine Vessel Rules (2020), which is referenced in this table.

Modifying the requirements for ship service generators in Table 62.35–50. Currently, compliance with the ABS Steel Vessel Rules for propulsion boilers and propulsion diesel engines is required. The requirements for auxiliary generators in Section 4–9–6 of the ABS Marine Vessel Rules (2020) are referenced instead because this section of the ABS Rules is more directly applicable to generators.

Deleting the requirements for generators to comply with §§ 111.12–1 (b) and (c), and parenthetical items 6 and 7 in Table 62.35–50.

**Part 63—Automatic Auxiliary Boilers**

Making stylistic changes throughout part 63 for greater clarity and readability.

*Section 63.01–3 Scope and Applicability.*

Amending paragraph (b) to remove language regarding electric cooking equipment, electric air heaters, and electric oil immersion heaters. The requirements for these electric appliances are covered in 46 CFR subchapter J part 111.

*Section 63.05–1 Incorporation by reference.*

Modifying paragraphs (a) through (f) to update contact information for the ANSI, ASME, ASTM, IMO, ISO, and UL Solutions, respectively.

*Section 63.10–1 Test procedures and certification report.*

Updating address and options for item submittals.

*Section 63.25–9 Incinerators.*

Modifying paragraph (a) to update address and options for application for type approval of shipboard incinerators.

Modifying paragraph (b) to clarify and update requirements for testing prior to granting type approval.

Adding paragraph (g) to reflect IMO MEPC.244(66) as an accepted design standard for incinerators.

**Part 64—Marine Portable Tanks and Cargo Handling Systems**

Replacing the words “ASME Code” with “ASME BPVC” throughout part 64, as BPVC is recognized as the appropriate acronym for the ASME Boiler Pressure Vessel Code. Making stylistic changes throughout part 64 for greater clarity and readability.

*Section 64.2 Incorporation by reference.*

Modifying paragraph (b) to update the address for the ASME.

**E. Additional Changes From the NPRM**

In addition to the changes discussed above, we are making further editorial changes from the text proposed in the NPRM, as follows.

In § 56.30–20(d), correcting an erroneous Fahrenheit to Celsius conversion. The Fahrenheit temperature currently provided in the CFR is correct.

In § 56.50–60(n), restoring the word “flammable,” as it was inadvertently deleted.

In § 56.50–70(e), clarifying that the openings indicated in this paragraph are openings for fuel tanks.

In § 56.50–75(b)(1), adding “seamless steel” to the list of acceptable materials. Seamless steel has always been acceptable under this paragraph as an “other material,” but, because it is commonly used, we are adding it to the list for clarity.

In § 56.50–75(b)(6), removing the words “on vessels less than 100 gross tons and tank barges” as unnecessary because this applicability condition is already specified in § 56.50–75(b).

In § 56.50–95(f), removing redundant text relating to prohibitions on the use of heat-sensitive materials.

In Table 2 to § 56.50–105, removing footnote 2 and renumbering the remaining footnotes. Footnote 2 redirected readers to part 54 for additional information, and all the necessary information is found in the table. Deleting cross-references to table 1 to § 56.85–10(c) as we are removing that table, as discussed below.

In § 56.60–1, relocating note 1 to table 1 to § 56.60–1(a) to follow the table rather than precede it and redesignating the other note as note 2 to table 1 to § 56.60–1(a).

Reorganizing the information in table 1 to § 56.60–2 and its associated footnotes to ensure all substantive requirements are found in the table itself and renumbering the remaining footnotes.

In § 56.85–10, revising the text and removing table 1 to § 56.85–10(c) to simplify the information presented and focus on the incorporated standard,

ASME B31.1. The relevant information regarding heat treatment of welds is already provided by ASME B31.1 and it is unnecessary to supplement the text with additional Coast Guard requirements that are redundant to ASME B31.1. In addition, removing a cross-reference to table 1 to § 56.85–10(c) in § 56.50–105, as noted above.

As with § 56.85–10, revising the text in § 56.85–15 to remove unnecessary supplementary information regarding post-heat treatment of welds and, instead, directing readers to follow the relevant section and table of the incorporated standard, ASME B31.1.

In § 56.95–10 (a)(1), correcting an Imperial unit/Metric system unit conversion that is incorrect in the current CFR.

In § 58.05–1(b), removing the requirement for drawings to be submitted in quadruplicate because drawings are typically submitted under this section electronically, making multiple copies unnecessary.

In § 58.16–10(e), removing the requirement for plans to be submitted in triplicate because plans are typically submitted under this section electronically, making multiple copies unnecessary.

Restoring § 58.25–25(a) and (e), with minor stylistic changes, as these paragraphs were inadvertently deleted.

In § 58.50–1(b), removing the text “converted on or after July 1, 1935” because the emergency systems requirements under this section now apply to all ships.

Reorganizing the information in table 1 to § 62.35–50 and its associated footnotes to ensure all substantive requirements are in the table itself and renumbering the remaining footnotes.

In § 62.50–20(g)(2), correcting a drafting error by changing the reference to “§§ 111.12–11(g) and 111.30–1 of this subchapter” to read “§§ 111.12–11(g) and 111.30–1 of this chapter.” The referenced sections are in the same chapter as § 62.50–20(g)(2), but not the same subchapter.

In § 64.2, removing the incorporation by reference of section VIII of the ASME BPVC, 1974 edition, as it is only relevant as the source for a constant used in a calculation in § 64.63. The actual value of the constant, given in that section, is sufficient for the calculation.

In § 64.63, removing the reference to the 1974 edition of section VIII of the ASME BPVC as the source of the value of constant C used in calculating total emergency venting capacity. The source of constant C is not required for this calculation, and as noted above we are removing the incorporation by reference

of section VIII of the ASME BPVC for this part.

**V. Incorporation by Reference**

Material for incorporation by reference appears in 46 CFR parts 50, 52, 53, 54, 56, 57, 58, 59, 61, 62, 63, and 64 and is summarized in section IV.B of this preamble. Copies of the material are available either at the publisher’s web address listed in the incorporation by reference sections in 46 CFR parts 50, 52, 53, 54, 56, 57, 58, 59, 61, 62, 63, and 64 or by contacting the publisher listed for those standards. We reviewed and updated all the publisher’s web addresses listed in the parts to ensure they are current. You may also contact the person in the **FOR FURTHER INFORMATION CONTACT** section for additional direction on how to obtain access to electronic copies of the materials.

Based on the volume of equivalency requests the Coast Guard receives asking us to confirm that the latest edition is equivalent to or better than the edition currently incorporated, we believe industry already has access to and uses these more recent standards. The affected industry typically obtains the more recent editions of standards in the course of their business in order to address advancements in technology.

The Director of the Federal Register approved the material in 46 CFR parts 50, 52, 53, 54, 56, 57, 58, 59, 61, 62, and 63 for incorporation by reference under 5 U.S.C. 552 and 1 CFR part 51.

**VI. Regulatory Analyses**

We developed this rule after considering numerous statutes and Executive Orders related to rulemaking. A summary of our analyses based on these statutes or Executive Orders follows.

*A. Regulatory Planning and Review*

Executive Orders 12866 (Regulatory Planning and Review), as amended by Executive Order 14094 (Modernizing Regulatory Review) and 13563 (Improving Regulation and Regulatory Review) direct agencies to assess the costs and benefits of available regulatory alternatives and, if regulation is necessary, to select regulatory approaches that maximize net benefits (including potential economic, environmental, public health and safety effects, distributive impacts, and equity). Executive Order 13563 emphasizes the importance of quantifying costs and benefits, reducing costs, harmonizing rules, and promoting flexibility.

As OMB has not designated this rule a significant regulatory action under section 3(f) of Executive Order 12866, as amended by Executive Order 14094, it has not reviewed this regulatory action. An RA follows.

The Coast Guard received four public comments on the affected population in the RA for the proposed rule. Two of these comments stated that the RA in the NPRM did not provide clarity on the inclusion of OCS facilities. We also

received two comments, with essentially the same content, stating that the suggested listing of 110 MODUs in table 3 of the RA in the NPRM was incorrect. We discuss our responses to these comments in section III.F of the preamble of this final rule. We are incorporating the commenters’ suggestions into the RA for this final rule and are revising the population of MODUs and Cargo and Miscellaneous Vessels based on MISLE Data.

We are also revising our affected population estimate from 16,148 vessels and facilities to 5,655. While preparing this final rule we obtained the most current data from the MISLE database, and determined we likely overcounted in our analysis in the NPRM (see Affected Population section for details).<sup>6</sup> Additionally, we updated the mean hourly wage rate for private sector workers and Coast Guard military and civilian personnel using 2022 data. Furthermore, we updated the load factor used to account for non-wage benefits for private sector employees by using Q4 2022 U.S. Department of Labor’s Bureau of Labor Statistics (BLS) data instead of Q4 2020 BLS data. We further revised the load factor for civilian Coast Guard marine engineers from 1.75 to 1.69 to be consistent with other recently published rulemakings from the Coast Guard’s Office of Design and Engineering Standards (CG-ENG). We present a summary of changes to the RA from the NPRM to the final rule in table 2, below.

**TABLE 2—SUMMARY OF CHANGES TO THE RA FROM THE NPRM TO THE FINAL RULE**

Element of the analysis	NPRM	Final rule	Reason for change	Resulting change in RA
Affected population of U.S.-flagged vessels and facilities.	The Coast Guard estimated that the rule affected 16,148 vessels and facilities and 6,437 owners and operators.	In the final rule, we revised this estimate down to 5,655 vessels and facilities.	We performed a new data pull of the affected population and determined that the NPRM affected population estimate was likely incorrect. Availability of more recent data	No change because the RA does not directly use the affected population in calculations but instead uses equivalency requests. Data directly affects the calculation of projected cost savings.
Hourly wage rates for private sector and for Federal Government civilian and uniformed personnel.	The NPRM used BLS Occupational and Employment Statistics, Office of Personnel Management (OPM) General Schedule (GS) Pay Tables, and Commandant Instruction U for calendar year 2020.	The final rule uses BLS Occupational and Employment Statistics, OPM GS Pay Tables, and Commandant Instruction W for calendar year 2022.	Availability of more recent data	Encourage consistency across recent rulemakings involving the same category of Coast Guard civilian employees.
Load factor to account for non-wage benefits for private sector employees and Federal Government civilian employees.	The NPRM used BLS Employer Cost for Employee Compensation data for Q4 2020 for private-sector employees. The NPRM used a load factor of 1.75 for civilian Coast Guard marine engineers.	The final rule uses BLS Employer Cost for Employee Compensation data for Q4 2022 for private-sector employees. The final rule uses a load factor of 1.69 for civilian Coast Guard marine engineers.	Encourage consistency across recent rulemakings involving the same category of Coast Guard civilian employees.	Data directly affects the calculation of projected cost savings.

<sup>6</sup> The updated affected population estimate of 5,655 vessels and facilities subject to subchapter F is similar to the estimate from the Update to Electrical Engineering Regulations (Subchapter J) final rule published on March 16, 2023. There is a

high degree of overlap in the populations of vessels and facilities subject to subchapters F and J; therefore, we believe this revised estimate is more accurate than what we presented in the NPRM. Readers can access the Subchapter J final rule at

[www.federalregister.gov/documents/2023/03/16/2023-04370/update-to-electrical-engineering-regulations](http://www.federalregister.gov/documents/2023/03/16/2023-04370/update-to-electrical-engineering-regulations).

With this final rule, the Coast Guard updates 46 CFR subchapter F. This final rule aligns the standards for U.S.-flagged vessels and facilities in subchapter F with current industry practices to ensure that regulatory requirements are consistent with current industry standards. Most of the updates simply incorporate by reference the more recent versions of the same standards with little or no substantive change. In some

cases, the more recent editions reflect more modern technologies, terminology, and practices. The updates also correct regulatory language and remove redundant and outdated references. The Coast Guard finds no additional costs associated with this rule and estimates this rule saves the regulated public and the Federal Government approximately \$9.762 million over the 10-year period of analysis, discounted at 7 percent and

in 2022 dollars. The total annualized cost savings are an estimated \$1.390 million, discounted at 7 percent and in 2022 dollars.

The following RA provides an evaluation of the economic impacts associated with this final rule. Table 3 provides a summary of the rule's costs and benefits.

TABLE 3—SUMMARY OF IMPACTS OF THE FINAL RULE

Category	Summary
Affected Population .....	952 vessel owners and operators, 83 shipyards, builders, and manufacturers of vessels and vessel components, the Coast Guard MSC, and the Commercial Regulations and Standards Directorate (CG-5PS). Approximately 5,614 vessels and 41 floating production systems subject to regulations in subchapter F.
Costs .....	None. The rule does not increase costs of compliance for the regulated public or the Coast Guard.
Cost Savings (7-percent discount rate).	\$9.762 million (10-year discounted cost savings), annualized cost savings: \$1.390 million in 2022 dollars.
Unquantified Benefits .....	Clarity of regulatory intent through stylistic changes and corrections, harmonization of regulatory requirements with current industry standards, better utilization of Coast Guard human resources, compliance with Presidential Regulatory Reform Initiative (March 4, 1995). <sup>7</sup>

The objective of the final rule is to update design standards in 46 CFR subchapter F by incorporating by reference more recent industry standards. The final rule provides clarity, simplifies regulatory compliance for industry with the removal of obsolete regulations, and revises current regulatory text, which includes the correction of errors.<sup>8</sup>

Affected Population

The Coast Guard analyzed the impacts of the final rule to determine the affected population and how the rule affects vessel and facility owners and manufacturers. The engineering updates for subchapter F potentially affect the vessels and facilities inspected under the following subchapters: D “Tank Vessels;” H “Passenger Vessels;” I “Cargo and Miscellaneous Vessels;” I–A “Mobile Offshore Drilling Units;” L “Offshore Supply Vessels;” O “Certain Bulk Dangerous Cargoes;” O–I “Combination Bulk Cargo;” O–D “Combination Bulk Cargo-including chemicals;” R “Nautical Schools;” U “Oceanographic Research Vessels;” and 41 floating production systems (facilities) in 33 CFR subchapter N

“Outer Continental Shelf Activities.”<sup>9</sup> Because the rule impacts only new vessels or those undergoing major conversions, we estimate that fewer than 200 vessels will be impacted annually.<sup>10</sup>

We estimate the final rule affects about 5,614 vessels and 41 facilities owned by approximately 952 owners and operators. The rule directly impacts vessel owners or operators procuring a new vessel or engaging in a major conversion of an existing vessel under conditions specified in the rule. Large self-propelled vessels generally have a greater number of complex engineering systems covered in subchapter F than smaller vessels or barges. With the updates to engineering standards in this final rule, we expect, therefore, that large self-propelled vessels are more likely to be impacted.

In the NPRM for this rulemaking, we significantly overcounted the number of vessels subject to subchapter F because two categories of vessels in MISLE that do not have distinct 46 CFR subchapters, “industrial vessels” and “tank barges,” were incorrectly assumed to be subject to subchapter F’s marine engineering requirements in all cases.

Subchapter F is generally applicable only to larger vessels such as cargo ships, large passenger vessels, and tank vessels, so many vessels in the categories mentioned above are not subject to its requirements. In addition, because cargo and tank barges are not self-propelled, and subchapter F primarily focuses on vital engineering systems such as propulsion and steering systems, much of subchapter F is not applicable to barges.

In this final rule we revise the population estimate, as shown in table 4 below. The total affected population of vessels and facilities is reduced from 16,148 in the proposed rule to 5,655 in the final rule. However, vessels are generally subject to the regulations in effect at the time of ship construction. Therefore, only vessels constructed subsequent to the effective date of this final rule will be subject to its requirements, so our estimate of the average number of new vessels entering service annually (provided in the last row of table 4) provides a much more realistic picture of the affected population of this final rule than does the total universe of vessels subject to subchapter F.

<sup>7</sup> The rule continues the Coast Guard’s response to the Presidential Regulatory Reform Initiative of March 4, 1995, and directives including Executive Orders 12866 and 13563 that are intended to improve regulation and the regulatory process. The provisions of this rule remove outdated regulations, revise current regulatory text, and incorporate by reference more recent national and international

industry standards into the CFR. The Coast Guard recognizes the significant technological advances technology and equipment which is used or carried on vessels. As a result, this rule encourages the use of newer equipment and promotes adherence to modern standards in the industry.

<sup>8</sup> We present a full list of corrections in table 1 of the preamble.

<sup>9</sup> We excluded public vessels from the population.

<sup>10</sup> Based on input from Coast Guard subject matter experts with relevant technical expertise in the Office of Design and Engineering Standards (CG-ENG).

TABLE 4—U.S.-FLAGGED VESSEL AND FACILITY POPULATION SUBJECT TO 46 CFR SUBCHAPTER F

Subchapter F vessels and facilities	Description	Population
D .....	Tank Vessels .....	869
H .....	Passenger Vessels (≥100 gross tons) .....	45
I .....	Cargo and Miscellaneous Vessels .....	623
I-A .....	Mobile Offshore Drilling Units (MODUs) .....	1
L .....	Offshore Supply Vessels (OSV) .....	284
O (tank barge) .....	Certain Bulk Dangerous Cargoes .....	8
R .....	Nautical Schools .....	19
U .....	Oceanographic Research Vessels .....	7
O-I (tank barge) .....	Combination Bulk Cargo .....	145
O-D (tank barge or freight barge) .....	Combination Bulk Cargo-including chemicals .....	3,613
33 CFR subchapter N .....	Floating Production Systems .....	41
<b>Total</b> .....	.....	<b>5,655</b>
Average number of new U.S.-flagged vessels entering service annually.	Includes all subchapters listed above (average of the population for the period 2016–2021).	129

**Note:** These data are based on Coast Guard data found in the MISLE database as of September 9, 2022.

The rule also affects businesses involved in vessel or facility manufacturing. There are approximately 83 shipyards and manufacturers of vessels or vessel components in the affected population. However, the Coast Guard believes that because equipment and vessel manufacturers participate in the development and revision of marine industry standards and ship design requirements, manufacturers are already in voluntary compliance with the changes. In addition, the rule affects the Coast Guard and its staff in the MSC and CG-ENG. The rule impacts an estimated six civilian engineers and six military engineers.

**Summary of Changes Adopted for the Final Rule**

In this final rule, the Coast Guard adopts the changes included in the NPRM, which update the codified references to standards incorporated by reference in subchapter F with their more recent editions. More specifically, the changes in the final rule fall into three categories: (1) editorial changes to the CFR, (2) technical updates to standards incorporated by reference, and (3) compliance alternatives to standards incorporated by reference. Based on data from industry, the Coast Guard assumes industry already uses the more recent standards referenced in the rule.

First, this final rule makes editorial changes to 46 CFR subchapter F (parts 50, 52, 53, 54, 56, 57, 58, 59, 61, 62, 63 and 64) that include such items as the removal of outdated terminology and the consolidation of text. These changes have no costs or cost savings associated with them.

Second, this rule updates standards incorporated by reference throughout subchapter F. Because no resources are

required, and because they have already been adopted voluntarily by manufacturers, these changes have no cost associated with them.

Third, this rule amends the regulatory text in 46 CFR 58.10–5(d)(1) and 61.10–5(g) impacting compliance alternatives for vessel and facility owners or operators. The changes reflect the addition of one compliance alternative and the removal of another. This change results from the discontinuation of a standard incorporated by reference that is the basis of the compliance alternative. (Please see Section IV.D. in the preamble under the discussion, “Part 61—Periodic Tests and Inspections,” and further details in the “Cost Savings” portion of this RA.) These changes provide regulatory flexibility for the regulated public. The final rule imposes no additional costs on industry, and the addition of a compliance alternative in § 61.10–5(g) may save the regulated public money and generate cost savings for vessel and facility owners or operators if they choose to use this compliance alternative.

The final rule promotes consistency between Coast Guard regulations and national and international standards through incorporation by reference, provides options with alternative standards, eliminates obsolete standards, and clarifies the existing requirements through the changes in 46 CFR subchapter F. Readers may consult the preamble of this rule for a general summary of the changes.

The final rule adopts the regulatory changes in the proposed rule. Additionally, based on feedback from the public during the comment period, the rule reorganizes 46 CFR 56.60–1(a)(2) and adds 46 CFR 56.60–1(b) for the purpose of regulatory clarity. These

changes are editorial in nature and do not impose costs on or create cost savings for industry.

**Data Input for Calculations**

This RA uses multiple data sources. We estimated the duration of tasks and determined the relevant personnel with input from Coast Guard subject matter experts within CG-ENG.

The Coast Guard obtained wage data from three publicly available sources. First, for Coast Guard military personnel, we used the Coast Guard Commandant Instruction entitled “Reimbursable Standard Rates” (commonly called Commandant Instruction W).<sup>11</sup> Second, for Coast Guard civilian personnel we used OPM’s GS hourly rates for the Washington, DC, locality pay area for 2022.<sup>12</sup> Third, for workers outside of the Federal Government, we used the BLS Occupational Employment and Wage Statistics dataset for 2022 for private sector wage rates.

To estimate the actual cost savings of labor to employers, the Coast Guard determined the loaded wage rates of each type of occupation (military, civilian in Government, and civilian out of Government) affected by the final

<sup>11</sup> The Instruction is dated August 11, 2022, and is numbered COMDTINST 7310.1W. Appendix B of COMDINST 7310.1W lists the relevant data; please see in-government wage data. The file is available at [https://media.defense.gov/2022/Aug/24/2003063079/-1/-1/0/CI\\_7310\\_1W.PDF](https://media.defense.gov/2022/Aug/24/2003063079/-1/-1/0/CI_7310_1W.PDF) (last visited September 28, 2022). Commandant Instruction W provides fully loaded wage rates for military personnel.

<sup>12</sup> The Coast Guard obtained hourly wage rates from OPM’s salary table for 2022 for the Washington, DC, locality, which readers can access at [https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/salary-tables/pdf/2022/DCB\\_h.pdf](https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/salary-tables/pdf/2022/DCB_h.pdf) (last visited May 12, 2023). For Coast Guard civilian personnel, we use the hourly wage rates that correspond to a step 5 wage rate for the appropriate GS grade.



rule.<sup>13</sup> Commandant Instruction W presents loaded wage rates; therefore, we did not apply a load factor adjustment for Coast Guard military personnel. However, for Coast Guard civilian personnel and for private sector workers outside of the Federal Government, we multiplied the wage data obtained in the previous step by a load factor to estimate the loaded wage rates for these employees. We calculated the load factors to apply to Coast Guard civilian employees from total compensation and wage data in the 2017 Congressional Budget Office (CBO) report “Comparing the Compensation of Federal and Private-Sector Employees, 2011 to 2015.” We calculated the load factor to apply to private sector workers from BLS’s “Employer Cost for Employee Compensation” dataset for the fourth quarter of 2022.

#### Costs

The Coast Guard finds no costs associated with this final rule. The rule does not require actions of manufacturers nor vessel and facility owners or operators. The rule is not retroactive, and existing vessels are not required to be retrofitted.

This rule does not require owners or operators to acquire any standards incorporated by reference; they will not need the standard in hand to comply. Owners and operators need only look for evidence from manufacturers that vessels or facilities meet or exceed the standard before purchase; such evidence could be found in a contract for purchase or repair of a vessel or facility or in product documentation such as a user guide or warranty information. For these reasons, the Coast Guard has not included a cost for the procurement of the newer standards for vessel and facility owners or operators.

The Coast Guard estimates that the regulated public (manufacturers) are currently in voluntary compliance with the requirements of the rule based upon manufacturer participation in the development of industry standards. When standards organizations formulate industry standards, the standards undergo a process of review and comment by the industry. Input from manufacturers is key to developing new standards that consider the engineering capabilities of manufacturers. After the review and comment process, the newer standard is voted upon at the various governing bodies’ committee meetings, and manufacturers are among those

<sup>13</sup> A loaded hourly wage rate is what a company pays per hour to employ a person, not the hourly wage an employee receives. The loaded hourly wage rate includes the cost of non-wage benefits (health insurance, vacation, etc.).

voting. For this reason, the Coast Guard believes manufacturers are aware and knowledgeable about the newer standards. Given this, we further assume they already own copies of the standards and, therefore, have not computed a cost for them to procure the standards incorporated by reference.

Manufacturers have already been producing equipment to meet the standard, and typically begin to make manufacturing modifications even before such changes are adopted formally. Therefore, the Coast Guard does not anticipate that there will be costs to retrofit manufacturing equipment to comply with the final rule. For previous similar rulemakings, no manufacturers commented that they would experience incremental costs of production to comply with newer editions of standards incorporated by reference.<sup>14</sup> For these reasons, the Coast Guard has not included a cost for these provisions. However, the Coast Guard acknowledges that some manufacturers may need to purchase a newer standard. The estimated incremental cost to do so varies according to which standard is needed.<sup>15</sup>

#### Cost Savings

By amending 46 CFR subchapter F, this final rule eliminates confusion from outdated and conflicting rules on marine engineering safety for various vessel or facility components and systems and gives the maritime industry clear instructions on how to comply with regulations. Moreover, this final rule amends existing regulations to reflect current national and international standards. The final rule also generates cost savings to the regulated public and the Federal Government.

Several of the rule’s changes have no cost or cost savings impact. These editorial changes, such as the removal of outdated terminology and the consolidation of text, clarify regulations but do not result in cost savings, as noted earlier. Also, by incorporating the newer standards, the changes provide clarity and specificity. The Coast Guard

<sup>14</sup> A similar rulemaking is the Revision of Crane Regulation Standards for Mobile Offshore Drilling Units, Offshore Supply Vessels, and Floating Outer Continental Shelf Facilities proposed rule, published May 13, 2013 (78 FR 27913) (Docket Number: USCG–2011–0992).

<sup>15</sup> We estimate the cost to acquire a standard by the equation (0.25 hour × supervisory wage rate + 0.5 hour × admin assistant wage rate + cost of purchasing a copy of the standard + shipping cost). We base this equation on the publicly vetted cost estimation in the regulatory analysis for the rule Revision of Crane Regulation Standards for Mobile Offshore Drilling Units, Offshore Supply Vessels, and Floating Outer Continental Shelf Facilities (Docket Number: USCG–2011–0992).

expects these changes to have no direct cost savings since they are inseparable from the cost savings noted previously.

The compliance alternatives remove overly prescriptive requirements, simplify regulatory compliance, and provide regulatory flexibility for industry. In this rule, the Coast Guard includes the compliance alternative to hydrostatic tests from the proposed rule, thereby allowing the regulated public to perform an internal inspection in lieu of the hydrostatic test. The inclusion of this compliance alternative saves a given vessel owner labor and material to the extent that it is used. To comply with the existing requirement for hydrostatic tests, the vessel owner must remove existing lagging around the unit, then replace it once the test is completed. The compliance alternative involves less labor and does not necessitate the removal and replacement of lagging as the existing requirements do. The Coast Guard has not estimated a cost or cost savings for this alternative, as it is unknown how many vessel owners or operators will choose to pursue the alternative. Because equipment sizes vary, the amount of labor and material needed to comply now and under the alternative is also unknown.<sup>16</sup>

The quantifiable cost savings from the rule are due to a reduction in the number of equivalency requests from the regulated public, as well as time dedicated to continuing education on older standards. There are also quantifiable cost savings for the Federal Government because Coast Guard personnel will no longer have to review and approve equivalency requests from the regulated public. Additionally, Coast Guard employees will no longer need to continue with education on older, outdated standards.

To estimate the cost savings of the final rule, the Coast Guard first determined the wages of affected workers. For Coast Guard military personnel, using Commandant Instruction W, we found the wage rate for officers, who are engineers, at the O–3 and O–4 rank, to be \$89 and \$105, respectively. We also found an hourly wage rate of \$117 for a military supervisory engineer with a rank of O–5. The wage rates in Commandant Instruction W are already loaded wage rates; therefore, a load factor adjustment is not required. For Coast Guard civilian personnel, we used hourly pay rates from OPM’s pay table for Federal

<sup>16</sup> This information is needed to determine the existing cost of compliance. Since it is unknown, the Coast Guard is unable to estimate the cost savings of the new compliance alternative.

Government workers in the Washington, DC, locality pay area for calendar year 2022. The unloaded hourly wage rates for a GS-14 (step 5) marine engineer and a GS-15 (step 5) marine engineering supervisor are \$68.55 and \$80.63, respectively.

For private sector workers, we used the hourly wage rates reported in the BLS “Occupational Employment and Wage Statistics” database for May 2022. The unloaded mean hourly wage rate for “Marine Engineers and Naval Architects” (occupational code 17-2121) is \$50.75. The unloaded mean hourly rate for an “Architectural and Engineering Manager” (occupational code 11-9041) is \$78.52.<sup>17</sup>

Next, the Coast Guard determined the loaded mean hourly wage rates to

estimate the total cost savings of employees more accurately by accounting for employees’ non-wage benefits. For Coast Guard civilian positions, we used a Congressional Budget Office (CBO) report “Comparing the Compensation of Federal and Private-Sector Employees, 2011 to 2015,” which includes information on Federal Government worker average wages and average total compensation. We calculated a load factor by dividing the average total compensation in Table 4 of the CBO report by the average wages in Table 2 of the report for Federal Government workers “All Levels of Education.” We obtained a load factor of about 1.69 ( $\$64.80 \div \$38.30$ ).<sup>18</sup>

We calculated the load factor (or benefits multipliers) for the regulated public with fourth quarter 2022 data from the BLS’s “Employer Cost for Employee Compensation” database were used for the regulated public’s wages.<sup>19</sup> The Coast Guard determined the load factor to be approximately 1.46, rounded, for private sector employees by dividing total compensation for workers in “Transportation and Material Moving” occupations by wages ( $\$33.01 \div \$22.66 = 1.46$ ). We estimated the load factor for the applicable occupation category by dividing the total compensation by the unloaded hourly wage rate. Table 5 displays the labor categories, the source of the wage rates, the total compensation, the wage rates, and the calculated load factor.

TABLE 5—LOADED WAGE FACTOR CALCULATION

Occupation category	Data source(s)	Total compensation (a)	Wage and salaries (b)	Loaded wage factor (c) = (a) ÷ (b)
All Workers, Transportation and Moving Materials.	BLS Q4 2022 Employer Costs for Employee Compensation, All workers in Transportation and Materials Moving Occupations.	\$33.01	\$22.66	1.46
Federal Government civilian workers, All Levels of Education.	CBO Report “Comparing the Compensation of Federal and Private Sector Employees, 2011 to 2015” dated April 2017.	64.80	38.30	1.69

After obtaining these load factors, the Coast Guard estimated the cost savings to employers under the final rule. The Coast Guard assumed a constant wage rate and a constant duration for tasks throughout the period of analysis.<sup>20</sup> We based these estimates using 2022 dollars.

The Coast Guard multiplied the unloaded wage rate for a “Marine Engineer and Naval Architect” (occupational code 17-2121) of \$50.75 by the load factor of 1.46 to obtain a loaded mean hourly wage rate of about \$74.10 for this occupation. We also multiplied the unloaded hourly rate for an “Architectural and Engineering Manager” (occupational code 11-9041) of \$78.52, which we then multiplied by 1.46 to obtain a loaded mean hourly wage rate of about \$114.64 for this occupation.

For all provisions related to the Federal Government, the Coast Guard used publicly available data as found in Commandant Instruction W and in the OPM GS pay table to determine wage rates for Coast Guard military and civilian personnel, respectively. The final rule has cost savings for Coast Guard military and civilian engineers and their supervisors at the MSC and in CG-ENG. We estimated the labor rate for a civilian GS-14 engineer in the Coast Guard using a loaded mean hourly wage rate of \$115.85 (unloaded hourly wage rate of \$68.55 × 1.69 load factor). We also estimated a loaded mean hourly wage rate for a civilian GS-15 engineering supervisor in the Coast Guard to be about \$136.26 (unloaded hourly wage rate of \$80.63 × 1.69 load factor). Military engineers at an O-3 or

O-4 rank will be equally involved in processing equivalency requests and staying educated on older standards. Specifically, we expect that for each equivalency request, either an O-3 or O-4 military engineer spends 1 hour reviewing and verifying the accuracy of an equivalency request. We also expect that six O-3 or O-4 military engineers each spend roughly 30 minutes each year on maintaining awareness of older standards. Since engineers of each rank are involved in these tasks, we used the average wage rate of each one, which is \$97 ( $(\$89 + \$105) \div 2$ ).

According to Commandant Instruction W, the loaded wage rate for a military supervisory engineer is \$117 for an O-5. Table 6 presents a summary of the hourly wage rates we used in this analysis.

<sup>17</sup> Readers should access these web pages to view the wage rate: <https://www.bls.gov/oes/2022/may/oes172121.htm> for wage data for marine engineers and naval architects; <https://www.bls.gov/oes/2022/may/oes119041.htm> for wage data for architectural and engineering managers. These pages were last visited on April 25, 2023.

<sup>18</sup> Based on data from the CBO report “Comparing the Compensation of Federal and Private-Sector

Employees, 2011 to 2015,” April 25, 2017. Readers can access the report at <https://www.cbo.gov/system/files/115th-congress-2017-2018/reports/52637-federalprivatepay.pdf> (last visited May 12, 2023).

<sup>19</sup> Readers can access the BLS Employer Cost for Employee Compensation dataset with the following link: [https://www.bls.gov/news.release/archives/ecce\\_03172023.htm](https://www.bls.gov/news.release/archives/ecce_03172023.htm) (last visited May 12, 2023). We

compared the total compensation and wage and salaries data in table 4 for workers in the transportation and material moving occupations series.

<sup>20</sup> Some tasks may take less time in the future due to technological advances. However, the Coast Guard assumed no change in the duration of tasks over the 10-year period of analysis.

TABLE 6—ESTIMATED LOADED HOURLY WAGE RATES FOR THE FINAL RULE  
[\$2022]

Category	Mean hourly wage data source(s)	Unloaded mean hourly wage	Load factor	Loaded hourly wage
		(a)	(b)	(c) = (a × b)
Engineer .....	Marine Engineers and Naval Architects (17–2121) .....	\$50.75	1.46	\$74.10
Supervisory Engineer .....	Architectural and Engineering Managers (11–9041) .....	78.52	1.46	114.64
Coast Guard Civilian Engineer (GS–14).	OPM 2022 GS Pay Tables .....	68.55	1.69	115.85
Coast Guard Civilian Supervisor (GS–15).	OPM 2022 GS Pay Tables .....	80.63	1.69	136.26
Coast Guard Military Engineer (O–3) ..	Appendix B to Commandant Instruction W (released August 2022).	.....	.....	89
Coast Guard Military Engineer (O–4) ..	Appendix B to Commandant Instruction W (released August 2022).	.....	.....	105
Average Military Engineer in MSC .....	As calculated by the average of the hourly wage rates of O–3 and O–4 military engineers.	.....	.....	97
Coast Guard Officer (O–5) .....	Appendix B to Commandant Instruction W (released August 2022).	.....	.....	117

Cost Savings to the Regulated Public

The final rule results in cost savings to the regulated public and the Coast Guard from a reduction in the labor cost for processing equivalency requests and the removal of the education labor cost for the older standards that are incorporated by reference. An equivalency is meant to provide an opportunity for a vessel or facility owner or operator to still meet a regulatory requirement but allows them to do so through a different arrangement or piece of equipment. The Coast Guard expects this final rule to generate cost savings for owners or operators of vessels or facilities who no longer need to request an equivalency of subchapter F regulatory standards from the MSC. Generally, the reason an owner or operator makes an equivalency request is to seek a determination from the Coast Guard as to whether an edition of an industry standard not codified in the CFR is sufficient for use.

Based on MSC and CG–5PS data, the Coast Guard receives approximately 200 equivalency requests annually. The Coast Guard estimates it takes a civilian marine engineer or naval architect employed by a vessel or facility owner approximately 40 hours of time to develop an equivalency request and submit it to the Coast Guard for review. An estimated 0.5 hours is needed for a supervisor engineer to approve the work. The owner or operator of a vessel or facility asks for an equivalency request from the Coast Guard by email. Because a vessel or facility owner or operator makes an equivalency request by email, we did not estimate a cost for this item.

In addition, the regulated public realizes cost savings from the avoided cost of education for maintaining situational awareness on the existing standards incorporated by reference, which the rule eliminates. The Coast Guard estimates that 0.5 hours are spent annually by engineers on education necessary to familiarize or re-familiarize themselves with these standards. The Coast Guard believes that, as industry standards evolve and advance, older editions may not be readily accessible, even if they are incorporated by reference into the CFR. As such, we expect that engineers find the older standards and read them on occasion to maintain an awareness of how these standards are different from current industry standards.

Cost Savings to the Coast Guard

The Coast Guard also experiences cost savings from the rule. When the Coast Guard receives an equivalency request from a vessel or facility owner or operator, a Coast Guard engineering staff member at the MSC must review the request to provide a determination on whether the standard(s) is equivalent to the existing standard(s) found in subchapter F. The Coast Guard MSC engineer needs approximately 32 hours to review an equivalency request, followed by 0.5 hours of supervisor review. In a small percentage of more complex cases, the MSC works with CG–5PS engineering staff to complete the equivalency review. Following review, the MSC emails a decision back to the owner or operator. The Coast Guard estimates it reviews 200 equivalency requests annually. To calculate the costs avoided by Coast

Guard no longer processing equivalency requests, we multiplied the number of annual equivalency requests by the sum of the duration of initial 1 hour of military engineer review, 32 hours of civilian engineer review, and 30 minutes of supervisory engineer review multiplied by the loaded wage rates of the respective Coast Guard personnel performing the review (200 equivalency requests × (1 hour × average wage rate for military engineer + 32 hours × wage rate for civilian engineer + 0.5 hours × wage rate for civilian engineering supervisor)).

In addition, the Coast Guard will save labor costs annually, because staff will no longer need to maintain an awareness of the older versions of standards that are incorporated by reference. The rule eliminates and replaces them with newer standards. The Coast Guard estimates that a marine engineer with a vessel or facility owner or manufacturer of vessels or vessel components who is tasked with working on equivalency requests spend 0.5 hours annually on education on the older standards. We similarly estimate that Coast Guard personnel also spend 0.5 hours on education to maintain awareness and knowledge of older standards. This applies to six civilian engineers and six military engineers who work on equivalency requests. To calculate the costs avoided by Coast Guard personnel no longer requiring education on outdated standards, we multiplied 0.5 hours by the hourly wage rates of the Coast Guard personnel (0.5 hours × (6 military engineers × average wage rate for military engineer + 6 civilian engineers × wage rate for civilian engineer)).

Cost Savings of the Rule

This rule will generate cost savings to two segments of the regulated public: vessel or facility owners or operators and manufacturers. For vessel or facility owners or operators, the Coast Guard estimates that the annual undiscounted cost savings from a reduced number of equivalency requests is about \$604,264 (200 equivalency requests × (40 hours × \$74.10 loaded wage of a marine engineer + 0.5 hours × \$114.64 loaded wage of an engineering manager)). The annual undiscounted cost savings from avoided education on outdated standards is about \$7,410 (200 equivalency requests × (0.5 hours × \$74.10 loaded wage of a marine

engineer)). For manufacturers, we estimate that the annual undiscounted cost savings due to avoided education on older standards is about \$3,075 (83 manufacturers × (0.5 hours × \$74.10 loaded wage of a marine engineer)). Therefore, the total annual undiscounted cost savings to the regulated public is approximately \$614,749.

The Coast Guard estimates that the total annual undiscounted cost savings to the Federal Government due to averted equivalency requests is \$774,466 (200 equivalency requests × ((32 hours × \$115.85 loaded wage of a civilian engineer) + (1 hour × \$97 loaded wage of a uniformed engineer) + (0.5 hours × \$136.26 loaded wage of a

civilian engineering manager)). The estimated total annual undiscounted cost savings to the Federal Government due to avoided education on outdated standards is approximately \$639 (0.5 hours × (6 civilian CG-5PS engineers × \$115.85 loaded wage of a civilian engineer) + (6 uniformed engineers × \$97 loaded wage of a uniformed engineer)). The total annual undiscounted cost savings to the Federal Government is approximately \$775,105.

The total undiscounted cost savings from the rule, therefore, is approximately \$1,389,854. Table 7 presents the estimated cost savings of the rule to the regulated public and to the Coast Guard.

TABLE 7—ESTIMATED ANNUAL UNDISCOUNTED COST SAVINGS OF THE FINAL RULE

CFR citation	Task	Calculation	Cost savings
<b>Cost Savings to Regulated Public (Vessel and Facility Owners or Operators)</b>			
§§ 50.20–5(b), 56.01–10(a); 58.05–1(b); 58.16–10(e); 63.10–1.	Fewer copies required for submittal .....	Too small and inseverable to be calculated separately .....	Unquantifiable
54.01–18(a), 54.10–3, 54.10–3(c), <sup>21</sup> 54.10–20(a)(2), <sup>22</sup> 54.10–3, <sup>23</sup> 54.10–3(c), <sup>24</sup> and 62.25–25(d).	Avoided questions or performance of unrequired tasks due to misunderstanding of rules.	Untracked by the Coast Guard and unreported by regulated public.	Unquantifiable
61.10–5(g) .....	Owner/operator may select method (internal inspection vs hydrostatic test) to comply <sup>25</sup> .	Saves cost of lagging and its installation and the cost difference between internal inspections versus hydrostatic tests; untracked by the Coast Guard and unreported by regulated public.	Unquantifiable
Multiple .....	Avoided preparation and submittal of equivalency request.	200 requests × ((40 hours × \$74.10/hour engineer) + (0.5 hours × \$114.64/hour engineering supervisor)).	\$604,264
Multiple .....	Avoided cost of education .....	200 engineers × 0.5 hours × \$74.10/hour engineer .....	7,410
Subtotal Cost Savings for Regulated Public (Vessel and Facility Owner/Operators).	.....	.....	611,674
<b>Cost Savings to Regulated Public (Manufacturers)</b>			
Multiple .....	Avoided cost of education .....	83 manufacturers × 0.5 hours × \$74.10/hour engineer .....	3,075
Subtotal Cost Savings for Regulated Public (Manufacturers).	.....	.....	3,075
Annual Cost Savings for Regulated Public.	.....	.....	614,749
<b>Cost Savings for the Federal Government (Coast Guard)</b>			
Multiple .....	Avoided processing of equivalency request.	200 requests × ((1 hour × \$97/hour military engineer) + (32 hours × \$115.85/hour civilian engineer) + (0.5 hours × \$136.26/hour civilian engineering supervisor)).	774,466
Multiple .....	Avoided cost of education .....	0.5 hours × ((\$115.85/hour civilian engineer × 6 count civilian engineers) + (\$97/hour × 6 military engineers)).	639
Subtotal for Federal Government ....	.....	.....	775,105
Annual Total for Regulated Public and Federal Government.	.....	.....	1,389,854

Note: Undiscounted costs appear in the table.

The Coast Guard estimates the final rule results in an annualized cost

savings of about \$614,749 (with a 7 percent discount rate) and a 10-year cost

savings of about \$4,317,741 (with a 7 percent discount rate) to industry. Table

<sup>21</sup> Existing regulations have been misunderstood as to whether a pressure vessel (PV) requires or does not require plan review by the Coast Guard. This change clarifies regulatory intent and will preclude inquiries to the Coast Guard.

<sup>22</sup> The requirement for Coast Guard numbering of PVs is often misunderstood. The change clarifies that Coast Guard numbering is required only when

the Coast Guard has inspected the PV during construction (shop inspection).

<sup>23</sup> The requirement for use of the Coast Guard Symbol on PVs (§ 54.10–3) often is misunderstood. This section has been edited to assist readers in finding rules requiring stamping of the Coast guard Symbol.

<sup>24</sup> This section has been clarified by adding a section clearly identifying which PVs do not require stamping.

<sup>25</sup> The change gives operators the option of undergoing an internal inspection every 10 years as opposed to requiring a hydrostatic test every 10 years.

8 summarizes the cost savings per year of the rule for the regulated public.

**TABLE 8—TOTAL ESTIMATED COST SAVINGS OF THE RULE TO INDUSTRY**  
[10-Year period of analysis, 7- and 3-percent discount rates (2022 dollars)]

Year	Discounted		Undiscounted
	7%	3%	
1	\$574,532	\$596,844	\$614,749
2	536,946	579,460	614,749
3	501,818	562,583	614,749
4	468,989	546,197	614,749
5	438,308	530,288	614,749
6	409,633	514,843	614,749
7	382,835	499,847	614,749
8	357,790	485,289	614,749
9	334,383	471,154	614,749
10	312,507	457,431	614,749
Total	4,317,741	5,243,935	6,147,492
Annualized	614,749	614,749	.....

**Note:** Totals may not sum due to independent rounding.

The Coast Guard estimates the final rule results in annualized cost savings to the Federal Government of about \$775,105 (with a 7 percent discount

rate) and a 10-year cost savings of \$5,444,010 (with a 7 percent discount rate). Table 9 summarizes the cost savings of the rule for each year of the

analysis periods for the Federal Government.

**TABLE 9—TOTAL ESTIMATED COST SAVINGS OF THE RULE TO FEDERAL GOVERNMENT**  
[10-Year period of analysis, 7- and 3-percent discount rates (2022 dollars)]

Year	Discounted		Undiscounted
	7%	3%	
1	\$724,397	\$752,529	\$775,105
2	677,006	730,610	775,105
3	632,716	709,330	775,105
4	591,324	688,670	775,105
5	552,639	668,612	775,105
6	516,485	649,138	775,105
7	482,696	630,231	775,105
8	451,118	611,875	775,105
9	421,606	594,053	775,105
10	394,024	576,751	775,105
Total	5,444,010	6,611,799	7,751,046
Annualized	775,105	775,105	.....

**Note:** Totals may not sum due to independent rounding.

**Unquantified Benefits**

In this final rule, the Coast Guard is incorporating by reference updated industry standards. These updated standards reflect the latest available technologies, practices, and procedures that voluntary consensus standards organizations, ship classification societies, or maritime organizations recommend for use within the industry. The Coast Guard is making these updates to harmonize the standards in the CFR with the latest industry standards. As a result, these updates provide the qualitative benefit of greater

consistency between the CFR and current industry practices. Updating to some newer editions of standards also provides more flexibility for regulatory compliance. In addition, the final rule provides qualitative benefits through certain editorial changes that correct for inadvertent errors, remove obsolete language, update Coast Guard contact information, standardize the use of words and phrases in the CFR, account for relocation of certain provisions, and standardize the designation of tables and figures. These changes improve clarity of regulatory requirements and reduce confusion, thereby improving

service to the regulated public through more accurate information.

**Alternatives Considered**

Within the Coast Guard’s development of this rule, significant alternatives to the regulatory component(s) were considered to determine if any alternative could accomplish the stated objectives of applicable statutes and could minimize any significant economic impact of the rule on small entities beyond the rule. Among these alternatives were the following:

### Alternative 1: Take No Action

The Coast Guard could have chosen not to pursue the rulemaking. Taking no action would cause no incremental costs to regulated entities nor to the Coast Guard. However, in doing nothing, the Coast Guard would have no mechanism to update regulations to reflect current practices and improve their relevance to the public. There would be neither an increase nor decrease in benefits to regulated entities due to the alternative. The rule has been estimated to produce quantifiable cost savings to the Coast Guard and the regulated public, which would not be possible under the alternative of no action.

In addition, the standards currently incorporated by reference are outdated. To keep them codified would, in theory, maintain existing safety levels.

However, because they are so outdated, they are sparsely available. Compliance with them may become problematic in the future due to lack of availability. The older editions of the standards do not contain guidance for several current industry practices. Maintaining the regulations with the existing standards incorporated by reference does not allow for the cost savings the rule does.

We rejected this alternative because taking no action would not provide additional benefits to the public. The public and the Coast Guard, under this alternative, would not experience cost savings through reduction in the number of submissions of equivalency requests and ongoing education on outdated standards. Additionally, reliance on older editions of standards in the CFR as industry practices continue to evolve may cause confusion. By rejecting this alternative, the Coast Guard will provide greater clarity of regulatory requirements and better service to public with the final rule.

### Alternative 2: Delay the Effective Date

The Coast Guard could have delayed the effective date beyond the 90 days after publication of the final rule currently provided. Delayed effective dates are used to aid in compliance implementation, particularly when the labor costs or capital costs are considerable. The compliance costs for this rule are, as noted earlier, zero, and a delayed effective date delays the cost savings opportunities to all parties. For these reasons, the Coast Guard rejected this alternative.

### Alternative 3: Exempt Small Entities

The Coast Guard could have exempted small entities from some or all of the rule's provisions. In principle, an exemption could save small entities

time and money to comply with regulations. Exemptions for small entities often are used when costs of compliance, such as capital costs, are high. However, there are no costs of compliance for this rule. For this alternative, an exemption may cause the cost savings opportunities of the rulemaking to be precluded for small entities and, thereby, the total value of the rule's cost savings declines accordingly.

The rule implements requirements for business practices in which the majority (if not all) of small businesses now engage. An exemption for small business entities from the rulemaking would have little effective and practical impact on small business entities. There is a high level of voluntary compliance and limited applicability for the affected population. The costs of compliance are zero and the rule is applicable only if an actionable event occurs (for example, if a new vessel is procured or an existing vessel undergoes a major conversion). For these reasons, the Coast Guard did not pursue an exemption for small entities.

### B. Small Entities

Under the Regulatory Flexibility Act of 1980 (5 U.S.C. 601–612), we have considered whether this final rule will have a significant economic impact on a substantial number of small entities. The term “small entities” comprises small businesses, not-for-profit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations of less than 50,000.

The rule creates cost savings for industry because we estimate fewer equivalency requests will be submitted to the Coast Guard. We expect equivalency requests to be submitted by owners or operators of new U.S.-flagged vessels or facilities who may have questions about standards that are not in 46 CFR subchapter F. Over a 6-year period, from 2016–2021, we found 771 new U.S.-flagged vessels entered service, or an average of about 129 annually during this period. We found that 156 companies owned the 771 vessels. The final rule also potentially affects 22 nonprofits, under the conditions specified in the rule.

Using the publicly-available online database “ReferenceUSA.gov” (in addition to individual online searches of companies) to search for company-specific information, such as annual revenues and number of employees, we found revenue and employee information on 139 of the 178

companies and nonprofits,<sup>26</sup> or approximately 78 percent.<sup>27</sup> Using the Small Business Administration's (SBA) “Table of Size Standards”<sup>28</sup> and the North American Industry Classification System (NAICS) codes listed in the table, we found 49 of the 139 companies to be small entities. We found the other 90 companies to be not small. We did not find information on the remaining 38 companies and one nonprofit; therefore, we assumed these companies to be small entities for a total of 88 small entities out of 178, or approximately 49 percent.

We analyzed the potential economic impacts of this final rule on small entity companies and nonprofits and found that each entity that no longer submits an equivalency request saves approximately \$3,058 ((40 hours × \$74.10 loaded wage of a marine engineer or equivalent employee) + (0.5 hours × \$114.64 loaded wage rate of an engineering manager or equivalent employee) + (0.5 hours × \$74.10 loaded wage of a marine engineer or equivalent employee)) annually. The cost savings of \$3,058 is less than 1 percent of annual revenue for 42 out of 47 small entity companies and nonprofits for which we obtained revenue information, or approximately 89 percent.<sup>29</sup> We found cost savings to revenue ratios of greater than 1 percent but less than 2 percent for the five remaining small entity companies and non-profits.<sup>30</sup>

Additionally, the final rule potentially impacts manufacturers of vessels or vessel or facility components. We estimate the average potential cost savings to manufacturers for no longer needing education older standards is about \$57 (\$114.64 loaded hourly wage of an engineering manager × 0.5 hours).

Therefore, the Coast Guard certifies under 5 U.S.C. 605(b) that this final rule

<sup>26</sup> Including colleges and universities, museums, and science foundations.

<sup>27</sup> Readers can access company-specific information at <https://www.referenceusagov.com> (last visited May 12, 2023).

<sup>28</sup> The Coast Guard used the October 2022 version of the SBA's table of size standards. Readers can access this version at the following web page: [https://www.sba.gov/sites/default/files/2022-09/Table%20of%20Size%20Standards%20NAICS%202022%20Final%20Rule\\_Effective%20October%201%2C%202022.pdf](https://www.sba.gov/sites/default/files/2022-09/Table%20of%20Size%20Standards%20NAICS%202022%20Final%20Rule_Effective%20October%201%2C%202022.pdf) (last visited May 12, 2023).

<sup>29</sup> The Coast Guard found revenue data on a 48th small entity, however, the reported revenue was \$0, which we believe may have been in error. Since we could not verify the accuracy of this reported amount, we chose not to include this data point in our assessment of the potential economic impacts of the rule on small entities.

<sup>30</sup> For four small entity companies and one small entity nonprofit, the impact from a reduced number of equivalency requests would be greater than 1 percent and less than 2 percent of annual revenues.

does not have a significant economic impact on a substantial number of small entities because the cost savings of this final rule will have a positive impact on revenues of less than 1 percent on nearly 90 percent of the small entity owners that we researched. We also found that the potential cost savings to manufacturers is less than 1 percent of revenue among all manufacturers for which we could obtain revenue information. Furthermore, no small entity that does not submit an equivalency request will be impacted by any cost savings.

If you think that your business, organization, or governmental jurisdiction qualifies as a small entity and that this rule will have a significant economic impact on it, please submit a comment to docket at the address in the **ADDRESSES** section. In your comment, explain why you think it qualifies and how and to what degree this rule will affect it economically.

#### C. Assistance for Small Entities

Under section 213(a) of the Small Business Regulatory Enforcement Fairness Act of 1996, Public Law 104–121, we want to assist small entities in understanding this rule so that they can better evaluate its effects on them and participate in the rulemaking. If the rule affects your small business, organization, or governmental jurisdiction and you have questions concerning its provisions or options for compliance, please call or email the person in the **FOR FURTHER INFORMATION CONTACT** section of this rule. The Coast Guard will not retaliate against small entities that question or complain about this rule or any policy or action of the Coast Guard.

Small businesses may send comments on the actions of Federal employees who enforce, or otherwise determine compliance with, Federal regulations to the Small Business and Agriculture Regulatory Enforcement Ombudsman and the Regional Small Business Regulatory Fairness Boards. The Ombudsman evaluates these actions annually and rates each agency's responsiveness to small business. If you wish to comment on actions by employees of the Coast Guard, call 1–888–REG–FAIR (1–888–734–3247).

#### D. Collection of Information

The Paperwork Reduction Act of 1995 (44 U.S.C. 3501–3520) requires the U.S. Coast Guard to consider the impact of paperwork and other information collection burdens imposed on the public. As defined in 5 CFR 1320.3(c), “collection of information” comprises reporting, recordkeeping, monitoring,

posting, labeling, and other similar actions.

This rule does not require a modification of an existing collection of information and does not call for new collection of information under the Paperwork Reduction Act.

#### E. Federalism

A rule has implications for federalism under Executive Order 13132 (Federalism) if it has a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of Government. We have analyzed this rule under Executive Order 13132 and determined that it is consistent with the fundamental federalism principles and preemption requirements described in Executive Order 13132. Our analysis follows.

It is well settled that States may not regulate in categories reserved by Congress for regulation by the Coast Guard. It is also well settled that all of the categories regulated under 43 U.S.C. 1333 and 46 U.S.C. 3306 and 3703, as well as any other category in which Congress intended the Coast Guard to be the sole source of a vessel's obligations, are within the field foreclosed from regulation by the States. *See United States v. Locke* and *Intertanko v. Locke*, 529 U.S. 89 (2000). This rulemaking updates the references to incorporated standards in 46 CFR subchapter F, which is authorized under 43 U.S.C. 1333, 46 U.S.C. 3306, and 46 U.S.C. 3703. Therefore, because the States may not regulate within these categories, this rule is consistent with the fundamental federalism principles and preemption requirements described in Executive Order 13132.

While it is well settled that States may not regulate in categories in which Congress intended the Coast Guard to be the sole source of a vessel's obligations, the Coast Guard recognizes the key role that State and local governments may have in making regulatory determinations. Additionally, for rules with federalism implications and preemptive effect, Executive Order 13132 specifically directs agencies to consult with State and local Governments during the rulemaking process. If you believe this rule has implications for federalism under Executive Order 13132, please contact the person listed in the **FOR FURTHER INFORMATION** section of this preamble.

#### F. Unfunded Mandates Reform Act

The Unfunded Mandates Reform Act of 1995, 2 U.S.C. 1531–1538, requires Federal agencies to assess the effects of

their discretionary regulatory actions. In particular, the Act addresses actions that may result in the expenditure by a State, local, or tribal government, in the aggregate, or by the private sector of \$100,000,000 (adjusted for inflation) or more in any one year. Although this rule does not result in such an expenditure, we do discuss the effects of this rule elsewhere in this preamble.

#### G. Taking of Private Property

This rule does not cause a taking of private property or otherwise have taking implications under Executive Order 12630 (Governmental Actions and Interference with Constitutionally Protected Property Rights).

#### H. Civil Justice Reform

This rule meets applicable standards in sections 3(a) and 3(b)(2) of Executive Order 12988, (Civil Justice Reform), to minimize litigation, eliminate ambiguity, and reduce burden.

#### I. Protection of Children

We have analyzed this rule under Executive Order 13045 (Protection of Children from Environmental Health Risks and Safety Risks). This rule is not an economically significant rule and does not create an environmental risk to health or risk to safety that might disproportionately affect children.

#### J. Indian Tribal Governments

This rule does not have Tribal implications under Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), because it does not have a substantial direct effect on one or more Tribal governments, on the relationship between the Federal Government and Tribal governments, or on the distribution of power and responsibilities between the Federal Government and Tribal governments.

#### K. Energy Effects

We have analyzed this rule under Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use). We have determined that it is not a “significant energy action” under that order because it is not a “significant regulatory action” under Executive Order 12866 and is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

#### L. Technical Standards

The National Technology Transfer and Advancement Act, codified as a note to 15 U.S.C. 272, directs agencies to use voluntary consensus standards in

their regulatory activities unless the agency provides Congress, through OMB, with an explanation of why using these standards would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (such as specifications for materials, performance, design, or operation; test methods; sampling procedures; and related management systems practices) that are developed or adopted by voluntary consensus standards bodies.

This rule uses the following voluntary standards:

- ABS Rules for Building and Classing Marine Vessels, 2020, Part 4, Vessel Systems and Machinery, January 2020 (“ABS Marine Vessel Rules”).
- ABYC P-1-14, Installation of Exhaust Systems for Propulsion and Auxiliary Engines, reaffirmed 2014 (“ABYC P-1”).
- ANSI Z21.22-2015, Relief valves for hot water supply systems, July 2015 (“ANSI Z21.22”).
- API Recommended Practice 14C, Analysis, Design, Installation, and Testing of Safety Systems for Offshore Production Facilities, Eighth Edition, February 2017 with errata May 2018 (“API RP 14C”).
- API Standard 53 Well Control Equipment Systems for Drilling Wells, Fifth Edition, December 2018 (“API STD 53”).
- API Standard 607, Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats, Seventh Edition, June 2016 (“API STD 607”).
- 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”).
- ASME Boiler and Pressure Vessel Code, Section IV, Rules for Construction of Heating Boilers, 2019 Edition, issued July 1, 2019 (“Section IV of the ASME BPVC”).
- ASME Boiler and Pressure Vessel Code, Section VII, Recommended Guidelines for the Care of Power Boilers, 2019 Edition, issued July 1, 2019 (“Section VII of the ASME BPVC”).
- ASME Boiler and Pressure Vessel Code, Section VIII, Rules for Construction of Pressure Vessels, 2019 Edition, issued July 1, 2019 (“Section VIII of the ASME BPVC”).
- 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”).
- ASME B1.1-2003 (reaffirmed 2008), Unified Inch Screw Threads (UN and UNR Thread Form), issued September 30, 2004 (“ASME B1.1”).
- ASME B1.20.1-2013, Pipe Threads, General Purpose (Inch), issued November 15, 2013 (“ASME B1.20.1”).
- ANSI B1.20.3-1976 (Reaffirmed 2013), Dryseal Pipe Threads (Inch), issued November 18, 1976 (“ASME B1.20.3”).
- ASME B16.1-2015, Gray Iron Pipe Flanges and Flanged Fittings, Classes 25, 125, and 250, issued December 28, 2015 (“ASME B16.1”).
- ASME B16.3-2016, Malleable Iron Threaded Fittings, Classes 150 and 300, issued November 30, 2016 (“ASME B16.3”).
- ASME B16.4-2016, Gray Iron Threaded Fittings Classes 125 and 250, issued November 11, 2016 (“ASME B16.4”).
- ASME B16.5-2017, Pipe Flanges and Flanged Fittings NPS ½ through NPS 24 Metric/Inch Standard, issued November 20, 2017 (“ASME B16.5”).
- ASME B16.11-2016, Forged Fittings, Socket-Welding and Threaded, issued January 20, 2017 including errata (“ASME B16.11”).
- ASME B16.14-2013, Ferrous Pipe Plugs, Bushings, and Locknuts with Pipe Threads, issued November 15, 2013 (“ASME B16.14”).
- ASME B16.15-2013, Cast Copper Alloy Threaded Fittings, Classes 125 and 250, issued December 6, 2013 (“ASME B16.15”).
- ASME B16.20-2012, Metallic Gaskets for Pipe Flanges, Ring-Joint, Spiral-Wound, and Jacketed, issued June 25, 2013 (“ASME B16.20”).
- ASME B16.21-2016, Nonmetallic Flat Gaskets for Pipe Flanges, issued December 9, 2016 (“ASME B16.21”).
- ASME B16.23-2016, Cast Copper Alloy Solder Joint Drainage Fittings: DWV, issued January 16, 2017 (“ASME B16.23”).
- ASME B16.25-2012, Buttwelding Ends, issued December 20, 2012 (“ASME B16.25”).
- ASME B16.29-2012, Wrought Copper Alloy Solder-Joint Drainage Fittings-DWV, issued September 26, 2012 (“ASME B16.29”).
- ASME B16.34-2017, Valves—Flanged, Threaded, and Welding End, issued August 23, 2017 (“ASME B16.34”).
- 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”).
- ASME B18.2.2-2015, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Couplings Nuts (Inch Series), issued November 30, 2015 (“ASME B18.2.2”).
- ASME B31.1-2016, Power Piping, ASME Code for Pressure Piping, B31, issued June 30, 2016 (“ASME B31.1”).
- ASME B31.3-2018, Process Piping, ASME Code for Pressure Piping, B31, issued August 30, 2019 (“ASME B31.3”).
- ASME B31.5-2016, Refrigeration Piping and Heat Transfer Components, ASME Code for Pressure Piping, B31, issued June 29, 2016 (“ASME B31.5”).
- ASME B36.10M-2015, Welded and Seamless Wrought Steel Pipe, issued August 31, 2015 (“ASME B36.10M”).
- ASME B36.19M-2004, Stainless Steel Pipe (Reaffirmed 2015), issued October 25, 2004 (“ASME B36.19M”).
- ASME CSD-1-2018, Controls and Safety Devices for Automatically Fired Boilers, issued October 12, 2018 (“ASME CSD-1”).
- ASME BPVC.II.A-2021/SA-675-2021, 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”).
- ASTM A20/A20M-19, Standard Specification for General Requirements for Steel Plates for Pressure Vessels, approved May 1, 2019 (“ASTM A20/A20M”).
- ASTM A36/A36M-14, Standard Specification for Carbon Structural Steel, approved December 1, 2014 (“ASTM A36/A36M”).
- ASTM A47/A47M-99 (Reapproved 2014), Standard Specification for Ferritic Malleable Iron Castings, approved April 1, 2014 (“ASTM A47/A47M”).
- 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”).
- ASTM A126-04 (Reapproved 2014), Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings, approved April 1, 2014 (“ASTM A126”).
- ASTM A135/A135M-19, Standard Specification for Electric-Resistance-Welded Steel Pipe, approved May 1, 2019 (“ASTM A135/A135M”).
- ASTM A193/A193M-19, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High-Temperature Service or High Pressure Applications, approved November 1, 2019 (“ASTM A193/A193M”).



- ASTM A197/A197M-00 (Reapproved 2015), Standard Specification for Cupola Malleable Iron, approved November 1, 2015 (“ASTM A197/A197M”).
- ASTM A203/A203M-17, Standard Specification for Pressure Vessel Plates, Alloy Steel, Nickel, approved November 1, 2017 (“ASTM A203/A203M”).
- ASTM A210/A210M-19, Standard Specification for Seamless Medium-Carbon Steel Boiler and Superheater Tubes, approved May 1, 2019 (“ASTM A210/A210M”).
- 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”).
- ASTM A276/A276M-17, Standard Specification for Stainless Steel Bars and Shapes, approved March 15, 2017 (“ASTM A276/A276M”).
- ASTM A312/A312M-17, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes, approved March 15, 2017 (“ASTM A312/A312M”).
- 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”).
- 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”).
- 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”).
- 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”).
- 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”).
- ASTM A370-19, Standard Test Methods and Definitions for Mechanical Testing of Steel Products, approved July 1, 2019 (“ASTM A370”).
- ASTM A376/A376M-17, Standard Specification for Seamless Austenitic Steel Pipe for High-Temperature Service, approved September 1, 2017 (“ASTM A376/A376M”).
- ASTM A403/A403M-16, Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings, approved May 1, 2016 (“A403/A403M”).
- 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”).
- 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”).
- ASTM A575-96 (Reapproved 2013), Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades, approved April 1, 2013 (“ASTM A575”).
- ASTM A576-17, Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, approved November 1, 2017 (“ASTM 576”).
- 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”).
- ASTM B21/B21M-20, Standard Specification for Naval Brass Rod, Bar, and Shapes, approved April 1, 2020 (“ASTM B21/B21M”).
- ASTM B26/B26M-18, Standard Specification for Aluminum-Alloy Sand Castings, approved May 15, 2018 (“ASTM B26/B26M”).
- ASTM B42-20, Standard Specification for Seamless Copper Pipe, Standard Sizes, approved April 1, 2020 (“ASTM B42”).
- ASTM B43-15, Standard Specification for Seamless Red Brass Pipe, Standard Sizes, approved October 1, 2015 (“ASTM B43”).
- ASTM B68/B68M-19, Standard Specification for Seamless Copper Tube, Bright Annealed, approved April 1, 2019 (“ASTM B68/B68M”).
- ASTM B75/B75M-19, Standard Specification for Seamless Copper Tube, approved April 1, 2019 (“ASTM B75/B75M”).
- ASTM B85/B85M-18, Standard Specification for Aluminum-Alloy Die Castings, approved May 1, 2018 (ASTM B85/B85M”).
- 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”).
- ASTM B111/B111M-18a, Standard Specification for Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock, approved October 1, 2018 (“ASTM B111/B111M”).
- ASTM B122/B122M-16, Standard Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip, and Rolled Bar, approved April 1, 2016 (“ASTM B122”).
- ASTM B124/B124M-18, Standard Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes, approved March 15, 2018 (“ASTM B124/B124M”).
- ASTM B127-19, Standard Specification for Nickel-Copper Alloy Plate, Sheet, and Strip, approved November 1, 2019 (“ASTM B127”).
- ASTM B152/B152M-19, Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar, approved October 1, 2019 (“ASTM B152”).
- ASTM B161-05 (Reapproved 2019), Standard Specification for Nickel Seamless Pipe and Tube, approved April 1, 2019 (“ASTM B161”).
- ASTM B165-19, Standard Specification for Nickel-Copper Alloy Seamless Pipe and Tube, approved November 1, 2019 (“ASTM B165”).
- 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”).
- 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”).
- ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate, approved November 1, 2014 (“ASTM B209”).
- ASTM B210/B210M-19a, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes, approved November 1, 2019 (“ASTM B210”).
- 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”).
- ASTM B241/B241M-16, Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube, approved

February 1, 2016 (“ASTM B241/B241M”).

- ASTM B280–18, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service, approved March 1, 2018 (“ASTM B280”).

- ASTM B283/B283M–18, Standard Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed), approved March 1, 2018 (“ASTM B283/B283M”).

- ASTM B315–19, Standard Specification for Seamless Copper Alloy Pipe and Tube, approved April 1, 2019 (“ASTM B315”).

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

- 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”).

- ASTM D92–18, Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester, approved July 1, 2018 (“ASTM D92”).

- ASTM D93–19, Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester, approved November 1, 2019 (“ASTM D93”).

- ASTM D323–15a, Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method), approved June 1, 2015 (“ASTM D323”).

- ASTM D665–19, Standard Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water, approved December 1, 2019 (“ASTM D665”).

- ASTM E23–18, Standard Test Methods for Notched Bar Impact Testing of Metallic Materials, approved June 1, 2018 (“ASTM E23”).

- ASTM E208–19, Standard Test Method for Conducting Drop-Weight Test to Determine Nil-Ductility Transition Temperature of Ferritic Steels, approved October 1, 2019 (“ASTM E208”).

- ASTM F1006–86 (Reapproved 2018), Standard Specification for Entrainment Separators for Use in Marine Piping Applications, approved September 1, 2018 (“ASTM F1006”).

- ASTM F1007–18, Standard Specification for Pipeline Expansion Joints of the Packed Slip Type for Marine Application, approved May 1, 2018 (“ASTM F1007”).

- ASTM F1020–86 (Reapproved 2018), Standard Specification for Line-Blind Valves for Marine Applications, approved March 1, 2018 (“ASTM F1020”).

- ASTM F1120–87 (Reapproved 2015), Standard Specification for Circular Metallic Bellows Type Expansion Joints for Piping Applications, approved May 1, 2015 (“ASTM F1120”).

- ASTM F1123–87 (Reapproved 2015), Standard Specification for Non-Metallic Expansion Joints, approved May 1, 2015 (“ASTM F1123”).

- ASTM F1139–88 (Reapproved 2015), Standard Specification for Steam Traps and Drains, approved May 1, 2015 (“ASTM F1139”).

- ASTM F1155–10 (Reapproved 2015), Standard Practice for Selection and Application of Piping System Materials, approved May 1, 2015 (“ASTM F1155”).

- ASTM F1172–88 (Reapproved 2015), Standard Specification for Fuel Oil Meters of the Volumetric Positive Displacement Type, approved May 1, 2015 (“ASTM F1172”).

- ASTM F1173–01 (Reapproved 2018), Standard Specification for Thermosetting Resin Fiberglass Pipe Systems to be Used for Marine Applications, approved March 1, 2018 (“ASTM F1173”).

- 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”).

- 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”).

- ASTM F1201–88 (Reapproved 2016), Standard Specification for Fluid Conditioner Fittings in Piping Applications above 0 °F, approved September 1, 2016 (“ASTM F1201”).

- ASTM F1323–14, Standard Specification for Shipboard Incinerators, approved November 1, 2014 (“ASTM F1323”).

- ASTM F1387–19, Standard Specification for Performance of Piping and Tubing Mechanically Attached Fittings, approved September 15, 2019 (“ASTM F1387”).

- ASTM F1476–07 (Reapproved 2013), Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications, approved October 1, 2013 (“ASTM F1476”).

- 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”).

- CGA S–1.2–2009, Pressure Relief Device Standards—Part 2—Portable

Containers for Compressed Gases, Ninth Edition, 2009 (“CGA S–1.2”).

- Standards of the Expansion Joint Manufacturers Association, Tenth Edition, 2015.

- FCI 69–1, Pressure Rating Standard for Steam Traps, 2017 (“FCI 69–1”).

- SOLAS Consolidated Edition 2020, Consolidated text of the International Convention for Safety of Life at Sea, 1974, and its Protocol of 1988: articles, annexes and certificates, 2020 (“SOLAS”).

- IMO Resolution A.467(XII), Guidelines for Acceptance of Non-Duplicated Rudder Actuators for Tankers, Chemical Tankers and Gas Carriers of 10,000 Tons Gross Tonnage and Above But Less Than 100,000 Tonnes Deadweight, 1981 (“IMO A.467(XII)”).

- IMO Resolution A.753(18), Guidelines for the Application of Plastic Pipes on Ships, November 4, 1993 (“IMO Resolution A.753(18)”).

- IMO Resolution MEPC.76(40), Standard Specification for Shipboard Incinerators, September 25, 1997 (“IMO MEPC.76(40)”).

- IMO Resolution MEPC.244(66), Standard Specification for Shipboard Incinerators, April 4, 2014 (“IMO MEPC.244(66)”).

- IMO 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)”).

- IMO Resolution MSC.337(91), Code on Noise Levels on Board Ships, November 30, 2012 (“IMO MSC.337(91)”).

- The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), Annexes I, II, III, and V (1978) (“IMO MARPOL 73/78”).

- ISO 9096:2017(E), Stationary source emissions—Manual determination of mass concentration of particulate matter, Third Edition, September 2017 (“ISO 9096”).

- ISO 10396:2007(E), Stationary source emissions—Sampling for the automated determination of gas emission concentrations for permanently-installed monitoring systems, Second Edition, February 1, 2007 (“ISO 10396”).

- ISO 13617:2019(E), Ships and marine technology—Shipboard incinerators—Requirements, Third Edition, August 2019 (“ISO 13617”).

- 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”).

- MSS SP-6-2017, Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings, approved January 2017, published March 2017 (“MSS SP-6”).
- MSS SP-9-2013, Spot Facing for Bronze, Iron, and Steel Flanges, approved October 2012, published March 2013 (“MSS SP-9”).
- MSS SP-25 (ANSI/MSS SP-25-2018), Standard Marking System for Valves, Fittings, Flanges and Unions, approved March 2018, published September 2018 (“MSS SP-25”).
- MSS SP-45-2003, Bypass Drain Connections, 2008 Edition, originally approved July 1953, reaffirmed 2008 (“MSS SP-45”).
- MSS SP-51-2012, Class 150LW Corrosion Resistant Flanges and Cast Flanged Fittings, 2012 Revision, approved August 2011, published May 2012 (“MSS SP-51”).
- MSS SP-53-2012, Quality Standard for Steel Castings and Forgings for Valves, Flanges, Fittings, and Other Piping Components-Magnetic Particle Examination Method, approved October 2012, published December 2012 (“MSS SP-53”).
- MSS SP-55 (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, 2011 Revised Edition, approved August 2011, published October 2011 (“MSS SP-55”).
- MSS SP-58 (ANSI/MSS SP-58-2009), Pipe Hangers and Supports-Materials, Design, Manufacture, Selection, Application, and Installation, approved May 2011, published October 2011 (“MSS SP-58”).
- MSS SP-61-2019, Pressure Testing of Valves, approved September 2019, published December 2019 (“MSS SP-61”).
- NFPA 302, Fire Protection Standard for Pleasure and Commercial Motor Craft, 2020 Edition, approved August 25, 2019 (“NFPA 302”).
- SAE J429 MAY2014, Mechanical and Material Requirements for Externally Threaded Fasteners, revised May 2014 (“SAE J429”).
- SAE J1475 JUN2014, Hydraulic Hose Fittings for Marine Applications, stabilized June 2014 (“SAE J1475”).
- SAE J1928 JUN2018, Devices Providing Backfire Flame Control for Gasoline Engines in Marine Applications, revised June 2018 (“SAE J1928”).
- SAE J1942 MAR2019, Hose and Hose Assemblies for Marine Applications, revised March 2019 (“SAE J1942”).

- UL 174, Standard for Safety, Household Electric Storage Tank Water Heaters, Eleventh Edition, April 29, 2004, including revisions through December 15, 2016 (“UL 174”).
- UL 296, Standard for Safety, Oil Burners, Eleventh Edition, February 24, 2017 (“UL 296”).
- UL 343, Standard for Safety, Pumps for Oil-Burning Appliances, Ninth Edition, December 17, 2008, including revisions through June 12, 2013 (“UL 343”).
- UL 1453, Standard for Safety, Electric Booster and Commercial Storage Tank Water Heaters, Sixth Edition, March 29, 2016, including revisions through March 9, 2017 (“UL 1453”).

The Director of the Federal Register has approved the material in §§ 52.01-1, 53.01-1, 54.01-1, 56.01-2, 57.02-1, 58.03-1, 59.01-2, 61.03-1, 62.05-1, and 63.05-1 for incorporation by reference under 5 U.S.C. 552 and 1 CFR part 51. Copies of the material are available from the sources listed in §§ 52.01-1, 53.01-1, 54.01-1, 56.01-2, 57.02-1, 58.03-1, 59.01-2, 61.03-1, 62.05-1, and 63.05-1.

Consistent with 1 CFR part 51 incorporation by reference provisions, this material is reasonably available. Interested persons have access to it through their normal course of business, may purchase it from the organization identified in §§ 52.01-1, 53.01-1, 54.01-1, 56.01-2, 57.02-1, 58.03-1, 59.01-2, 61.03-1, 62.05-1, and 63.05-1, or may view a copy by means we have identified in those sections.

#### *M. Environment*

We have analyzed this rule under Department of Homeland Security Management Directive 023-01, Rev. 1, associated implementing instructions, and Environmental Planning COMDTINST 5090.1 (series), which guide the Coast Guard in complying with the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4370f), and have determined that this action is one of a category of actions that do not individually or cumulatively have a significant effect on the human environment. A final Record of Environmental Consideration supporting this determination is available in the docket. For instructions on locating the docket, see the **ADDRESSES** section of this preamble. This rule is categorically excluded under paragraphs L54, L57 and L58 of Appendix A, Table 1 of DHS Instruction Manual 023-01, Rev. 1.<sup>31</sup> Paragraph L54

pertains to regulations which are editorial and procedural; paragraph L57 pertains to regulations concerning manning, documentation, admeasurement, inspection, and equipping of vessels; and paragraph L58 pertains to regulations concerning equipment approval and carriage requirements.

This action involves amending rules relating to standards for marine engineering details for various types of vessels, including incorporation of national and international safety standards by reference. This rule is part of the Coast Guard’s ongoing regulatory reform efforts to increase compliance options for the regulated public while providing cost savings to the public and U.S. Government, and also promotes the Coast Guard’s marine safety mission.

#### **List of Subjects**

##### *46 CFR Part 50*

Reporting and recordkeeping requirements, Vessels.

*46 CFR Parts 52, 53, 54, 56, 57, 58, 59, 61, 62, and 64*

Incorporation by reference, Reporting and recordkeeping requirements, Vessels.

##### *46 CFR Part 63*

Incorporation by reference, Vessels.

For the reasons discussed in the preamble, the Coast Guard amends 46 CFR parts 50, 52, 53, 54, 56, 57, 58, 59, 61, 62, 63, and 64 (subchapter F) as follows:

#### **PART 50—GENERAL PROVISIONS**

- 1. The authority citation for part 50 is revised to read as follows:

**Authority:** 43 U.S.C. 1333; 46 U.S.C. 3306, 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3; Section 50.01-20 also issued under the authority of 44 U.S.C. 3507.

##### **§ 50.01-10 [Amended]**

- 2. In § 50.01-10(b), remove the word “shall” and add, in its place, the word “must”.

- 3. Revise and republish subpart 50.05 to read as follows:

##### **Subpart 50.05—Application**

Sec.

50.05-1 General.

50.05-5 Existing boilers, pressure vessels or piping systems.

50.05-10 Alterations or repairs.

50.05-15 Vessels subject to regulations in this subchapter.

50.05-20 Steam-propelled vessels.

<sup>31</sup> [https://www.dhs.gov/sites/default/files/publications/DHS\\_Instruction%20Manual%20023-01-001-01%20Rev%2001\\_508%20Admin%20Rev.pdf](https://www.dhs.gov/sites/default/files/publications/DHS_Instruction%20Manual%20023-01-001-01%20Rev%2001_508%20Admin%20Rev.pdf) (last visited May 12, 2023).

**Subpart 50.05—Application****§ 50.05–1 General.**

(a) The regulations in this subchapter apply to the marine engineering details of installations on vessels required to be inspected and certificated under other subchapters in this chapter as described in § 50.01–10.

(b) The regulations in this subchapter are not retroactive in effect, except as provided in § 50.05–5 or § 50.05–10, or if specifically so provided for at the time specific regulations are amended or added.

(c) The requirements in this subchapter revised or added subsequent to July 1, 1969, are applicable to the installations contracted for after the effective dates of such requirements. Normally, materials, items of equipment, or installations in vessels which have been accepted and passed as satisfactory and meeting the applicable requirements in this subchapter then in effect and which are maintained in good and serviceable condition to the satisfaction of the Officer in Charge, Marine Inspection, may be continued in use until replacement is deemed necessary by such officer or as specified in the regulations.

(d) Items of equipment, which are in use on vessels, previously approved by the Commandant but not complying with the latest specification requirements may be continued in use so long as they are maintained in good and serviceable condition to the satisfaction of the Officer in Charge, Marine Inspection, until replacement is deemed necessary by such officer or as specified in the regulations.

(e) Industrial systems and components on mobile offshore drilling units must meet subpart 58.60 of this subchapter.

**§ 50.05–5 Existing boilers, pressure vessels or piping systems.**

(a) Whenever doubt exists as to the safety of an existing boiler, pressure vessel, or piping system, the marine inspector may require that it be gaged or checked to determine the extent of deterioration, and if necessary for safety may require the recalculation and reduction of the maximum allowable working pressure.

(b) For the purpose of recalculating the maximum allowable working pressure of boilers, pressure vessels, or piping which have deteriorated in service, the applicable design formulas in effect at the time it was contracted for or built must be used.

(c) When existing vessels are reboilered, the mountings and

attachments must be renewed in accordance with the regulations in this subchapter in effect at the time such reboiling work is contracted for. The existing steam piping must be examined. Those portions which are in good condition and comply with minimum thickness requirements in effect at the time such reboiling work is contracted for may be continued in service. The steam piping replaced must be in accordance with the regulations in this subchapter in effect for new construction.

(d) For the purpose of this section, existing equipment includes only items which have previously met all Coast Guard requirements for installation aboard a vessel certificated by the Coast Guard, including requirements for design, fabrication, testing, and inspection at the time the equipment was new.

**§ 50.05–10 Alterations or repairs.**

(a) When alteration or repair of boilers, pressure vessels, machinery, safety valves or piping systems becomes necessary, the work must be done under the cognizance of the Officer in Charge Marine Inspection. It must be done in accordance with the regulations in effect at the time such vessel or installation was contracted for or built (whichever is latest), or in accordance with the regulations in effect for new construction.

(b) When alterations or repairs are made to a U.S. flag vessel in a port or place not in the United States, a notice containing details of the proposed alterations or repairs must be submitted to the appropriate Officer in Charge, Marine Inspection.

**§ 50.05–15 Vessels subject to regulations in this subchapter.**

(a) Passenger vessels, tank vessels, cargo and miscellaneous vessels, nautical schoolships, mobile offshore drilling units, and oceanographic vessels are subject to the regulations in this subchapter to the extent prescribed by various laws and regulations as described in § 50.01–1. The applicable provisions in this subchapter apply to all such U.S. flag vessels, and to all such foreign vessels which carry passengers from any port in the United States except as follows:

(1) Any vessel of a foreign nation signatory to the International Convention for Safety of Life at Sea, 1974, and which has on board a current, valid Convention certificate attesting to the sufficiency of the marine engineering details as prescribed by applicable regulations in this chapter.

(2) Any vessel of a foreign nation having inspection laws approximating those of the United States together with reciprocal inspection arrangements with the United States, and which has on board a current, valid certificate of inspection issued by its government under such arrangements.

(3) Any vessel operating exclusively on inland waters which are not navigable waters of the United States.

(4) Any vessel laid up and dismantled and out of commission.

(5) With the exception of vessels of the U.S. Maritime Administration, any vessel with the title vested in the United States and which is used for public purposes.

(b) Notwithstanding the exceptions previously noted in paragraphs (a)(1) and (2) of this section, foreign vessels of novel design or construction or whose operation involves potential unusual risks are subject to inspection to the extent necessary to safeguard life and property in U.S. ports, as further provided by § 2.01–13 in subchapter A of this chapter.

**§ 50.05–20 Steam-propelled vessels.**

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

(b) If the engines, boilers, and auxiliary machinery are found to be in safe operating condition at the initial or subsequent periodical inspection, the Officer in Charge, Marine Inspection, must issue a letter to that effect. Such letter must be posted on the vessel under glass. The letter will be valid for a specified period of time, as determined by the Officer in Charge, Marine Inspection. The owner, within 30 days prior to its expiration, must make application to the nearest Officer in Charge, Marine Inspection for a renewal thereof.

**Subpart 50.10—Definition of Terms Used in This Subchapter****§ 50.10–20 [Amended]**

■ 4. In § 50.10–20, remove the text “SE.” and add, in its place, the text “SE”.

■ 5. Revise § 50.10–23 to read as follows:

**§ 50.10–23 Marine Safety Center.**

The term *Marine Safety Center* refers to the Commanding Officer, Marine Safety Center, U.S. Coast Guard Stop 7430, 2703 Martin Luther King Jr.

Avenue SE, Washington, DC 20593–7430 for mail. Send mail in a printed or electronic format. Information for submitting the documents electronically can be found at <https://www.uscg.mil/HQ/MSC>.

#### § 50.10–25 [Amended]

■ 6. Amend § 50.10–25 as follows:

■ a. In paragraph (b), remove the text “Figure 50.10–25(b)” and add in its place the text “figure 1 to § 50.10–25(b)”;

■ b. Redesignate figure 50.10–25(b) as figure 1 to § 50.10–25(b).

#### § 50.10–30 [Amended]

■ 7. Amend § 50.10–30 as follows:

■ a. In paragraph (b), remove the word “shall” and add, in its place, the word “must”;

■ b. In paragraph (c)(1), remove the text “table 50.10–30” and add, in its place, the text “table 1 to § 50.10–30”;

■ c. Redesignate table 50.10–30 as table 1 to § 50.10–30.

■ 8. Revise and republish subpart 50.20 to read as follows:

#### Subpart 50.20—Plan Submittal and Approval

Sec.

50.20–1 General.

50.20–5 Procedures for submittal of plans.

50.20–10 [Reserved]

50.20–15 Previously approved plans.

50.20–25 Calculations.

50.20–30 Alternative materials or methods of construction.

50.20–33 [Reserved]

50.20–35 Marine inspector’s decisions.

50.20–40 Right of appeal.

#### Subpart 50.20—Plan Submittal and Approval

##### § 50.20–1 General.

(a) The required vessel, equipment, or installation plans, as listed in this subchapter, are general in character, but include all plans which normally show the intended construction and safety features coming under the cognizance of the Coast Guard. In a particular case, however, not all of the plans enumerated may be applicable, and in such cases the Coast Guard will so notify the submitter.

(b) Manufacturers of pressure vessels and other components, which require specific fabrication inspection in accordance with the requirements of this subchapter, must submit and obtain approval of the applicable construction plans prior to the commencement of such fabrication. Manufacturers of automatically controlled boilers must submit and obtain approval of the applicable control system plans prior to installation of the boiler. Manufacturers

of boilers which must meet the requirements of part 52 of this subchapter must submit the applicable construction plans for review prior to installation.

##### § 50.20–5 Procedures for submittal of plans.

(a) As the relative locations of shipyards, design offices, and Coast Guard offices vary throughout the country, no specific routing will be required in the submittal of plans. In general, one of the procedures outlined in this section apply, but if a more expeditious procedure can be used, there will normally be no objection to it.

(b) The plans may be submitted in duplicate to the Officer in Charge, Marine Inspection, at or nearest the place where the vessel is to be built. Alternatively, the plans may be submitted to the Marine Safety Center.

(c) In the case of classed vessels, upon specific request by the submitter, the American Bureau of Shipping will arrange to forward the necessary plans to the Coast Guard indicating its action thereon.

##### § 50.20–10 [Reserved]

##### § 50.20–15 Previously approved plans.

(a) A manufacturer wishing to fabricate equipment in accordance with a plan previously approved is not required to resubmit such plans provided:

(1) Certification is submitted that the proposed equipment conforms in every respect to the plan previously approved, and such certification contains the drawing number, title, date, and last revision or change date, and date of previous approval;

(2) The current regulations, including adopted specifications, standards or codes, pertaining to the proposed equipment are the same as those current when the original plan was approved; and

(3) A copy of the approved plan is available for review by the approving office.

(b) [Reserved]

##### § 50.20–25 Calculations.

(a) Calculations must be forwarded with plans submitted for approval and must clearly substantiate compliance with this subchapter. Care must be taken to identify sources of equations, factors and other information upon which the calculations are based.

(b) The results of the calculations, such as the maximum allowable working pressure (MAWP), test pressure, and safety device settings, must be clearly identified.

##### § 50.20–30 Alternative materials or methods of construction.

When new or alternative materials, procedures, designs, or methods of construction are submitted for approval and are not addressed by regulations, the Commandant will act to approve or disapprove.

##### § 50.20–33 [Reserved]

##### § 50.20–35 Marine inspector’s decisions.

(a) When it becomes necessary for a marine inspector to make decisions on matters covered by the regulations in this subchapter or by requirements in referenced specifications, standards or codes, the inspector must inform the owner or their representative of the requirement, which will be identified by source, section, and paragraph number, on which the decisions are based. Whenever it is necessary to make decisions in matters not specifically covered by the regulations in this subchapter or by referenced requirements, the marine inspector must clearly state the reasons which caused them to arrive at such decisions.

(b) If the owner or their representative disagrees with a decision made by the marine inspector, they must take up the matter with the local Officer in Charge, Marine Inspection. The owner or their representative may appeal the decision of the Officer in Charge, Marine Inspection, in accordance with § 50.20–40.

##### § 50.20–40 Right of appeal.

Any person directly affected by a decision or action taken under this subchapter, by or on behalf of the Coast Guard, may appeal therefrom in accordance with subpart 1.03 of this chapter.

##### § 50.25–1 [Amended]

■ 9. Amend § 50.25–1 as follows:

■ a. Remove paragraph (e);

■ b. Redesignate paragraph (f) as paragraph (e); and

■ c. In newly redesignated paragraph (e), remove the word “shall” and add, in its place, the word “must”.

##### § 50.25–3 [Amended]

■ 10. In § 50.25–3, remove the word “shall” wherever it appears and add, in its place, the word “must”.

##### § 50.25–5 [Amended]

■ 11. In § 50.25–5, remove the word “shall” wherever it appears and add, in its place, the word “must”.

■ 12. Revise § 50.25–7 to read as follows:

**§ 50.25–7 Testing of products required to be certified in presence of marine inspector.**

(a) Certified products are not normally tested in the presence of a marine inspector. The Commandant may, however, assign a marine inspector to witness tests required by the applicable specifications to ensure that the requirements are met.

(b) Marine inspectors must have free entry at all times to those parts of the plant where material subject to this subchapter is being manufactured. The manufacturer must provide marine inspectors all reasonable facilities to satisfy them that the material is being manufactured in accordance with the requirements of the Commandant.

(c) Unless otherwise authorized, required tests and inspections described in applicable specifications must be made at the place of manufacture prior to shipment.

■ 13. Revise and republish subpart 50.30 to read as follows:

**Subpart 50.30—Fabrication Inspection**

Sec.

50.30–1 Scope.

50.30–10 Class I, I–L and II–L pressure vessels.

50.30–15 Class II pressure vessels.

50.30–20 Class III pressure vessels.

**Subpart 50.30—Fabrication Inspection****§ 50.30–1 Scope.**

(a) The manufacturer must notify the Officer in Charge, Marine Inspection, of the intended fabrication of pressure vessels that will require Coast Guard inspection.

(b) For exemption of certain pressure vessels from shop inspection see § 54.01–15 of this subchapter.

(c) For a classification delineation of boilers and pressure vessels refer to tables 1 and 2 to § 54.01–5 of this subchapter.

**§ 50.30–10 Class I, I–L and II–L pressure vessels.**

(a) Classes I, I–L and II–L pressure vessels must be subject to shop inspection at the plant where they are being fabricated, or when determined necessary by the Officer in Charge, Marine Inspection.

(b) The manufacturer must submit Class I, I–L and II–L pressure vessels, as defined in parts 54 and 56 of this subchapter for shop inspection at such stages of fabrication as may be requested by the Officer in Charge, Marine Inspection.

**§ 50.30–15 Class II pressure vessels.**

(a) Class II pressure vessels must be subject to shop inspections at the plant where they are being fabricated, as or

when determined necessary by the Officer in Charge, Marine Inspection.

The inspections described in this section are required, unless specifically exempted by other regulations in this subchapter.

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

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

**§ 50.30–20 Class III pressure vessels.**

(a) Class III pressure vessels must be subject to shop inspection at the plant where they are being fabricated, as or when determined necessary by the Officer in Charge, Marine Inspection. The inspection described in this section is required, unless specifically exempted by other regulations in this subchapter.

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

■ 14. Revise and republish part 52 to read as follows:

**PART 52—POWER BOILERS****Subpart 52.01—General Requirements**

52.01–1 Incorporation by reference.

52.01–2 Adoption of Section I of the ASME BPVC.

52.01–3 Definitions of terms used in this part.

52.01–5 Plans.

52.01–10 Automatic controls.

52.01–35 Auxiliary, donkey, fired thermal fluid heater, and heating boilers.

52.01–40 Materials and workmanship.

52.01–50 Fusible plugs (modifies A–19 through A–21).

52.01–55 Maximum allowable working pressure.

52.01–90 Materials.

52.01–95 Design (modifies PG–16 through PG–31 and PG–100).

52.01–100 Openings and compensation (modifies PG–32 through PG–39, PG–42 through PG–55).

52.01–105 Piping, valves and fittings (modifies PG–58 and PG–59).

52.01–110 Water-level indicators, water columns, gauge-glass connections, gauge cocks, and pressure gauges (modifies PG–60).

52.01–115 Feedwater supply (modifies PG–61).

52.01–120 Safety valves and safety relief valves (modifies PG–67 through PG–73).

52.01–130 Installation.

52.01–135 Inspection and tests (modifies PG–90 through PG–100).

52.01–140 Certification by stamping (modifies PG–104 through PG–113).

52.01–145 Manufacturers' data report forms (modifies PG–112 and PG–113).

**Subpart 52.05—Requirements for Boilers Fabricated by Welding**

52.05–1 General (modifies PW–1 through PW–54).

52.05–15 Heat treatment (modifies PW–10).

52.05–20 Radiographic and ultrasonic examination (modifies PW–11 and PW–41.1).

52.05–30 Minimum requirements for attachment welds (modifies PW–16).

52.05–45 Circumferential joints in pipes, tubes and headers (modifies PW–41).

**Subpart 52.15—Requirements for Watertube Boilers**

52.15–1 General (modifies PWT–1 through PWT–15).

52.15–5 Tube connections (modifies PWT–9 and PWT–11).

**Subpart 52.20—Requirements for Firetube Boilers**

52.20–1 General (modifies PFT–1 through PFT–49).

52.20–17 Opening between boiler and safety valve (modifies PFT–44).

52.20–25 Setting (modifies PFT–46).

**Subpart 52.25—Other Boiler Types**

52.25–1 General.

52.25–3 Feedwater heaters (modifies PFH–1).

52.25–5 Miniature boilers (modifies PMB–1 through PMB–21).

52.25–7 Electric boilers (modifies PEB–1 through PEB–19).

52.25–10 Organic fluid vaporizer generators (modifies PVG–1 through PVG–12).

52.25–15 Fired thermal fluid heaters.

52.25–20 Exhaust gas boilers.

**Authority:** 46 U.S.C. 3306, 3307, 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3.

**PART 52—POWER BOILERS****Subpart 52.01—General Requirements****§ 52.01–1 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](mailto:typeapproval@uscg.mil). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material is available from:

*American Society of Mechanical Engineers (ASME)*, Two Park Avenue, New York, NY 10016-5990; 800-843-2763; [CustomerCare@asme.org](mailto:CustomerCare@asme.org); [www.asme.org](http://www.asme.org);

(a) 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 §§ 52.01-2; 52.01-3 introductory text and (g); 52.01-5; 52.01-50(a); 52.01-90; 52.01-95(a) and (f); 52.01-100(a) and (b); 52.01-105(a) and (b); 52.01-110(a); 52.01-115; 52.01-120; 52.01-135(a) through (c); 52.01-140; 52.01-145; 52.05-1; 52.05-15; 52.05-20; 52.05-30; 52.05-45; 52.15-1; 52.15-5(a) and (b); 52.20-1; 52.20-25(a); 52.25-3; 52.25-5; 52.25-7; 52.25-10(a).

(b) [Reserved]

**§ 52.01-2 Adoption of Section I of the ASME BPVC.**

(a) Main power boilers and auxiliary boilers must be designed, constructed, inspected, tested, and stamped in accordance with Section I of the ASME BPVC (incorporated by reference; see § 52.01-1), as limited, modified, or replaced by specific requirements in this part. The appendices to Section I of the ASME BPVC are adopted and must be followed when the requirements in Section I make them mandatory. For general information, table 1 to § 52.01-2(a) lists the various paragraphs in Section I of the ASME BPVC that are limited, modified, or replaced by regulations in this part.

TABLE 1 TO § 52.01-2(a)—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF SECTION I OF THE ASME BPVC

Paragraphs in section I, ASME BPVC and disposition	Unit of this part
PG-1 replaced by .....	54.01-5(a).
PG-16 through PG-31 modified by .....	52.01-95.
PG-32 through PG-39 modified by .....	52.01-100.
PG-42 through PG-55 modified by .....	52.01-100.
PG-58 and PG-59 modified by .....	52.01-105.
PG-60 modified by .....	52.01-110.
PG-61 modified by .....	52.01-115 (56.50-30).
PG-67 through PG-73 modified by .....	52.01-120.
PG-90 through PG-100 modified by .....	52.01-135 (52.01-95).
PG-91 modified by .....	52.01-135(b).
PG-99 modified by .....	52.01-135(c).
PG-100 modified by .....	52.01-95(e).
PG-104 through PG-113 modified by .....	52.01-140(a).
PG-112 and PG-113 modified by .....	52.01-145.
PW-1 through PW-54 modified by .....	52.05-1.
PW-10 modified by .....	52.05-15.
PW-11.1 modified by .....	52.05-20.
PW-16 modified by .....	52.05-30.
PW-41 modified by .....	52.05-20, 52.05-45.
PWT-1 through PWT-15 modified by .....	52.15-1.
PWT-9 modified by .....	52.15-5.
PWT-9.2 replaced by .....	52.15-5(b).
PWT-11 modified by .....	52.15-5.
PWT-11.3 replaced by .....	52.15-5(b).
PFT-1 through PFT-49 modified by .....	52.20-1.
PFT-44 modified by .....	52.20-17.
PFT-46 modified by .....	52.20-25.
PFH-1 modified by .....	52.25-3.
PMB-1 through PMB-21 modified by .....	52.25-5.
PEB-1 through PEB-19 modified by .....	52.25-7.
PVG-1 through PVG-12 modified by .....	52.25-10.
A-19 through A-21 modified by .....	52.01-50.

**Note 1 to table 1 to § 52.01-2(a):** The references to specific provisions in the ASME BPVC are coded. The first letter “P” refers to section I, while the letter “A” refers to the appendix to section I. The letter or letters following “P” refer to a specific subsection of section I. The number following the letter or letters refers to the paragraph so numbered in the text.

(b) References to the ASME BPVC, such as paragraph PG-1, indicate:

- (1) P=Section I, Power Boilers.
- (2) G=Subsection—General

Requirements.

- (3) 1=Paragraph 1.

(c) When a section or paragraph of the regulations in this part relates to Section I of the ASME BPVC, the relationship

with the code will be shown immediately following the heading of the section or at the beginning of the paragraph as follows:

- (1) (Modifies P \_\_\_\_.) This indicates that the material in P \_\_\_\_ is generally applicable but is being altered, amplified, or augmented.

(2) (Replaces P \_\_\_\_.) This indicates that P \_\_\_\_ does not apply.

(3) (Reproduces P \_\_\_\_.) This indicates that P \_\_\_\_ is being identically reproduced for convenience, not for emphasis.

**§ 52.01–3 Definition of terms used in this part.**

For primary definitions associated with power boiler design, see Section I of the ASME BPVC (incorporated by reference; see § 52.01–1).

(a) *Types of boilers*—(1) *Main power boiler*. A main power boiler is a steam boiler used for generating steam for main propulsion.

(2) *Auxiliary or donkey boiler*. An auxiliary or donkey boiler is a steam boiler used for general purposes other than main propulsion.

(3) *Watertube boiler*. A watertube boiler is a steam boiler in which the boiler tubes contain water and steam. The heat is applied to the outside surface of the tubes.

(4) *Internally fired firetube boiler (scotch boiler)*. An internally fired firetube boiler is a steam boiler containing furnaces, one or more combustion chambers and tubes or flues, which are surrounded by water and through which the products of combustion pass from the furnace to the uptake.

(5) *Externally fired firetube or flue boiler (horizontal return tubular)*. An externally fired firetube or flue boiler is a steam boiler, part of the outer shell of which is exposed to fire or to the products of combustion, and containing flues through which such products pass from the furnace to the uptake.

(6) *Unfired steam boiler*. A pressure vessel in which steam is generated by means other than fuel combustion is classed as an unfired steam boiler. (See § 54.01–10 of this subchapter.)

(b) *Parts of boilers*—(1) *Superheater*. A superheater is an appliance, normally consisting of tube rows, for the purpose of increasing the temperature of steam above the saturation temperature.

(2) *Economizer*. An economizer is a feed-water heater usually located in the uptake or casing of a boiler to absorb heat from the waste gases.

(3) *Furnace*. A furnace is a firebox or a large flue in which the fuel is burned.

(4) *Flues*. Flues are cylindrical shells made of seamless or welded tubing, or with a riveted longitudinal joint, the ends being attached by riveting or welding. Their purpose is to provide additional heating surface and to form a path for the products of combustion.

(5) *Tubes*. Tubes are cylindrical shells of comparatively small diameter constituting the main part of the heating surface of a boiler or superheater.

(c) *Pressure relief devices*. For boilers, pressure vessels, and pressure piping, a pressure relief device is designed to open to prevent a rise of internal pressure in excess of a specified value due to emergency or abnormal

conditions. It may be a pressure relief valve or a nonreclosing pressure relief device.

(1) *Pressure relief valve*. A pressure relief valve is a pressure relief device, which is designed to reclose and prevent the further flow of fluid after normal conditions have been restored.

(i) *Safety valve*. A safety valve is a pressure relief valve actuated by inlet static pressure and characterized by rapid opening or pop action. Examples of types used on boilers include:

(A) *Spring-loaded safety valve*. A spring-loaded safety valve is a safety valve fitted with a spring, which normally holds the valve disk in a closed position against the seat and allows it to open or close at predetermined pressures. Spring-loaded safety valves are characterized by pop action.

(B) [Reserved]

(ii) *Pilot operated pressure relief valve*. A pilot operated pressure relief valve is a pressure relief valve in which the major relieving device is combined with and is controlled by a self-actuated auxiliary pressure relief pilot valve.

(iii) *Temperature actuated pressure relief valve*. A temperature actuated pressure relief valve is a dual-function relief device designed to protect against both excessive pressure and temperature.

(2) *Nonreclosing pressure relief device*. A nonreclosing pressure relief device is a pressure relief device not designed to reclose after operation.

(i) *Rupture disk device*. A rupture disk device is a device actuated by inlet static pressure and designed to function by the bursting of a pressure-retaining disk.

(ii) *Explosion rupture disk device*. An explosion rupture disk device is a rupture disk device designed for use at high rates of pressure rise.

(iii) *Fusible plug device*. A fusible plug device is a device designed to function by the yielding or melting of a plug of suitable melting temperature.

(3) *Vacuum relief valve*. A vacuum relief valve is a valve designed to admit fluid or gas to prevent an excessive internal vacuum.

(d) *Other boiler attachments*—(1) *Mountings*. Mountings are nozzle connections, distance pieces, valves, or fittings attached directly to the boiler.

(2) *Main steam stop valve*. A main steam stop valve is a valve usually connected directly to the boiler for the purpose of shutting off the steam to/ from the main steam line.

(3) *Auxiliary steam stop valve*. An auxiliary steam stop valve is a valve usually connected directly to the boiler

for the purpose of shutting off the steam to/from the auxiliary lines.

(4) *Manifold*. A manifold is a fitting with two or more branches having valves either attached by bolting or integral with the fitting.

(5) *Blowoff valve*. A blowoff valve is a valve connected directly to the boiler for the purpose of blowing out water, scum or sediment.

(6) *Dry pipe*. A dry pipe is a perforated or slotted pipe placed in the highest part of the steam space of a boiler to prevent priming (water carryover).

(7) *Water column*. A water column is a fitting or tube equipped with a water glass attached to a boiler for the purpose of indicating the water level.

(8) *Test cocks*. Test cocks are small valves on a boiler for indicating the water level or water sampling.

(9) *Fusible plugs*. Fusible plugs are plugs made with a bronze casing and a tin filling, which melts at a temperature of 445 to 450 °F. They are intended to melt in the event of low water level.

(e) *Boiler fabrication*—(1) *Repair*. Repair is the restoration of any damaged or impaired part to an effective and safe condition.

(2) *Alteration*. Alteration is a structural modification to or departure from an approved design or existing construction.

(3) *Access or inspection openings*. Access or inspection openings are holes cut in the shells or heads of boilers or boiler pressure parts for the purpose of inspection and cleaning.

(f) *Gage (or gauge) pressure*. Gage pressure is the difference between the pressure at the point being measured and the ambient pressure for the gage. It is measured in units such as pounds per square inch gage (psig).

(g) *Maximum allowable working pressure*. For a definition of maximum allowable working pressure, see PG–21 of Section I of the ASME BPVC.

**§ 52.01–5 Plans.**

(a) Manufacturers intending to fabricate boilers to be installed on vessels must submit detailed plans as required by subpart 50.20 of this subchapter. The plans, including design calculations, must be certified by a registered professional engineer as meeting the design requirements in this part and in Section I of the ASME BPVC (incorporated by reference; see § 52.01–1).

(b) The following information must be included:

(1) Calculations for all pressure containment components including the maximum allowable working pressure and temperature, the hydrostatic or



pneumatic test pressure, the maximum steam generating capacity and the intended safety valve settings.

(2) Joint design and methods of attachment of all pressure containment components.

(3) A bill of material meeting the requirements of Section I of the ASME BPVC, as modified by this subpart.

(4) A diagrammatic arrangement drawing of the assembled unit indicating the location of internal and external components including any interconnecting piping.

(Approved by the Office of Management and Budget under control number 1625-0097)

#### **§ 52.01-10 Automatic controls.**

(a) Each main boiler must meet the special requirements for automatic safety controls in § 62.35-20(a)(1) of this subchapter.

(b) Each automatically controlled auxiliary boiler having a heat input rating of less than 12,500,000 Btu/hr. (3.66 megawatts) must meet the requirements of part 63 of this subchapter.

(c) Each automatically controlled auxiliary boiler with a heat input rating of 12,500,000 Btu/hr. (3.66 megawatts) or above, must meet the requirements for automatic safety controls in part 62 of this subchapter.

#### **§ 52.01-35 Auxiliary, donkey, fired thermal fluid heater, and heating boilers.**

(a) To determine the appropriate part of the regulations where requirements for miscellaneous boiler types, such as donkey, fired thermal fluid heater, heating boiler, etc., may be found, refer to table 1 to § 54.01-5 of this subchapter.

(b) Fired vessels in which steam is generated at pressures exceeding 103 kPa gage (15 psig) must meet the requirements of this part.

#### **§ 52.01-40 Materials and workmanship.**

All materials to be used in any of the work specified in the various sections of this part must be free from injurious defects and must have a workmanlike finish. The construction work must be executed in a workmanlike manner with proper tools or equipment and must be free from defects which would impair strength or durability.

#### **§ 52.01-50 Fusible plugs (modifies A-19 through A-21).**

(a) Fusible plugs must comply with the requirements of A19 and A20 of Section I of the ASME BPVC (incorporated by reference; see § 52.01-1) and be stamped on the casing with the name of the manufacturer, and on the water end of the fusible metal

“ASME Std.” Fusible plugs are not permitted where the maximum steam temperature to which they are exposed exceeds 218 °C (425 °F).

(b)(1) Fusible plugs must be cleaned and will be examined by the marine inspector at each inspection for certification, periodic inspection, or if the boiler is opened for repair or inspection. If in the marine inspector's opinion, the condition of any plug is satisfactory, it may be continued in use.

(2) When fusible plugs are renewed at other than the inspection for certification and no marine inspector is in attendance, the Chief Engineer must report the renewal to the Officer in Charge, Marine Inspection. This report must contain the following information:

- (i) Name and official number of vessel.
- (ii) Date of renewal of fusible plugs.
- (iii) Number and location of fusible plugs renewed in each boiler.
- (iv) Manufacturer and rating of each plug.
- (v) Reason for renewal.

#### **§ 52.01-55 Maximum allowable working pressure.**

(a) The piping system, machinery, and appurtenances must meet the requirements of this subchapter for the boiler maximum allowable working pressure. Only the Commandant may grant an increase in pressure.

(b) When an existing boiler is replaced by a new boiler designed to operate at pressures in excess of the pressure indicated on the certificate of inspection for the previous boiler, an analysis of the complete system must be made, including machinery and piping, to insure its compatibility with the increased steam pressure. The maximum allowable working pressure on the certificate of inspection must be based on the results of this analysis.

#### **§ 52.01-90 Materials**

Material subject to stress due to pressure must conform to specifications as indicated in paragraphs PG-5 through PG-14 of Section I of the ASME BPVC (incorporated by reference; see § 52.01-1).

#### **§ 52.01-95 Design (modifies PG-16 through PG-31 and PG-100).**

(a) *Requirements.* Boilers required to be designed to this part must meet the requirements of PG-16 through PG-31 of Section I of the ASME BPVC (incorporated by reference; see § 52.01-1) except as noted otherwise in this section.

(b) *Superheater.* (1) The design pressure of a superheater integral with the boiler must not be less than the lowest setting of the drum safety valve.

(2) Controls must be provided to ensure that the maximum temperature at the superheater outlets does not exceed the allowable temperature limit of the material used in the superheater outlet, in the steam piping, and in the associated machinery under all operating conditions. Visible and audible alarms indicating excessive superheat must be provided in any installation in which the superheater outlet temperature exceeds 454 °C (850 °F). The setting of the excessive superheat alarms must not exceed the maximum allowable temperature of the superheater outlet, which may be limited by the boiler design, the main steam piping design, or the temperature limits of other equipment subjected to the temperature of the steam.

(3) Arrangement must be made for venting and draining the superheater in order to permit steam circulation through the superheater when starting the boiler.

(c) *Economizer.* The design pressure of an economizer integral with the boiler and connected to the boiler drum without intervening stop valves must be at least equal to 110 percent of the highest setting of the safety valves on the drum.

(d) *Brazed boiler steam air heaters.* Boiler steam air heaters utilizing brazed construction are permitted at temperatures not exceeding 525 °F. Refer to § 56.30-30(b)(1) of this subchapter for applicable requirements.

(e) *Stresses.* (Modifies PG-22.) The stresses due to hydrostatic head must be taken into account in determining the minimum thickness of the shell or head of any boiler pressure part unless noted otherwise. Additional stresses, imposed by effects other than internal pressure or static head, which increase the average stress over substantial sections of the shell or head by more than 10 percent of the allowable stress, must be taken into account. These effects include the weight of the vessel and its contents, method of support, impact loads, superimposed loads, localized stresses due to the reactions of supports, stresses due to temperature gradients and dynamic effects.

(f) *Cylindrical components under internal pressure.* (Modifies PG-27.) The minimum required thickness and maximum allowable working pressure of boiler piping, tubes, drums, and headers must be as required by the formula in PG-27 of Section I of the ASME BPVC except that threaded boiler tubes are not permitted.

**§ 52.01–100 Openings and compensation (modifies PG–32 through PG–39, PG–42 through PG–55).**

(a) The rules for openings and compensation must be as indicated in PG–32 through PG–55 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) except as noted otherwise in this section.

(b) (Modifies PG–39.) Pipe and nozzle necks must be attached to vessel walls as indicated in PG–39 of Section I of the ASME BPVC except that threaded connections must not be used under any of the following conditions:

(c) (Modifies PG–42.) Butt-welding flanges and fittings must be used when full radiography is required by § 56.95–10 of this subchapter. The revisions read as follows:

**§ 52.01–105 Piping, valves and fittings (modifies PG–58 and PG–159).**

(a) Boiler external piping within the jurisdiction of the ASME BPVC must be as indicated in PG–58 and PG–59 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) except as noted otherwise in this section. Piping outside the jurisdiction of the ASME BPVC must meet the appropriate requirements of part 56 of this subchapter.

(b) In addition to the requirements in PG–58 and PG–59 of Section I of the ASME BPVC, boiler external piping must:

(1) Meet the design conditions and criteria in § 56.07–10 of this subchapter, except § 56.07–10(b);

(2) Be included in the pipe stress calculations required by § 56.35–1 of this subchapter;

(3) Meet the nondestructive examination requirements in § 56.95–10 of this subchapter;

(4) Have butt-welding flanges and fittings when full radiography is required; and

(5) Meet the requirements for threaded joints in § 56.30–20 of this subchapter.

(c) Steam stop valves, in sizes exceeding 152mm (6 inch) NPS, must be fitted with bypasses for heating the line and equalizing the pressure before the valve is opened.

(d)(1) Feed water must not be discharged into a boiler against surfaces exposed to hot gases or radiant heat of the fire.

(2) Feed water nozzles of boilers designed for pressures of 2758 kPa (400 psi), or over, must be fitted with sleeves or other suitable means employed to reduce the effects

(e)(1) Firetube and drum type boilers must be fitted with a surface and a bottom blowoff valve or cock attached

directly to the boiler or to a short distance piece. The bottom blowoff valve must be attached to the lowest part of the boiler or fitted with an internal pipe leading to the lowest point inside the boiler. Boilers equipped with a continuous blowdown valve on the steam drum are not required to be fitted with an additional surface blowoff connection.

(2) Where blowoff pipes are exposed to radiant heat of the fire, they must be protected by fire brick or other suitable heat-resisting material.

(f) Where dry pipes are used, they must be provided with drains at each end to prevent an accumulation of water.

**§ 52.01–110 Water-level indicators, water columns, gauge-glass connections, gauge cocks, and pressure gauges (modifies PG–60).**

(a) *Boiler water level devices.* Boiler water level devices must be as indicated in PG–60 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) except as noted otherwise in this section.

(b) *Water level indicators.* (Modifies PG–60.1.)

(1) Each boiler, except those of the forced circulation type with no fixed water line and steam line, must have two independent means of indicating the water level in the boiler connected directly to the head or shell. One must be a gage lighted by the emergency electrical system (See subpart 112.15 of subchapter J of this chapter). The secondary indicator may consist of a gage glass, or other acceptable device. Where the allowance pressure exceeds 1724 kPa (250 psig), gage glasses must be of the flat type instead of the common tubular type.

(2) Gage glasses must be in continuous operation while the boiler is steaming.

(3) Double-ended firetube boilers must be equipped as specified in this paragraph (b) and paragraph (e) of this section except that the required water level indicators must be installed on each end of the boiler.

(4) Externally fired flue boilers, such as are used on central western river vessels, must be equipped as specified in paragraphs (b)(1) through (3) of this section except that float gages may be substituted for gage glasses.

(c) *Water columns.* (Modifies PG–60.2.) The use of water columns is generally limited to firetube boilers. Water column installations must minimize the effect of ship motion on water level indication. Water columns must be fitted directly to the heads or shells of boilers or drums, or if

necessary, connected thereto by a distance piece both at the top and bottom of the water columns. Shutoff valves used in the pipe connections between the boiler and water column must be locked or sealed open. Water column piping must not be fitted inside the uptake, the smoke box, or the casing. Water columns must be fitted with suitable drains. Cast iron fittings are not permitted.

(d) *Gage glass connections.* (Modifies PG–60.3.) Gage glasses and gage cocks must be connected directly to the head or shell of a boiler as indicated in paragraph (b)(1) of this section.

(e) *Gage cocks.* (Modifies PG–60.4.)

(1) When the steam pressure does not exceed 250 psi, three test cocks attached directly to the head or shell of a boiler may serve as the secondary water level indicator.

(2) [Reserved]

(f) *Salinometer cocks.* In vessels operating in saltwater, each boiler must be equipped with a salinometer cock or valve. They must not be attached to the water gage or water column.

(g) *High-water-level alarm.* Each watertube boiler for propulsion must have an audible and a visible high-water-level alarm. The alarm indicators must be located where the boiler is controlled.

**§ 52.01–115 Feedwater supply (modifies PG–61).**

Boiler feedwater supply must meet the requirements of PG–61 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) and § 56.50–30 of this subchapter.

**§ 52.01–120 Safety valve and safety relief valves (modifies PG–67 through PG–73).**

(a)(1) Boiler safety valves and safety relief valves must be as indicated in PG–67 through PG–73 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) except as noted otherwise in this section.

(2) A safety valve must:

(i) Be stamped in accordance with PG–110 of Section I of the ASME BPVC;

(ii) Have its capacity certified by the National Board of Boiler and Pressure Vessel Inspectors;

(iii) Have a drain opening tapped for not less than 6mm (¼ in.) NPS; and

(iv) Not have threaded inlets for valves larger than 51mm (2 in.) NPS.

(3) On river steam vessels whose boilers are connected in batteries without means of isolating one boiler from another, each battery of boilers must be treated as a single boiler and equipped with not less than two safety valves of equal size.

(4) (Modifies PG–70.) The total rated relieving capacity of drum and

superheater safety valves as certified by the valve manufacturer must not be less than the maximum generating capacity of the boiler, which must be determined and certified by the boiler manufacturer. This capacity must comply with PG-70 of Section I of the ASME BPVC.

(5) In the event the maximum steam generating capacity of the boiler is increased by any means, the relieving capacity of the safety valves must be checked by an inspector, and, if necessary, valves of increased relieving capacity must be installed.

(6) (Modifies PG-67.) Drum safety valves must be set to relieve at a pressure not in excess of that allowed by the Certificate of Inspection. Where for any reason this is lower than the pressure for which the boiler was originally designed and the revised safety valve capacity cannot be recomputed and certified by the valve manufacturer, one of the tests described in PG-69 of section I of the ASME BPVC must be conducted in the presence of the Inspector to ensure that the relieving capacity is sufficient at the lower pressure.

(7) On new installations the safety valve nominal size for propulsion boilers and superheaters must not be less than 38mm (1.5 in.) nor more than 102mm (4 in.). Safety valves 38mm (1.5 in.) to 114mm (4.5 in.) may be used for replacements on existing boilers. The safety valve size for auxiliary boilers must be between 19mm (¾ in.) and 102mm (4 in.) NPS. The nominal size of a safety valve is the nominal diameter (as defined in § 56.07-5(b) of this subchapter) of the inlet opening.

(8) Lever or weighted safety valves now installed may be continued in use and may be repaired, but when repairs are not possible, lever or weighted safety valves must be replaced by valves conforming to the requirements of this section.

(9) Gags or clamps for holding the safety valve disk on its seat must be carried on board the vessel at all times.

(10) (Modifies PG-73.2.) Cast iron may be used only for caps and lifting bars. When used for these parts, the elongation must be at least 5 percent in 51mm (2 inch) gage length. Nonmetallic material may be used only for gaskets and packing.

(b)(1) (Modifies PG-68.) Superheater safety valves must be as indicated in PG-68 of Section I of the ASME BPVC except as noted otherwise in this paragraph.

(2) The setting of the superheater safety valve must not exceed the design pressure of the superheater outlet flange or the main steam piping beyond the superheater. To prevent damage to the

superheater, the drum safety valve must be set at a pressure not less than that of the superheater safety valve setting plus 5 pounds, plus the pressure drop through the superheater and associated piping, including the desuperheater if fitted. See also § 52.01-95(b)(1).

(3) Drum pilot actuated superheater safety valves are permitted provided the setting of the pilot valve and superheater safety valve is such that the superheater safety valve will open before the drum safety valve.

(c)(1) (Modifies PG-71.) Safety valves must be installed as indicated in PG-71 of Section I of the ASME BPVC except as noted otherwise in this paragraph (c).

(2) The final setting of boiler safety valves must be checked and adjusted under steam pressure and, if possible, while the boiler is on line and at operating temperatures, to the satisfaction of a marine inspector who, upon acceptance, must seal the valves. This regulation applies to both drum and superheater safety valves of all boilers.

(3) The safety valve body drains required by PG-71 of Section I of the ASME BPVC must be run as directly as possible from the body of each safety valve, or the drain from each safety valve may be led to an independent header common only to boiler safety valve drains. No valves of any type may be installed in the leakoff from drains or drain headers and they must be led to suitable locations to avoid hazard to personnel.

(d)(1) (Modifies PG-72.) The operation of safety valves must be as indicated in PG-72 of Section I of the ASME BPVC except as noted in paragraph (d)(2) of this section.

(2) (Modifies PG-73.) The lifting device required by PG-73.1.3 of Section I of the ASME BPVC must be fitted with suitable relieving gear so arranged that the controls may be operated from the fireroom or engine room floor.

#### § 52.01-130 Installation.

(a) *Foundations.* (1) Plans showing details of proposed foundations and support for boilers and the proposed means of bracing boilers in the vessel must be submitted for approval to the Officer in Charge, Marine Inspection, in the district where the installation is being made.

(2) Provision must be made in foundations for expansion of the boilers when heated.

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

(b) *Protection of adjacent structure.*

(1) Boilers must be so placed that all parts are readily accessible for inspection and repair.

(2) In vessels having a double bottom or other extensive surfaces directly below the boiler, the distance between such surface and a boiler must in no case be less than 18 inches at the lowest part.

(3) The pans of oil-burning, watertube boilers must be arranged to prevent oil from leaking into the bilges and must be lined with firebrick or other heat resisting material.

(4) The distance between a boiler and a compartment containing fuel oil must not be less than 24 inches.

(5) All oil-burning boilers must be provided with oiltight drip pans under the burners to prevent oil draining into the bilges.

(c) *Boiler uptakes.*

(1) Where dampers are installed in the uptakes or funnels, the arrangement must be such that it will not be possible to shut off the gas passages from the operating boilers.

(2) Each main power boiler and auxiliary boiler must be fitted with a separate gas passage.

#### § 52.01-135 Inspection and tests (modifies PG-90 through PG-100).

(a) *Requirements.* Inspection and test of boilers and boiler pressure parts must be as indicated in PG-90 through PG-100 of Section I of the ASME BPVC (incorporated by reference; see § 52.01-1) except as noted otherwise in this section.

(b) *Inspection personnel.* The inspections required by PG-90 through PG-100 of Section I of the ASME BPVC must be performed by the "Authorized Inspector" as defined in PG-91 of Section I of the ASME BPVC. The Authorized Inspector must hold a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors. After installation, boilers will be inspected for compliance with this part by the "Marine Inspector" as defined in § 50.10-15 of this subchapter.

(c) *Hydrostatic test.* (Modifies PG-99.) Each new boiler must be hydrostatically tested after installation to 1.5 times the maximum allowable working pressure as indicated in PG-99 of Section I of the ASME BPVC. Before the boilers are insulated, accessible parts of the boiler must be emptied, opened, and all interior surfaces must be examined by the marine inspector to ascertain that no defects have occurred due to the hydrostatic test.

(d) *Operating tests.* In addition to hydrostatic tests prescribed in paragraph (c) of this section,

automatically controlled propulsion and auxiliary boilers must be subjected to operating tests as specified in §§ 61.30–20, 61.35–1, 61.35–3, 62.30–10, 63.15–9, 63.25–3, and 63.25–5 of this subchapter, as appropriate, or as directed by the Officer in Charge, Marine Inspection, for propulsion boilers. These tests are to be performed after final installation.

**§ 52.01–140 Certification by stamping (modifies PG–104 through PG–113).**

(a) All boilers built in accordance with this part must be stamped with the appropriate ASME symbol as required by PG–104 through PG–113 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1).

(b) (1) Upon satisfactory completion of the tests and Coast Guard inspections, boilers must be stamped with the following:

(i) Manufacturer's name and serial number;

(ii) ASME symbol;

(iii) Coast Guard symbol, which is affixed only by marine inspector (see § 50.10–15 of this subchapter);

(iv) Maximum allowable working pressure \_\_\_\_ at \_\_\_\_ °C (°F); and

(v) Boiler rated steaming capacity in kilograms (pounds) per hour (rated joules (Btu) per hour output for high temperature water boilers).

(2) The information required in paragraph (b)(1) of this section must be located on:

(i) The front head or shell near the normal waterline and within 610 mm (24 inches) of the front of firetube boilers; and

(ii) The drum head of water tube boilers.

(3) Heating boilers built to Section I of the ASME BPVC, as permitted by § 53.01–10(e) of this subchapter, do not require Coast Guard stamping but must receive full ASME stamping including the appropriate code symbol.

(c) The data must be legibly stamped and must not be obliterated during the life of the boiler. In the event that the portion of the boiler upon which the data is stamped is to be insulated or otherwise covered, a metal nameplate as described in PG–106.6 of Section I of the ASME BPVC must be furnished and mounted. The nameplate is to be maintained in a legible condition so that the data may be easily read.

(d) Safety valves must be stamped as indicated in PG–110 of the ASME BPVC.

**§ 52.01–145 Manufacturer's data report forms (modifies PG–112 and PG–113).**

The manufacturer's data report forms required by PG–112 and PG–113 of Section I of the ASME BPVC

(incorporated by reference; see § 52.01–1) must be made available to the marine inspector for review. The Authorized Inspector's National Board commission number must be included on the manufacturer's data report forms.

**Subpart 52.05—Requirements for Boilers Fabricated by Welding**

**§ 52.05–1 General (modifies PW–1 through PW–54).**

Boilers and component parts, including piping, that are fabricated by welding must be as indicated in PW–1 through PW–54 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) except as noted otherwise in this subpart.

**§ 52.05–15 Heat treatment (modifies PW–10).**

Vessels and vessel parts must be preheated and postweld heat treated in accordance with PW–38 and PW–39 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1). This includes boiler parts made of pipe material, even though they may be nondestructively examined under § 52.05–20.

**§ 52.05–20 Radiographic and ultrasonic examination (modifies PW–11 and PW–41.1).**

Radiographic and ultrasonic examination of welded joints must be as described in PW–11 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1). Parts of boilers, fabricated of pipe material such as drums, shells, downcomers, risers, cross pipes, headers, and tubes containing only circumferentially welded butt joints, must be nondestructively examined as required by § 56.95–10 of this subchapter.

**§ 52.05–30 Minimum requirements for attachment welds (modifies PW–16).**

(a) The location and minimum size of attachment welds for nozzles and other connections must be as required by PW–16 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) except as noted otherwise in this section.

(b) When nozzles or couplings are attached to boilers, as shown in Figure PW–16 (a) and (c) of Section I of the ASME BPVC, and are welded from one side only, backing strips must be used unless it can be determined visually or by nondestructive test methods that complete penetration has been obtained.

(c) When attachments as shown in Figure PW–16 (y) and (z) of Section I of the ASME BPVC are employed they must be limited to 2-inch pipe size for pressure exceeding 150 psig.

**§ 52.05–45 Circumferential joints in pipes, tubes, and headers (modifies PW–41).**

(a) Circumferential welded joints of pipes, tubes and headers must be as required by PW–41 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) except as noted otherwise in this section.

(b) (Modifies PW–41.1.) Circumferential welded joints in pipes, tubes, and headers of pipe material must be nondestructively examined as required by § 56.95–10 of this subchapter and PW–41 of Section I of the ASME BPVC.

(c) (Modifies PW–41.5.) Butt-welded connections must be provided whenever radiography is required by § 56.95–10 of this subchapter for the piping system in which the connection is to be made. When radiography is not required, welded socket or sleeve type joints meeting the requirements of PW–41.5 of Section I of the ASME BPVC may be provided.

**Subpart 52.15—Requirements for Watertube Boilers**

**§ 52.15–1 General (modifies PWT–1 through PWT–15).**

Watertube boilers and parts thereof must be as indicated in PWT–1 through PWT–15 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) except as noted otherwise in this subpart.

**§ 52.15–5 Tube connections (modifies PWT–9 and PWT–11).**

(a) Tubes, pipe, and nipples must be attached to sheets, heads, headers, and fittings as indicated in PWT–11 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) except as noted otherwise in this section.

(b) (Replaces PWT–9.2 and PWT–11.3.) Threaded boiler tubes are not permitted as described by PWT–9.2 and PWT–11.3 of Section I of the ASME BPVC.

(c) In welded wall construction employing stub and welded wall panels that are field welded, 10 percent of the field welds must be checked using any acceptable nondestructive test method.

(d) Nondestructive testing of the butt-welded joints must meet the requirements of § 56.95–10 of this subchapter.

**Subpart 52.20—Requirements for Firetube Boilers**

**§ 52.20–1 General (modifies PFT–1 through PFT–49).**

Firetube boilers and parts thereof must be as indicated in PFT–1 through PFT–49 of Section I of the ASME BPVC

(incorporated by reference; see § 52.01–1) except as noted otherwise in this subpart.

**§ 52.20–17 Opening between boiler and safety valve (modifies PFT–44).**

Discharge pipes must be installed in accordance with the requirements of § 52.01–105.

**§ 52.20–25 Setting (modifies PFT–46).**

(a) The method of supporting firetube boilers must be as indicated in PFT–46 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1) except as noted otherwise in this section.

(b) The foundations must meet the requirements of § 52.01–130.

**Subpart 52.25—Other Boiler Types**

**§ 52.25–1 General.**

Requirements for fired boilers of various sizes and uses are referenced in table 1 to § 54.01–5 of this subchapter.

**§ 52.25–3 Feedwater heaters (modifies PFH–1).**

Feedwater heaters must meet the requirements in PFH–1 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1).

**§ 52.25–5 Miniature boilers (modifies PMB–1 through PMB–21).**

Miniature boilers must meet the requirements in PMB–1 through PMB–21 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1).

**§ 52.25–7 Electric boilers (modifies PEB–1 through PEB–19).**

Electric boilers required to comply with this part must meet the requirements in PEB–1 through PEB–19 except PEB–3 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1).

**§ 52.25–10 Organic fluid vaporizer generators (modifies PVG–1 through PVG–12).**

(a) Organic fluid vaporizers must meet the requirements of PVG–1 through PVG–12 of Section I of the ASME BPVC (incorporated by reference; see § 52.01–1).

(b) The Commandant must approve the application and end use of organic fluid vaporizer generators.

**§ 52.25–15 Fired thermal fluid heaters.**

(a) Fired thermal fluid heaters must be designed, constructed, inspected, tested, and stamped in accordance with the applicable provisions in this part.

(b) Each fired thermal fluid heater must be fitted with a control which prevents the heat transfer fluid from being heated above its flash point.

(c) The heat transfer fluid must be chemically compatible with any cargo carried in the cargo tanks serviced by the heat transfer system.

(d) Each fired thermal fluid heater must be tested and inspected in accordance with the requirements of subpart 61.30 of this subchapter.

**§ 52.25–20 Exhaust gas boilers.**

Exhaust gas boilers with a maximum allowable working pressure greater than 103 kPa gage (15 psig) or an operating temperature greater than 454 °C (850 °F) must be designed, constructed, inspected, tested, and stamped in accordance with the applicable provisions in this part. The design temperature of parts exposed to the exhaust gas must be the maximum temperature that could normally be produced by the source of the exhaust gas. This temperature must be verified by testing or by the manufacturer of the engine or other equipment producing the exhaust. Automatic exhaust gas boiler control systems must be designed, constructed, tested, and inspected in accordance with § 63.25–7 of this subchapter.

■ 15. Revise and republish part 53 to read as follows:

**PART 53—HEATING BOILERS**

Sec.

**Subpart 53.01—General Requirements**

53.01–1 Incorporation by reference.

53.01–3 Adoption of Section IV of the ASME BPVC.

53.01–5 Scope (modifies HG–100).

53.01–10 Service restrictions and exceptions (replaces HG–101).

**Subpart 53.05—Pressure Relieving Devices (Article 4)**

53.05–1 Safety valve requirements for steam boilers (modifies HG–400 and HG–401).

53.05–2 Relief valve requirements for hot water boilers (modifies HG–400.2).

53.05–3 Materials (modifies HG–401.2).

53.05–5 Discharge capacities and valve markings.

**Subpart 53.10—Tests, Inspection, Stamping, and Reporting (Article 5)**

53.10–1 General.

53.10–3 Inspection and tests (modifies HG–500 through HG–540).

53.10–10 Certification by stamping.

53.10–15 Manufacturers' data report forms.

**Subpart 53.12—Instruments, Fittings, and Controls (Article 6)**

53.12–1 General (modifies HG–600 through HG–640).

**Authority:** 46 U.S.C. 3306, 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3.

**PART 53—HEATING BOILERS**

**Subpart 53.01—General Requirements**

**§ 53.01–1 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](mailto:typeapproval@uscg.mil). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material may be obtained from the following sources:

(a) *American Society of Mechanical Engineers (ASME)*, Two Park Avenue, New York, NY 10016–5990; 800–843–2763; [CustomerCare@asme.org](mailto:CustomerCare@asme.org); [www.asme.org](http://www.asme.org).

(1) 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 § 53.01–10(e).

(2) ASME BPVC.IV–2019, 2019 ASME Boiler and Pressure Vessel Code, Section IV, Rules for Construction of Heating Boilers, 2019 Edition, issued July 1, 2019 (“Section IV of the ASME BPVC”); IBR approved for §§ 53.01–3; 53.01–5; 53.01–10(a); 53.05–1(a); 53.05–2(a); 53.05–3; 53.05–5; 53.10–1; 53.10–3(a); 53.10–10; 53.10–15; 53.12–1(a).

(b) *UL Solutions*, 333 Pfingston Road, Northbrook, IL 60062; 847–272–8800; [www.ul.com](http://www.ul.com).

(1) UL 174, Standard for Safety, Household Electric Storage Tank Water Heaters, Eleventh Edition, dated April 29, 2004, including revisions through December 15, 2016 (“UL 174”); IBR approved for § 53.01–10(c).

(2) UL 1453, Standard for Safety, Electric Booster and Commercial Storage Tank Water Heaters, Sixth Edition, dated March 29, 2016, including revisions through March 9, 2017 (“UL 1453”); IBR approved for § 53.01–10(c).

**§ 53.01–3 Adoption of Section IV of the ASME BPVC.**

(a) Heating boilers must be designed, constructed, inspected, tested, and stamped in accordance with Section IV of the ASME BPVC (incorporated by

reference; see § 53.01–1) as limited, modified, or replaced by specific requirements in this part. The provisions in the appendices to Section IV of the ASME BPVC are adopted and must be followed when the

requirements in Section IV make them mandatory. For general information, table 1 to § 53.01–3(a) lists the various paragraphs in Section IV of the ASME BPVC that are limited, modified, or replaced by regulations in this part.

TABLE 1 TO § 53.01–3(a)—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF SECTION IV OF THE ASME BPVC

Paragraphs in Section IV of the ASME BPVC and disposition	Unit of this part
HG–100 modified by .....	53.01–5(b).
HG–101 replaced by .....	53.01–10.
HG–400 modified by .....	53.05–1.
HG–400.2 modified by .....	53.05–2.
HG–401 modified by .....	53.05–1.
HG–401.2 modified by .....	53.05–3.
HG–500 through HG–540 modified by .....	53.10–3.
HG–600 through HG–640 modified by .....	53.12–1.

**Note 1 to table § 53.01–3(a):** The references to specific provisions in Section IV of the ASME BPVC are coded. The first letter, such as “H,” refers to Section IV. The second letter, such as “G,” refers to a part or subpart in Section IV. The number following the letters refers to the numbered paragraph in the text of the part or subpart in Section IV.

- (b) References to the ASME BPVC, such as paragraph HG–307, indicate:
- (1) H = Section IV of the ASME BPVC.
  - (2) G = Part containing general requirements.
  - (3) 3 = Article in part.
  - (4) 307 = Paragraph within Article 3.

(c) When a paragraph or a section of the regulations in this part relates to Section IV of the ASME BPVC, the relationship with the code will be shown immediately following the heading of the section or at the beginning of the paragraph, as follows:

- (1) (Modifies H\_\_\_\_.) This indicates that the material in H\_\_\_\_ is generally applicable but is being altered, amplified, or augmented.
- (2) (Replaces H\_\_\_\_.) This indicates that H\_\_\_\_ does not apply.
- (3) (Reproduces H\_\_\_\_.) This indicates that H\_\_\_\_ is being identically reproduced for convenience, not for emphasis.

**§ 53.01–5 Scope (modifies HG–100).**

(a) The regulations in this part apply to steam heating boilers, hot water boilers (which include hot water heating boilers and hot water supply boilers), and to appurtenances thereto. The requirements in this part must be used in conjunction with Section IV of the ASME BPVC (incorporated by reference; see § 53.01–1). Table 1 to § 54.01–5 of this subchapter gives a breakdown by parts in this subchapter of the regulations governing various types of pressure vessels and boilers.

(b) (Modifies HG–100.) The requirements of part HG of Section IV of the ASME BPVC must be used except as noted otherwise in this part.

**§ 53.01–10 Service restrictions and exceptions (replaces HG–101).**

(a) *General.* The service restrictions and exceptions must be as indicated in this section in lieu of the requirements of HG–101 of Section IV of the ASME BPVC (incorporated by reference; see § 53.01–1).

(b) *Service restrictions.* (1) Boilers of wrought materials must be restricted to a maximum of 103 kPa gage (15 psig) for steam and a maximum of 689 kPa (100 psig) or 121 °C (250 °F) for hot water. If operating conditions exceed these limits, design and fabrications must be in accordance with part 52 of this subchapter.

(2) Boilers of cast iron materials must be restricted to a maximum of 103 kPa gage (15 psig) for steam and to a maximum of 206 kPa gage (30 psig) or 121 °C (250 °F) for hot water.

(c) *Hot water supply boilers.* (1) Electrically fired hot water supply boilers that have a capacity not greater than 454 liters (120 gallons), a heat input not greater than 58.6 kilowatts (200,000 Btu per hour), and are listed as approved under UL 174 or UL 1453 (both incorporated by reference; see § 53.01–1) are exempted from the requirements of this part provided they are protected by a pressure relief device. This relief device need not comply with § 53.05–2.

(2) Oil fired hot water supply boilers are not exempted from the requirements of this part on the basis of size or heat input.

(d) *Exhaust gas boilers.* Exhaust gas type boilers must be restricted to a working pressure equal to or less than 103 kPa gage (15 psig) and an operating temperature equal to or less than 454 °C (850 °F). The design temperature of parts exposed to the exhaust gas must be the

maximum temperature that could normally be produced by the source of exhaust gas. This temperature must be verified by testing or by the manufacturer of the engine or other equipment producing the exhaust.

(e) *ASME BPVC Section I.* Heating boilers whose operating conditions are within the service restrictions of paragraph (b)(1) of this section may be constructed in accordance with Section I of the ASME BPVC (incorporated by reference; see § 53.01–1). In addition, these heating boilers must:

- (1) Be stamped with the appropriate ASME symbol in accordance with Section I of the ASME BPVC;
- (2) Meet the service restrictions of paragraph (b)(2) of this section if made of cast iron;
- (3) Have safety valves which meet the requirements of § 52.01–120 of this subchapter;
- (4) If a hot water supply boiler, have a temperature relief valve or a pressure-temperature relief valve in accordance with § 53.05–2(c);
- (5) If automatically controlled, meet the applicable requirements in part 63 of this subchapter; and
- (6) Meet the inspection and test requirements of § 53.10–3.

(f) *Controls and miscellaneous accessories.* Refer to part 63 of this subchapter for the requirements governing controls and miscellaneous accessories.

**Subpart 53.05—Pressure Relieving Devices (Article 4)**

**§ 53.05–1 Safety valve requirements for steam boilers (modifies HG–400 and HG–401).**

(a) The pressure relief valve requirements and the safety valve requirements for steam boilers must be

as indicated in HG-400 and HG-401 of Section IV of the ASME BPVC (incorporated by reference; see § 53.01-1) except as noted otherwise in this section.

(b) Each steam boiler must have at least one safety valve.

**§ 53.05-2 Relief valve requirements for hot water boilers (modifies HG-400.2).**

(a) *Relief valves.* The relief valve requirements for hot water boilers must be as indicated in article 4 of Section IV of the ASME BPVC (incorporated by reference; see § 53.01-1) except as noted otherwise in this section.

(b) *Hot water heating boilers.* Each hot water heating boiler must have at least one safety relief valve.

(c) *Hot water supply boilers.* Each hot water supply boiler must have at least one safety relief valve and a temperature relief valve or a pressure-temperature relief valve. The valve temperature setting must not be more than 99 °C (210 °F).

**§ 53.05-3 Materials (modifies HG-401.2).**

Materials for valves must be in accordance with HG-401.2 of Section IV of the ASME BPVC (incorporated by reference; see § 53.01-1) except that nonmetallic materials may be used only for gaskets and packing.

**§ 53.05-5 Discharge capacities and valve markings.**

The discharge capacities and valve markings must be as indicated in HG-402 of Section IV of the ASME BPVC (incorporated by reference; see § 53.01-1). The discharge capacities must be certified by the National Board of Boiler and Pressure Vessel Inspectors.

**Subpart 53.10—Tests, Inspection, Stamping, and Reporting (Article 5)**

**§ 53.10-1 General**

The tests, inspection, stamping, and reporting of heating boilers must be as indicated in article 5, part HG of Section IV of the ASME BPVC (incorporated by reference; see § 53.01-1) except as noted otherwise in this subpart.

**§ 53.10-3 Inspection and tests (modifies HG-500 through HG-540).**

(a) The inspections required by HG-500 through HG-540 must be performed by the “Authorized Inspector” as defined in HG-515 of Section IV of the ASME BPVC (incorporated by reference; see § 53.01-1). The Authorized Inspector must hold a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors. After installation, heating boilers must be inspected for compliance with this part by a marine inspector.

(b) Automatically controlled boilers must be subjected to the operating tests prescribed in part 63 of this subchapter.

(c) All heating boilers must have the operation of their pressure relieving devices checked after the final installation.

**§ 53.10-10 Certification by stamping.**

Stamping of heating boilers must be as indicated in HG-530 of Section IV of the ASME BPVC (incorporated by reference; see § 53.01-1).

**§ 53.10-15 Manufacturer’s data report forms.**

The manufacturer’s data report forms required by HG-520 of Section IV of the ASME BPVC (incorporated by reference; see § 53.01-1) must be made available to the marine inspector for review. The Authorized Inspector’s National Board commission number must be included on the manufacturer’s data report forms.

**Subpart 53.12—Instruments, Fittings, and Controls (Article 6)**

**§ 53.12-1 General (modifies HG-600 through HG-640).**

(a) The instruments, fittings and controls for heating boilers must be as indicated in HG-600 through HG-640 of Section IV of the ASME BPVC (incorporated by reference; see § 53.01-1) except as noted otherwise in this section.

(b) For control systems for automatic auxiliary heating equipment, the requirements in part 63 of this subchapter govern and must be followed.

■ 16. Revise and republish part 54 to read as follows:

**PART 54—PRESSURE VESSELS**

Sec.

**Subpart 54.01—General Requirements**

- 54.01-1 Incorporation by reference.
- 54.01-2 Adoption of Division 1 of Section VIII of the ASME BPVC.
- 54.01-5 Scope (modifies U-1 and U-2).
- 54.01-10 Steam-generating pressure vessels (modifies U-1(g)).
- 54.01-15 Exemptions from shop inspection and plan approval (modifies U-1(c)(2)).
- 54.01-17 Pressure vessel for human occupancy (PVHO).
- 54.01-18 Plan approval.
- 54.01-25 Miscellaneous pressure components (modifies UG-11).
- 54.01-30 Loadings (modifies UG-22).
- 54.01-35 Corrosion (modifies UG-25).
- 54.01-40 External pressure (modifies UG-28).

**Subpart 54.03—Low Temperature Operation**

- 54.03-1 Scope.
- 54.03-5 General.

**Subpart 54.05—Toughness Tests**

- 54.05-1 Scope (replaces UG-84).
- 54.05-3 Tests required.
- 54.05-5 Toughness test specimens.
- 54.05-6 Toughness test temperatures.
- 54.05-10 Certification of material toughness tests.
- 54.05-15 Weldment toughness tests—procedure qualifications.
- 54.05-16 Production toughness testing.
- 54.05-17 Weld toughness test acceptance criteria.
- 54.05-20 Impact test properties for service of 0 °F and below.
- 54.05-25 [Reserved]
- 54.05-30 Allowable stress values at low temperatures.

**Subpart 54.10—Inspection, Reports, and Stamping**

- 54.10-1 Scope (modifies UG-90 through UG-103 and UG-115 through UG-120).
- 54.10-3 Marine inspectors and Coast Guard Symbol stamping (replaces UG-90 and UG-91, and modifies UG-92 through UG-103).
- 54.10-5 Maximum allowable working pressure (reproduces UG-98).
- 54.10-10 Standard hydrostatic test (modifies UG-99).
- 54.10-15 Pneumatic test (modifies UG-100).
- 54.10-20 Marking and stamping.
- 54.10-25 Manufacturers’ data report forms (modifies UG-120).

**Subpart 54.15—Pressure-Relief Devices**

- 54.15-1 General (modifies UG-125 through UG-137).
- 54.15-3 Definitions (modifies appendix 3).
- 54.15-5 Protective devices (modifies UG-125).
- 54.15-10 Safety and relief valves (modifies UG-126).
- 54.15-13 Rupture disks (modifies UG-127).
- 54.15-15 Relief devices for unfired steam boilers, evaporators, and heat exchangers (modifies UG-126).
- 54.15-25 Minimum relief capacities for cargo tanks containing compressed or liquefied gas.

**Subpart 54.20—Fabrication by Welding**

- 54.20-1 Scope (modifies UW-1 through UW-65).
- 54.20-2 Fabrication for hazardous materials (replaces UW-2(a)).
- 54.20-3 Design (modifies UW-9, UW-11(a), UW-13, and UW-16).
- 54.20-5 Welding qualification tests and production testing (modifies UW-26, UW-28, UW-29, UW-47, and UW-48).

**Subpart 54.23—Fabrication by Brazing**

- 54.23-1 Scope (modifies UB-1).

**Subpart 54.25—Construction With Carbon, Alloy, and Heat-Treated Steels**

- 54.25-1 Scope.
- 54.25-3 Steel plates (modifies UCS-6).
- 54.25-5 Corrosion allowance.
- 54.25-7 Requirement for postweld heat treatment (modifies UCS-56).
- 54.25-8 Radiography (modifies UW-11(a), UCS-57, UNF-57, UHA-33, and UHT-57).

- 54.25–10 Low temperature operation—ferritic steels (replaces UCS–65 through UCS–67).
- 54.25–15 Low temperature operation—high alloy steels (modifies UHA–23(b) and UHA–51).
- 54.25–20 Low temperature operation—ferritic steels with properties enhanced by heat treatment (modifies UHT–5(c), UHT–6, UHT–23, and UHT–82).
- 54.25–25 Welding of quenched and tempered steels (modifies UHT–82).

**Subpart 54.30—Mechanical Stress Relief**

- 54.30–1 Scope.
- 54.30–3 Introduction.
- 54.30–5 Limitations and requirements.
- 54.30–10 Method of performing mechanical stress relief.
- 54.30–15 Requirement for analysis and computation.

**Authority:** 33 U.S.C. 1509; 43 U.S.C. 1333; 46 U.S.C. 3306, 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3.

**PART 54—PRESSURE VESSELS**

**Subpart 54.01—General Requirements**

**§ 54.01–1 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](mailto:typeapproval@uscg.mil). For information on the availability of this

material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material may be obtained from the following sources:

(a) *American Society of Mechanical Engineers (ASME)*, Two Park Avenue, New York, NY 10016–5990; 800–843–2763; [CustomerCare@asme.org](mailto:CustomerCare@asme.org); [www.asme.org](http://www.asme.org).

(1) 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 §§ 54.01–2; 54.01–5 (c), (e), and table 2; 54.01–18(b); 54.01–25(a); 54.01–30; 54.01–35(a), (b), and (e); 54.03–1; 54.05–1; 54.10–1; 54.10–3(b); 54.10–5(a), (b), and table 1; 54.10–10(b) and (e); 54.10–15(c); 54.15–1(a); 54.15–5(a); 54.15–10(e) and (h); 54.15–13(a); 54.20–1(a); 54.20–3(b), (c), and (d); 54.25–1; 54.25–3; 54.25–8(b); 54.25–10(b) and (c); 54.25–15; 54.25–20(b), (c), and (e); 54.30–3(c); 54.30–5(a); 54.30–10(a).

(2) [Reserved]

(b) *ASTM International*, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428–2959; 610–832–9500; [service@astm.org](mailto:service@astm.org); [www.astm.org](http://www.astm.org).

(1) ASTM A20/A20M–19, Standard Specification for General Requirements for Steel Plates for Pressure Vessels, approved May 1, 2019 (“ASTM A20/A20M”); IBR approved for §§ 54.05–10(a); 54.25–10(b).

(2) ASTM A203/A203M–17, Standard Specification for Pressure Vessel Plates, Alloy Steel, Nickel, approved November 1, 2017 (“ASTM A203/A203M”); IBR approved for § 54.05–20(b).

(3) ASTM A370–19, Standard Test Methods and Definitions for Mechanical Testing of Steel Products, approved July 1, 2019 (“ASTM A370”); IBR approved for § 54.25–20(b).

(4) ASTM E23–18, Standard Test Methods for Notched Bar Impact Testing

of Metallic Materials, approved June 1, 2018 (“ASTM E23”); IBR approved for § 54.05–5(a).

(5) ASTM E208–19, Standard Test Method for Conducting Drop-Weight Test to Determine Nil-Ductility Transition Temperature of Ferritic Steels, approved October 1, 2019 (“ASTM E208”); IBR approved for § 54.05–5(b) and (c).

(c) *Compressed Gas Association (CGA)*, 8484 Westpark Drive, Suite 220, McLean, VA 22012; 703–788–2700; [www.cganet.com](http://www.cganet.com).

(1) CGA S–1.2–2009, Pressure Relief Device Standards—Part 2—Portable Containers for Compressed Gases, Ninth Edition, 2009 (“CGA S–1.2”); IBR approved for § 54.15–10(h).

(2) [Reserved]

(d) *Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)*, 127 Park Street NE, Vienna, VA 22180–4602; 703–281–6613; [www.msshq.org](http://www.msshq.org).

(1) ANSI/MSS SP–25–2018, Standard Marking System for Valves, Fittings, Flanges and Unions, published September 2018 (“MSS SP–25”); IBR approved for § 54.01–25(b).

(2) [Reserved]

**§ 54.01–2 Adoption of Division 1 of Section VIII of the ASME BPVC.**

(a) Pressure vessels must be designed, constructed, and inspected in accordance with Section VIII of the ASME BPVC (incorporated by reference, see § 54.01–1), as limited, modified, or replaced by specific requirements in this part. The provisions in the appendices to Section VIII of the ASME BPVC are adopted and must be followed when the requirements in Section VIII make them mandatory. For general information, table 1 to § 54.01–2(a) lists the various paragraphs in Section VIII of the ASME BPVC that are limited, modified, or replaced by regulations in this part.

TABLE 1 TO § 54.01–2(a)—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF SECTION VIII OF THE ASME BPVC

Paragraphs in section VIII of the ASME BPVC and disposition	Unit of this part
U–1 and U–2 modified by .....	54.01–5 through 54.01–15.
U–1(c) replaced by .....	54.01–5.
U–1(d) replaced by .....	54.01–5(a) and 54.01–15.
U–1(g) modified by .....	54.01–10.
U–1(c)(2) modified by .....	54.01–15.
UG–11 modified by .....	54.01–25.
UG–22 modified by .....	54.01–30.
UG–25 modified by .....	54.01–35.
UG–28 modified by .....	54.01–40.
UG–84 replaced by .....	54.05–1.
UG–90 and UG–91 replaced by .....	54.10–3.
UG–92 through UG–103 modified by .....	54.10–1 through 54.10–15.
UG–98 reproduced by .....	54.10–5.
UG–115 through UG–120 modified by .....	54.10–1.



TABLE 1 TO § 54.01–2(a)—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF SECTION VIII OF THE ASME BPVC—Continued

Paragraphs in section VIII of the ASME BPVC and disposition	Unit of this part
UG–116, except (j), replaced by .....	54.10–20(a).
UG–116(j) replaced by .....	54.10–20(b).
UG–117 replaced by .....	54.10–20(c).
UG–118 replaced by .....	54.10–20(a).
UG–119 modified by .....	54.10–20(d).
UG–120 modified by .....	54.10–25.
UG–125 through UG–137 modified by .....	54.15–1 through 54.15–15.
UW–1 through UW–65 modified by .....	54.20–1.
UW–2(a) replaced by .....	54.01–5(b) and 54.20–2.
UW–2(b) replaced by .....	54.01–5(b) and 54.20–2.
UW–9, UW–11(a), UW–13, and UW–16 modified by .....	54.20–3.
UW–11(a) modified by .....	54.25–8.
UW–26, UW–27, UW–28, UW–29, UW–47, and UW–48 modified by .....	54.20–5.
UB–1 modified by .....	54.23–1.
UB–2 modified by .....	52.01–95(d) and 56.30–30(b)(1).
UCS–6 modified by .....	54.25–3.
UCS–56 modified by .....	54.25–7.
UCS–57, UNF–57, UHA–33, and UHT–57 modified by .....	54.25–8.
UCS–65 through UCS–67 replaced by .....	54.25–10.
UHA–23(b) and UHA–51 modified by .....	54.25–15.
UHT–5(c), UHT–6, and UHT–23 modified by .....	54.25–20.
UHT–82 modified by .....	54.25–20 and 54.25–25.
Appendix 3 modified by .....	54.15–3.

**Note 1 to table § 54.01–2(a):** The references to specific provisions in Section VIII of the ASME BPVC are coded. The first letter, such as “U,” refers to Division 1 of Section VIII. The second letter, such as “G,” refers to a subsection within Section VIII. The number refers to the paragraph within the subsection.

(b) References to the ASME BPVC, such as paragraph UG–125, indicate:

(1) U = Division 1 of Section VIII of the ASME BPVC.

(2) G = Part containing general requirements.

(3) 125 = Paragraph within part.

(c) When a paragraph or a section of the regulations in this part relates to material in Section VIII of the ASME BPVC, the relationship with the code will be shown immediately following the heading of the section or at the beginning of the paragraph, as follows:

(1) (Modifies U \_\_\_\_.) This indicates that the material in U \_\_\_\_ is generally applicable but is being altered, amplified or augmented.

(2) (Replaces U \_\_\_\_.) This indicates that U \_\_\_\_ does not apply.

(3) (Reproduces U \_\_\_\_.) This indicates that U \_\_\_\_ is being identically reproduced for convenience, not for emphasis.

**§ 54.01–5 Scope (modifies U–1 and U–2).**

(a) This part contains requirements for pressure vessels. Table 1 to § 54.01–5 gives a breakdown by parts in this subchapter of the regulations governing various types of pressure vessels, boilers, and thermal units.

(b) Pressure vessels are divided into Classes I, I–L (low temperature), II, II–L (low temperature), and III. Table 2 to § 54.01–5 describes these classes and sets out additional requirements for welded pressure vessels.

(c) The requirements for pressure vessels by class are as follows:

(1) Class I–L and II–L pressure vessels must meet the applicable requirements in this part.

(2) Pressure vessels containing hazardous materials as defined in § 150.115 of this chapter must meet the requirements of this part or, as applicable, the requirements in 49 CFR parts 171–177, or part 64 of this subchapter.

(3) Except as provided in paragraph (c)(4) of this section, Classes I, II, and III pressure vessels not containing hazardous materials must be designed and constructed in accordance with the requirements in Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) and must be stamped with the ASME “U” symbol. These pressure vessels must also comply with the requirements that are listed or prescribed in paragraphs (d) through (g) of this section. Compliance with other provisions in this part is not required.

(4) Classes II and III pressure vessels that have a net internal volume of less than 0.14 cubic meters (5 cubic feet) and do not contain hazardous materials must be stamped with either the ASME “U” or “UM” symbol. Compliance with other provisions in this part is not required.

(d) Pressure vessels described in paragraph (c)(3) of this section must—

(1) Have detailed plans that include the information required by § 54.01–18;

(2) Meet §§ 54.01–35, 54.20–3(c), and 54.25–3;

(3) Have pressure relief devices required by subpart 54.15;

(4) Meet the applicable requirements in §§ 54.10–3, 54.10–20, and 54.10–25 for inspection, reports, and stamping;

(5) If welded, meet the post weld heat treatment and minimum joint and radiography requirement in table 2 to § 54.01–5; and

(6) If a steam generating pressure vessel, meet § 54.01–10.

(e) The plans required by paragraph (d)(1) of this section must be certified by a registered professional engineer to meet the design requirements in paragraph (d) of this section and in Section VIII of the ASME BPVC. The certification must appear on all drawings and analyses. The plans must be made available to the Coast Guard prior to the inspection required by § 54.10–3(c).

(f) If a pressure vessel has more than one independent chamber and the chambers have different classifications, each chamber must, as a minimum, meet the requirements for its classification. If a single classification for the entire pressure vessel is preferred, the classification selected must be one that is required to meet all of the regulations applicable to the classification that is not selected. For example, if one chamber is Class I and one chamber is Class II–L, the only

single classification that can be selected is Class I–L.

(g) The design pressure for each interface between two chambers in a multichambered pressure vessel must be—

(1) The maximum allowable working pressure (gauge) in the chamber with the higher pressure; or

(2) If one chamber is a vacuum chamber, the maximum allowable working pressure (absolute) in the other

chamber minus the least operating pressure (absolute) in the vacuum chamber.

TABLE 1 TO § 54.01–5—REGULATION REFERENCE FOR BOILERS, PRESSURE VESSELS, AND THERMAL UNITS

Service and pressure temperature boundaries	Part of subchapter regulating mechanical design	Part of subchapter regulating automatic control
Main (power) boiler: All .....	52	62
Pressure vessel: All .....	54	NA
Fired auxiliary boiler <sup>1</sup> (combustion products or electricity):		
(1) Steam:		
More than 103 kPa (15 psig) .....	52	<sup>2</sup> 62 or 63
Equal to or less than 103 kPa (15 psig) .....	53	63
(2) Hot water heating:		
More than 689 kPa (100 psig) or 121 °C (250 °F) .....	52	63
Equal to or less than 689 kPa (100 psig) and 121 °C (250 °F) .....	53	63
(3) Hot water supply:		
More than 689 kPa (100 psig) or 121 °C (250 °F) .....	52	63
Equal to or less than 689 kPa (100 psig) and 121 °C (250 °F) .....	53	63
Other:		
(1) Fired thermal fluid heaters: All	52	63
(2) Unfired steam boiler:		
More than 206 kPa (30 psig) or 454 °C (850 °F) <sup>3</sup> .....	52	NA
Equal to or less than 206 kPa (30 psig) and 454 °C (850 °F) .....	54	NA
(3) Evaporators and heat exchangers: More than 103 kPa (15 psig) <sup>4</sup>	54	NA
(4) Unfired hot water supply or heating boiler: More than 103 kPa (15 psig) <sup>4</sup>	54	NA

<sup>1</sup> Including exhaust gas types.

<sup>2</sup> Boilers with heat input ratings ≥12,500,000 Btu/hr. must have controls that meet part 62 of this subchapter. Boilers with heat input ratings <12,500,000 Btu/hr. must have controls that meet part 63 of this subchapter.

<sup>3</sup> Temperature of working fluid.

<sup>4</sup> Relief device is required even if designed for less than 103 kPa (15 psig).

TABLE 2 TO § 54.01–5—PRESSURE VESSEL CLASSIFICATION

Class	Service contents	Class limits on pressure and temperature	Joint requirements <sup>1 6 7</sup>	Radiography requirements, Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) <sup>3 7</sup>	Post-weld heat treatment requirements <sup>5 7</sup>
I .....	(a) Vapor or gas ..... (b) Liquid ..... (c) Hazardous Materials <sup>2</sup> .	Vapor or gas: Over 600 psi or 700 °F. Liquid: Over 600 psi or 400 °F.	(1) For category A; (1) or (2) for category B. All categories C and D must have full penetration welds extending through the entire thickness of the vessel wall or nozzle wall.	Full on all butt joints regardless of thickness. Exceptions listed in table UCS–57 of Section VIII of the ASME BPVC do not apply.	For carbon- or low-alloy steel, in accordance with table UCS–56 of Section VIII of the ASME BPVC, regardless of thickness. For other materials, in accordance with Section VIII.
I–L Low Temperature.	(a) Vapor or gas, or liquid. (b) Hazardous Materials <sup>2</sup> .	Over 250 psi and service temp. below 0 °F.	(1) For categories A and B. All categories C and D must have full penetration welds extending through the entire thickness of the vessel wall or nozzle wall. No backing rings or strips left in place.	Full on all butt joints regardless of thickness. Exceptions listed in table UCS–57 of Section VIII of the ASME BPVC do not apply.	For carbon- or low-alloy steel, in accordance with table UCS–56 of Section VIII of the ASME BPVC, regardless of thickness. For other materials, in accordance with Section VIII.
II .....	(a) Vapor or gas ..... (b) Liquid ..... (c) Hazardous Materials <sup>2 3 6</sup> .	Vapor or gas: 30 through 600 psi or 275 through 700 °F. Liquid: 200 through 600 psi or 250 through 400 °F.	(1) Or (2) for category A. (1), (2), or (3) for category B. Categories C and D in accordance with UW–16 of Section VIII of the ASME BPVC.	Spot, unless exempted by UW–11(c) of Section VIII of the ASME BPVC.	In accordance with Section VIII of the ASME BPVC.
II–L Low Temperature.	(a) Vapor or gas, or liquid. (b) Hazardous Materials <sup>2</sup> .	0 through 250 psi and service temp. below 0 °F.	(1) For category A; (1) or (2) for category B. All categories C and D must have full-penetration welds extending through the entire thickness of the vessel wall or nozzle wall.	Spot. The exemption of UW–11(c) of Section VIII of the ASME BPVC does not apply.	Same as for I–L except that mechanical stress relief may be substituted if allowed under subpart 54.30.

TABLE 2 TO § 54.01–5—PRESSURE VESSEL CLASSIFICATION—Continued

Class	Service contents	Class limits on pressure and temperature	Joint requirements <sup>1 6 7</sup>	Radiography requirements, Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) <sup>3 7</sup>	Post-weld heat treatment requirements <sup>5 7</sup>
III .....	(a) Vapor or gas ..... (b) Liquid ..... (c) Hazardous Materials <sup>2 3 6</sup> .	Vapor or gas: Under 30 psi and 0 through 275 °F. Liquid: Under 200 psi and 0 through 250 °F.	In accordance with Section VIII of the ASME BPVC.	Spot, unless exempted by UW–11(c) of Section VIII of the ASME BPVC.	In accordance with Section VIII of the ASME BPVC.

<sup>1</sup> Welded joint categories are defined under UW–3 of Section VIII of the ASME BPVC. Joint types are described in table UW–12 of Section VIII of the ASME BPVC, and numbered (1), (2), etc.

<sup>2</sup> See § 54.20–2.

<sup>3</sup> See §§ 54.25–8(c) and 54.25–10(d).

<sup>4</sup> See §§ 54.01–15 and 54.10–3 for exemptions.

<sup>5</sup> Specific requirements modifying table UCS–56 of Section VIII of the ASME BPVC appear in § 54.25–7.

<sup>6</sup> See § 54.20–3(c) and (f).

<sup>7</sup> Applies only to welded pressure vessels.

**Note 1 to table 2 to § 54.01–5:** All classes of pressure vessels are subject to shop inspection and plan approval. See §§ 54.01–15 and 54.10–3 for exemptions.

(Approved by the Office of Management and Budget under OMB control number 2130–0181)

**§ 54.01–10 Steam-generating pressure vessels (modifies U–1(g)).**

(a) Pressure vessels in which steam is generated are classed as “Unfired Steam Boilers” except as required otherwise by paragraph (b) of this section. Unfired steam boilers must be fitted with an efficient water level indicator, a pressure gage, a blowdown valve, and an approved safety valve as required by § 54.15–15. Unfired steam boilers must be constructed in accordance with this part other than when the pressures are more than 206 kPa (30 psig) or the temperatures of the working fluid are more than 454 °C (850 °F) when such boilers must be constructed in accordance with part 52 of this subchapter.

(b) Vessels known as “Evaporators” or “Heat Exchangers” are not classified as unfired steam boilers. They must be fitted with an approved safety device as required under § 54.15–15 and constructed in accordance with this part.

(c) An evaporator in which steam is generated must be fitted with an efficient water level indicator, a pressure gage, and a blowdown valve.

**§ 54.01–15 Exemptions from shop inspection and plan approval (modifies U–1(c)(2)).**

(a) The following classifications are exempt from shop inspection and plan approval requirements of this part:

(1) Vessels containing water at a pressure not greater than 689 kPa (100 psig), and at a temperature not above 93 °C (200 °F) including those containing air, the compression of which serves only as a cushion. Air-charging lines may be permanently

attached if the air pressure does not exceed 103 kPa (15 psig).

(2) (i) Hot water supply storage tanks heated by steam or any other indirect means when none of the following limitations is exceeded:

(A) A heat input of 58 kW (200,000 Btu per hour);

(B) A water temperature of 93 °C (200 °F);

(C) A nominal water-containing capacity of 454 liters (120 gallons); or

(D) A pressure of 689 kPa (100 psig).  
(ii) The exemption of any tank under this paragraph (a)(2) requires that it must be fitted with a safety relief valve of at least 1-inch diameter, set to relieve below the maximum allowable working pressure of the tank.

(3)(i) Vessels having an internal operating pressure not exceeding 103 kPa (15 psig) with no limitation on size.

(ii) Cargo tanks of pressure vessel configuration are not included in the exemption in paragraph (a)(3)(i) of this section.

(4) Class I, II, and III pressure vessels that meet the requirements of § 54.01–5(c)(3) and (4).

(5) Condensers and heat exchangers, regardless of size, when the design is such that the liquid phase is not greater than 689 kPa (100 psig) and 200 °F (93 °C) and the vapor phase is not greater than 103 kPa (15 psig) provided that the Officer in Charge, Marine Inspection is satisfied that system overpressure conditions are addressed by the owner or operator.

(b) For fluid conditioner fittings see § 56.15–1 of this subchapter.

**§ 54.01–17 Pressure vessel for human occupancy (PVHO).**

Pressure vessels for human occupancy (PVHOs) must meet the requirements of subpart B (Commercial Diving Operations) of part 197 of this chapter.

**§ 54.01–18 Plan approval.**

(a) Manufacturers intending to fabricate pressure vessels, heat exchangers, evaporators, and similar appurtenances, covered by the regulations in this part must submit detailed plans in accordance with subpart 50.20 of this subchapter except as provided in paragraph (c) of this section.

(b) The following information must be submitted:

(1) Calculations for all pressure containment components including the maximum allowable working pressure, the hydrostatic or pneumatic test pressure, and the intended safety device setting.

(2) Joint design and methods of attachment of all pressure containment components.

(3) Foundations and supports (design and attachment).

(4) Pertinent calculations for pressure vessel foundations and/or supports.

(5) A bill of material meeting the requirements of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1), as modified by this part.

(6) A diagrammatic arrangement drawing of the assembled unit indicating location of internal and external components.

(c) Plans for Class I, II, and III pressure vessels with the ASME “U” stamp that do not contain hazardous materials are not required to be submitted for approval (see § 54.01–5(e)).

**§ 54.01–25 Miscellaneous pressure components (modifies UG–11).**

(a) Pressure components for pressure vessels must be as required by UG–11 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) except as noted otherwise in this section.

(b) All pressure components conforming to an accepted ANSI (American National Standards Institute) Standard referred to in an adopted code, specification or standard or in this subchapter must also be marked in accordance with MSS SP-25 (incorporated by reference; see § 54.01-1).

**§ 54.01-30 Loadings (modifies UG-22).**

(a) The loadings for pressure vessels must be as required by UG-22 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01-1) except as noted otherwise in this section.

(b) In evaluating loadings for certain pressure vessel applications, the Commandant may require consideration of the following loads in addition to those listed in UG-22 of Section VIII of the ASME BPVC:

(1) Loading imposed by vessel's attitude in roll, list, pitch and trim.

(2) Dynamic forces due to ship motions.

**§ 54.01-35 Corrosion (modifies UG-25).**

(a) Vessels or portions of vessels subject to corrosion must be as required by UG-25 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01-1) except as noted otherwise in this section.

(b) The pressure portions of pressure vessels must:

(1) Normally have a corrosion allowance of one-sixth of the calculated thickness, or one-sixteenth inch, whichever is smaller, added to the calculated thickness as determined by the applicable design formula.

(2) Be specifically evaluated in cases where unusually corrosive cargoes will be involved, for the possible increase of this corrosion allowance.

(3) Have no additional thickness required when acceptable corrosion resistant materials are used.

(4) Not normally need additional thickness allowance when the effective stress (either S or SE depending on the design formula used) is 80 percent or less of the allowable stress listed in Section VIII of the ASME BPVC for calculating thickness.

(c) Telltale holes must not be permitted in pressure vessels containing dangerous fluids, such as acid, poison, corrosives, etc.

(d) Exemption from these corrosion allowance requirements will be granted by the Commandant in those cases where:

(1) The contents of the pressure vessel are judged to be sufficiently noncorrosive; and,

(2) Where the external surface is also protected from corrosion. A suitable

vapor barrier is adequate protection, while paint or other thin coatings exposed to weather or mechanical damage are not acceptable.

(e) No applied linings except as provided in part UCL of Section VIII of the ASME BPVC are acceptable.

**§ 54.01-40 External pressure (modifies UG-28).**

(a) The exemption from external pressure consideration provided by the note under UG-28(f) does not apply.

(b) Vessels which may at times be subjected to partial vacuum due to nature of the contents, temperature, unloading operations, or other facet of employment must either have vacuum breaker protection or be designed for not less than one-half atmosphere of external pressure.

**Subpart 54.03—Low Temperature Operation**

**§ 54.03-1 Scope.**

The pressure vessels for low temperature operation must be as required by Section VIII of the ASME BPVC (incorporated by reference; see § 54.01-1) as modified by this subpart.

**§ 54.03-5 General.**

(a) Requirements for ferritic steels, high alloy steels, and heat-treated ferritic steels are contained in §§ 54.25-10, 54.25-15, and 54.25-20, respectively.

(b) Requirements for toughness testing of material product forms and weldments (including weld procedure qualification and production toughness tests) are contained in subpart 54.05.

(c) Materials suitable for a given minimum service temperature may be used in warmer service. Steels differing in chemical composition, mechanical properties, or heat treatments from those specified may be specially approved by the Commandant. Similarly, aluminum alloys and other nonferrous materials not intended to be covered by these sections may be specially considered by the Commandant for service at any low temperature.

**Subpart 54.05—Toughness Tests**

**§ 54.05-1 Scope (replaces UG-84).**

The toughness tests of materials used in pressure vessels must be as required by this subpart in lieu of requirements in UG-84 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01-1).

**§ 54.05-3 Tests required.**

(a) Where material or welding toughness tests are required by §§ 54.25-10, 54.25-15, 54.25-20, and

subpart 57.03 or 57.06 of this subchapter, the following requirements apply:

(1) Additional requirements for ferritic steels with properties enhanced by heat treatment are in § 54.25-20.

(2) Certified reports of toughness tests by the material manufacturer will be acceptable evidence provided the specimens taken are representative of the material delivered and that the material is not subject to treatment during or following fabrication that will reduce its impact properties. If such treatment is subsequently applied to the material, test specimens must be so taken and treated as to be representative of the material in the finished vessel.

(b) The requirements of this subpart are also applicable to nonpressure vessel type low temperature tanks and associated secondary barriers, as defined in § 38.05-4 of subchapter D of this chapter.

**§ 54.05-5 Toughness test specimens.**

(a) *Charpy V-notch impact tests.* Where required, Charpy V-notch tests must be conducted in accordance with ASTM E23 (incorporated by reference, see § 54.01-1), using the Type A specimen shown in ASTM E23—Figure 4. Special attention is drawn to the fact that the Charpy Keyhole and U-notch specimens are not acceptable substitutes for the Charpy V-notch specimen and must not be used to qualify materials within the scope of this subpart. Each set of Charpy impact tests must consist of three specimens. For materials 1/2-inch thick or less, the largest possible Charpy specimens for that thickness must be cut centered at the material's mid-thickness. For materials thicker than 1/2-inch, full size Charpy specimens must be cut centered at a location as near as practicable to a point midway between the material's surface and half-thickness. Except where otherwise specified, transversely oriented specimens must be used. When longitudinal specimens are used, the required energy values may not be less than 1.5 times the values required for transversely oriented specimens. In all cases, the notch must be cut normal to the material's surface. Test specimens must be taken at least one "t" from any heat-treated edge (where "t" is the material's nominal thickness).

(b) *Drop weight tests.* Where required, drop weight tests must be conducted for no-break performance in accordance with ASTM E208 (incorporated by reference, see § 54.01-1). For material thicknesses between 1/2-inch and 5/8-inch, the ASTM E208 specimen P-3, machined to 1/2-inch thickness, must be used with a stop distance of 0.090-inch.

In preparing weld specimens for drop weight testing, weld reinforcement must be ground flush, the hard facing bead centered on and transverse to the weld, and the notch centered on and parallel to the weld axis.

(c) *Retest procedures.* (1) When Charpy V-notch impact specimens are used and the average value of the three initial specimens fails to meet the stated requirements by an amount not exceeding 15 percent, or the value for more than one specimen is below the required average value of when the value for one specimen is below the minimum value permitted for a single specimen by an amount not exceeding 15 percent, three additional specimens from the same material may be tested and the results combined with those previously obtained to form a new average. This new average of six specimens must exceed the specified minimum average. In the event the Charpy retests fail, the material may still be qualified by exhibiting a no-break performance when tested in accordance with the drop weight procedure, if applicable. Two drop weight specimens must be tested for each Charpy V-notch set of three initial specimens which failed to qualify. Failure of either or both of these drop weight specimens will constitute rejection of the material or weldments represented, except as outlined in paragraph (c)(3) of this section.

(2) When drop weight specimens are used, retests are permitted only within the limits prescribed in ASTM E208, except as outlined in paragraph (c)(3) of this section.

(3) If, for heat treated base material, the required toughness results are not obtained in the initial test or in the retest, the material may be reheat treated one time and tested again in accordance with the initial requirements for the material.

(d) *Alternate toughness tests.* The Charpy V-notch impact values of §§ 54.05–20(a) and 54.05–25(a) are representative of those which correlate with the nil-ductility transition temperature determined by the drop-weight tests for the steels specified in § 54.25–10. For materials for which there are other data showing suitable correlation between Charpy V-notch and drop-weight tests, V-notch acceptance limits different from those tabulated herein may be specially approved by the Commandant, based upon the actual correlation. In the case of steels for which the tabulated Charpy V-notch values can be shown to be inapplicable or in the case of specially considered steels, or as an alternative to complying with the tabulated impact requirements,

acceptance may be based upon the material exhibiting a no-break performance when tested in accordance with the drop-weight procedure. Whenever the drop-weight test is used as an alternative to the Charpy V-notch test, two drop-weight specimens must be tested for each set of three Charpy V-notch specimens otherwise required. If the drop-weight test cannot be performed because of material thickness limitations (less than one-half inch) or product shape, or is otherwise inapplicable (because of heat treatment, chemistry, etc.), other tests and/or test criteria will be specified by the Commandant to assure the adequacy of the material for the intended application.

#### **§ 54.05–6 Toughness test temperatures.**

Each toughness test must be conducted at temperatures not warmer than  $-20^{\circ}\text{F}$  or  $10^{\circ}\text{F}$  below the minimum service temperature, whichever is lower, except that for service at or below  $-320^{\circ}\text{F}$ , the tests may be conducted at the service temperature in accordance with § 54.25–10(a)(2).

#### **§ 54.05–10 Certification of material toughness tests.**

(a) *Plate material.* The manufacturer of plates may certify such material, provided it has been given an appropriate heat-treatment, by reporting the results of tests of one set of Charpy impact specimens or of two drop weight specimens, as applicable, taken from each plate as rolled. Impact specimens must be taken as outlined in section 12 of ASTM A20/A20M (incorporated by reference, see § 54.01–1). The long axis of the Charpy specimen must be perpendicular to the final direction of rolling. When the direction of maximum stress is unknown, the manufacturer may certify on the basis of specimens taken parallel to the final direction of rolling.

(b) *Pipe or tube material.* (1) The manufacturer of pipe, tube, or welded fittings formed from pipe or tube may certify such material by reporting the results of tests of one set of Charpy impact specimens, provided the requirement for production in this paragraph (b)(1) or (2) of this section, as well as the requirement for sampling in paragraph (b)(3) of this section are met. The specimens must have the major axis parallel to the length of pipe or tube. In the case of welding fittings, the specimens may be taken from the tubing prior to forming provided the fittings are normalized after forming. Such specimens must be normalized before testing.

(2) One set of specimens may represent each five (5) short tons, or less, of the pipe, tubes, or welding fittings produced from one heat of steel poured from a single melting furnace charge and subsequently processed in the same manner, provided all are given a normalizing heat-treatment in a continuous treating furnace in which the temperature is automatically controlled and checked by recording pyrometer.

(3) One set of specimens may represent each five (5) short tons, or less, of the pipe, tubes, or welding fittings that have been given a normalizing heat-treatment as a single charge in a batch-treating furnace equipped with recording pyrometer provided all have been produced from a single melting furnace heat and are subsequently processed in the same manner. If more than one melting furnace heat is present in the batch heat-treating furnace, means of identification must be provided and one set of specimens must be taken from each heat.

(4) One set of impact specimens must be taken from one pipe or tube picked at random from each heat or furnace batch or portion thereof to be certified.

(c) *Forgings and forged or rolled fittings.* (1) The manufacturer of forgings for any purpose may certify them by reporting the results of tests of one set of Charpy impact specimens or two drop-weight specimens, as applicable, taken from each 5 short tons of product from each melting heat provided the requirements in this paragraph for production and sampling are met.

(2) One or more test blocks must be cut from billets or blooms selected at random from each heat of material. Each test block must be forge-reduced in thickness to the thickness of the finished forgings to be certified, within the limitations set below. After forging to the reduced thickness, the test block must be heat-treated in the same manner as the finished forgings represented, which heat-treatment of test blocks may be carried out in the furnace with the forgings, or separately. If carried out separately, both heat-treatments must be done in automatically controlled furnaces equipped with calibrated recording pyrometers, the certified records of which must be made available to the inspector.

(3) One set of Charpy impact specimens or two drop-weight specimens, as applicable, must be cut from each such test block and these specimens will represent all forgings (up to 5 short tons) that are from the same heat of material and given the same heat-treatment as the test block,

and the thickness of which does not differ from that of the test block by more than plus or minus 50 percent of 1½ inches, whichever is less, except that forged flanges and tube sheets thicker than 5½ inches may be qualified from a 4-inch test block.

(4) As many test blocks must be made as are required under the foregoing rule in paragraph (c)(3) of this section to cover the weight of product and range of thickness found in the forgings represented. The major axis of the test specimens must be parallel to the length of the test block.

(d) *Bars and shapes, rolled or forged.*

(1) The manufacturer of forged or rolled bars and shapes may certify such by reporting the results of one set of Charpy impact specimens, or two drop-weight specimens, as applicable, produced from each 5 short tons from a single melting furnace heat, processed in a similar manner and heat-treated as a single furnace batch, if heat-treated. The impact specimens must be cut from the heaviest section, clear of fillets, of the shape being tested with the axis of the specimens parallel to the axis of the bar or shape.

(2) [Reserved]

(e) *Castings.* (1) The manufacturer of castings may certify them by reporting the results of one set of Charpy impact specimens or two drop-weight specimens, as applicable, taken from each 5 short tons of product from each melting furnace heat. These specimens must be taken either directly from a production casting or from test coupons cast attached thereto provided the

additional requirements in this paragraph are met.

(2) One set of Charpy impact or two drop-weight specimens may represent all castings (up to 5 short tons) that are from the same heat of material and that have a thickness that does not differ from the thickness of the section from which the specimens were taken by more than plus or minus 25 percent, or 1.5 inches, whichever is less. A wider range of thicknesses from one heat may be covered by taking additional sets of specimens from thicker or thinner material as may be required.

(3) The test specimens must be heat-treated in the same manner as the castings represented, which heat-treatment of specimens may be carried out in the furnace with the castings represented, or separately, but if carried out separately both heat-treatments must be done in automatically controlled furnaces equipped with calibrated recording pyrometers, the certified records of which must be made available to the marine inspector.

(f) *Small parts.* The manufacturer of small parts, either cast or forged, may certify a lot of not more than 20 duplicate parts or 5 short tons, whichever is less, by reporting the results of one set of Charpy impact specimens, or two drop-weight specimens, as applicable, taken from one such part selected at random, provided the same kind of material and the same process of production were used for all of the lot. When the part is too small to provide the specimens of at least minimum size, no impact test need

be made. For such parts too small to impact test, the Commandant will determine toughness qualifications based on material, chemical, and mechanical properties.

**§ 54.05–15 Weldment toughness tests—procedure qualifications.**

(a) Plate for which Charpy V-notch impact testing is required in the parent material and for which V-notch minima are specified must similarly have welding procedures qualified for toughness by Charpy V-notch testing. For these tests, the test plates must be oriented with their final rolling direction parallel to the weld axis (*i.e.*, so that transverse impact specimens result), and with the V-notch normal to the plate surface. The sample weld joint preparation must be the same as that used in production. The number of test specimens and the location of their notches must be as shown in Figure 1 to § 54.05–15(a) and as described in paragraphs (a)(1) through (5) of this section.

(1) Three specimens with the notch centered in the weld metal.

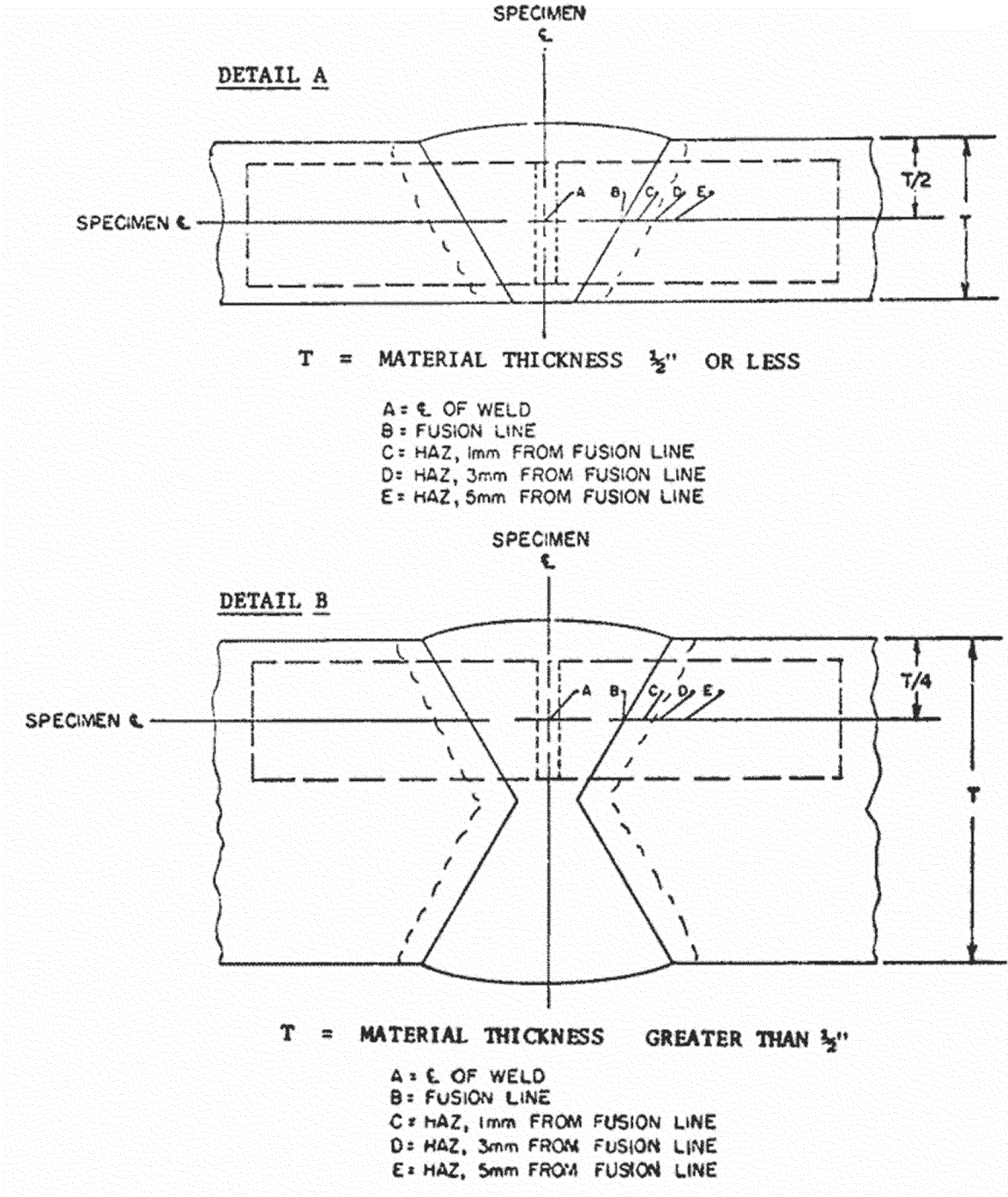
(2) Three specimens with the notch centered on the fusion line between parent plate and weld. (The fusion line may be identified by etching the specimen with a mild reagent.)

(3) Three specimens with the notch centered in the heat affected zone, 1 mm from the fusion line.

(4) Same as paragraph (a)(3) of this section, but 3 mm from the fusion line.

(5) Same as paragraph (a)(3) of this section, but 5 mm from the fusion line.

Figure 1 to § 54.05-15(a)—Charpy V-Notch Specimen Removal Details



(b) Plate materials for which Charpy V-notch minimums are not specified, or for which a Charpy V-notch correlation with NDT is not known, and which are themselves tested for toughness by the drop-weight procedure, must have welding procedures similarly qualified by the drop-weight test. For such qualifications, two drop-weight specimens are to be tested, with the

notch positioned directly above and parallel to the centerline of the weld.

(c) Piping welding toughness tests must be qualified, by making Charpy V-notch impact tests as prescribed in paragraph (a) of this section.

(d) Materials which are specially approved based on toughness criteria or tests, other than those discussed in paragraphs (a) and (b) of this section,

must have welding procedures tested and qualified for toughness as deemed appropriate and necessary by the Commandant.

(e) In the case of stainless steels, weld procedure toughness tests may be limited to weld metal only if this is all that is required by § 54.25-15.

**§ 54.05–16 Production toughness testing.**

(a) For vessels of welded construction, production toughness test plates must be prepared for each 50 feet of longitudinal and circumferential butt-weld in each Class I–L vessel, or for each 150 feet in each Class II–L vessel, except for material other than stainless steel that is exempted from impact test requirements by this subchapter. In the case of stainless steels, weld production toughness tests may be limited to weld metal only if this is all that is required by § 54.25–15. The test-plate thickness must be the same as that of the vessel wall at the location of the production weld being sampled. The test plates must be prepared, wherever possible, as run-off tabs attached at the ends of weld butts or seams. The rolling direction of the run-off tabs should be oriented parallel to the rolling direction of the adjacent production material. The test-plate material must be taken from one of the heats of material used in the vessel, and both the electrodes and welding procedures must be the same as used in the fabrication of the vessel. From each test plate, one set of three Charpy impact bars or two drop-weight specimens, as applicable according to the test used in procedure qualification, must be taken transverse to the weld axis. For Charpy V-notch specimens, the notch must be normal to the material surface and its location alternated (approximately) on successive tests between the weld metal and heat affected zone. Thus, approximately half of all weld production impact tests will be of weld metal and half of heat affected zone material. For the weld metal tests, the V-notch is to be centered between the fusion lines. For the heat affected zone tests, the notch is to be centered so as to sample, as nearly as practicable, the most critical location for

toughness observed in the weld procedure qualification tests. Where the drop weight specimen is used in production weld testing, it must be prepared in the same manner as specified for procedure qualification testing in § 54.05–15(b).

(b) For vessels not exceeding 5 cubic feet in volume, one set of impact specimens, or two drop-weight specimens, as applicable according to the test used in procedure qualification, may represent all vessels from the same heat of material not in excess of 100 vessels, or one heat-treatment furnace batch. In addition, when such vessels are welded, one weld test plate made from one of the heats of material used, and two sets of impact specimens or two drop-weight specimens, as applicable, cut therefrom, may represent the weld metal in the smallest of: One lot of 100 vessels or less; or each heat-treatment furnace batch; or each 50 feet of welding for Class I–L vessels; or each 150 feet of welding for Class II–L vessels.

(c) For several vessels or parts of vessels being welded in succession, the plate thickness of which does not vary by more than one-fourth inch, and which are made of the same grade of material, a test plate must be furnished for each 50 feet of welding for Class I–L vessels or 150 feet of welding for Class II–L vessels. For each 50- or 150-foot increment of weld, as applicable, the test plates must be prepared at the time of fabrication of the first vessel involving that increment.

(d) The test plates and any other test material from which toughness test specimens are cut must be given the same heat-treatment as the production material they represent. Test specimens representing other material than the weld toughness test plates should preferably be cut from a part of the vessel material but may be cut from like

material that has been heat-treated within the temperature range specified by the producer in treating the actual vessel material.

(e) For nonpressure vessel type tanks and associated secondary barriers, as defined in § 38.05–4, subchapter D of this chapter, production toughness test plates must be prepared in accordance with paragraphs (a) and (d) of this section. One set of toughness test plates must be prepared for each 165 feet (50 meters) of production butt-type welds.

**§ 54.05–17 Weld toughness test acceptance criteria.**

(a) For Charpy V-notch impact tests the energy absorbed in both the weld metal and heat affected zone impact tests in weld qualification and production must be:

(1) For weld metal specimens, not less than the transverse values required for the parent material.

(2) For heat affected zone specimens, when the specimens are transversely oriented, not less than the transverse values required for the parent material.

(3) For heat affected zone specimens, when the specimens are longitudinally oriented, not less than 1.5 times the transverse values required for the parent material.

(b) For drop-weight tests both specimens from each required set must exhibit a no-break performance.

**§ 54.05–20 Impact test properties for service of 0°F and below.**

(a) The impact energies of each set of transverse Charpy specimens may not be less than the values shown in table 1 to § 54.05–20(a). Only one specimen in a set may be below the required average and the value of that specimen must be above the minimum impact value permitted on one specimen only. See § 54.05–5(c) for retest requirements.

TABLE 1 TO § 54.05–20(a)—CHARPY V-NOTCH IMPACT REQUIREMENTS

Size of specimen	Minimum impact value required for average of each set of 3 specimens foot-pounds <sup>1</sup>	Minimum impact value permitted on one specimen only of a set, foot-pounds
10 × 10 mm .....	20.0	13.5
10 × 7.5 mm .....	16.5	11.0
10 × 5 mm .....	13.5	9.0
10 × 2.5 mm .....	10.0	6.5

<sup>1</sup> Straight line interpolation for intermediate values is permitted.

(b) Transversely oriented Charpy V-notch impact specimens of ASTM A203 (incorporated by reference, see § 54.01–1) nickel steels must exhibit energies not less than the values shown in paragraph (a) of this section. Requirements for 9 percent nickel steels

are contained in § 54.25–20. Other nickel alloy steels, when specially approved by the Commandant, must exhibit a no-break performance when tested in accordance with the drop weight procedure. If, for such materials, there are data indicating suitable

correlation with drop-weight tests, Charpy V-notch tests may be specially considered by the Commandant in lieu of drop-weight tests. If the drop-weight test cannot be performed because of material thickness limitations (less than one-half inch), or product shape, or is



otherwise inapplicable (because of heat treatment, chemistry etc.) other tests or test criteria will be specified by the Commandant.

(c) Where sufficient data are available to warrant such waiver, the Commandant may waive the requirements for toughness testing austenitic stainless-steel materials. Where required, austenitic stainless steels are to be tested using the drop-weight procedure and must exhibit a no-break performance. Where data are available indicating suitable correlation of Charpy V-notch results with drop-weight NDT or no-break performance, Charpy V-notch tests may be specially considered by the Commandant in lieu of dropweight tests. If the dropweight test cannot be performed because of material thickness limitations (less than one-half inch), or product shape, or is otherwise inapplicable (because of heat treatment, chemistry, etc.) other tests and test criteria will be specified by the Commandant.

**§ 54.05–25 [Reserved]**

**§ 54.05–30 Allowable stress values at low temperatures.**

(a) The Coast Guard will give consideration to the enhanced yield and tensile strength properties of ferrous and nonferrous materials at low temperature for the purpose of establishing allowable stress values for service temperature below 0 °F.

(b) The use of such allowable stress values must be specially approved by the Coast Guard for each application. Further information may be obtained by writing to the 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.

(c) Submittals must include information and calculations specified by the U.S. Coast Guard, Office of Design and Engineering Standards (CG–ENG) to demonstrate that the allowable

stress for the material cannot be exceeded under any possible combination of vessel loads and metal temperature.

**Subpart 54.10—Inspection, Reports, and Stamping**

**§ 54.10–1 Scope (modifies UG–90 through UG–103 and UG–115 through UG–120).**

The inspection, tests, stamping, and reports for pressure vessels must be as required by paragraphs UG–90 through UG–103 and UG–115 through UG–120 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) except as noted otherwise in this subpart.

**§ 54.10–3 Marine inspectors and Coast Guard Symbol stamping (replaces UG–90 and UG–91, and modifies UG–92 through UG–103).**

(a) Only marine inspectors will apply the Coast Guard Symbol. They will not apply any other code symbol to pressure vessels.

(b) All pressure vessels not exempted under provisions of § 54.01–15 must be subject to shop inspection by a marine inspector referring to procedures outlined in UG–92 through UG–103 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) and §§ 50.30–10, 50.30–15, and 50.30–20 of this subchapter. The marine inspector will then stamp the vessel with the Coast Guard Symbol.

(c) Pressure vessels exempted under provisions of § 54.01–15, except as provided in paragraph (d) of this section, are not required to be stamped with the Coast Guard Symbol.

(d) Pressure vessels described in § 54.01–5(c)(3), except pressure vessels in systems regulated under subpart 58.60 of this subchapter, must be visually examined by a marine inspector prior to installation. The marine inspector also reviews the associated plans and manufacturers' data reports. If, upon inspection, the pressure vessel

complies with the applicable requirements in § 54.01–5, the marine inspector stamps the pressure vessel with the Coast Guard Symbol.

**§ 54.10–5 Maximum allowable working pressure (reproduces UG–98).**

(a) The maximum allowable working pressure for a vessel is the maximum pressure permissible at the top of the vessel in its normal operating position at the designated coincident temperature specified for that pressure. It is the least of the values found for maximum allowable working pressure for any of the essential parts of the vessel by the principles given in paragraph (b) of this section and adjusted for any difference in static head that may exist between the part considered and the top of the vessel. (See appendix 3 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1).)

(b) The maximum allowable working pressure for a vessel part is the maximum internal or external pressure, including the static head hereon, as determined by the rules and formulas in Section VIII of the ASME BPVC, together with the effect of any combination of loadings listed in UG–22 of Section VIII of the ASME BPVC (see § 54.01–30) that are likely to occur, or the designated coincident operating temperature, excluding any metal thickness specified as corrosion allowance. (See UG–25 of Section VIII of the ASME BPVC.)

(c) Maximum allowable working pressure may be determined for more than one designated operating temperature, using for each temperature the applicable allowable stress value.

**Note 1 to § 54.10–5:** Table 1 to § 54.10–5 gives the interrelation among the various pressure levels pertinent to this part of the regulations. It includes reference to Section VIII of the ASME BPVC for definitions and explanations.

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Table 1 to § 54.10–5 – Pressure Vessel Design, Testing and Relief Valve

Characteristics <sup>1</sup>

Pressure differential <sup>2</sup>	Test pressures	Relief Device pressure settings	Pressures upon which relief device flow capacity is based
Increasing Pressure ↑	Burst proof test (UG-101(m) of Section VIII of the ASME BPVC).		
	Yield proof test (UG-101(j) of Section VIII of the ASME BPVC).		
	Standard hydrostatic test (UG-99 of Section VIII of the ASME BPVC)		
			Fire exposure, 120% MAWP
	Pneumatic test (UG-100 of Section VIII of the ASME BPVC)		
		Rupture disk burst (§ 54.15-13)	
	Maximum allowable working pressure (MAWP), UG-98 of Section VIII of the ASME BPVC	Maximum allowable working pressure (MAWP), UG-98 of Section VIII of the ASME BPVC	Maximum allowable working pressure (MAWP), UG-98 of Section VIII of the ASME BPVC
Increasing Pressure ↑	Design pressure, UG-21 and Appendix 3 of Section VIII of the ASME BPVC	Design pressure, UG-21 and Appendix 3 of Section VIII of the ASME BPVC	Design pressure, UG-21 and Appendix 3 of Section VIII of the ASME BPVC
		Safety or relief valve setting (UG-133 of Section VIII of the ASME BPVC)	
	Operating Pressure (Appendix 3 of Section VIII of the ASME BPVC)	Operating Pressure (Appendix 3 of Section VIII of the ASME BPVC)	Operating Pressure (Appendix 3 of Section VIII of the ASME BPVC)

<sup>1</sup>For basic **pressure** definitions, see Section VIII of the ASME BPVC.

<sup>2</sup>For **pressure** differentials above 3,000 psi, special requirements may apply. Arrow of increasing pressure in left column signifies that, for example, the standard hydrostatic test pressure is higher than the MAWP, which in turn is higher than the design pressure and the operating pressure, and so forth.

	Maximum allowable working pressure (MAWP), UG-98 of section VIII of the ASME Boiler and Pressure Vessel Code	Maximum allowable working pressure (MAWP), UG-98 of section VIII of the ASME Boiler and Pressure Vessel Code	Maximum allowable working pressure (MAWP), UG-98 of section VIII of the ASME Boiler and Pressure Vessel Code
Increasing Pressure ↑	Design pressure, UG-21 and Appendix 3 of section VIII of the ASME Boiler and Pressure Vessel Code	Design pressure, UG-21 and Appendix 3 of section VIII of the ASME Boiler and Pressure Vessel Code	Design pressure, UG-21 and Appendix 3 of section VIII of the ASME Boiler and Pressure Vessel Code
		Safety or relief valve setting (UG-133 of section VIII of the ASME Boiler and Pressure Vessel Code)	
	Operating Pressure (Appendix 3 of section VIII of the ASME Boiler and Pressure Vessel Code)	Operating Pressure (Appendix 3 of section VIII of the ASME Boiler and Pressure Vessel Code)	Operating Pressure (Appendix 3 of section VIII of the ASME Boiler and Pressure Vessel Code)

<sup>1</sup> For basic pressure definitions see 46 CFR 52.01-3(g) of this subchapter. Section VIII of the ASME Boiler and Pressure Vessel Code; see 46 CFR 54.01-1.

<sup>2</sup> For pressure differentials above 3,000 pounds per square inch (p.s.i.), special requirements may apply. Arrow of increasing pressure in left column signifies that, for example, the standard hydrostatic-test pressure is higher than the MAWP, which in turn is higher than the design pressure and the operating pressure, and so forth.

**§ 54.10–10 Standard hydrostatic test (modifies UG–99).**

(a) All pressure vessels must satisfactorily pass the hydrostatic test prescribed by this section, except those pressure vessels noted under § 54.10–15(a).

(b) The hydrostatic-test pressure must be at least one and three-tenths (1.30) times the maximum allowable working pressure stamped on the pressure vessel, multiplied by the ratio of the stress value “S” at the test temperature to the stress value “S” at the design temperature for the materials of which the pressure vessel is constructed. The values for “S” must be taken from tables UCS 23, UNF 23, UHA 23, or UHT 23 of Section VIII of the ASME BPVC (incorporated by reference, see § 54.01–1). The value of “S” at test temperature must be that taken for the material of the tabulated value of temperature closest to the test temperature. The value of “S” at design temperature must be as interpolated from the appropriate table. No ratio less than one must be used. The stress resulting from the hydrostatic test must not exceed 90 percent of the yield stress of the material at the test temperature. External loadings, which will exist in supporting structure during the hydrostatic test, should be considered. The design must consider the combined stress during hydrostatic testing due to pressure and the support reactions. This stress must not exceed 90 percent of the yield stress of the material at the test temperature. In addition, the adequacy of the supporting structure during hydrostatic testing should be considered in the design.

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

(d) Defects detected during the hydrostatic test or subsequent examination must be completely removed and then inspected. Provided the marine inspector gives their approval, they may then be repaired.

(e) Vessels requiring stress relieving must be stress relieved after any welding repairs have been made. (See UW–40 of Section VIII of the ASME BPVC.)

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

**§ 54.10–15 Pneumatic test (modifies UG–100).**

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

(b) Proposals to pneumatically test must be submitted to the cognizant Officer in Charge, Marine Inspection, for approval.

(c) Except for enameled vessels, for which the pneumatic test pressure must be at least equal to, but need not exceed, the maximum allowable working pressure to be marked on the vessel, the pneumatic test pressure must be at least equal to one and one-tenth (1.10) times the maximum allowable working pressure to be stamped on the vessel multiplied by the lowest ratio (for the materials of which the vessel is constructed) of the stress value “S” for the test temperature of the vessel to the stress value “S” for the design temperature (see UG–21 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1)). In no case must the pneumatic test pressure exceed one and one-tenth (1.10) times the basis for calculated test pressure as defined in UA–60(e) of Section VIII of the ASME BPVC.

(d) The pneumatic test of pressure vessels must be accomplished as follows:

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

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

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

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

(f) After satisfactory completion of the pneumatic pressure test, the vessel may be stamped in accordance with § 54.10–20. A marine inspector must observe the pressure vessel in a loaded condition at the first opportunity following the pneumatic test. The tank supports and saddles, connecting piping, and insulation if provided must be examined to determine if they are satisfactory and that no leaks are evident.

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

**§ 54.10–20 Marking and stamping.**

(a) *Pressure vessels* (Replaces UG–116, except paragraph (k), and UG–118). Pressure vessels that are required by § 54.10–3 to be stamped with the Coast Guard Symbol must also be stamped with the following information:

(1) Manufacturer’s name and serial number.

(2) Coast Guard number, see § 50.10–30 of this subchapter (only applicable to pressure vessels inspected as required by § 54.10–3(b)).

(3) Coast Guard Symbol, which is affixed only by the marine inspector.

(4) Maximum allowable working pressure \_\_\_\_ kPa (\_\_\_\_ psig) at \_\_\_\_ °C (\_\_\_\_ °F).

(5) Class.

(6) Minimum design metal temperature, if below –18 °C (0 °F).

(7) Water capacity in liters (U.S. gallons), if a cargo-carrying pressure vessel.

(b) *Multichambered pressure vessels* (Replaces UG–116(k)). In cases where more than one pressure vessel is involved in an integral construction, as with a heat exchanger, the manufacturer may elect to class the component pressure vessels differently. In such cases they must stamp the combined structures as required in paragraph (a) of this section with information for each pressure vessel. Where an item for stamping is identical for both vessels, as with name and address of manufacturer, it need not be duplicated. However, where differences exist, each value and the vessel to which it applies shall be clearly indicated.

(c) *Stamping data* (Replaces UG–117). Except as noted in paragraph (d) of this section, the data must be stamped directly on the pressure vessel. The data must be legibly stamped and must not be obliterated during the service life of the pressure vessel. In the event that the portion of the pressure vessel upon which the data is stamped is to be insulated or otherwise covered, the data must be reproduced on a metal nameplate. This plate must be securely attached to the pressure vessel. The nameplate must be maintained in a legible condition such that it may be easily read.

(1) Those parts of pressure vessels requiring Coast Guard shop inspection under this part which are furnished by other than the shop of the manufacturer responsible for the completed vessel must be stamped with the Coast Guard

Symbol, the Marine Inspection Office identification letters (see § 50.10–30 of this subchapter) and the word “Part”, the manufacturer’s name and serial number, and the design pressure.

(2) [Reserved]

(d) *Thin-walled vessels* (Modifies UG–119). In lieu of direct stamping on the pressure vessel, the information required by paragraph (a) of this section must be stamped on a nameplate permanently attached to the pressure vessel when the pressure vessel is constructed of—

(1) Steel plate less than one-fourth inch thick; or

(2) Nonferrous plate less than one-half inch thick.

**§ 54.10–25 Manufacturers’ data report forms (modifies UG–120).**

(a) The Manufacturers’ data report form, as provided by the Coast Guard, must be completed in duplicate and certified by the manufacturer for each pressure vessel required to be shop inspected under these regulations. The original of this form must be delivered to the Coast Guard inspector.

(b) Data forms for those parts of a pressure vessel requiring inspection, which are furnished by other than the shop of the manufacturer responsible for the completed unit, must be executed in triplicate by the manufacturer of the parts. The original and one copy must be delivered to the Coast Guard inspector who must forward one copy of the report to the Officer in Charge, Marine Inspection, having cognizance over the final assembly. These partial data reports, together with the final inspection and tests, must be the final Coast Guard inspector’s authority to apply the Coast Guard symbol and number. A final data report must be executed by the manufacturer or assembler who completes the final assembly and tests.

(c) If a pressure vessel is required to be inspected in accordance with § 54.10–3(c), the manufacturer’s data reports required by UG–120 must be made available to the Coast Guard inspector for review prior to inspection of the pressure vessel.

(Approved by the Office of Management and Budget under control number 2130–0181)

**Subpart 54.15—Pressure-Relief Devices**

**§ 54.15–1 General (modifies UG–125 through UG–137).**

(a) All pressure vessels must be provided with protective devices as indicated in UG–125 through UG–136 Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–

1) except as noted otherwise in this subpart.

(b) The markings must be in accordance with this chapter for devices covered by § 54.15–10.

**§ 54.15–3 Definitions (modifies appendix 3).**

Definitions applicable to this subpart are in § 52.01–3 of this subchapter.

**§ 54.15–5 Protective devices (modifies UG–125).**

(a) All pressure vessels must be provided with protective devices. The protective devices must be in accordance with the requirements of UG–125 through UG–136 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) except as modified in this subpart.

(b) An unfired steam boiler evaporator or heat exchanger (see § 54.01–10) must be equipped with protective devices as required by § 54.15–15.

(c) All pressure vessels other than unfired steam boilers must be protected by pressure-relieving devices that will prevent the pressure from rising more than 10 percent above the maximum allowable working pressure, except when the excess pressure is caused by exposure to fire or other unexpected source of heat.

(d) Where an additional hazard can be created by exposure of a pressure vessel to fire or other unexpected sources of external heat (for example, vessels used to store liquefied flammable gases), supplemental pressure-relieving devices must be installed to protect against excessive pressure. Such supplemental pressure-relieving devices must be capable of preventing the pressure from rising more than 20 percent above the maximum allowable working pressure of the vessel. The minimum required relief capacities for compressed gas pressure vessels are given under § 54.15–25. A single pressure-relieving device may be used to satisfy the requirements of this paragraph and paragraph (c) of this section, provided it meets the requirements of both paragraphs.

(e) Pressure-relieving devices should be selected on the basis of their intended service. They must be constructed, located, and installed so that they are readily accessible for inspection and repair and so arranged that they cannot be readily rendered inoperative.

(f) Where pressure-indicating gages are used, they must be chosen to be compatible with the pressure to be indicated. The size of the visual display, the fineness of graduations, and the orientation of the display will be

considered. In no case must the upper range of the gage be less than 1.2 times nor more than 2 times the pressure at which the relieving device is set to function.

(g) The Commandant may authorize or require the use of a rupture disk in lieu of a relief or safety valve under certain conditions of pressure vessel use and design. See § 54.15–13.

(h) Vessels that are to operate completely filled with liquid must be equipped with liquid relief valves unless otherwise protected against overpressure.

(i) The protective devices required under paragraph (a) of this section must be installed directly on a pressure vessel except when the source of pressure is external to the vessel, and is under such positive control that the pressure in the vessel cannot exceed the maximum allowable working pressure at the operating temperature except as permitted in paragraphs (c) and (d) of this section.

(j) Pressure-relieving devices must be constructed of materials suitable for the pressure, temperature, and other conditions of the service intended.

(k) The opening through all pipes and fittings between a pressure vessel and its pressure-relieving device must have at least the area of the pressure-relieving device inlet, and in all cases must have sufficient area so as not to unduly restrict the flow to the pressure-relieving device. The opening in the vessel must be designed to provide direct and unobstructed flow between the vessel and its pressure-relieving device.

(l) Safety devices need not be provided by the pressure vessel manufacturer. However, overpressure protection must be provided prior to placing the vessel in service.

**§ 54.15–10 Safety and relief valves (modifies UG–126).**

(a) All safety and relief valves for use on pressure vessels or piping systems must be designed to meet the protection and service requirements for which they are intended and must be set to relieve at a pressure which does not exceed the “maximum allowable working pressure” of the pressure vessel or piping system. Relief valves are not required to have huddling chambers for other than steam service. In addition, safety valves used on vessels in which steam is generated must meet the standards in § 52.01–120 of this subchapter except § 52.01–120(a)(9). For steam service below 206 kPa (30 psig), bodies of safety valves may be made of cast iron. Safety relief valves used in liquefied compressed gas service must

meet the standards in subpart 162.017 or 162.018 in subchapter Q of this chapter as appropriate.

(b) Pilot-valve control or other indirect operation of safety valves is not permitted unless the design is such that the main unloading valve will open automatically at not over the set pressure and will discharge its full rated capacity if some essential part of the pilot or auxiliary device should fail. All other safety and relief valves shall be of the direct spring-loaded type.

(c) Safety and relief valves for steam or air service must be provided with a substantial lifting device so that the disk can be lifted from its seat when the pressure in the vessel is 75 percent of that at which the valve is set to blow.

(d) Safety and relief valves for service other than steam and air need not be provided with a lifting device although a lifting device is desirable if the vapors are such that their release will not create a hazard.

(e) If the design of a safety or relief valve is such that liquid can collect on the discharge side of the disk, the valve must be equipped with a drain at the lowest point where liquid can collect (for installation, see UG-134 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01-1)).

(f) Cast iron may be employed in the construction of relief valves for pressures not exceeding 125 pounds per square inch and temperatures not exceeding 450 °F. Seats or disks of cast iron are prohibited.

(g) The spring in a relief valve in service for pressures up to and including 250 pounds per square inch must not be reset for any pressure more than 10 percent above or 10 percent below that for which the relief valve is marked. For higher pressures, the spring must not be reset for any pressure more than 5 percent above or 5 percent below that for which the relief valve is marked.

(h) The rated relieving capacity of safety and relief valves for use on pressure vessels must be based on actual flow test data and the capacity must be certified by the manufacturer in accordance with one of the following:

(1) 120 percent of the valve set pressure for valves rated in accordance with CGA S-1.2 (incorporated by reference; see § 54.01-1).

(2) 110 percent of the valve set pressure for valves rated in accordance with UG-131 of Section VIII of the ASME BPVC.

(3) 103 percent of the valve set pressure for steam in accordance with PG-69 of Section VIII of the ASME BPVC.

**§ 54.15-13 Rupture disks (modifies UG-127).**

(a) Paragraph UG-127 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01-1) provides for the use of rupture disks in series with spring loaded safety or relief valves.

(b) For certain pressure vessels containing substances which may render a relief or safety valve inoperative, or where the installation of a valve is considered impractical, the Commandant may authorize or require the use of a rupture disk in parallel with or in lieu of a spring-loaded safety or relief valve. These rupture disks must:

(1) Comply with the general provisions of § 54.15-5 except as noted otherwise in this section;

(2) Have a capacity for discharge such that the volume of release is sufficient to prevent the internal pressure from exceeding 120 percent of the “maximum allowable working pressure” with the pressure vessel exposed to fire conditions (see § 54.15-25); and,

(3) Operate at a pressure level which does not produce fatigue failure of the disk. The normal maximum operating pressure multiplied by 1.3 must not exceed the nominal disk burst pressure. (Notice that this restriction for protection of the rupture disk will usually require operation below the “maximum allowable working pressure” of the pressure vessel and therefore should be considered in design.)

(c) All disks must be oriented so that if rupture occurs, the disk fragments and pressure vessel discharge will be directed away from operating personnel and vital machinery.

**§ 54.15-15 Relief devices for unfired steam boilers, evaporators, and heat exchangers (modifies UG-126).**

(a) An approved safety valve set to relieve at a pressure not exceeding the “maximum allowable working pressure” of the shell must be fitted to all unfired steam boilers and evaporators except for evaporators of the atmospheric type designed for vapor discharge direct to a distiller with no shutoff valve in the discharge line. The distiller connected to atmospheric evaporators must be fitted with a vent to prevent a buildup in pressure. In no case must the vent be less than 1.5 inches in diameter. Evaporators operating between atmospheric pressure and 15 psig, may use a rupture disc as an alternative to the safety valve.

(b) Safety valves for use on pressure vessels in which steam or pressure is generated must comply with the requirements of § 54.15-10. Rupture discs used in lieu of these safety valves,

as provided for in paragraph (a) of this section, must comply with the requirements of § 54.15-13.

(c) The relieving capacity of evaporator safety valves required by paragraph (a) of this section must be at least equal to the capacity of the orifice fitted in the steam supply to the evaporator. The orifice capacity must be determined in accordance with the formula in paragraph (c)(1) or (2) of this section as appropriate:

(1) Where the set pressure of the evaporator shell safety valve is 58 percent or less than the setting of the safety valve in the steam supply:

Formula 1 to § 54.15-15(c)(1)

$$W = 51.45AP$$

(2) Where the set pressure of the evaporator shell safety valve exceeds 58 percent of the setting of the safety valve on the steam supply:

Formula 2 to § 54.15-15(c)(2)

$$W = 105.3A\sqrt{P_1(P - P_1)}$$

where:

W = The required orifice capacity, in pounds per hour.

A = Cross-sectional area of rounded entrance orifice, in square inches. The orifice must be installed near the steam inlet or the coils or tubes and where no orifice is employed the area used in the formula must be that of the inlet connection or manifold.

P = Set pressure of steam supply safety valve, in pounds per square inch, absolute.

P<sub>1</sub> = Set pressure of evaporator shell safety valve, in pounds per square inch, absolute.

(d) The relieving capacity of safety valves on unfired steam boilers must not be less than the maximum generating capacity of the unfired steam boiler as certified by the manufacturer.

(e) On new installations and where the orifice size of an existing unfired steam boiler or evaporator is increased, an accumulation test must be made by closing all steam outlet connections except the safety valves for a period of five minutes. When conducting the accumulation test, the water must be at the normal operating level and the steam pressure must be at the normal operating pressure, and while under this test the pressure must not rise more than 6 percent above the safety valve setting.

(f) A heat exchanger with liquid in the shell and the heating medium in the tubes or coils, must be fitted with a liquid relief valve meeting the requirement of § 54.15-5.

(g)(1) A heat exchanger with steam in the shell and liquid in the tubes or coils at a pressure exceeding that in the shell, must have a liquid relief valve fitted to protect the shell against excess pressure.

(2) The discharge capacity of such relief valves must be calculated on the basis of the discharge from one tube using the difference in pressures between that in the shell and that in the tubes and must be not less than that determined by the following formula:

Formula 3 to § 54.15–15(g)(2)

$$Q = 29.81KD \sqrt{P_1 - P_2}$$

where:

Q = Required relief valve discharge capacity, in gallons per minute, based on relief valve set pressure.

P<sub>1</sub> = Pressure in the tube or coils, in pounds per square inch.

P<sub>2</sub> = Set pressure of the shell relief valve, in pounds per square inch.

D = Internal diameter of the largest tube or coil, in inches.

K = Coefficient of discharge = 0.62.

**§ 54.15–25 Minimum relief capacities for cargo tanks containing compressed or liquefied gas.**

(a) Each tank must be fitted with one or more safety relief valves designed, constructed, and flow tested in accordance with subpart 162.017 or 162.018 in subchapter Q of this chapter. Valves conforming to specification subpart 162.017 must be limited to use on tanks whose maximum allowable working pressure is not in excess of 10 pounds per square inch. With specific approval of the Commandant, such

valves may be connected to the vessel in lieu of being directly fitted to the tanks.

(b) The discharge pressure and the maximum overpressure permitted must be in accordance with § 54.15–5.

(c)(1) The rate of discharge for heat input of fire must meet the following formula:

Formula 1 to § 54.15–25(c)(1)

$$Q = FGA^{0.82}$$

where:

Q = minimum required rate of discharge in cubic meters (cubic feet) per minute of air at standard conditions 15 °C and 103 kPa (60 °F and 14.7 psia).

F = fire exposure factor for the following tank types:

F = 1.0 for tanks without insulation located on the open deck.

F = 0.5 for tanks on the open deck having insulation that has approved fire proofing, thermal conductance, and stability under fire exposure.

F = 0.5 for uninsulated independent tanks installed in holds.

F = 0.2 for insulated independent tanks in holds or for uninsulated independent tanks in insulated holds.

F = 0.1 for insulated independent tanks in inerted holds or for uninsulated independent tanks in inerted, insulated holds.

F = 0.1 for membrane and semi-membrane tanks.

G = gas factor of:

$$G = [(177 \div LC) \sqrt{((ZT) \div M)}]$$
 SI units

$$G = [(633,000 \div LC) \sqrt{((ZT) \div M)}]$$
 English units

where:

L = latent heat of the material being vaporized at the relieving conditions, in Kcal/kg (Btu per pound).

C = constant based on relation of specific heats (k, table 1 to § 54.15–25(c) (if k is not known, C = .606(315)).

Z = compressibility factor of the gas at the relieving conditions (if not known, Z = 1.0).

T = temperature in K = (273 + °C) (R = (460 + °F)) at the relieving conditions (120% of the pressure at which the pressure relief valve is set).

M = molecular weight of the product.

A = external surface area of the tank in m<sup>2</sup> (sq. ft.) for the following tank types:

For a tank of a body of revolution shape:

A = external surface area.

For a tank other than a body of revolution shape:

A = external surface area less the projected bottom surface area.

For a grouping of pressure vessel tanks having insulation on the vessel's structure:

A = external surface area of the hold without the projected bottom area.

For a grouping of pressure tanks having insulation on the tank:

A = external surface area of the pressure tanks excluding insulation, and without the projected bottom area.

**Note 1 to Formula 1 to § 54.15–25(c)(1):**

Figure 1 to § 54.15–25(c)(1) shows a method of determining the side external surface area of a grouping of vertical pressure tanks.

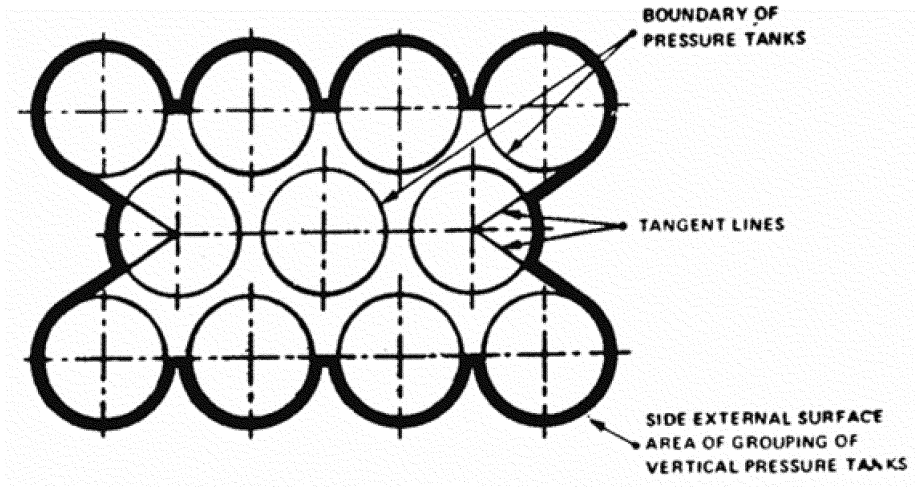


TABLE 1 TO § 54.15–25(c)(1)—  
CONSTANT C

k	C	
1.00	.606	(315)
1.02	.611	(318)
1.04	.615	(320)
1.06	.620	(322)
1.08	.624	(324)
1.10	.628	(327)

TABLE 1 TO § 54.15–25(c)(1)—  
CONSTANT C—Continued

k	C	
1.12	.633	(329)
1.14	.637	(331)
1.16	.641	(333)
1.18	.645	(335)
1.20	.649	(337)
1.22	.652	(339)

TABLE 1 TO § 54.15–25(c)(1)—  
CONSTANT C—Continued

k	C	
1.24	.658	(341)
1.26	.660	(343)
1.28	.664	(345)
1.30	.667	(347)
1.32	.671	(349)
1.34	.674	(351)

TABLE 1 TO § 54.15–25(c)(1)—  
CONSTANT C—Continued

k	C	
1.36	.677	(352)
1.38	.681	(354)
1.40	.685	(356)
1.42	.688	(358)
1.44	.691	(359)
1.46	.695	(361)
1.48	.698	(363)
1.50	.701	(364)
1.52	.704	(366)
1.54	.707	(368)
1.56	.710	(369)
1.58	.713	(371)
1.60	.716	(372)
1.62	.719	(374)
1.64	.722	(376)
1.66	.725	(377)
1.68	.728	(379)
1.70	.731	(380)
1.72	.734	(382)
1.74	.736	(383)
1.76	.739	(384)
1.78	.742	(386)
1.80	.745	(387)
1.82	.747	(388)
1.84	.750	(390)
1.86	.752	(391)
1.88	.755	(392)
1.90	.758	(394)
1.92	.760	(395)
1.94	.763	(397)
1.96	.765	(398)
1.98	.767	(399)
2.00	.770	(400)
2.02	.772	(401)
2.20	.792	(412)

(2) For an independent tank that has a portion of the tank protruding above the open deck, the fire exposure factor must be calculated for the surface area above the deck and the surface area below the deck, and this calculation must be specially approved by the U.S. Coast Guard, Office of Design and Engineering Standards (CG–ENG).

(d) In determining the total safety valve relieving capacity, the arrangement and location of the valves on the tank will be evaluated. The valves must be placed so that a number of valves sufficient to provide the required relieving capacity must always be in communication with the cargo vapor phase. The possible motions which the tank may see in its intended service and attendant changes in cargo liquid level will be considered. Shut off valves must not be installed between the vessel and the safety relief valves. Manifolds for mounting multiple relief valves may be fitted with acceptable interlocking shut off valves so arranged that the required capacity of discharge will be “lined up” at all times.

(e)(1) Each safety relief valve must be tested in the presence of a marine inspector before being placed in service

except as noted otherwise in paragraph (e)(2) of this section. The test must satisfactorily show that the valve will start to discharge at the required minimum pressure.

(2) Each safety relief valve fitted with a breaking pin and rupture disk need not be tested in the presence of a marine inspector before being placed in service. In lieu thereof, a certificate must be furnished with the valve attested to by the manufacturer that the test requirements of paragraph (e)(1) of this section have been met.

#### Subpart 54.20—Fabrication by Welding

##### § 54.20–1 Scope (modifies UW–1 through UW–65).

(a) Pressure vessels and vessel parts that are fabricated by welding must be as required by paragraphs UW–1 through UW–65 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) except as noted otherwise in this subchapter.

(b) [Reserved]

##### § 54.20–2 Fabrication for hazardous materials (replaces UW–2(a)).

(a) Pressure vessels containing hazardous materials as defined in § 150.115 of this subchapter must be of the class and construction required by subchapters D, I, or O of this chapter, or, when not specified, of a class determined by the Commandant.

(b) Class III pressure vessels must not be used for the storage or stowage of hazardous materials unless there is specific authorization in subchapters D, I, or O of this chapter.

##### § 54.20–3 Design (modifies UW–9, UW–11(a), UW–13, and UW–16).

(a) Fabrication by welding must be in accordance with the provisions of this part and with part 57 of this subchapter.

(b) Welding subject to UW–11(a) of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) must be modified as described in § 54.25–8 for radiographic examination.

(c) A butt-welded joint with one plate edge offset, as shown in Figure UW–13.1(k) of Section VIII of the ASME BPVC, may only be used for circumferential joints of Class II and Class III pressure vessels.

(d) Attachment welds for nozzles and other connections must be in accordance with UW–16 of Section VIII of the ASME BPVC. When nozzles or connections are made to pressure vessels, as shown in Figure UW–16.1 (a) and (c) of the ASME BPVC, and are welded from one side only, backing strips must be used unless it can be determined visually that a full penetration weld has been achieved.

(e) When fabricating by welding the minimum joint requirements must be as specified under the column headed “minimum joint requirements” in table 2 to § 54.01–5 for various classes of pressure vessels.

(f) Joints in Class II or III pressure vessel cargo tanks must meet the following:

(1) Category A and B joints must be type (1) or (2).

(2) Category C and D joints must have full penetration welds extending through the entire thickness of the vessel wall or nozzle wall.

##### § 54.20–5 Welding qualification tests and production testing (modifies UW–26, UW–28, UW–29, UW–47, and UW–48).

(a) *Performance and procedure qualification.* No production welding must be done until welding procedures and welders have been qualified in accordance with part 57 of this subchapter.

(b) *Tests.* Production tests are required in accordance with § 57.06–1 of this subchapter.

#### Subpart 54.23—Fabrication by Brazing

##### § 54.23–1 Scope (modifies UB–1).

(a) Fabrication by brazing must be in accordance with the provisions of this part and with part 57 of this subchapter.

(b) [Reserved]

#### Subpart 54.25—Construction With Carbon, Alloy, and Heat-Treated Steels

##### § 54.25–1 Scope.

The pressure vessels for low temperature operation must be as required by Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) as modified by this subpart.

##### § 54.25–3 Steel plates (modifies UCS–6).

The steels listed in UCS–6(b) of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) will be allowed only in Class III pressure vessels (see table 2 to § 54.01–5(b)).

##### § 54.25–5 Corrosion allowance.

The corrosion allowance must be as required in § 54.01–35.

##### § 54.25–7 Requirement for postweld heat treatment (modifies UCS–56).

(a) Postweld heat treatment is required for all carbon and low alloy steel Class I, I–L, and II–L vessels regardless of thickness. (Refer to table 2 to § 54.01–5 for applicable requirements.)

(b) Cargo tanks which are fabricated of carbon or low alloy steel as Class II pressure vessels, designed for pressures exceeding 100 pounds per square inch



gage and used in the storage or transportation of liquefied compressed gases must be postweld heat treated regardless of thickness.

**§ 54.25–8 Radiography (modifies UW–11(a), UCS–57, UNF–57, UHA–33, and UHT–57).**

(a) Full radiography is required for all Class I and Class I–L vessels regardless of thickness. (Refer to table 2 to § 54.01–5 for applicable requirements.)

(b) Class II–L vessels must be spot radiographed. The exemption provided in UW–11(c) of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) does not apply. (Refer to table 2 to § 54.01–5 for applicable requirements.)

(c) Each butt-welded joint in a Class II or III pressure vessel cargo tank must be spot radiographed, in accordance with UW–52, regardless of diameter or thickness, and each weld intersection or crossing must be radiographed for a distance of at least 10 thicknesses from the intersection.

**§ 54.25–10 Low temperature operation—ferritic steels (replaces UCS–65 through UCS–67).**

(a) *Scope.* (1) This section contains requirements for pressure vessels and nonpressure vessel type tanks and associated secondary barrier, as defined in §§ 38.05–4 and 154.7 of this chapter, and their parts constructed of carbon

and alloy steels which are stressed at operating or hydrostatic test temperatures below 0 °F.

(2)(i) The service temperature is the minimum temperature of a product at which it may be contained, loaded and/or transported. However, the service temperature must in no case be taken higher than given by the following formula:

**Formula 1 to § 54.25–10(a)(2)(i)**

$$t_s = t_w - 0.25(t_w - t_B)$$

where:

$t_s$  = Service temperature.

$t_w$  = Boiling temperature of gas at normal working pressure of container but not higher than + 32 °F.

$t_B$  = Boiling temperature of gas at atmospheric pressure.

(ii) Only temperatures due to refrigerated service usually need to be considered in determining the service temperature, except pressure vessel type cargo tanks operating at ambient temperatures must meet paragraph (d) of this section. “Refrigerated service”, as used in this paragraph (a)(2)(ii), means a service in which the temperature is controlled by the process and not by atmospheric conditions.

(b) *Specifications.* Materials used in the construction of vessels to operate below 0 °F (but not below the designated minimum service temperature) must conform to a specification given in table

UCS–23 in Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) and the following additional requirements:

**Note 1 to paragraph (b) introductory text:** For high alloy steels refer to § 54.25–15. For heat treated steels refer to § 54.25–20.

(1)(i) For minimum service temperatures not lower than – 67 °F, ferritic steels must be made with fine grain practice and must have an austenitic grain size of 5 or finer, and must be normalized. Consideration will be given to other heat treatments; refer to § 57.03–1(d) of this subchapter. Plate for pressure vessel applications must conform to the requirements of ASTM A20/A20M (incorporated by reference, see § 54.01–1). It may be produced by the open hearth, basic oxygen or electric furnace process and must conform to the requirements of table 1 to § 54.25–10(b)(1). (Other alloying elements may only be present in trace amounts.)

(ii) Mechanical properties must be within the following limits:

(A) Ultimate strength: 58,000<sup>1</sup>–85,000<sup>1</sup>psig.

(B) Yield strength: Minimum 35,000 psig. Maximum 80 percent of ultimate.

(C) Elongation minimum: 20 percent in 8 inches, or 24 percent in 2 inches, or 22 percent in 5.65 √A, where “A” is the test specimen cross sectional area.

TABLE 1 TO § 54.25–10(b)(1)

Minimum service <sup>1</sup> temperature °F	Max. C <sup>1</sup> percent	Manganese range <sup>1</sup> percent
– 30	0.20	0.70–1.35
– 50	.16	1.15–1.50
– 67	.12	1.30–1.60

<sup>1</sup> At service temperatures intermediate between those specified, intermediate amounts of carbon and manganese will be allowed (in proportion to the actual service temperature variation from that listed), provided all other chemical and mechanical properties specified for steels in this temperature range are satisfied.

TABLE 2 TO § 54.25–10(b)(1)

	Range percent
Si .....	0.10–0.50 Maximum.
S .....	0.035.
P .....	0.035.
Ni .....	0.80.
Cr .....	0.25.
Mo .....	0.08.
Cu .....	0.035.
Nb .....	0.05.
V .....	0.08.

(2) For minimum service temperature below – 67 °F, but not below the designated minimum service temperature, ferritic steels must be normalized, low carbon, fully killed, fine grain, nickel alloy type, conforming to any one of the specifications in table 3 to § 54.25–10(b)(2). Consideration will be given to other heat treatments. Refer to § 57.03–1(d) of this subchapter for quenched and tempered steels. The ultimate and yield strengths must be as

shown in the applicable specification and must be suitable to the design stress levels adopted. The service temperature must not be colder than the minimum specified in table 3 to § 54.25–10(b)(2) for each steel.

TABLE 3 TO § 54.25–10(b)(2)

Steel	Minimum service temperature
A–203, 2.25 percent, Ni, normalized .....	– 80 °F for Grade A. – 75 °F for Grade B.
A–203, 3.5 percent, Ni, normalized .....	– 130 °F for Grade D. – 110 °F for Grade E.

TABLE 3 TO § 54.25–10(b)(2)—Continued

Steel	Minimum service temperature
5 percent Ni, normalized .....	Dependent on chemical and physical properties.

(3) The materials permitted under paragraphs (b)(1) and (2) of this section must be tested for toughness in accordance with and must satisfy the applicable requirements of subpart 54.05.

(4) Welded pressure vessels or nonpressure vessel type tanks and associated secondary barriers, as defined in § 38.05–4 of subchapter D of this chapter must meet the toughness requirements of subparts 57.03 and 57.06 of this subchapter with regard to weld procedure qualifications and production testing.

(5) The material manufacturer’s identification marking required by the material specification must not be die-stamped on plate material less than one-fourth inch in thickness.

(c) *Design.* Pressure vessels must meet the requirements for Class I–L and II–L construction. (See table 2 to § 54.01–5 for applicable requirements). Except as permitted by § 54.05–30, the allowable stress values used in the design of low temperature pressure vessels may not exceed those given in table UCS–23 of Section VIII of the ASME BPVC for temperatures of 0 °F to 650 °F. For materials not listed in this table allowable stress values are determined in accordance with appendix P of Section VIII of the ASME BPVC.

(d) *Impact tests.* Weldments and all materials used in pressure vessel type cargo tanks operating at ambient temperatures and constructed of materials listed in table UCS–23 must pass Charpy impact tests in accordance with UG–84 at a temperature of –20 °F or colder, except as provided by paragraphs (d)(1), (2), and (3) of this section.

(1) Charpy impact tests are not required for any of the following ASTM materials if the thickness for each is 5/8 inch or less, unless otherwise indicated:

- (i) A–182, normalized and tempered.

- (ii) A–302, Grades C and D.
- (iii) A–336, Grades F21 and F22 that are normalized and tempered.
- (iv) A–387, Grades 21 and 22 that are normalized and tempered.

- (v) A–516, Grades 55 and 60.
- (vi) A–533, Grades B and C.
- (vii) All other plates, structural shapes and bars, and other product forms, except for bolting, if produced to a fine grain practice and normalized.

(2) Charpy impact tests are not required for any of the following ASTM materials if the thickness for each is 1.25 inch or less:

- (i) A–203.
- (ii) A–508, Class 1.
- (iii) A–516, normalized.
- (iv) A–524.
- (v) A–537.
- (vi) A–612, normalized.
- (vii) A–662, normalized.
- (viii) A–724, normalized.

(3) Charpy impact tests are not required for any of the following bolt materials:

- (i) A–193, Grades B5, B7, B7M, and B16.
- (ii) A–307, Grade B
- (iii) A–325, Type 1.
- (iv) A–449.

**§ 54.25–15 Low temperature operation—high alloy steels (modifies UHA–23(b) and UHA–51).**

(a) Toughness tests for the materials listed in UHA–51(a) in Section VIII of the ASME BPVC (incorporated by reference; see § 54.01–1) for service temperatures below –425 °F, UHA–51(b)(1) through (5) for service temperatures below 0 °F, and UHA–51(c) for all service temperatures, must be performed in accordance with the requirements of subpart 54.05. These requirements are also applicable to nonpressure vessel type, low temperature tanks and associated secondary barriers, as defined in

§ 38.05–4 in subchapter D of this chapter. Such tests are required regardless of the vessel’s design stress. Service temperature is defined in § 54.25–10(a)(2).

(b) Materials for pressure vessels with service temperatures below –320 °F must be of the stabilized or low carbon (less than 0.10 percent) austenitic stainless-steel type, produced according to the applicable specifications of table UHA–23 of Section VIII of the ASME BPVC. These materials and their weldments must be tested for toughness according to the requirements of subpart 54.05 except that the Charpy V-notch testing acceptance criteria will be in accordance with UHT–6(a)(4) and (5) of Section VIII of the ASME BPVC.

(c) Except as permitted by § 54.05–30, the allowable stress values used in the design of low temperature pressure vessels may not exceed those given in table UHA–23 of Section VIII of the ASME BPVC for temperatures of –20 °F to 100 °F.

**§ 54.25–20 Low temperature operation—ferritic steels with properties enhanced by heat treatment (modifies UHT–5(c), UHT–6, UHT–23, and UHT–82).**

(a) For service temperatures below 0 °F but not below the designated minimum service temperature, steel conforming to the specifications of table 1 to § 54.25–20(a) may be used in the fabrication of pressure vessels and nonpressure vessel tanks and associated secondary barriers, as defined in § 38.05–4 of subchapter D of this chapter. The ultimate and yield strengths must be as shown in the applicable specification and must be suitable for the design stress levels adopted. The service temperature must not be colder than –320 °F. Service temperature is defined in § 54.25–10(a)(2).

TABLE 1 TO § 54.25–20(a)

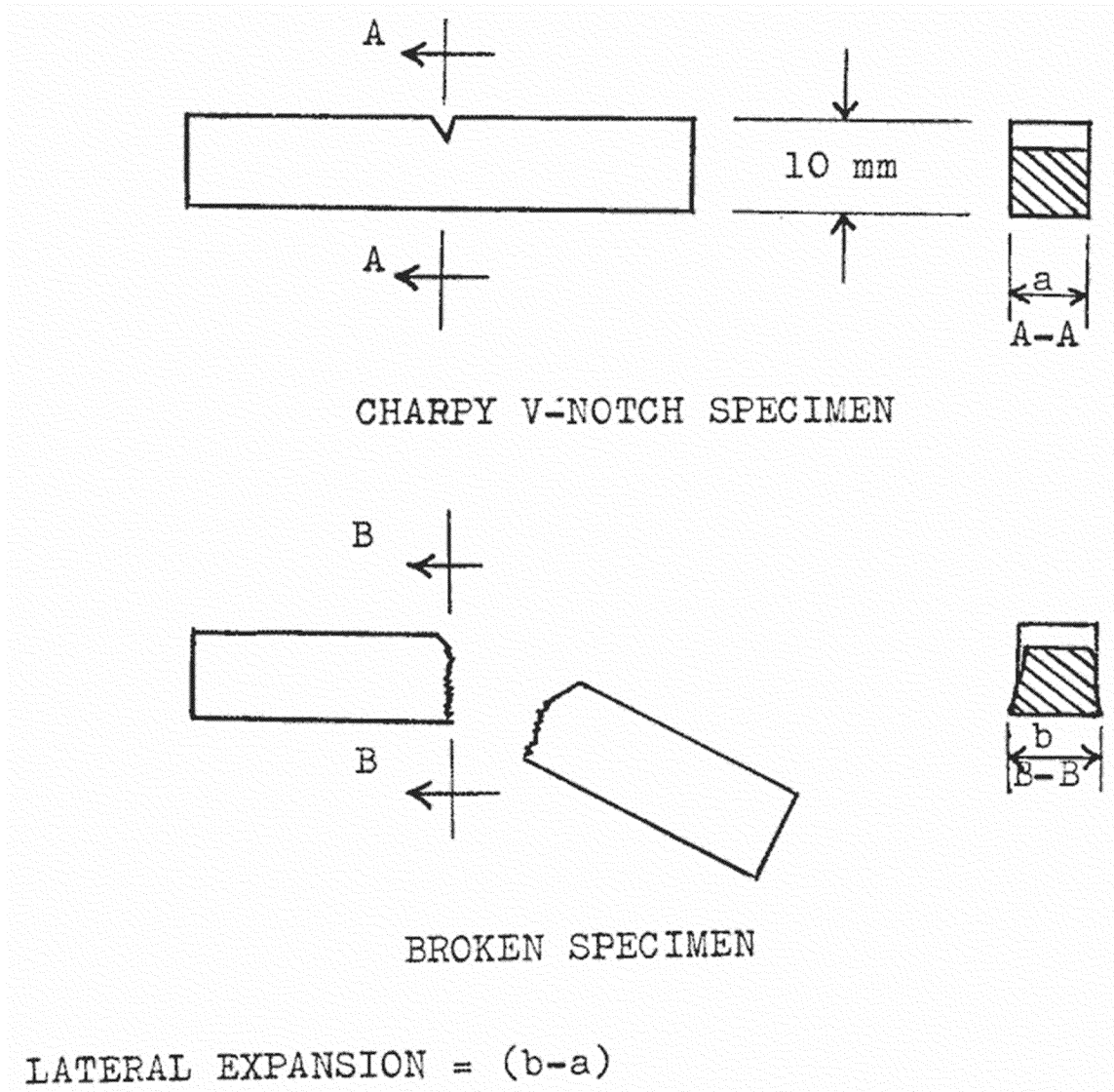
Steel	Minimum service temperature, °F
A–333, 9 percent Ni, grade 8 .....	–320
A–334, 9 percent Ni, grade 8 .....	–320
A–353, 9 percent Ni, double normalized and tempered .....	–320
A–522, 9 percent Ni, NNT, Q and T, forging .....	–320
A–553, 9 percent Ni, quenched and tempered .....	–320

(b) The materials permitted under paragraph (a) of this section must be tested for toughness in accordance with the requirements of UHT-6 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01-1) except that

tests must be conducted at the temperature specified in § 54.05-6 in lieu of that in UHT-5(c) of Section VIII of the ASME BPVC. Lateral expansion in a broken Charpy V-notch specimen is illustrated in figure 1 to § 54.25-20(b)

and must be measured in accordance with the procedure outlined in ASTM A370 (incorporated by reference, see § 54.01-1).

Figure 1 to § 54.20-20(b)



(c) The qualification of welding procedures, welders and weld-production testing for the steels of table 1 to § 54.25-20(a) must conform to the requirements of part 57 of this subchapter and to those of subpart 54.05 except that the acceptance criteria for Charpy V-notch testing must be in accordance with UHT-6(a)(4) of Section VIII of the ASME BPVC.

(d) The values of absorbed energy in foot-pounds and of fracture appearance in percentage shear, which are recorded for information when complying with paragraphs (b) and (c) of this section must also be reported to the marine

inspector or the Commandant, as applicable.

(e) Except as permitted by § 54.05-30, the allowable stress values may not exceed those given in table UHT-23 of Section VIII of the ASME BPVC for temperatures of 150 °F and below.

**§ 54.25-25 Welding of quenched and tempered steels (modifies UHT-82).**

(a) The qualification of welding procedures, welders, and weld-production testing must conform to the requirements of part 57 of this subchapter. The requirements of § 57.03-1(d) of this subchapter apply to

welded pressure vessels and non-pressure vessel type tanks of quenched and tempered steels other than 9-percent nickel.

(b) [Reserved]

**Subpart 54.30—Mechanical Stress Relief**

**§ 54.30-1 Scope.**

(a) Certain pressure vessels may be mechanically stress relieved in accordance with the requirements in this subpart.

(b) [Reserved]

**§ 54.30-3 Introduction.**

(a) Large conventional pressure vessels used to transport liquefied petroleum and natural gases, at “low temperatures” may often be difficult to thermally stress relieve. Where no other problem, such as corrosion exists, mechanical stress relief will be permitted for Class II-L pressure vessels.

(b) Mechanical stress relief serves to cause small flaws, particularly in the weld zone, to yield plastically at the flaw tip resulting in a local relief of stress and a blunting of the crack tip. To achieve the maximum benefit from mechanical stress relief, it is necessary that the stresses so imposed be more severe than those expected in normal service life. At the same time, it is necessary that the stresses which are imposed are not so high as to result in appreciable deformation or general yielding.

(c) The weld joint efficiencies as listed in table UW-12 of Section VIII of the BPVC (incorporated by reference; see § 54.01-1) apply except that a minimum of spot radiography will be required. UW-12(c) of Section VIII of the ASME BPVC that permits omitting all radiography does not apply. Spot examination must follow UW-52 of Section VIII of the ASME BPVC and, in addition, these vessels will be required to have radiographic examination of intersecting circumferential and longitudinal joints for a distance of at least 20 times the plate thickness from the junction. See § 54.25-8 on spot radiography.

(d) Severe cold forming will not be permitted unless thermal stress relief is used. For example, parts of the vessels which are individually cold formed, such as heads, must be thermally stress relieved, where the extreme fiber strain measured at the surface exceeds 5 percent as determined by:

$$\text{Percent strain} = (65t/R_f)[1 - (R_f/R_o)]$$

where:

t = Plate thickness.

R<sub>f</sub> = Final radius.

R<sub>o</sub> = Original radius (equals infinity for flat plate).

**§ 54.30-5 Limitations and requirements.**

(a) Class II-L pressure vessels which require stress relief (see table 2 to § 54.01-5) may be mechanically stress relieved provided:

(1) The steels from which they are fabricated do not specifically require thermal stress relief in UCS-56 of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01-1) and have a ratio of yield to ultimate tensile strength not greater than 0.8. For

example: A-537 steels could be mechanically stress relieved.

(2) Pressure difference across the shell is not greater than 100 pounds per square inch, thickness of shell is not greater than 1 inch, and the design temperature is not greater than 115 °F.

(3) It will carry liquids of specific gravity no greater than 1.05.

(4) Design details are sufficient to eliminate stress concentrators: Mechanical stress relief is not acceptable in designs involving the following types of welded connections shown in UW-16.1 of Section VIII of the ASME BPVC:

(i) Types l, m, n, and p because of nonintegral reinforcement. Type o will be acceptable provided the plate, nozzle, and reinforcement assembly are furnace stress relieved and the reinforcement is at least 6 inches or 10t, whichever is larger, from the plate head.

(ii) Types d, e, and f because expansion and contraction stresses are concentrated at the junction points.

(5) That no slip-on flanges in sizes greater than 2 inches are used.

(6) The categories A and B joints are type one as described in table UW-12 of Section VIII of the ASME BPVC and all categories C and D joints are full penetration welds. See UW-3 of the ASME BPVC for definition of categories.

(b) When a pressure vessel is to be mechanically stress relieved in accordance with § 54.30-10(a)(1), its maximum allowable working pressure will be 40 percent of the value which would otherwise be determined. However, an increase of this 40 percent factor may be permitted if the stress relief is carried out at a pressure higher than that required by § 54.30-10(a)(1) and an experimental strain analysis is carried out during stress relief. This evaluation should provide information as to the strains at the saddles, welded seams and nozzles as well as the body of the vessel. The hydrostatic pressure applied during stress relief should be such that, except in the case of welds, the stresses in the vessel must closely approach but not exceed 90 percent of the yield stress of the material at the test temperature. The proposed experimental program should be submitted to the Commandant for approval prior to its use. Photo-elastic coating, strain gaging, or a brittle coating technique is suggested for the experimental analysis.

**§ 54.30-10 Method of performing mechanical stress relief.**

(a) The mechanical stress relief must be carried out in accordance with the following stipulations using water as the pressurizing medium:

(1) At a hydrostatic pressure (measured at the tank top) of 1.5 times the design pressure. (See UA-60(e) of Section VIII of the ASME BPVC (incorporated by reference; see § 54.01-1).)

(2) At a temperature of 70 °F or the service temperature plus 50 °F, whichever is higher. Where the ambient temperature is below 70 °F, and use of water at that temperature is not practical, the minimum temperature for mechanical stress relief may be below 70 °F but must not be less than 50 °F above service temperature.

(3) The stress relief must be at the required temperature and pressure and held for a period not less than 2 hours per inch of metal thickness, but in no case less than 2 hours.

(b) It is considered preferable that mechanical stress relief be accomplished with the tanks in place on their saddles or supporting structure in the barge or ship in which they will be utilized. In any case, it is considered mandatory that the tank be supported only by its regular saddles or supporting structure, without any auxiliary or temporary supports.

**§ 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**

■ 17. The authority citation for part 56 is revised to read as follows:

**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; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3.

■ 18. Revise and republish subpart 56.01 to read as follows:

**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, 0.1.2, 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 56.01—General**

**§ 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.

**§ 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](mailto:typeapproval@uscg.mil). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto: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](mailto:APIpubs@api.org); [www.api.org](http://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](mailto:CustomerCare@asme.org); [www.asme.org](http://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 table 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](mailto:service@astm.org); [www.astm.org](http://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](http://www.ejma.org).

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

(2) [Reserved]

(e) *Fluid Controls Institute Inc. (FCI)*, 1300 Sumner Avenue, Cleveland, Ohio, 44115; 216–241–7333; [www.fluidcontrolsinstitute.org](http://www.fluidcontrolsinstitute.org).

(1) ANSI/FCI 69–1–2017, Pressure Rating Standard for Steam Traps, 2017 (“FCI 69–1”); IBR approved for § 56.60–1 table 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](mailto:sales@imo.org); [www.imo.org](http://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](mailto:central@iso.org); [www.iso.org](http://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](http://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](mailto:customerservice@sae.org); [www.sae.org](http://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).

**§ 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.

**§ 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).



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

Section or paragraph in ASME B31.1 and disposition	Unit in this part
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.

**§ 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.

■ 19. Amend § 56.04–1 as follows:

■ a. Revise the introductory text to § 56.04–1; and

■ b. Redesignate table 56.04–1 as table 1 to § 56.04–1.

The revision reads as follows:

#### Subpart 56.04—Piping Classification

##### § 56.04–1 Scope.

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

\* \* \* \* \*

■ 20. Amend § 56.04–2 as follows:

■ a. Revise the introductory text to § 56.04–2;

■ b. Redesignate table 56.04–2 as table 1 to § 56.04–2; and

■ c. Revise footnote 2 to newly redesignated table 1 to § 56.04–2.

The revisions read as follows:

##### § 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

\* \* \* \* \*

<sup>2</sup> 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).

\* \* \* \* \*

#### Subpart 56.07—Design

■ 21. Amend § 56.07–5 as follows:

■ a. Revise paragraphs (a) and (c); and

■ b. Remove paragraph (g).

The revisions read as follows:

##### § 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]

\* \* \* \* \*

(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).

\* \* \* \* \*

■ 22. Revise and republish § 56.07–10 to read as follows:

##### § 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.

■ 23. Revise and republish subparts 56.10 through 56.50 to read as follows:

#### Subpart 56.10—Components

Sec.

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 56.10—Components****§ 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.”

**§ 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.

**Subpart 56.15—Fittings****§ 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).

#### § 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.

#### § 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

#### § 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.

#### § 56.20-5 Marking (modifies 107.2).

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

#### § 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 welded 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.

#### § 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.

#### § 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.

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

#### § 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.

#### § 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).

#### § 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).

#### § 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.

#### § 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.

### Subpart 56.30—Selection and Limitations of Piping Joints

#### § 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.

#### § 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.

**§ 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 butt-welding 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 butt-welding 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.

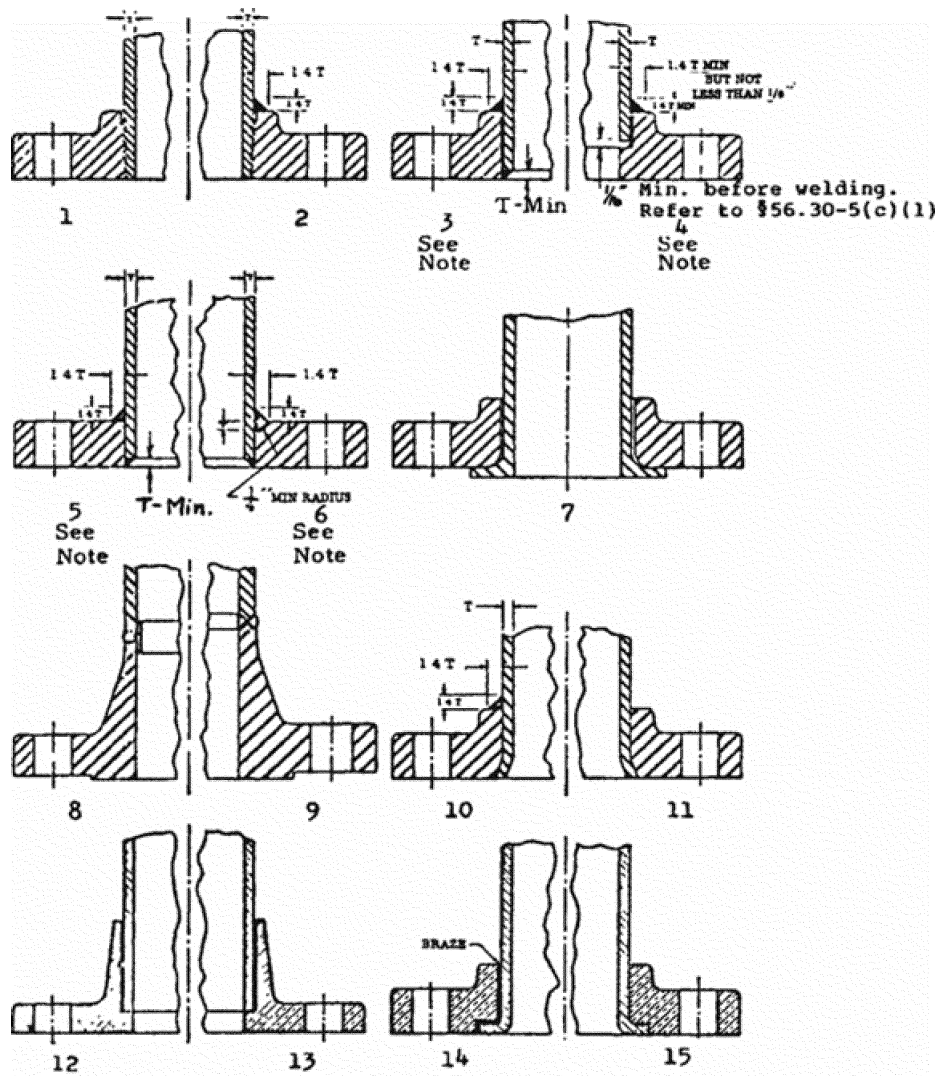
(12) *Figure 1 to § 56.30–10(b), Method 12.* High-hub bronze flanges may be used for temperatures not exceeding 425 °F. A preinserted ring of silver brazing alloy having a melting point not less than 1,000 °F must be inserted into the groove. A suitable flux must be applied to the surfaces to be joined 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.

**§ 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<sup>1 2</sup>

Maximum nominal size, inches	Maximum pressure, psig
Above 2" .....	(Not permitted in Class I piping service.)
Above 1" up to 2" .....	600.
Above 3/4" up to 1" .....	1,200.
3/4" and below .....	1,500.

<sup>1</sup> Further restrictions on the use of threaded joints appear in the low temperature piping section.

<sup>2</sup> 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).

#### **§ 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.)

#### **§ 56.30–27 Caulked joints.**

Caulked joints may not be used.

#### **§ 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.

#### **§ 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.

#### **§ 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.

#### **Subpart 56.35—Expansion, Flexibility and Supports**

##### **§ 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.

**§ 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]

**§ 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.

**Subpart 56.50—Design Requirements Pertaining to Specific Systems**

**§ 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.

**§ 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.

**§ 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.

#### § 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.

#### § 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.

#### § 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.

#### § 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.

#### § 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 suction 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.

**§ 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 <sup>1</sup>			Dry-cargo vessels <sup>2</sup>		Tank vessels	Mobile offshore drilling units
	International voyages <sup>3</sup>	Ocean, coast-wise and Great Lakes	All other waters	Ocean, coast-wise and Great Lakes	All waters	All waters	All waters
180' or more .....	43	43	2	2	2	2	2
Below 180' and exceeding 65' .....	43	52	52	52	52	2	2
65' or less .....	3	1	1	1	1	1	.....

<sup>1</sup> Small passenger vessels under 100 gross tons refer to subpart 182.520 of subchapter T of this chapter.

<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> 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.)

<sup>5</sup> 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 <sup>1</sup>	Hand pumps
Sailing .....	Ocean and coastwise .....	2	( <sup>2</sup> )
Manned barges .....	do .....	2	( <sup>2</sup> )
Manned barges .....	Other than ocean and coastwise .....	( <sup>3</sup> )	( <sup>3</sup> )
Unmanned barges .....	All waters .....	( <sup>3</sup> )	( <sup>3</sup> )
Mobile offshore drilling units .....	All waters .....	2	None.

<sup>1</sup> Where power is available, independent power bilge pumps must be installed as required and must be connected to the bilge main.

<sup>2</sup> 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.

<sup>3</sup> 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<sup>3</sup>/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.

**§ 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).

#### § 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. Coatings, 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.

#### § 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.

**§ 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.

**§ 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.

#### § 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.

#### § 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.

#### **§ 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 nonreturn 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.

**§ 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]

**§ 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]

**§ 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.

**§ 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 <sup>1</sup>	Factor for minimum energy, average of 3 specimens <sup>1</sup>	Factor for minimum energy single specimen <sup>1</sup>
10 × 10 mm .....	1	2/3
10 × 7.5 mm .....	5/6	5/6
10 × 5.0 mm .....	2/3	4/6
10 × 2.5 mm .....	1/2	1/3

<sup>1</sup>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 <sup>1</sup>	Grade <sup>2</sup>	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 <sup>3</sup> .....	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.

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

Product form	ASTM specification <sup>1</sup>	Grade <sup>2</sup>	Minimum service temperature	Minimum avg Charpy V notch energy
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 <sup>3</sup> .....	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.
		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.
Nuts, bolting .....	F1155 .....	4 .....	– 150 °F .....	20 ft. lb.
		8T, 8F .....	– 325 °F .....	No test required.
		8, 8C .....	No limit .....	Same requirement as comparable grades (B8, B8C) of bolting listed above.

<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> 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.

**§ 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.

**Subpart 56.60—Materials**

■ 24. Revise § 56.60–1 to read as follows:

**§ 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 § 56.60–1 or 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 <sup>3</sup> 4).
A312/A312M Austenitic steel (welded with no filler metal).	B31.1, B31.3 .....	(1 <sup>4</sup> ).
A333/A333M Low temperature steel pipe .....	Sec. VIII of the BPVC, B31.3 .....	(5 <sup>6</sup> ).
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 <sup>4</sup> 9).
Pipe, forged and bored:		
A358/A358M Ferritic alloy .....	B31.1.	
Tube, seamless:		

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

ASTM standards	ASME standards	Notes
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 <sup>5</sup> ).
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 <sup>4</sup> ).
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, <sup>12</sup> 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<sup>14</sup>**

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.	
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.	

<sup>1</sup> For austenitic materials where two sets of stresses appear, use the lower values.

<sup>2</sup> 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.

<sup>3</sup> Electric resistance welded pipe or tubing of this specification may be used to a maximum design pressure of 350 psig.

<sup>4</sup> Refer to limitations on use of welded grades given in § 56.60–2(b).

<sup>5</sup> 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.

<sup>6</sup> Furnace lap or furnace butt grades only. Limited to Class II applications only where the maximum service temperature is 450 °F, or less.

<sup>7</sup> 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.

<sup>8</sup> 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.

<sup>9</sup> For Class I applications only the Class I Grade of the specification may be used.

<sup>10</sup> 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.

<sup>11</sup> 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.

<sup>12</sup> 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.

<sup>13</sup> 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.

<sup>14</sup> For limitations in use refer to §§ 56.10–5(c) and 56.60–20.

<sup>15</sup> 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.

<sup>16</sup> The stress values must be taken from UNF23 of Section VIII of the ASME BPVC for B75 annealed and light drawn temper as appropriate.

<sup>17</sup> B68 is acceptable if provided with a mill hydrostatic or eddy current test.

<sup>18</sup> 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 <sup>1</sup>**

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. <sup>3</sup>
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.
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. <sup>4</sup>
ASME B16.25 .....	Buttwelding Ends.
ASME B16.29 .....	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings-DWV. <sup>4</sup>
ASME B16.34 .....	Valves—Flanged, Threaded, and Welding End. <sup>3</sup>
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) <sup>1</sup>**

ASTM F1006 .....	Standard Specification for Entrainment Separators for Use in Marine Piping Applications. <sup>4</sup>
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. <sup>4</sup>
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. <sup>2</sup>
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. <sup>1</sup>**

Fluid Controls Institute Inc..	Standards of the Expansion Joint Manufacturers Association, 2016
FCI 69–1 .....	Pressure Rating Standard for Steam Traps.
<b>Manufacturers' Standardization Society of the Valve and Fittings Industry, Inc. <sup>1</sup></b>	
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.
MSS SP–25 .....	Standard Marking System for Valves, Fittings, Flanges and Unions.
MSS SP–45 .....	Bypass and Drain Connections.

TABLE 2 TO § 56.60-1—ADOPTED STANDARDS APPLICABLE TO PIPING SYSTEMS—Continued  
[Replaces Table 126.1]

MSS SP-51 .....	Class 150LW Corrosion Resistant Flanges and Cast Flanged Fittings. <sup>4</sup>
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.

<sup>1</sup> All standards incorporated by reference; see § 56.01-2.

<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> 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.

■ 25. Revise and republish §§ 56.60-2 through 56.60-20 to read as follows:

**§ 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). A575 and A576 (Grades 1010-1030).	Allowable stresses must be the same as those listed in UCS23 of Section VIII of the ASME BPVC for the corresponding SA-182 material.  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 <sup>2</sup> (soft and half hard tempers)  B21 (alloys A, B, and C) .....	An ammonia vapor test in accordance with ASTM B858 must be performed on a representative model of each finished product design.  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 <sup>2</sup> .....	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.



TABLE 1 TO § 56.60-2—ADOPTED SPECIFICATIONS NOT LISTED IN THE ASME BPVC—Continued

ASTM specifications	Supplementary requirements
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 <sup>2</sup> (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 <sup>2,3</sup> .....	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 <sup>2,3</sup> .....	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.

<sup>1</sup> For limitations in use refer to § 56.60-5.

<sup>2</sup> 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.

<sup>3</sup> 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).

**§ 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.

**§ 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.

**§ 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).

**§ 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.

**§ 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.

■ 26. Amend § 56.60–25 by revising the introductory text to paragraph (a)(3) and paragraphs (b) through (d) to read as follows:

**§ 56.60–25 Nonmetallic materials.**

(a) \* \* \*

(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:

\* \* \* \* \*

(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.

■ 27. Revise subpart 56.65 to read as follows:

**Subpart 56.65—Fabrication, Assembly, and Erection**

**§ 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.

■ 28. Add subpart 56.70 to read as follows:

**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 56.70—Welding**

**§ 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  $\frac{1}{16}$ -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  $\frac{1}{32}$ -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  $\frac{1}{32}$ -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  $\frac{1}{32}$ -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.

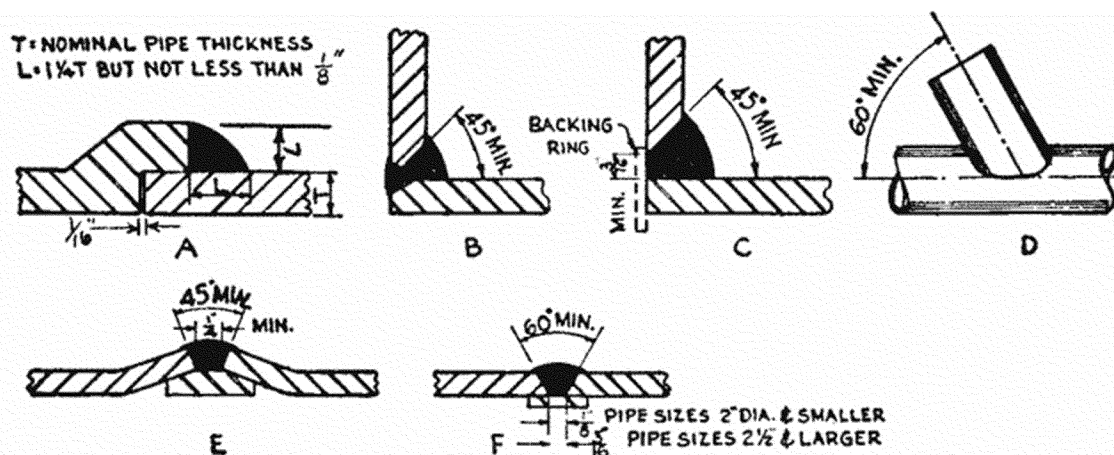
(g) *Welded branch connections.* (1) Figures 127.4.8A, B, and C of ASME B31.1 show typical details of branch connections with and without added

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  $\frac{1}{4}$  inch or  $0.7t_n$ .

$t_r$  = nominal thickness of reinforcing element (ring or saddle), inches ( $t_r = 0$  if there is no added reinforcement).

$t_{min}$  = the smaller of  $t_n$  or  $t_c$ .

$t_w$  = 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  $0.5 t_c$ .

(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  $0.5 t_c$ .

(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  $750^\circ\text{F}$  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)

<sup>1</sup> The greater of 1/4 in. or 1/8 times the width of the weld in inches.

**Notes:**

<sup>1</sup> For double welded butt joints, this limitation on reinforcement given above applies separately to both inside and outside surfaces of the joint.

<sup>2</sup> For single welded butt joints, the reinforcement limits given above apply to the outside surface of the joint only.

<sup>3</sup> The thickness of weld reinforcement is based on the thickness of the thinner of the materials being joined.

<sup>4</sup> The weld reinforcement thicknesses must be determined for the higher of the abutting surfaces involved.

<sup>5</sup> 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.

■ 29. Revise and republish subparts 56.75 through 56.97 to read as follows:

**Subpart 56.75—Brazing**

- Sec.
- 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.

**Subpart 56.75—Brazing**

**§ 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.

**§ 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.

**§ 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]

**§ 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.

**§ 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.

**§ 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**

##### **§ 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.

##### **§ 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.

#### **Subpart 56.85—Heat Treatment of Welds**

##### **§ 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.

##### **§ 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).

##### **§ 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).

#### **Subpart 56.90—Assembly**

##### **§ 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.

##### **§ 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.

#### **Subpart 56.95—Inspection**

##### **§ 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.

##### **§ 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 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.

**Subpart 56.97—Pressure Tests****§ 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.

**§ 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.

**§ 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.

**§ 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.

**§ 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).

**§ 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.

**§ 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.

■ 30. Revise and republish part 57 to read as follows:

**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.

**PART 57—WELDING AND BRAZING**

**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 brazing machines are specifically exempt from performance qualification tests.

**Subpart 57.02—General Requirements**

**§ 57.02–1 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 [ypeapproval@uscg.mil](mailto:ypeapproval@uscg.mil). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material may be obtained from *American Society of Mechanical Engineers (ASME)*, Two Park Avenue, New York, NY 10016–5990; 800–843–2763; [CustomerCare@asme.org](mailto:CustomerCare@asme.org); [www.asme.org](http://www.asme.org):

(a) 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 §§ 57.02–2; 57.02–4(a); 57.03–1(a) and (b); 57.04–1; 57.05–1(a); 57.06–1(c); 57.06–4(h).

(b) [Reserved]

**§ 57.02–2 Adoption of Section IX of the ASME BPVC.**

(a) The qualifications for all types of welders and brazers, the qualification of welding procedures, and the production tests for all types of manual and machine arc and gas welding and brazing processes used in fabricating power boilers, heating boilers, pressure vessels and piping must be in accordance with Section IX of the ASME BPVC (incorporated by reference; see § 57.02–1), as limited, modified, or replaced by specific requirements in this part. For general information, table 1 to § 57.02–2(a) lists the various paragraphs in Section IX of the ASME BPVC which are limited, modified, or replaced by regulations in this part.

TABLE 1 TO § 57.02–2(a)—LIMITATIONS AND MODIFICATIONS TO THE ADOPTION OF SECTION IX OF THE ASME BPVC

Paragraphs in section IX of the ASME BPVC, and disposition	Unit of this part
QW–100 replaced by .....	57.01–1(a).
QW–201 modified by .....	57.03–1(a).
QW–202 modified by .....	57.04–1
QW–202.1 modified by .....	57.03–1(b).
QW–210 modified by .....	57.04–1.
QW–211 modified by .....	57.02–4.
QW–253 modified by .....	57.03–1(g).
QW–254 modified by .....	57.03–1(g).
QW–255 modified by .....	57.03–1(g).
QW–305 modified by .....	57.01–1(b).
QW–451 modified by .....	57.03–1(b) and 57.04–1.
QB–100 replaced by .....	57.01–1(a).
QB–103 replaced by .....	57.02–3(a).
QB–201 modified by .....	57.03–1(a).
QB–202 modified by .....	57.04–1.
QB–305 modified by .....	57.01–1(b).

(b) References to the ASME Code, like paragraph QW-131.1 indicate:

(1) Q = Section IX, Welding and Brazing Qualifications, ASME BPVC.

(2) W = Part containing requirements for welding procedure, welder, and welding operator qualifications.

(3) 131 = Major division within the part.

(4) 131.1 = Specific subparagraph within the part.

(c) When a paragraph or a section of the regulations in this part relates to material in Section IX of the ASME BPVC, the relationship with the code will be shown immediately following the heading of the section or at the beginning of the paragraph as follows:

(1) (Modifies Q\_\_\_.) This indicates that the material in Q\_\_\_ is generally applicable but is being altered, amplified, or augmented.

(2) (Replaces Q\_\_\_.) This indicates that Q\_\_\_ does not apply.

(3) (Reproduces Q\_\_\_.) This indicates that Q\_\_\_ is being identically reproduced for convenience, not for emphasis.

**§ 57.02-3 Performance qualifications issued by other agencies.**

(a) Within the limits of the qualification tests passed, the Officer in Charge, Marine Inspection, may accept welders who have been qualified by other agencies of the Federal Government; by the American Bureau of Shipping; or by the fabricator concerned.

(b) [Reserved]

**§ 57.02-4 Fabricator's responsibility.**

(a) (Replaces QW 103 and QB 103.) Each manufacturer or contractor is responsible for the welding and brazing done by their organization and must conduct tests required in this part to qualify the welding and brazing procedures used and the performance of welders and brazers who apply these procedures. The manufacturer must bear the expense of conducting the tests. Each manufacturer must maintain a record of the test results obtained in welding and brazing procedure and welder and brazer performance

qualifications. These required records, together with identification data, must be maintained by the manufacturer or contractor on the recommended forms illustrated in Section IX of the ASME BPVC (incorporated by reference; see § 57.02-1), or on any other form acceptable to the Officer in Charge, Marine Inspection. Upon request, duplicate forms must be furnished by the manufacturer or contractor to the marine inspector.

(b) Except as otherwise provided for in § 57.02-2, the fabricator must notify the Officer in Charge, Marine Inspection, prior to conducting performance or procedure qualification tests, and arrange a suitable time and place for conducting the tests, so that a marine inspector may be present.

**§ 57.02-5 Filler metals.**

(a) Except as provided for in paragraph (b) of this section, when filler metal is used in a welded fabrication that is required to meet the requirements of this part the filler metal must be one that has been approved by the American Bureau of Shipping.

(b) In instances where a fabricator desires to use a filler metal which has not been approved by the American Bureau of Shipping the approval of the filler metal can be made by the Officer in Charge, Marine Inspection on the basis of the fabricator passing the weld procedure qualification tests as outlined in this part. This alternate means of approval applies to wire-gas and wire-flux combinations as well as to stick electrodes. Filler metal approvals given in this manner will extend only to the specific fabricator to whom they are granted.

**Subpart 57.03—Procedure Qualifications**

**§ 57.03-1 General requirements.**

(a) (Modifies QW 201 and QB 201.) In order to obtain Coast Guard approval of a weld procedure to be used on welded fabrication that is required to meet the requirements of this part each manufacturer or contractor must do the following:

(1) Each manufacturer or contractor must submit to the cognizant Officer in Charge, Marine Inspection, for approval, a welding or brazing procedure specification for the particular welding or brazing process to be used. The welding or brazing procedure specification must include a sketch showing joint preparation. Suggested forms showing the information which is required in the welding or brazing procedure specification are in Form QW 482 and Form QB 482 of Section IX of the ASME BPVC (incorporated by reference; see § 57.02-1).

(2) Each manufacturer or contractor must submit to the cognizant Officer in Charge, Marine Inspection, for approval, the results of the physical tests required by Section IX of the ASME BPVC.

(b) (Modifies QW 202.1 and QW 451.) To obtain approval of the welding procedure, fabricators desiring to use any welding process for applications involving temperatures below -18 °C (approx. 0 °F) must conduct a procedure qualification test in accordance with the requirements of paragraph (a) of this section and the following additional requirements:

(1) The test piece must be large enough so that sufficient material is available for the tests prescribed in QW 451 of the ASME BPVC, plus toughness tests and a macro-etch specimen.

(2) To obtain approval the fabricator must conduct toughness tests and qualify in accordance with § 54.05 of the subchapter. Results of toughness tests must be submitted for approval to the cognizant Officer in Charge, Marine Inspection.

(3) The macro-etch specimen must be submitted with the test results required by paragraph (a) of this section. Macro-etch specimens must not be obtained by flame or arc cutting from the test piece. Weld reinforcement must remain in place unless the production welds are to be machined or ground. Backing rings must also be left in place unless they are to be removed in production.

(4) Low temperature procedure qualification thickness ranges are as indicated in table 1 to § 57.03-1(b).

TABLE 1 TO § 57.03-1(b)—LOW TEMPERATURE WELD PROCEDURE QUALIFICATION THICKNESS RANGES

Thickness, "t" of test plate or pipe as welded (inches)	Range of thickness of materials qualified by test plate or pipe (inches)	
	Minimum	Maximum
1/16 to 3/8, inclusive .....	1/16	3/8
Over 3/8 but less than 3/4 .....	1 3/8	3/4
3/4 to 3, inclusive .....	3/4	2t

<sup>1</sup> For thicknesses less than 5/8 inch, the thickness of the test plate or pipe is the minimum thickness qualified.

<sup>2</sup> Where "t" is the thickest material over 3/4 inch to be used in production.

(5) The limits for heat input production, as measured in Joules/inch, must be at or below the maximum heat input applied to the procedure test plate. The word "maximum" must not be interpreted as either nominal or average.

(c) For quenched and tempered steels, the Commandant may prescribe special testing to assure that the welding procedure produces weldments which are not prone to low energy fracture through the heat affected zone.

(d) Welding procedures that utilize type E 6012, E 6013, E 6014, E 6024, E 7014, or E 7024 electrode will be approved only for the specific type, size, and brand electrode used. If a different type, size, or brand of electrode is used, a new procedure qualification test must be conducted.

(e) Welding or brazing procedure approvals cannot be transferred from one plant to another plant of the same company or from one company to another.

(f) (Modifies QW 253, QW 254, and QW 255.) Item QW 402.4 is an essential variable for all procedure specifications.

**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).**

The type and number of specimens that must be tested to qualify an automatic, semiautomatic, or manual procedure specification must be in accordance with QW 202, QW 210, or QB 202 of Section IX of the ASME BPVC (incorporated by reference; see § 57.02-1) as applicable, except as supplemented by §§ 57.03-1(b) and (d).

**Subpart 57.05 Performance Qualifications**

**§ 57.05-1 General.**

(a) This subpart supplements the various paragraphs in Section IX of the ASME BPVC dealing with Performance Qualifications (see § 57.02-2).

(b) [Reserved]

**§ 57.05-2 Transfer of performance qualifications.**

(a) The performance qualification records of a welder may be transferred

from one plant to another of the same company or from one company to another company provided the following requirements are met:

(1) The transfer is authorized by the cognizant Officer in Charge, Marine Inspection;

(2) A copy of the qualification test records of each welder together with employment records and identification data are transferred by the plant or company which qualified the welder to the new plant or company; and,

(3) The new plant or company accepts the welder as qualified.

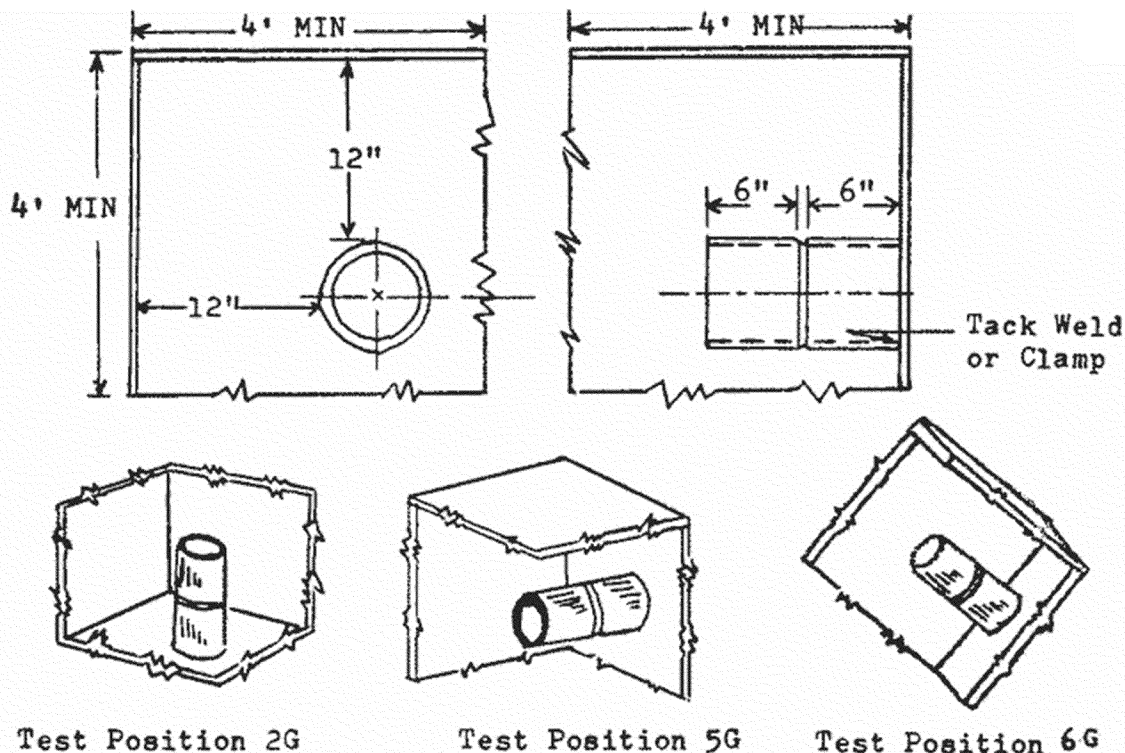
(b) [Reserved]

**§ 57.05-3 Limited space qualifications.**

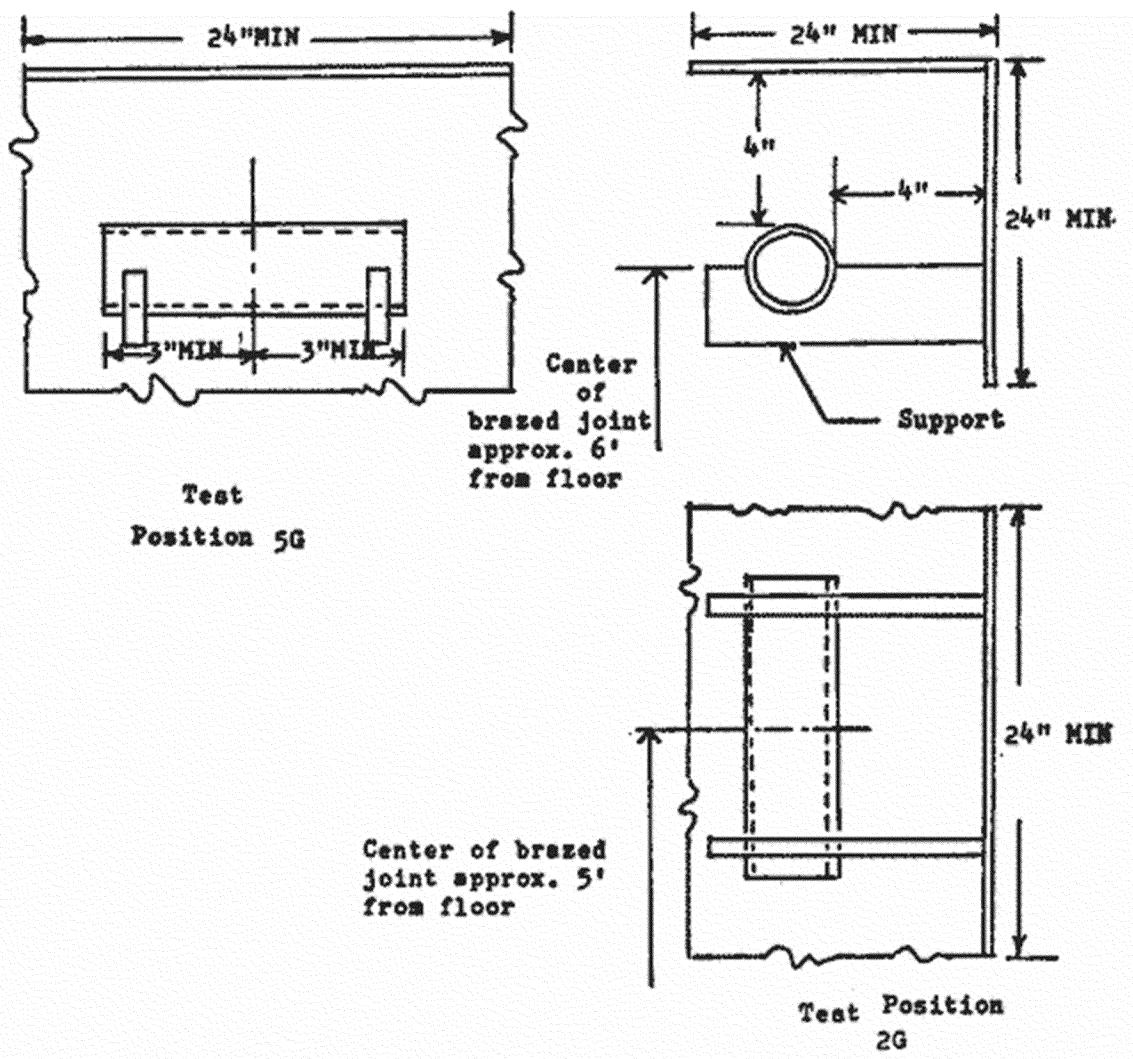
When a welder is to be qualified for welding or torch brazing of piping on board ship in a limited or restricted space, the space restrictions shown in connection with figures 1 or 2 to § 57.05-3 must be used when welding and brazing the test joint.

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**Figure 1 to § 57.05-3—Limited Space Restriction for Pipe Welding Performance Qualification**



**Figure 2 to § 57.05-3—Limited Space Restriction for Pipe Brazing Performance Qualification**



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**§ 57.05-4 Welder qualification by procedure tests.**

Qualification tests of welders may be omitted for welders who weld satisfactory procedure qualification test assemblies as required by subpart 57.03.

**§ 57.05-5 Low temperature application.**

For low temperature application, each welder must demonstrate their ability to weld satisfactorily in accordance with procedures qualified in accordance with § 57.03-1(b). Manual welding must be qualified in the position prescribed by the procedure.

**Subpart 57.06—Production Tests**

**§ 57.06-1 Production test plate requirements.**

(a) Production test plates must be provided for Class I, Class I-L, Class II, and Class II-L pressure vessels as specified in this section.

(b) Main power boilers must meet the test plate requirements for Class I pressure vessels.

(c) Test plates are not required for heating boilers or Class III pressure vessels. Test plates are not required for main power boilers or pressure vessels constructed of P1 material as listed in QW/QB 422 of Section IX of the ASME BPVC (incorporated by reference; see § 57.02-1) whose welded joints are fully radiographed as required by part 52 or 54 of this subchapter as applicable except when toughness tests are required in accordance with § 57.06-5. When toughness tests are required, all prescribed production tests must be performed.

**§ 57.06-2 Production test plate interval of testing.**

(a) At least one set of production test plates must be welded for each Class I or Class I-L pressure vessel except as follows:

(1) When the extent of welding on a single vessel exceeds 50 lineal feet of

either or both longitudinal and circumferential joints, at least one set of test plates must be welded for each 50 feet of joint.

(2) When the extent of welding on vessels welded in succession exceeds 50 lineal feet of either or both longitudinal and circumferential joints, at least one set of test plates must be welded for each 50 feet of aggregate joint of the same material where the plate thicknesses fall within a range of one-fourth inch. For each 50-foot increment of weld, test plates must be prepared at the time of fabrication of the first vessel involving that increment.

(b) Production test plates for Class II-L pressure vessels must be prepared as for Classes I and I-L vessels except that the provisions of paragraphs (a)(1) and (2) of this section are applicable to each 150 lineal feet of welded joint in lieu of each 50 lineal feet.

(c) In the case of Class II pressure vessels, no more than one set of production test plates need be prepared

for each 300 lineal feet of either or both longitudinal and circumferential joints. In the case of single vessel fabrication, a set of test plates is required for each 300 lineal feet of weld or fraction thereof. In the case of multiple vessel fabrication where each increment of 300 lineal feet of weld involves more than one pressure vessel, the set of test plates must be prepared at the time of fabrication of the first vessel involving that increment.

**§ 57.06-3 Method of performing production testing.**

(a) Except as otherwise specified in this section a test plate must be attached to the shell plate on one end of the longitudinal joint of each vessel as shown in figure 1 to § 57.06-3(d), so that the edges of the test plate to be welded are a continuation of and duplication of the corresponding edges

of the longitudinal joint. For attached test plates, the weld metal must be deposited in the test plate welding groove continuously with the weld metal deposited in the groove of the longitudinal joint. As an alternate method, the marine inspector may permit the use of separate test plates, provided the same welding process, procedure, and technique employed in the fabrication of the longitudinal joint are used in welding the test plates.

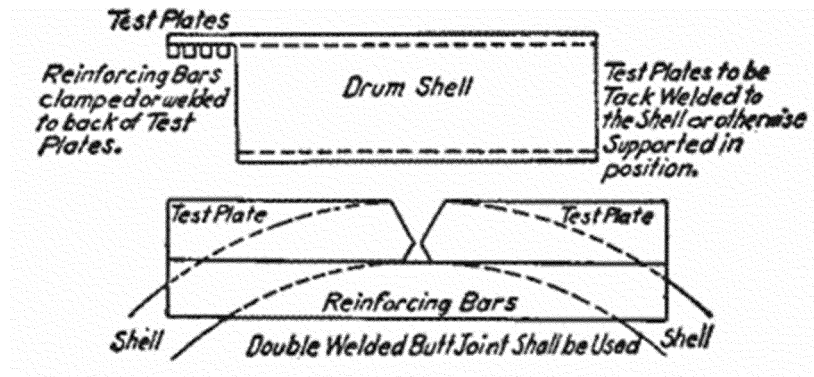
(b) All test plates, whether attached to the shell or separate in accordance with paragraphs (a) and (d) of this section, must be prepared from material of the same specification, thickness, and heat treatment and, for Class I-L and Class II-L vessels, the same heat as that of the vessel for which they are required. However, except when required to be from a specific heat, test plates may be

prepared from material of a different product form, such as plate in lieu of a forging, provided the chemical composition is within the vessel material specification limits and the melting practice is the same.

(c) Test plates are not required for welded nozzle attachments.

(d) In the case of vessels having no longitudinal welded joints, at least one set of test plates must be welded for each vessel, using the circumferential joint process, procedure, and technique, except that the provisions of § 57.06-2(a) also apply for Classes I and I-L vessels, and that the provisions of § 57.06-2(a) and (c) also apply for Classes II and II-L vessels.

**Figure 1 to § 57.06-3(d)—(PW-53.2) Method of Forming Longitudinal Test Plates**



(e) Test plates must be made by the same welder producing the longitudinal and circumferential joints. If more than one welder is employed in the welding of the pressure vessel(s), the test plates must be made by the welder designated by the marine inspector. The test plates must be of the same thickness as the material being welded and must be of sufficient size to provide two specimens of each type required, except that in the case of pressure vessels having no longitudinal seams, the test plate need be only of sufficient length to provide one set of test specimens, and if a retest is necessary, an additional set of test plates may be welded separately.

**§ 57.06-4 Production testing specimen requirements.**

(a) For test plates three-fourths inch or less in thickness one reduced section tensile specimen and two free-bend specimens must be tested. For plates exceeding three-fourths inch in thickness one reduced section tensile specimen, one free-bend specimen and one guided side bend specimen must be tested. In addition, boiler drums of thickness five-eighths inch or greater must have a tension test specimen of the weld metal as required by paragraph (f)(2) of this section. Toughness tests are required for Classes I-L and II-L pressure vessels as specified in § 57.06-5.

(b) The test plates must be so supported that the warping due to

welding does not throw the finished test plate out of line by an angle of over 5°.

(c) Where the welding has warped the test plates, the plates must be straightened before being stress-relieved. The test plates must be subjected to the same stress-relieving operation as required by this subchapter for the pressure vessel itself. At no time must the test plates be heated to a temperature higher than that used for stress-relieving the vessel.

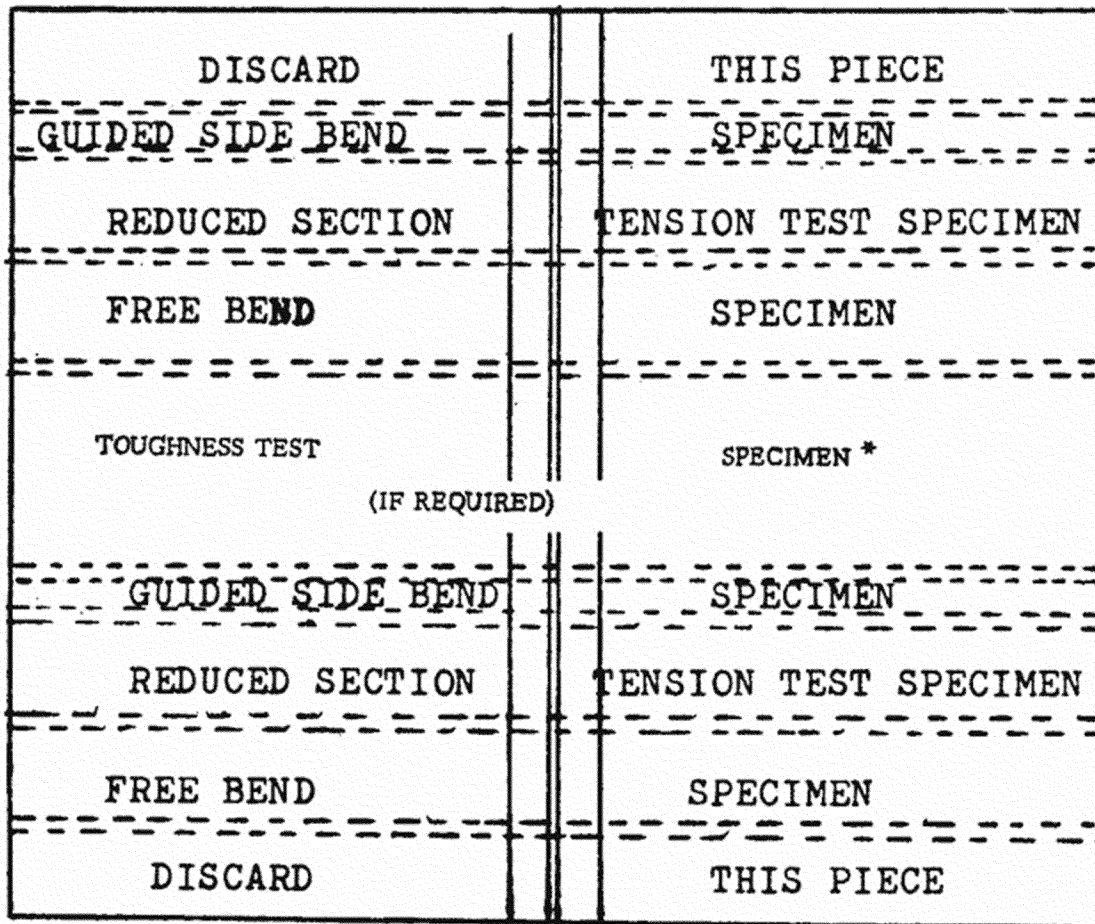
(d) The bend specimens must be taken from opposite sides of the reduced-section tensile specimen in their respective test plates as shown in figures 1 and 2 to § 57.06-4(d).

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Figure 1 to § 57.06-4(d)—Workmanship  
 Test Plates for Material Three-Fourths  
 Inch or Less in Thickness

DISCARD		THIS PIECE
FREE BEND		SPECIMEN
REDUCED SECTION		TENSION TEST SPECIMEN
FREE BEND		SPECIMEN
TOUGHNESS TEST OR ALL WELD METAL (IF REQUIRED)		SPECIMEN 1 TENSION SPECIMEN
FREE BEND		SPECIMEN
REDUCED SECTION		TENSION TEST SPECIMEN
FREE BEND		SPECIMEN
DISCARD		THIS PIECE

Figure 2 to § 57.06-4(d)—Workmanship  
Test Plates for Material Three-Fourths  
Inch or Less in Thickness



**\*WHEN CHARPY V NOTCH IMPACT SPECIMENS ARE  
REQUIRED, THE TEST PLATES SHALL BE NO  
SMALLER THAN TWO FEET ON A SIDE**

(e) In submitting the samples for test the manufacturer must state the minimum and maximum tensile range of the base metal.

(f) The external appearances of the welds and the amount of weld reinforcement shall conform to the requirements for fabrication, and the maximum reinforcement for the test plates must not exceed the maximum permitted for construction.

(1) The tension-test specimen of the joint must be transverse to the welded joint and must be of the full thickness of the plate after the weld reinforcement has been machined flush. The form and

dimensions must be as shown in figure 3 to § 57.06-4(f). When the capacity of the available testing machine does not permit testing a specimen of the full thickness of the welded plate, the specimen may be cut with a thin saw into as many portions of the thickness as necessary, as shown in figure 4 to § 57.06-4(f) each of which must meet the requirements. The tensile strength of the joint specimen when it breaks in the weld must not be less than the minimum of the specified tensile range of the plate used. If the specimen breaks in the plate at not less than 95 percent of the minimum specified tensile range

of the plate and the weld shows no sign of weakness, the test is considered acceptable.

(2) Boiler drums fabricated of plate of thicknesses of five-eighths inch or greater 2 to § have a tension-test specimen of the weld metal machined to form as shown in figure 5 to § 57.06-4(f) taken entirely from the deposited metal. The all-weld tension test specimen 2 to § have a tensile strength of not less than the minimum of the range of the plate which is welded and 2 to § have a minimum elongation in 2 inches of not less than 20 percent.

Figure 3 to § 57.06-4(f)-(PW-53.1)  
Reduced-Section Test Specimen for  
Tension Test of Welded Joint

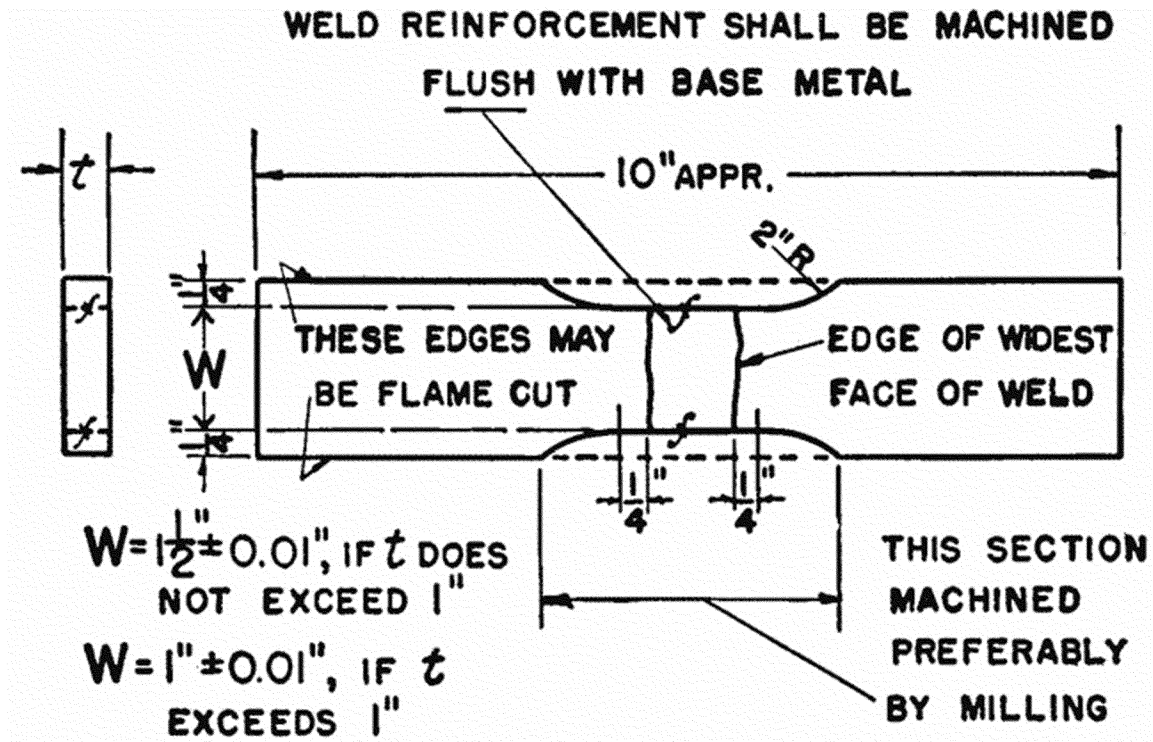


Figure 4 to § 57.06-4(f)-(PW-53.3)  
Cross Section of Bend-Test Specimens  
From Very Thick Plate



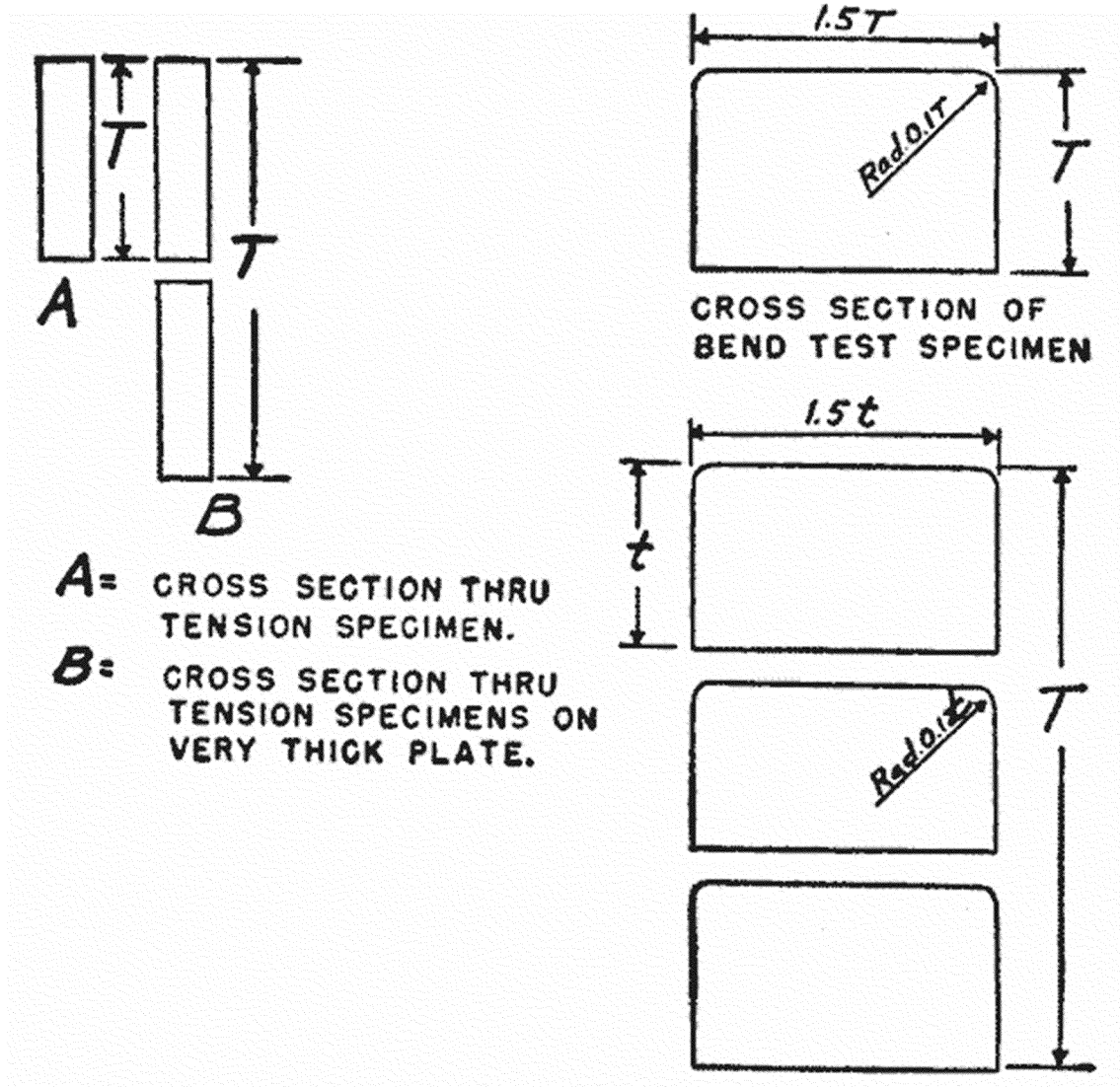
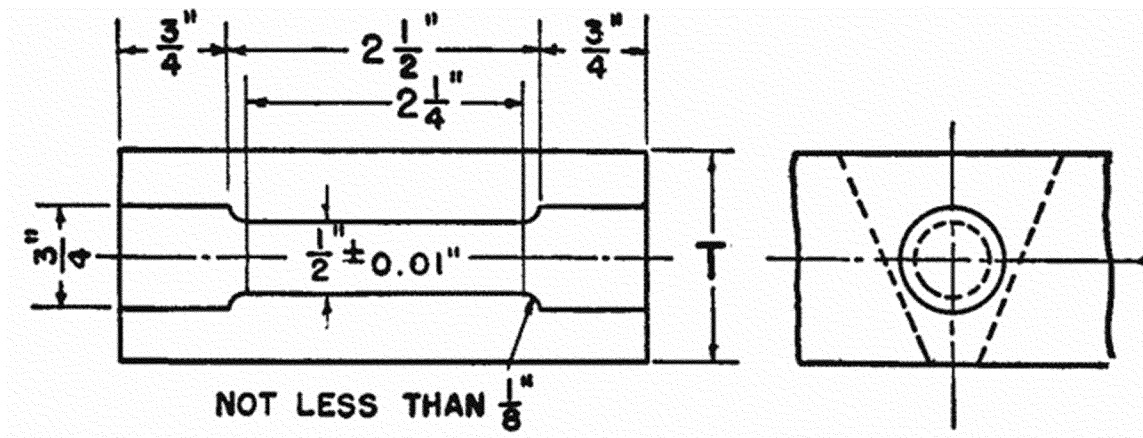


Figure 5 to § 57.06-4(f)—(PW-53.3) All Weld Metal Tension-Test Specimen

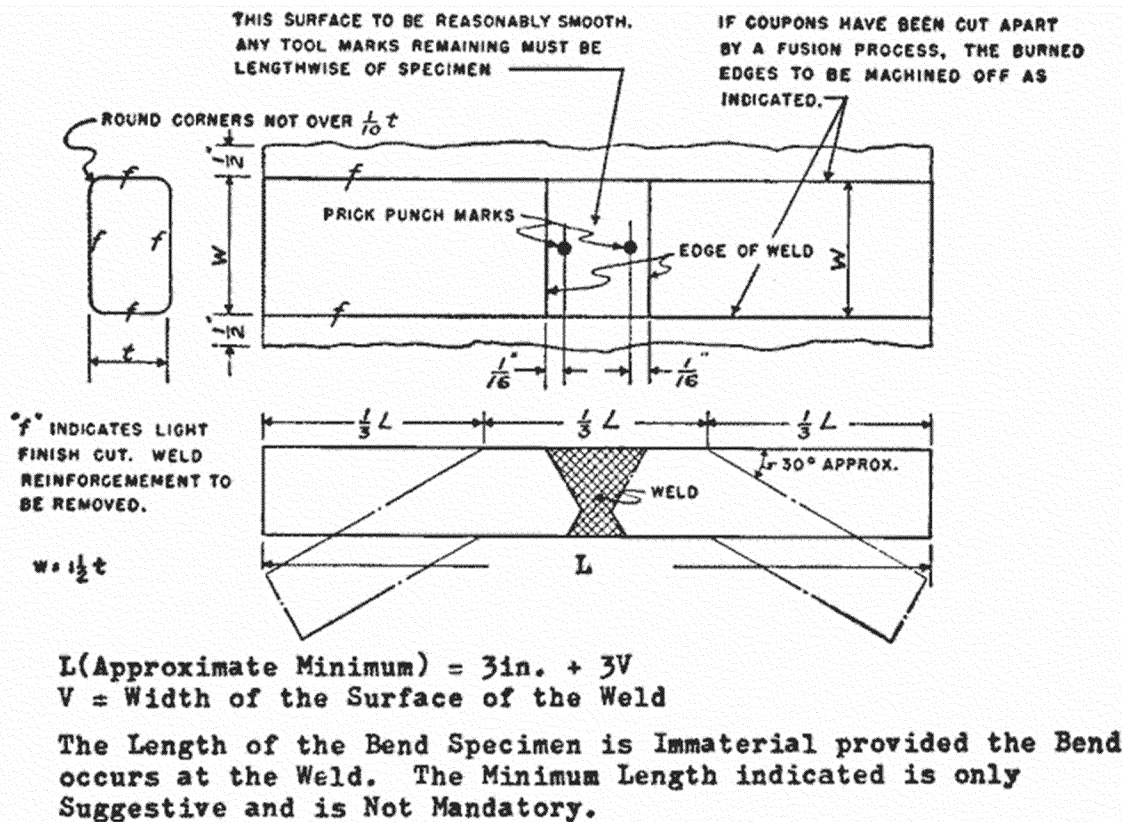


(g) The freebend specimens must be of the form and dimensions shown in figure 6 to § 57.06-4(g). For plates of three-fourths inch or less in thickness one of the specimens must be bent with the face of the weld in tension. Each freebend specimen must be bent cold under freebending conditions until the elongation measured within or across approximately the entire weld on the outer surface of the bend is at least 30

percent, except that for Class II and Class II-L pressure vessels, the minimum elongation must be 20 percent. When the capacity of the available testing machine will not permit testing a full thickness specimen, the specimen may be cut with a thin saw into as many portions of the thickness as necessary as shown in figure 4 to § 57.06-4(f), provided each such piece retains the proportion of 1.5

to 1, width to thickness, each of which must meet the requirements. Cracks at the corners of the specimens or small defects in the convex surface, the greatest dimensions of which do not exceed one-sixteenth inch need not be considered as failures.

Figure 6 to § 57.06-4(g)—(PW-53.8)  
Specimen for Free-Bend Test



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(h) The guided-bend specimen must be bent with the side of the weld in tension, its width must be equal to the full thickness of the plate and its thickness, after machining, must be 0.350 inch to 0.380 inch to permit bending in a jig having the contour of the standard jig as shown in Figure QW 466.1, QW 466.2, or QW 466.3 of Section IX of the ASME BPVC (incorporated by reference; see § 57.02-1). The specimen must withstand being bent cold to the full capacity of the jig without developing any crack exceeding one-eighth inch in any direction. Where the plate thickness exceeds two inches, the specimen must be cut in two so that each portion does not exceed 2 inches in width. Each such portion must be tested and must meet the requirements.

(i) One retest must be made for each of the original specimens which fails to meet the requirements. Should the retests fail to meet the requirements, the welds which they represent must be chipped out, rewelded and new test plates provided.

**§ 57.06-5 Production toughness testing.**

(a) In addition to the test specimens required by § 57.06-4(a), production toughness test plates must be prepared for Classes I-L and II-L pressure vessels in accordance with subpart 54.05 of this subchapter.

(b) For nonpressure vessel type cargo tanks and associated secondary barriers as defined in § 38.05-4 of subchapter D of this chapter, production toughness test plates must be prepared in accordance with subpart 54.05 of this subchapter.

**PART 58—MAIN AND AUXILIARY MACHINERY AND RELATED SYSTEMS**

■ 31. The authority citation for part 58 is revised to read as follows:

**Authority:** 43 U.S.C. 1333; 46 U.S.C. 3306, 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3.

**Subpart 58.01—General Requirements**

■ 32. Revise § 58.01-5 to read as follows:

**§ 58.01-5 Applicable standards.**

The applicable standards established by the ABS Marine Vessel Rules (incorporated by reference, see § 58.03-1), may be used as the standard for the design, construction, and testing of

main and auxiliary machinery except as modified in this subchapter.

- 33. Amend § 58.01–10 by revising paragraph (b) to read as follows:

**§ 58.01–10 Fuel oil.**

\* \* \* \* \*

(b) The flashpoint of oil must be determined by the Pensky-Martens Closed Tester, ASTM D93 (incorporated by reference, see § 58.03–1).

- 34. Revise § 58.01–20 to read as follows:

**§ 58.01–20 Machinery guards.**

Gears, couplings, flywheels, and all rotating machinery capable of injuring personnel must be provided with adequate covers or guards.

- 35. Revise § 58.01–30 to read as follows:

**§ 58.01–30 Trial-trip observance.**

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

**§ 58.01–35 [Amended]**

- 36. In § 58.01–35, designate the note at the end of the section as note 1 to § 58.01–30.

- 37. Revise § 58.01–50 to read as follows:

**§ 58.01–50 Machinery space, noise.**

Each machinery space must be designed to minimize the exposure of personnel to noise in accordance with IMO Resolution MSC.337(91) (incorporated by reference, see § 58.03–1).

- 38. Amend § 58.01–55 by revising paragraph (e) to read as follows:

**§ 58.01–55 Tanks for flammable and combustible oil.**

\* \* \* \* \*

(e) In general, no freestanding fuel-oil tank is permitted in any machinery space of Category A on a passenger vessel. A freestanding fuel-oil tank is permitted in other spaces only if authorized by the Commanding Officer, Marine Safety Center. If so authorized, each freestanding fuel-oil tank must—

- (1) Comply with subpart 58.50; and
- (2) Be placed in an oil-tight spill tray with a drain pipe leading to a spill-oil tank.

\* \* \* \* \*

**Subpart 58.03—Incorporation of Standards**

- 39. Revise § 58.03–1 to read as follows:

**§ 58.03–1 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 [typesapproval@uscg.mil](mailto:typesapproval@uscg.mil). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material may be obtained from the following sources:

(a) *American Boat and Yacht Council (ABYC)*, 613 Third Street, Suite 10, Annapolis, MD 21403; (410) 990–4460; [www.abycinc.org](http://www.abycinc.org).

(1) ABYC P–1, Installation of Exhaust Systems for Propulsion and Auxiliary Engines, reaffirmed July 2014; IBR approved for § 58.10–5(d).

(2) [Reserved]

(b) *American Bureau of Shipping (ABS)*, 1701 City Plaza Drive, Spring, TX 77389; 281–877–6000; [CSC@eagle.org](mailto:CSC@eagle.org); [www2.eagle.org](http://www2.eagle.org).

(1) ABS Rules for Building and Classing Marine Vessels, Part 4, Vessel Systems and Machinery, January 2020 (“ABS Marine Vessel Rules”); IBR approved for §§ 58.01–5; 58.05–1; 58.10–15(a); 58.20–5(a); 58.25–5(d).

(2) [Reserved]

(c) *American Petroleum Institute (API)*, 200 Massachusetts Avenue NW, Washington, DC 20001–5571; 202–682–8000; [APIpubs@api.org](mailto:APIpubs@api.org); [www.api.org](http://www.api.org).

(1) API Recommended Practice 14C, Analysis, Design, Installation and Testing of Safety Systems for Offshore Production Facilities, Eighth Edition, February 2017, including Errata 1 (May 2018) (“API RP 14C”); IBR approved for § 58.60–9.

(2) API Standard 53, Well Control Equipment Systems for Drilling Wells, Fifth Edition, December 2018 (“API STD 53”); IBR approved for § 58.60–7.

(d) *American Society of Mechanical Engineers (ASME)*, Two Park Avenue, New York, NY 10016–5990; 800–843–2763; [CustomerCare@asme.org](mailto:CustomerCare@asme.org); [www.asme.org](http://www.asme.org).

(1) 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 § 58.30–15(b).

(2) 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 § 58.30–15(b).

(3) ASME B31.3–2018, Process Piping, ASME Code for Pressure Piping, B31, issued August 30, 2019 (“ASME B31.3”); IBR approved for § 58.60–7.

(4) ASME B31.5–2016, Refrigeration Piping and Heat Transfer Components, issued June 29, 2016 (“ASME B31.5”); IBR approved for §§ 58.20–5(a); 58.20–20(b).

(e) *ASTM International*, 100 Barr Harbor Drive, West Conshohocken, PA 19428–2959; 610–832–9500; [service@astm.org](mailto:service@astm.org); [www.astm.org](http://www.astm.org).

(1) ASTM A193/A193M–19, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service or High Pressure Service and Other Special Purpose Applications, approved November 1, 2019 (“ASTM A193/A193M”); IBR approved for § 58.30–15(c).

(2) 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”); IBR approved for § 58.50–5(a).

(3) ASTM B122/B122M–16, Standard Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip, and Rolled Bar, approved April 1, 2016 (“ASTM B122”); IBR approved for § 58.50–5(a).

(4) ASTM B127–19, Standard Specification for Nickel-Copper Alloy Plate, Sheet, and Strip, approved November 1, 2019 (“ASTM B127”); IBR approved for §§ 58.50–5(a); 58.50–10(a).

(5) ASTM B152/B152M–19, Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar, approved October 1, 2019 (“ASTM B152”); IBR approved for § 58.50–5(a).

(6) ASTM B209–14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate, approved November 1, 2014 (“ASTM B209”); IBR approved for §§ 58.50–5(a); 58.50–10(a).

(7) ASTM D92–18, Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester, approved July 1, 2018 (“ASTM D92”); IBR approved for § 58.30–10(b).

(8) ASTM D93–19, Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester, approved November 1, 2019 (“ASTM D93”); IBR approved for § 58.01–10(b).

(9) ASTM D323–15a, Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method), approved June 1, 2015 (“ASTM D323”); IBR approved for § 58.16–5.

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

(1) Resolution A.467(XII), Guidelines for Acceptance of Non-Duplicated Rudder Actuators for Tankers, Chemical Tankers and Gas Carriers of 10,000 Tons Gross Tonnage and Above But Less Than 100,000 Tonnes Deadweight, 1981 (“IMO A.467(XII)”); IBR approved for § 58.25–60.

(2) Resolution MSC.337(91), Code on Noise Levels on Board Ships, adopted November 30, 2012 (“IMO Resolution MSC.337(91)”); IBR approved for § 58.01–50.

(3) SOLAS Consolidated Edition 2020, 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 § 58.25–10(a).

(g) *National Fire Protection Association (NFPA)*, 1 Batterymarch Park, Quincy, MA 02169–7471; 617–770–3000; *custserv@nfpa.org*; *www.nfpa.org*.

(1) NFPA 302, Fire Protection Standard for Pleasure and Commercial Motor Craft, 2020 Edition, ANSI-approved August 25, 2019 (“NFPA 302”); IBR approved for § 58.10–5(d).

(2) [Reserved]

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

(1) SAE J429 MAY2014, Mechanical and Material Requirements for Externally Threaded Fasteners, revised May 2014 (“SAE J429”); IBR approved for § 58.30–15(c).

(2) SAE J1928 JUN2018, Devices Providing Backfire Flame Control for Gasoline Engines in Marine Applications, revised June 2018 (“SAE J1928”); IBR approved for § 58.10–5(b).

### Subpart 58.05—Main Propulsion Machinery

■ 40. Revise § 58.05–1 to read as follows:

#### § 58.05–1 Material, design, and construction.

(a) The material, design, construction, workmanship, and arrangement of main propulsion machinery and of each auxiliary, directly connected to the engine and supplied as such, must be at least equivalent to the standards established by the ABS Marine Vessel Rules (incorporated by reference, see § 58.03–1), except as otherwise provided by this subchapter.

(b) When main and auxiliary machinery is to be installed without classification society review, the builder must submit to the cognizant Officer in Charge, Marine Inspection, such drawings and particulars of the installation as are required by the ABS Marine Vessel Rules for similar installations on classed vessels.

■ 41. Revise § 58.05–5 to read as follows:

#### § 58.05–5 Astern power.

(a) All vessels must have sufficient power for going astern to secure proper control of the ship in all normal circumstances.

(b) [Reserved]

■ 42. Revise subparts 58.10 through 58.20 to read as follows:

### Subpart 58.10—Internal Combustion Engine Installations

Sec.

58.10–5 Gasoline engine installations.

58.10–10 Diesel engine installations.

58.10–15 Gas turbine installations.

### Subpart 58.16—Liquefied Petroleum Gases for Cooking and Heating

58.16–1 Scope.

58.16–5 Definition.

58.16–7 Use of liquefied petroleum gas.

58.16–10 Approvals.

58.16–15 Valves and safety relief devices.

58.16–16 Reducing regulators.

58.16–17 Piping and fittings.

58.16–18 Installation.

58.16–19 Tests.

58.16–20 Ventilation of compartments containing gas-consuming appliances.

58.16–25 Odorization.

58.16–30 Operating instructions.

58.16–35 Markings.

### Subpart 58.20—Refrigeration Machinery

58.20–1 Scope.

58.20–5 Design.

58.20–10 Pressure relieving devices.

58.20–15 Installation of refrigerating machinery.

58.20–20 Refrigeration piping.

58.20–25 Tests.

### Subpart 58.10—Internal Combustion Engine Installations

#### § 58.10–5 Gasoline engine installations.

(a) *Engine design*. All installations must be of marine type engines suitable for the intended service, designed and constructed in conformance with the requirements of this subchapter.

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

**Note 1 to paragraph (b)(1):** It is recommended that drip collectors be drained by a device for automatic return of all drip to engine air intakes.

(2) All gasoline engines must be equipped with an acceptable means of backfire flame control. Installations of backfire flame arresters bearing basic Approval Nos. 162.015 or 162.041 or engine air and fuel induction systems bearing basic Approval Nos. 162.015 or 162.042 may be continued in use as long as they are serviceable and in good condition. New installations or replacements must meet the applicable requirements of this section.

(3) The following are acceptable means of backfire flame control for gasoline engines:

(i) A backfire flame arrester complying with SAE J1928 (incorporated by reference; see § 58.03–1) and marked accordingly. The flame arrester must be suitably secured to the air intake with a flamtight connection.

(ii) An engine air and fuel induction system which provides adequate protection from propagation of backfire flame to the atmosphere equivalent to that provided by an acceptable backfire flame arrester. A gasoline engine utilizing an air and fuel induction system, and operated without an approved backfire flame arrester, must either include a reed valve assembly or be installed in accordance with SAE J1928.

(iii) An arrangement of the carburetor or engine air induction system that will disperse any flames caused by engine backfire. The flames must be dispersed to the atmosphere outside the vessel in such a manner that the flames will not endanger the vessel, persons, on board, or nearby vessels and structures. Flame dispersion may be achieved by attachments to the carburetor or location of the engine air induction system. All attachments must be of metallic construction with flamtight connections and firmly secured to

withstand vibration, shock, and engine backfire. Such installations do not require formal approval and labeling but must comply with this subpart.

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

(d) *Exhaust pipe.* (1) Exhaust pipe installations must conform to the requirements of ABYC P-1 and Chapter 6 of NFPA 302 (both incorporated by reference; see § 58.03-1) and the following additional requirements:

(i) All exhaust installations with pressures in excess of 15 psig or employing runs passing through living or working spaces shall meet the material requirements of part 56 of this subchapter.

(ii) Horizontal dry exhaust pipes are permitted only if they do not pass through living or berthing spaces, they terminate above the deepest load waterline and are so arranged as to prevent entry of cold water from rough or boarding seas, and they are constructed of corrosion resisting material "at the hull penetration."

(2) [Reserved]

#### § 58.10-10 Diesel engine installations.

(a) The requirements of § 58.10-5 (a), (c), and (d) apply to diesel engine installations.

(b) A diesel engine air intake on a mobile offshore drilling unit must not be in a classified location.

(c) A diesel engine exhaust on a mobile offshore drilling unit must not discharge into a classified location.

**Note 1 to § 58.10-10:** Sections 108.171 to 108.175 of this chapter define classified locations for mobile offshore drilling units.

#### § 58.10-15 Gas turbine installations.

(a) *Standards.* The design, construction, workmanship and tests of gas turbines and their associated machinery must be at least equivalent to the standards of the ABS Marine Vessel Rules (incorporated by reference, see § 58.03-1).

(b) *Materials.* The materials used for gas turbine installations must have properties suitable for the intended service. When materials not conforming to standard ASTM specifications are

employed, data concerning their properties, including high temperature strength data, where applicable, must be furnished.

(c) *Exhausts.* (1) Where piping is used for gas turbine exhaust lines, Class II is required as a minimum. (See subpart 56.04 of this subchapter.) Where the exhaust pressure exceeds 150 psig, such as in closed cycle systems, Class I must be used. Where ducting other than pipe is employed, the drawings and design data must be submitted to substantiate suitability and safety for the intended service.

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

(3) Gas turbine exhausts must not be interconnected with boiler uptakes except for gas turbines used for emergency power and lighting or for emergency propulsion. Dampers or other suitable means must be installed to prevent backflow of boiler exhaust gases through the turbine. Interconnected exhausts must be specifically approved by the Commandant.

(4) A gas turbine exhaust on a mobile offshore drilling unit must not discharge in a classified location. (See note 1 to this section.)

(d) *Air inlets.* Air inlets must be designed as follows:

(1) Each air inlet must have means to protect the safety of life and to prevent the entrance of harmful foreign material, including water, into the system.

(2) A gas turbine air inlet must not be in a classified location. (See note 1 to this section.)

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

(f) *Automatic shutdown.* (1) The control system must be designed for automatic shutdown of the engine with actuation of audible and visible alarms at shutdown. The visible malfunction indicator must indicate what condition caused the shutdown and remain visible until reset. Automatic shutdown must occur under the following conditions:

(i) Overspeed.

(ii) Low lubricating oil pressure. Consideration will be given providing alarm only (without shutdown) in those cases where suitable antifriction bearings are fitted.

(2) Audible or visible alarms must also be provided for:

(i) Excessive gas temperature, measured at the turbine inlet, gas

generator, interstage turbine or turbine exhaust.

(ii) Excessive lubricating oil temperature.

(iii) Excessive speed.

(iv) Reduced lubricating oil pressure.

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

(g) *Drawings and design data.*

Drawings and design data of the following components must be submitted to substantiate their suitability and safety for the service intended:

(1) Combustion chamber.

(2) Regenerator or recuperator.

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

(h) *Fuel systems.* Gas turbine fuel systems must meet the requirements of part 56 of this subchapter.

(i) *Fire extinguishing systems.* A special local fire extinguishing system may be required for gas turbine installations if considered necessary by the Commandant. Such a system would be in addition to any other required in the compartment in which the gas turbine is located.

**Note 1 to § 58.10-15:** Sections 108.171 to 108.175 of this chapter define classified locations for mobile offshore drilling units.

### Subpart 58.16—Liquefied Petroleum Gases for Cooking and Heating

#### § 58.16-1 Scope.

(a) This subpart prescribes standards for the use of liquefied petroleum gas for heating and cooking on inspected vessels, except ferries.

(b) It is the intent of the regulations in this subpart to permit liquefied petroleum gas systems of the vapor withdrawal type only. Cylinders designed to admit liquid gas into any other part of the system are prohibited.

(c) Except as provided by § 58.16-7(b), all component parts of the system, except cylinders, appliances, and low-pressure tubing, must be designed to withstand a pressure of 500 pounds per square inch without failure.

#### § 58.16-5 Definition.

For the purpose of this subpart the term "liquefied petroleum gas" means any liquefied flammable gas which is composed predominantly of hydrocarbons or mixtures of hydrocarbons, such as propane, propylene, butane, butylene, or butadiene, and which has a Reid vapor pressure exceeding 40 pounds per square inch absolute at 100 °F as

determined by ASTM D323 (incorporated by reference, see § 58.03–1).

#### **§ 58.16–7 Use of liquefied petroleum gas.**

(a) Cooking equipment using liquefied petroleum gas on vessels of 100 gross tons or more that carry passengers for hire must meet the requirements of this subpart.

(b) Cooking equipment using liquefied petroleum gas on vessels of less than 100 gross tons that carry passengers for hire must meet the requirements of § 25.45–2 or part 184, both of this chapter, as applicable.

(c) Systems using liquefied petroleum gas for cooking or heating on any other vessels subject to inspection by the Coast Guard must meet the requirements of this subpart.

#### **§ 58.16–10 Approvals.**

(a) *Gas appliances.* (1) All gas-consuming appliances used for cooking and heating must be tested, listed, and labeled by an acceptable laboratory, such as:

(i) The American Gas Association Testing Laboratories.

(ii) UL Solutions.

(2) Continuous-burning pilot flames are prohibited for use on gas appliances when installed below the weather deck.

(3) Printed instructions for proper installation, operation, and maintenance of each gas-consuming appliance must be furnished by the manufacturer.

(b) *Cylinders.* (1) Cylinders in which liquefied petroleum gas is stored and handled must be constructed, tested, marked, maintained, and retested in accordance with 49 CFR part 178.

(2) All liquefied petroleum gas cylinders in service must bear a test date marking indicating that they have been retested in accordance with the regulations of the Department of Transportation.

(3) Regardless of the date of the previous test, a cylinder must be rejected for further service when it leaks; when it is weakened appreciably by corrosion, denting, bulging or other evidence of rough usage; when it has lost more than 5 percent of its tare weight; or when it has been involved in a fire.

(c) *Safety-relief devices.* All required safety-relief devices must be accepted as to type, size, pressure setting, and location by the Commandant (CG–ENG) as being in accordance with 49 CFR part 178.

(d) *Valves, regulators, and vaporizers.* All component parts of the system, other than cylinders and low-pressure distribution tubing between regulators and appliances, must be tested and

approved by and bear the label of UL Solutions or other recognized testing laboratory.

(e) *Plan approval.* Drawings showing the location and installation of all piping, gas-consuming appliances, cylinders, and other component parts of the system must be submitted for approval.

#### **§ 58.16–15 Valves and safety relief devices.**

(a) Each cylinder must have a manually operated screw-down shutoff valve fitted with a handwheel installed directly at the cylinder outlet.

(b) All cylinders must be protected by one or more safety relief devices complying with the requirements of § 58.16–10(a). The safety relief device must be a shutoff valve with an integral spring-loaded safety relief valve and supplementary fusible plug, the latter designed to yield when the cylinder has been emptied of liquid gas by the relief valve under conditions of exposure to excessive heat.

(c) Cylinder valves and safety relief devices must have direct communication with the vapor space of the cylinder.

(d) In addition to the cylinder valve, a multiple cylinder system must be provided with a two-way positive shutoff manifold valve of the manually operated type. The manifold valve must be so arranged that the replacement of empty cylinders can be made without shutting down the flow of gas in the system.

(e) A master packless shutoff valve controlling all burners simultaneously must be installed at the manifold of all gas-consuming appliances.

#### **§ 58.16–16 Reducing regulators.**

(a) All systems shall be provided with a regulating device so adjusted as to release gas to the distribution tubing at a pressure not in excess of 18 inches water column, or approximately 10.5 ounces per square inch.

(b) The low-pressure side of all regulators must be protected against excessive pressure by means of a suitable relief valve, which must be integral with the regulator. The relief valve must be set to start to discharge at a pressure not less than two times and not more than three times the delivery pressure.

(c) All reducing regulators must be fitted with a pressure gage located on the high-pressure side of the regulator.

#### **§ 58.16–17 Piping and fittings.**

(a) The piping between the cylinders and the appliances must be seamless annealed copper tubing or such other

seamless tubing as may be approved by the Commandant.

(b) All high-pressure tubing between the cylinders and the regulators must have a minimum wall thickness of 0.049 inch. All low-pressure tubing between the regulator and appliances must have a minimum wall thickness of 0.032 inch.

(c) Tubing connecting fittings must be of the flare type; or connections may be soldered or brazed with material having a melting point in excess of 1,000 °F.

#### **§ 58.16–18 Installation.**

(a) *Cylinders, regulating and safety equipment.* (1) Cylinders, regulating and safety equipment must be installed in a substantially constructed and firmly fixed metal enclosure located on or above the weather deck. The cylinder enclosure must have access from the weather deck only. The enclosure must be provided with top and bottom ventilation consisting of a fresh air inlet pipe and an exhaust pipe both entering through the top of the cylinder housing. The enclosure must be constructed so that when the access opening is closed, no gas can escape except through the ventilation system.

(2) Cylinders, regulating and safety devices must be securely fastened and supported within the metal enclosure. The cylinders and high-pressure equipment must be so mounted as to be readily accessible and capable of easy removal for refilling and inspection. The stowage of high-pressure equipment in the housing must be such that the cylinder valves can be readily operated, and the pressure gage dial is easily visible. Where possible cylinders must be mounted in an upright position.

(3) Stowage of unconnected spare cylinders, filled or empty, must comply with the requirements for cylinders.

(4) All valves, manifolds and regulators must be securely mounted in locations readily accessible for inspection, maintenance, and testing, and must be adequately protected.

(5) Discharge of the safety relief valves must be vented away from the cylinder, and insofar as practicable, upward into the open atmosphere, but in all cases so as to prevent impingement of the escaping gas onto a cylinder.

(b) *Piping.* (1) All piping must be installed so as to provide minimum interior runs and adequate flexibility. The piping at the cylinder outlets must be fitted with flexible metallic connections to minimize the effect of cylinder movement on the outlet piping.

(2) Distribution lines must be protected from physical damage and be readily accessible for inspection. Lines must be substantially secured against

vibration by means of soft nonferrous metal clips without sharp edges in contact with the tubing. When passing through decks or bulkheads, the lines must be protected by ferrules of nonabrasive material. The distribution lines must be continuous length of tubes from the regulator to the shutoff valve at the appliance manifold.

(c) *Gas-consuming appliances.* All gas-consuming appliances must be permanently and securely fastened in place.

(d) *Electrical.* No electrical connections must be made within the cylinder housing.

#### § 58.16–19 Tests.

(a) *Installation.* (1) After installation, the distribution tubing must be tested prior to its connection to the regulator and appliance by an air pressure of not less than 5 psig.

(2) After satisfactory completion of the tests prescribed in paragraph (a)(1) of this section, the distribution tubing must be connected to the regulator and appliance and the entire system subjected to a leak test as required by § 58.16–30(j).

(b) *Periodic.* Leak tests as required by § 58.16–30(j) must be conducted at least once each month and at each regular annual or biennial inspection. The tests required at monthly intervals must be conducted by a credentialed officer of the vessel or qualified personnel acceptable to the Officer in Charge, Marine Inspection. The owner, master, or person in charge of the vessel must keep records of such tests showing the dates when performed and the name(s) of the person(s) and/or company conducting the tests. Such records must be made available to the marine inspector upon request and must be kept for the period of validity of the vessel's current certificate of inspection. Where practicable, these records should be kept in or with the vessel's logbook.

#### § 58.16–20 Ventilation of compartments containing gas-consuming appliances.

(a) Compartments containing gas-consuming appliances which are located above the weather deck must be fitted with at least two natural ventilator ducts led from the atmosphere with one extending to the floor level and the other extending to the overhead of the compartment. Powered ventilation may be used provided the motor is outside the compartment.

(b) Compartments in which gas-consuming appliances are located entirely below the weather deck must be provided with powered ventilation of sufficient capacity to effect a change of air at least once every 6 minutes. The

motor for the powered ventilation must be located outside the compartment.

#### § 58.16–25 Odorization.

(a) All liquefied petroleum gases must be effectively odorized by an agent of such character as to indicate positively by a distinctive odor, the presence of gas down to concentration in air of not over one-fifth the lower limit of combustibility.

(b) [Reserved]

#### § 58.16–30 Operating instructions.

(a) Before opening a cylinder valve, the outlet of the cylinder must be connected tightly to system; and in the case where only a single cylinder is used in the system, all appliance valves and pilots must be shut off before the cylinder valve is opened.

(b) Before opening cylinder valve after connecting it to system, the cylinder must be securely fastened in place.

(c) When cylinders are not in use their outlet valves must be kept closed.

(d) Cylinders when exhausted must have their outlet valves closed.

(e) Nothing must be stored in the metal enclosure except liquefied petroleum gas cylinders and permanently fastened parts of the system.

(f) Valve protecting caps, if provided, must be firmly fixed in place on all cylinders not attached to the system. Caps for cylinders in use may remain in the cylinder enclosure if rigidly fastened thereto.

(g) The opening to the cylinder enclosure must be closed at all times except when access is required to change cylinders or maintain equipment.

(h) Close master valve whenever gas-consuming appliance is not in use.

(i) No smoking is permitted in the vicinity of the cylinder enclosure when access to enclosure is open.

(j) Test system for leakage in accordance with the following procedure: With appliance valve closed, the master shutoff valve on the appliance open, and with one cylinder valve open, note pressure in the gage. Close cylinder valve. The pressure should remain constant for at least 10 minutes. If the pressure drops, locate leakage by application of liquid detergent or soapy water solution at all connections. Never use flame to check for leaks. Repeat test for each cylinder in a multicylinder system.

(k) Report any presence of gas odor.

#### § 58.16–35 Markings.

(a) The outside of the cylinder enclosure housing liquefied petroleum gas cylinders, valves and regulators must be marked as follows:

Liquefied Petroleum Gas  
Keep Open Fires Away.

(b) A durable and permanently legible instruction sign covering safe operation and maintenance of the gas-consuming appliance shall be installed adjacent to the appliance.

(c) "Operating Instructions" as listed in § 58.16–30 shall be framed under glass, or other equivalent, clear, transparent material, in plainly visible locations on the outside of the metal enclosure and near the most frequently used gas-consuming appliance, so they may be easily read.

### Subpart 58.20—Refrigeration Machinery

#### § 58.20–1 Scope.

(a) The regulations in this subpart apply to fixed refrigeration systems for air conditioning, refrigerated spaces, cargo spaces, and reliquefaction of low temperature cargo installed on vessels.

(b) The regulations in this subpart do not apply to small self-contained units.

#### § 58.20–5 Design.

(a) Refrigeration machinery may be accepted for installation provided the design, material, and fabrication comply with the applicable requirements of the ABS Marine Vessel Rules (incorporated by reference, see § 58.03–1). The minimum pressures for design of all components must be those listed for piping in Table 501.2.4 of ASME B31.5 (incorporated by reference; see § 58.03–1). In no case may pressure components be designed for a pressure less than that for which the safety devices of the system are set. Pressure vessels must be designed in accordance with part 54 of this subchapter.

(b) For refrigeration systems other than those for reliquefaction of cargo, only those refrigerants under § 147.90 of this chapter are allowed.

#### § 58.20–10 Pressure relieving devices.

(a) Each pressure vessel containing refrigerants, which may be isolated, must be protected by a relief valve set to relieve at a pressure not exceeding the maximum allowable working pressure of the vessel. When a pressure vessel forms an integral part of a system having a relief valve, such vessel need not have an individual relief valve.

(b) Relief valves fitted on the high-pressure side may discharge to the low-pressure side before relieving to atmosphere. When relieving to atmosphere, a relief valve must be fitted in the atmospheric discharge connection from the receivers and condensers. The relief valve from the receivers may relieve to the condenser, which in turn

may relieve either to the low side or to atmosphere. It must be set to relieve at a pressure not greater than the maximum allowable working pressure. A rupture disk may be fitted in series with the relief valve, provided the bursting pressure of the rupture disk is not in excess of the relief valve set pressure. Where a rupture disk is fitted on the downstream side of the relief valve, the relief valve must be of the type not affected by back pressure.

#### **§ 58.20-15 Installation of refrigerating machinery.**

(a) Where refrigerating machines are installed in which anhydrous ammonia is used as a refrigerant, such machines must be located in a well-ventilated, isolated compartment, preferably on the deck, but in no case is it permissible to install such machines in the engine room space unless the arrangement is such as to eliminate any hazard from gas escaping to the engine room. Absorption machines using a solution of aqua ammonia and machines using carbon dioxide are exempt from this requirement, provided the maximum charges that might be released in the event of breakage do not exceed 300 pounds.

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

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

#### **§ 58.20-20 Refrigeration piping.**

(a) All piping materials must be suitable for handling the primary refrigerant, brine, or fluid used, and must be of such chemical and physical properties as to remain ductile at the lowest operating temperature.

(b) Piping systems must be designed in accordance with ASME B31.5 (incorporated by reference; see § 58.03-1). Piping used for cargo reliquefaction systems must also comply with the applicable requirements found in low temperature piping, § 56.50-105 of this subchapter.

(c) A relief valve must be fitted on or near the compressor on the gas discharge side between the compressor and the first stop valve with the discharge therefrom led to the suction side. A check valve must be fitted in the atmospheric discharge line if it is led through the side of the vessel below the freeboard deck, or a shutoff valve may

be employed if it is locked in the open position.

#### **§ 58.20-25 Tests.**

(a) All pressure vessels, compressors, piping, and direct expansion cooling coils must be leak tested after installation to their design pressures, hydrostatically or pneumatically.

(b) No pneumatic tests in refrigeration systems aboard ships must be made at pressures exceeding the design pressure of the part of the system being tested. Pneumatic tests may be made with the refrigerant in the system. If the refrigerant has been removed, oil-pumped dry nitrogen or bone-dry carbon dioxide with a detectable amount of the refrigerant added should be used as a testing medium. (Carbon dioxide should not be used to leak test an ammonia system.) In no case should air, oxygen, any flammable gas or any flammable mixture of gases be used for testing.

#### **Subpart 58.25—Steering Gear**

■ 43. Amend § 58.25-5 by revising paragraphs (a) and (d) to read as follows:

##### **§ 58.25-5 General.**

(a) The following definitions apply to this subpart:

*Ancillary steering equipment* means steering equipment, other than the required control systems and power actuating systems, that either is not required, such as automatic pilot or non-followup control from the pilothouse, or is necessary to perform a specific required function, such as the automatic detection and isolation of a defective section of a tanker's hydraulic steering gear.

*Auxiliary steering gear* means the equipment, other than any part of the main steering gear, necessary to steer the vessel in case of failure of the main steering gear, not including a tiller, quadrant, or other component serving the same purpose.

*Control system* means the equipment by which orders for rudder movement are transmitted from the pilothouse to the steering-gear power units. A control system for steering gear includes, but is not limited to, one or more—

- (i) Transmitters;
- (ii) Receivers;
- (iii) Feedback devices;
- (iv) Hydraulic servo-control pumps, with associated motors and motor controllers;
- (v) Differential units, hunting gear, and similar devices;

(vi) All gearing, piping, shafting, cables, circuitry, and ancillary devices for controlling the output of power units; and

(vii) Means of bringing steering-gear power units into operation.

*Fast-acting valve*, as used in this subpart, means a ball, plug, spool, or similar valve with a handle connected for quick manual operation.

*Followup control* means closed-loop (feedback) control that relates the position of the helm to a specific rudder angle by transmitting the helm-angle order to the power actuating system and, by means of feedback, automatically stopping the rudder when the angle selected by the helm is reached.

*Main steering gear* means the machinery, including power actuating systems, and the means of applying torque to the rudder stock, such as a tiller or quadrant, necessary for moving the rudder to steer the vessel in normal service.

*Maximum ahead service speed* means the greatest speed that a vessel is designed to maintain in service at sea at the deepest loadline draft.

*Maximum astern speed* means the speed that it is estimated the vessel can attain at the maximum designed power astern at the deepest loadline draft.

*Power actuating system* means the hydraulic equipment for applying torque to the rudder stock. It includes, but is not limited to—

- (i) Rudder actuators;
- (ii) Steering-gear power units; and
- (iii) Pipes, valves, fittings, linkages, and cables for transmitting power from the power unit or units to the rudder actuator or actuators.

*Speedily regained*, as used in this subpart, refers to the time it takes one qualified crewmember, after arriving in the steering-gear compartment, and without the use of tools, to respond to a failure of the steering gear and take the necessary corrective action.

*Steering capability* means steering equivalent to that required of auxiliary steering gear by § 58.25-10(c)(2).

*Steering gear* means the machinery, including power actuating systems, control systems, and ancillary equipment, necessary for moving the rudder to steer the vessel.

*Steering-gear power unit* means:

(i) In the case of electric steering gear, an electric motor and its associated electrical equipment, including motor controller, disconnect switch, and feeder circuit.

(ii) In the case of an electro-hydraulic steering gear, an electric motor, connected pump, and associated electrical equipment such as the motor controller, disconnect switch, and feeder circuit.

(iii) In the case of hydraulic steering gear, the pump and its prime mover.



*Tank vessel*, as used in this subpart, means a self-propelled vessel, including a chemical tanker or a gas carrier, defined either as a tanker by 46 U.S.C. 2101(38) or as a tank vessel by 46 U.S.C. 2101(39).

\* \* \* \* \*

(d) Each non-pressure-containing steering-gear component and each rudder stock must be of sound and reliable construction, meet the minimum material requirements of § 58.25–75, and be designed to standards at least equal to those established by the ABS Marine Vessel Rules (incorporated by reference, see § 58.03–1).

\* \* \* \* \*

■ 44. Revise § 58.25–10 to read as follows:

**§ 58.25–10 Main and auxiliary steering gear.**

(a) Vessels accepted by a recognized classification society as meeting class Rules for steering gear, and SOLAS Chapter II–1, Regulations 29 and 30 (incorporated by reference; see § 58.03–1) are considered to meet the requirements of this subpart.

(b) Power-operated main and auxiliary steering gear must be separate and independent systems. Other arrangements of steering gear will be acceptable if the Commanding Officer, Marine Safety Center determines that they are equivalent to the requirements of this subpart.

(c) The main steering gear and rudder stock must be—

(1) Of adequate strength for and capable of steering the vessel at maximum ahead service speed, which must be demonstrated to the satisfaction of the cognizant Officer in Charge, Marine Inspection;

(2) Capable of moving the rudder from 35° on either side to 35° on the other with the vessel at its deepest loadline draft and running at maximum ahead service speed, and from 35° on either side to 30° on the other in not more than 28 seconds under the same conditions;

(3) Operated by power when necessary to comply with paragraph (c)(2) of this section or when the diameter of the rudder stock is over 12 centimeters (4.7 inches) in way of the tiller, excluding strengthening for navigation in ice; and

(4) Designed so that they will not be damaged when operating at maximum astern speed; however, this requirement need not be proved by trials at maximum astern speed and maximum rudder angle.

(d) The auxiliary steering gear must be—

(1) Of adequate strength for and capable of steering the vessel at navigable speed and of being brought speedily into action in an emergency;

(2) Capable of moving the rudder from 15° on either side to 15° on the other in not more than 60 seconds with the vessel at its deepest loadline draft and running at one-half maximum ahead service speed or 7 knots, whichever is greater; and

(3) Operated by power when necessary to comply with paragraph (d)(2) of this section or when the diameter of the rudder stock is over 23 centimeters (9 inches) in way of the tiller, excluding strengthening for navigation in ice.

(e) No auxiliary means of steering is required on a double-ended ferryboat with independent main steering gear fitted at each end of the vessel.

(f) When the main steering gear includes two or more identical power units, no auxiliary steering gear need be fitted, if—

(1) In a passenger vessel, the main steering gear is capable of moving the rudder as required by paragraph (c)(2) of this section while any one of the power units is not operating;

(2) In a cargo vessel, the main steering gear is capable of moving the rudder as required by paragraph (c)(2) of this section while all the power units are operating;

(3) In a vessel with an installation completed on or after September 1, 1984, and on an international voyage, and in any other vessel with an installation completed after June 9, 1995, the main steering gear is arranged so that, after a single failure in its piping system (if hydraulic), or in one of the power units, the defect can be isolated so that steering capability can be maintained or speedily regained in less than ten minutes; or

(4) In a vessel with an installation completed before September 1, 1986, and on an international voyage, with steering gear not complying with paragraph (f)(3) of this section, the installed steering gear has a proved record of reliability and is in good repair.

**Note 1 to paragraph (f)(4):** The place where isolation valves join the piping system, as by a flange, constitutes a single-failure point. The valve itself need not constitute a single-failure point if it has a double seal to prevent substantial loss of fluid under pressure. Means to purge air that enters the system as a result of the piping failure must be provided, if necessary, so that steering capability can be maintained or speedily regained in less than ten minutes.

(g) In each vessel of 70,000 gross tons or over, the main steering gear must

have two or more identical power units complying with paragraph (f) of this section.

■ 45. Revise § 58.25–20 to read as follows:

**§ 58.25–20 Piping for steering gear.**

(a) Pressure piping must comply with subpart 58.30.

(b) Relief valves must be fitted in any part of a hydraulic system that can be isolated and in which pressure can be generated from the power units or from external forces such as wave action. The valves must be of adequate size, and must be set to limit the maximum pressure to which the system may be exposed.

(c) Each hydraulic system must be provided with—

(1) Arrangements to maintain the cleanliness of the hydraulic fluid, appropriate to the type and design of the hydraulic system; and

(2) For a vessel on an ocean, coastwise, or Great Lakes voyage, a fixed storage tank having sufficient capacity to recharge at least one power actuating system including the reservoir. The storage tank must be permanently connected by piping so that the hydraulic system can be readily recharged from within the steering-gear compartment and must be fitted with a device to indicate liquid level.

(d) Neither a split flange nor a flareless fitting of the grip or bite type, addressed by § 56.30–25 of this subchapter, may be used in hydraulic piping for steering gear.

**§ 58.25–25 [Amended]**

■ 46. Amend § 58.25–25 by removing the Note following paragraph (e).

**§ 58.25–35 [Amended]**

■ 47. Amend § 58.25–35 by designating the note immediately following paragraph (d) as note 1 to § 58.25–35.

**§ 58.25–40 [Amended]**

■ 48. Amend § 58.25–40 by removing the note immediately following paragraph (a)(3).

■ 49. Revise § 58.25–60 to read as follows:

**§ 58.25–60 Non-duplicated hydraulic rudder actuators.**

Non-duplicated hydraulic rudder actuators may be installed in the steering gear control systems on vessels of less than 100,000 deadweight tons. These actuators must meet IMO A.467(XII) (incorporated by reference, see § 58.03–1) and be acceptable to the Commanding Officer, Marine Safety Center.

■ 50. Amend § 58.25–65 by revising paragraph (a) introductory text to read as follows:

**§ 58.25–65 Feeder circuits.**

(a) Each vessel with one or more electric-driven steering-gear power units must have at least two feeder circuits, which must be separated as widely as practicable. One or more of these circuits must be supplied from the vessel's main service switchboard. On a vessel where the rudder stock is over 23 centimeters (9 inches) in diameter in way of the tiller, excluding strengthening for navigation in ice, and where a final source of emergency power is required by § 112.05–5(a) of this chapter, one or more of these circuits must be supplied from the emergency switchboard, or from an alternative source of power that—

\* \* \* \* \*

■ 51. Amend § 58.25–70 by revising paragraph (h)(1) to read as follows:

**§ 58.25–70 Steering-gear control systems.**

\* \* \* \* \*

(h) \* \* \*

(1) The steering wheel or lever need not be duplicated.

\* \* \* \* \*

■ 52. Revise § 58.25–75 to read as follows:

**§ 58.25–75 Materials.**

Materials used for the mechanical or hydraulic transmission of power to the rudder stock must have an elongation of at least 15% in 5 centimeters (2 inches).

■ 53. Amend § 58.25–85 as follows:

■ a. Revise paragraphs (c) and (d)(2); and

■ b. Remove paragraph (g) and the note immediately following paragraph (g).

The revisions read as follows:

**§ 58.25–85 Special requirements for tank vessels.**

\* \* \* \* \*

(c) Each tank vessel of 10,000 gross tons or over constructed on or after September 1, 1984, must comply with the following:

(1) The main steering gear must be arranged so that, in case of loss of steering capability due to a single failure in any part of the power actuating system of the main steering gear, excluding seizure of a rudder actuator or failure of the tiller, quadrant, or components serving the same purpose, steering capability can be regained after the loss of one power actuating system.

(2) The main steering gear must include either—

(i) Two separate and independent power actuating systems, complying with § 58.25–10(b)(2); or

(ii) At least two identical hydraulic-power actuating systems, which, acting simultaneously in normal operation, must comply with § 58.25–10(b)(2).

(3) Steering gear other than hydraulic must meet equivalent standards to the satisfaction of the Commanding Officer, Marine Safety Center.

(d) \* \* \*

(2) In case of loss of steering capability due to a single failure either of any part of the piping systems or in one of the power units, steering capability can be regained.

\* \* \* \* \*

■ 54. Revise subparts 58.30 and 58.50 to read as follows:

**Subpart 58.30—Fluid Power and Control Systems**

Sec.

58.30–1 Scope.

58.30–5 Design requirements.

58.30–10 Hydraulic fluid.

58.30–15 Pipe, tubing, valves, fittings, pumps, and motors.

58.30–20 Fluid power hose and fittings.

58.30–25 Accumulators.

58.30–30 Fluid power cylinders.

58.30–35 Testing.

58.30–40 Plans.

58.30–50 Requirements for miscellaneous fluid power and control systems.

**Subpart 58.50—Independent Fuel Tanks**

58.50–1 General requirements.

58.50–5 Gasoline fuel tanks.

58.50–10 Diesel fuel tanks.

58.50–15 Alternate material for construction of independent fuel tanks.

**Subpart 58.30—Fluid Power and Control Systems**

**§ 58.30–1 Scope.**

(a) This subpart contains requirements for fluid power transmission and control systems and appurtenances. Except as otherwise provided for in this section, these requirements are applicable to fluid power and control systems where installed for the following equipment:

(1) Steering apparatus, main and auxiliary, including bow thruster systems.

(2) Cargo hatch operating systems unless fitted with an alternate mechanical means of operation and approved by the Commandant as hydraulically or pneumatically fail-safe. A system is considered to be fail-safe if a component failure will result in a slow and controlled release of the loading so as not to endanger personnel.

(3) Watertight door operating system.

(4) Automatic propulsion boiler control systems.

(5) Starting systems for internal combustion engines used for main propulsion, auxiliary power, as the

prime mover for any required emergency apparatus, or as the source of propulsion power in ship maneuvering thruster systems.

(6) Centralized control system of main propulsion and auxiliary machinery.

(7) Lifeboat handling equipment.

(8) Controllable pitch propeller system.

(9) Installations used to remotely control components of piping systems listed in § 56.01–10(c)(1) of this subchapter.

(10) All systems containing a pneumatic or hydropneumatic accumulator.

(11) Materials and/or personnel handling equipment systems, *i.e.*, cranes, hydraulic elevators, etc., not approved by the Commandant as fail-safe as defined in paragraph (a)(2) of this section.

(12) Any fluid power or control system installed in the cargo area of pump rooms on a tank vessel, or in spaces in which cargo is handled on a liquefied flammable gas carrier.

(13) All pneumatic power and control systems having a maximum allowable working pressure in excess of 150 psig.

(14) Any other hydraulic or pneumatic system on board that, in the judgment of the Commandant, constitutes a hazard to the seaworthiness of the ship or the safety of personnel either in normal operation or in case of failure.

(b) Other fluid power and control systems do not have to comply with the detailed requirements of this subpart but must meet the requirements of § 58.30–50.

**§ 58.30–5 Design requirements.**

(a) The requirements of part 56 of this subchapter are also applicable to piping and fittings in fluid power and control systems listed in § 58.30–1, except as modified herein. The designer should consider the additional pressure due to hydraulic shock.

(b) The system must be so designed that proper functioning of any unit must not be affected by the back pressure in the system. The design must be such that malfunctioning of any unit in the system will not render any other connected or emergency system inoperative because of back pressure.

(c) Pneumatic systems with a maximum allowable working pressure in excess of 150 psi must be designed with a surge tank or other acceptable means of pulsation dampening.

(d) Each pneumatic system must minimize the entry of oil into the system and must drain the system of liquids.

**§ 58.30–10 Hydraulic fluid.**

(a) The requirements of this section are applicable to all fluid power transmission and control systems installed on vessels subject to inspection.

(b) The fluid used in hydraulic power transmission systems must have a flashpoint of not less than 200 °F for pressures below 150 psig and 315 °F for pressures 150 psig and above, as determined by ASTM D92 (incorporated by reference, see § 58.03–1), Cleveland “Open Cup” test method.

(c) The chemical and physical properties of the hydraulic fluid must be suitable for use with any materials in the system or components thereof.

(d) The hydraulic fluid must be suitable for operation of the hydraulic system through the entire temperature range to which it may be subjected in service.

(e) The recommendations of the system component manufacturers must be considered in the selection and use of hydraulic fluid.

**§ 58.30–15 Pipe, tubing, valves, fittings, pumps, and motors.**

(a) The requirements of this section are applicable to those hydraulic and pneumatic systems listed in § 58.30–1.

(b) Materials used in the manufacture of tubing, pipes, valves, flanges, and fittings must be selected from those specifications that appear in table 1 to § 56.60–1 or table 1 to § 56.60–2; or they may be selected from the material specifications of Section I or Section VIII of the ASME BPVC (both incorporated by reference; see § 58.03–1). Materials designated by other specifications must be evaluated on the basis of physical and chemical properties. To assure these properties, the specifications must specify and require such physical and chemical testing as considered necessary by the Commandant. All tubing and pipe materials must be suitable for handling the hydraulic fluid used and must be of such chemical and physical properties as to remain ductile at the lowest operating temperature.

(c) Bolting must meet the requirements of § 56.25–20 of this subchapter except that regular hexagon bolts conforming to SAE J429, grades 2 through 8 (incorporated by reference, see § 58.03–1), or ASTM A193 (incorporated by reference, see § 58.03–1) may be used in sizes not exceeding 1.5 inches.

(d) The maximum allowable working pressure and minimum thickness must be calculated as required by § 56.07–10(e) of this subchapter.

(e) All flared, flareless and compression type joints must be in accordance with § 56.30–25 of this subchapter.

(f) Fluid power motors and pumps installed on vessels subject to inspection must be certified by the manufacturer as suitable for the intended use. Such suitability must be demonstrated by operational tests conducted aboard the vessel which must be witnessed by a marine inspector.

**§ 58.30–20 Fluid power hose and fittings.**

(a) The requirements of this section are applicable to those hydraulic and pneumatic systems listed in § 58.30–1.

(b) Hose and fittings must meet the requirements of subpart 56.60 of this subchapter.

(c) Hose assemblies may be installed between two points of relative motion but must not be subjected to torsional deflection (twisting) under any conditions of operation and must be limited, in general, to reasonable lengths required for flexibility. Special consideration may be given to the use of longer lengths of flexible hose where required for proper operation of machinery and components in the hydraulic system.

(d) Sharp bends in hoses must be avoided.

**§ 58.30–25 Accumulators.**

(a) An accumulator is an unfired pressure vessel in which energy is stored under high pressure in the form of a gas or a gas and hydraulic fluid. Accumulators must meet the applicable requirements in part 54 of this subchapter.

(b) If the accumulator is of the gas and fluid type, suitable separators must be provided between the two media, if their mixture would be dangerous, or would result in contamination of the hydraulic fluid and loss of gas through absorption.

(c) Each accumulator which may be isolated, must be protected on the gas and fluid sides by relief valves set to relieve at pressures not exceeding the maximum allowable working pressures. When an accumulator forms an integral part of systems having relief valves, the accumulator need not have individual relief valves.

**§ 58.30–30 Fluid power cylinders.**

(a) The requirements of this section are applicable to those hydraulic and pneumatic systems listed in § 58.30–1 and to all pneumatic power transmission systems.

(b) Fluid power cylinders consisting of a container and a movable piston rod

extending through the containment vessel, not storing energy but converting a pressure to work, are not considered to be pressure vessels and need not be constructed under the provisions of part 54 of this subchapter.

(c) Cylinders must be designed for a bursting pressure of not less than 4 times the maximum allowable working pressure. Drawings and calculations or a certified burst test report must be submitted to show compliance with this requirement.

(d) Piston rods, except steering gear rams, must be either of corrosion resistant material or of steel protected by a plating system acceptable to the Commandant.

(e) Materials selection must be in accordance with the requirements of § 58.30–15(b).

**§ 58.30–35 Testing.**

(a) All fluid power and control systems and components thereof must be tested as required by this section.

(b) Accumulators constructed as pressure vessels under the provisions of part 54 of this subchapter must be tested and retested as required by parts 54 and 61 of this subchapter.

(c) Fluid power and control systems and piping assemblies must be given an installation test as follows:

(1) Fluid power and control systems and piping assemblies and associated equipment components, including hydraulic steering gear, in lieu of being tested at the time of installation, may be shop tested by the manufacturer to 1.5 times the maximum allowable pressure of the system. The required test pressure must be maintained for a sufficient amount of time to check all components for strength and porosity and to permit an inspection to be made of all connections.

(2) Fluid power and control systems and associated hydraulic equipment components which have been tested in conformance with paragraph (c)(1) of this section and so certified by the manufacturer, may be tested after installation as a complete assembly by stalling the driven unit in a safe and satisfactory manner and by blowing the relief valves. Otherwise, these systems must be hydrostatically tested in the presence of a marine inspector at a pressure of 1.5 times the maximum allowable pressure.

(3) Fluid power and control systems incorporating hydropneumatic accumulators containing rupture discs may be tested at the maximum allowable working pressure of the system in lieu of 1.5 times this value as prescribed in paragraphs (c)(1) and (2) of this section provided the

accumulators have been previously tested in accordance with paragraph (b) of this section and welded or brazed piping joints are not employed in the system. If welded or brazed joints are employed, the system must be tested in accordance with the requirements of paragraphs (c)(1) and (2) of this section except that the accumulators may be isolated from the remainder of the system.

(d) Fluid power and control systems must be purged with an inert gas or with the working fluid and all trapped air bled from the system prior to any shipboard testing.

(e) Fluid control systems, such as boiler combustion controls, containing components with internal parts, such as bellows or other sensing elements, which would be damaged by the test pressure prescribed in paragraphs (c)(1) and (2) of this section may be tested at the maximum allowable working pressure of the system. In addition, all fluid control systems may be tested using the system working fluid.

**§ 58.30-40 Plans.**

(a) Diagrammatic plans and lists of materials must be submitted for each of the fluid power and control systems listed in § 58.30-1(a) that is installed on the vessel. Plan submission must be in accordance with subpart 50.20 of this

subchapter and must include the following:

- (1) The purpose of the system.
- (2) Its location on the vessel.
- (3) The maximum allowable working pressure.
- (4) The fluid used in the system.
- (5) Details of the system components in accordance with § 56.01-10(d) of this subchapter.

(b) [Reserved]

**§ 58.30-50 Requirements for miscellaneous fluid power and control systems.**

(a) All fluid power and control systems installed on a vessel, except those listed in § 58.30-1(a), must meet the following requirements:

- (1) Diagrams of the system providing the information required by § 58.30-40(a)(1) through (4) must be submitted. These are not approved but are needed for records and for evaluation of the system in accordance with § 58.30-1(a)(14).
- (2) The hydraulic fluid used in the system must comply with § 58.30-10.
- (3) The installed system must be tested in accordance with § 58.30-35(c)(2).
- (4) All pneumatic cylinders must comply with § 58.30-30.

(5) Additional plans may be required for “fail-safe” equipment and for cargo hatch systems with alternate means of operation.

(b) [Reserved]

**Subpart 58.50—Independent Fuel Tanks**

**§ 58.50-1 General requirements.**

(a) The regulations in this subpart contain requirements for independent fuel tanks.

(b) Passenger vessels exceeding 100 gross tons constructed on or after July 1, 1935, and emergency systems for all ships, must use fuel that has a flashpoint exceeding 110 °F for internal combustion engine units. Such vessels must carry a sufficient quantity of fuel to supply the emergency electrical system. Refer to § 112.05-5 of subchapter J, of this chapter.

(c) An outage of 2 percent must be provided on all fuel tanks containing petroleum products.

**§ 58.50-5 Gasoline fuel tanks.**

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

(2) *Materials and construction*. The material used and the minimum thickness allowed must be as indicated in table 1 to § 58.50-5(a)(2) except that consideration will be given to other materials which provide equivalent safety as indicated in § 58.50-15.

TABLE 1 TO § 58.50-5(a)(2)

Material	ASTM specification (all incorporated by reference; see § 58.03-1)	Thickness in inches and gage numbers <sup>1</sup> vs. tank capacities for—		
		1- through 80-gallon tanks	More than 80- and not more than 150-gallon tanks	Over 150-gallon tanks <sup>2</sup>
Aluminum <sup>5</sup>	B209, Alloy 5086 <sup>6</sup>	0.250 (USSG 3)	0.250 (USSG 3)	0.250 (USSG 3).
Nickel-copper	B127, Hot rolled sheet or plate.	0.037 (USSG 20) <sup>3</sup>	0.050 (USSG 18)	0.107 (USSG 12).
Copper-nickel	B122, Alloy No. 5	0.045 (AWG 17)	0.057 (AWG 15)	0.128 (AWG 8).
Copper	B152, Type ETP	0.057 (AWG 15)	0.080 (AWG 12)	0.182 (AWG 5).
Copper-silicon	B96, alloys C65100 and C65500.	0.050 (AWG 16)	0.064 (AWG 14)	0.144 (AWG 7).
Steel or iron <sup>4</sup>		0.0747 (MfgStd 14)	0.1046 (MfgStd 12)	0.179 (MfgStd 7).

<sup>1</sup> Gauges used are U.S. standard “USSG” for aluminum and nickel-copper; “AWG” for copper, copper-nickel, and copper-silicon; and “MfgStd” for steel.

<sup>2</sup> Tanks over 400 gallons will be designed with a factor of safety of four on the ultimate strength of the material used with a design head of not less than 4 feet of liquid above the top of the tank.

<sup>3</sup> Nickel-copper not less than 0.031 inch (USSG 22) may be used for tanks up to a 30-gallon capacity.

<sup>4</sup> Fuel tanks constructed of iron or steel, which is less than 3/16-inch thick must be galvanized inside and outside by the hot dip process.

<sup>5</sup> Anodic to most common metals. Avoid dissimilar metal contact with tank body.

<sup>6</sup> And other alloys acceptable to the Commandant.

(3) *Prohibited types*. Tanks with flanged-up top edges that may trap and hold moisture must not be used.

(4) *Openings*. Openings for fill, vent and fuel pipes, and openings for fuel level gages where used, must be on the topmost surface of tanks. Tanks must have no openings in bottoms, sides, or ends, except that an opening fitted with

threaded plug or cap may be used for tank cleaning purposes.

(5) *Joints*. All metallic tank joints must be welded or brazed.

(6) *Fittings*. Nozzles, flanges, or other fittings for pipe connections must be welded or brazed to the tank. The tank openings in way of pipe connections must be properly reinforced where

necessary. Where fuel level gages are used, the flange to which gage fittings are attached must be welded or brazed to the tank. Tubular gage glasses or try cocks must not be fitted to the tanks.

(7) *Baffle plates*. All tanks exceeding 30 inches in any horizontal dimension must be fitted with vertical baffle plates where necessary for strength or for

control of excessive surge. In general, baffle plates installed at intervals not exceeding 30 inches will be considered as meeting this requirement.

(8) *Baffle plate details.* Baffle plates, where required, must be of the same material and not less than the minimum thickness required in the tank walls and must be connected to the tank walls by welding or brazing. Limber holes at the bottom and air holes at the top of all baffles must be provided.

(b) *Installation.* (1) Gasoline fuel tanks used for propulsion must be located in water-tight compartments separate from, but adjacent to the engine room or machinery space. Fuel tanks for auxiliaries must be located on or above the weather deck outside of the engine housing or compartment and as close to the engine as practicable. All tanks must be so installed as to provide a free circulation of air around the tanks.

(2) Cylindrical tanks with longitudinal seams must be arranged

horizontally where practicable so that such seams are located as near the top as possible.

(3) Fuel tanks must be so installed as to permit examination, testing, or removal for cleaning.

(4) Fuel tanks must be adequately supported and braced to prevent movement. Portable fuel tanks are not permitted.

(5) All fuel tanks must be electrically bonded to the common ground.

(c) *Testing.* (1) Prior to installation, tanks vented to atmosphere must be tested to, and must withstand, a pressure of 5 psig or 1.5 times the maximum head to which they may be subjected in service, whichever is greater. A standpipe of 11.5 feet in height attached to the tank may be filled with water to accomplish the 5-psig test. Permanent deformation of the tank will not be cause for rejection unless accompanied by leakage.

(2) After installation of the fuel tank on a vessel the complete installation must be tested in the presence of a marine inspector to a head not less than that to which the tank may be subjected in service. Fuel may be used as a testing medium.

(3) All tanks not vented to atmosphere must be constructed and tested in accordance with part 54 of this subchapter.

**§ 58.50–10 Diesel fuel tanks.**

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

(2) The materials used, and the minimum thickness allowed in the construction of independent fuel tanks must be as indicated in table 1 to § 58.50–10(a)(2), except that consideration will be given to other materials which provide equivalent safety as indicated in § 58.50–15.

TABLE 1 TO § 58.50–10(a)(2)

Material	ASTM specification (all incorporated by reference; see § 58.03–1)	Thickness in inches and gage numbers <sup>1</sup> vs. tank capacities for—		
		1- through 80-gallon tanks	More than 80- and not more than 150-gallon tanks	Over 150-gallon tanks <sup>2</sup>
Aluminum <sup>5</sup> .....	B209, Alloy 5086 <sup>6</sup> .....	0.250 (USSG 3) .....	0.250 (USSG 3) .....	0.250 (USSG 3).
Nickel-copper .....	B127, Hot rolled sheet or plate. ....	0.037 (USSG 20) <sup>3</sup> .....	0.050 (USSG 18) .....	0.107 (USSG 12).
Steel or iron <sup>4</sup> .....	.....	0.0747 (MfgStd 14) .....	0.1046 (MfgStd 12) .....	0.179 (MfgStd 7).

<sup>1</sup> Gauges used are U.S. standard “USSG” for aluminum and nickel-copper and “MfgStd” for steel or iron.

<sup>2</sup> Tanks over 400 gallons must be designed with a factor of safety of four on the ultimate strength of the material used with a design head of not less than 4 feet of liquid above the top of the tank.

<sup>3</sup> Nickel-copper not less than 0.031 inch (USSG 22) may be used for tanks up to a 30-gallon capacity.

<sup>4</sup> For diesel tanks the steel or iron must not be galvanized on the interior.

<sup>5</sup> Anodic to most common metals. Avoid dissimilar metal contact with tank body.

<sup>6</sup> And other alloys acceptable to the Commandant.

(3) Tanks with flanged-up top edges, that may trap and hold moisture, must not be used.

(4) Openings for fill and vent pipes must be on the topmost surface of a tank. There must be no openings in the bottom, sides, or ends of a tank except as follows:

(i) The opening for the fuel supply piping is not restricted to the top of the tank.

(ii) An opening fitted with threaded plug or cap may be used on the bottom of the tank for tank cleaning purposes.

(iii) Liquid level gages must penetrate at a point that is more than 2 inches from the bottom of the tank.

(5) All tank joints must be welded.

(6) Nozzles, flanges, or other fittings for pipe connections must be welded or brazed to the tank. The tank opening in way of pipe connections must be properly reinforced where necessary. Where liquid level indicating devices are attached to the tank, they must be

of heat resistant materials adequately protected from mechanical damage and provided at the tank connections with devices which will automatically close in the event of rupture of the gage or gage lines.

(7) All tanks exceeding 30 inches in any horizontal dimension must be fitted with vertical baffle plates where necessary for strength or for control of excessive surge. In general, baffle plates installed at intervals not exceeding 30 inches will be considered as meeting this requirement.

(8) Baffle plates, where required, must be of the same material and not less than the minimum thickness required in the tank walls and must be connected to the tank walls by welding or brazing. Limber holes at the bottom and air holes at the top of all baffle plates must be provided.

(9) Iron or steel tanks must not be galvanized on the interior. Galvanizing paint or other suitable coating must be

used to protect the outside of iron and steel tanks.

(b) *Installation.* (1) Tanks containing fuel for emergency lighting units must be located on an open deck or in an adequately ventilated metal compartment. No tank must be located in a compartment where the temperature may exceed 150 °F.

(2) When cylindrical tanks are installed, longitudinal seams must be located as near the top of the tank as possible. Fuel tanks must be located in, or as close as practicable, to the machinery space which is served.

(3) Fuel tanks must be so installed as to permit examination, testing, or removal for cleaning.

(4) Fuel tanks must be adequately supported and braced to prevent movement. Portable tanks are not permitted.

(5) All fuel tanks must be electrically bonded to the common ground.

(c) *Tests.* (1) Prior to installation, tanks vented to the atmosphere must be tested to and must withstand a pressure of 5 pounds per square inch or 1.5 times the maximum head to which they may be subjected in service, whichever is greater. A standpipe of 11.5 feet in height attached to the tank may be filled with water to accomplish the 5-psig test. Permanent deformation of the tank will not be cause for rejection unless accompanied by leakage.

(2) After installation of the fuel tank on a vessel the complete installation must be tested in the presence of a marine inspector to a head not less than that to which the tank may be subjected in service. Fuel may be used as a testing medium.

(3) All tanks not vented to atmosphere must be constructed and tested in accordance with part 54 of this subchapter.

**§ 58.50–15 Alternate material for construction of independent fuel tanks.**

Materials other than those specifically listed in table 1 to § 58.50–5(a)(2) and in table 1 to § 58.50–10(a)(2) may be used for fuel tank construction only if the tank design meets material and testing requirements approved by the Commandant (CG–ENG). Approved testing may be accomplished by any acceptable laboratory, or may be done by the fabricator if witnessed by a marine inspector.

**Subpart 58.60—Industrial Systems and Components on Mobile Offshore Drilling Units (MODU)**

■ 55. Revise and republish § 58.60–3 to read as follows:

**§ 58.60–3 Pressure vessel.**

A pressure vessel that is a component in an industrial system under this subpart must meet the applicable requirements in § 54.01–5 of this subchapter.

■ 56. Revise § 58.60–7 to read as follows:

**§ 58.60–7 Industrial systems: Piping.**

The piping for industrial systems under this subpart must meet ASME B31.3 (incorporated by reference, see § 58.03–1), except that blow out preventor control systems must also meet API STD 53 (incorporated by reference, see § 58.03–1).57.

■ 57. Revise § 58.60–9 to read as follows:

**§ 58.60–9 Industrial systems: Design.**

Each system under this subpart must be designed and analyzed in accordance with the principles of API RP 14C

(incorporated by reference, see § 58.03–1).

■ 58. Revise and republish part 59 to read as follows:

**PART 59—REPAIRS TO BOILERS, PRESSURE VESSELS, AND APPURTENANCES**

**Subpart 59.01—General Requirements**

Sec.

59.01–1 Scope.

59.01–2 Incorporation by reference.

59.01–5 Repairs, replacements, or alterations.

**Subpart 59.10—Welding Repairs to Boilers and Pressure Vessels in Service**

59.10–1 Scope.

59.10–5 Cracks.

59.10–10 Corroded surfaces.

59.10–15 Rivets and staybolts.

59.10–20 Patches in shells and tube sheets.

59.10–25 Stayed areas.

59.10–30 Seal welding.

59.10–35 Wrapper plates and back heads.

**Subpart 59.15—Miscellaneous Boiler Repairs**

59.15–1 Furnace repairs.

59.15–5 Stayed furnaces and combustion chambers.

59.15–10 Bagged or blistered shell plates.

**Subpart 59.20—Welding Repairs to Castings**

59.20–1 Carbon-steel or alloy-steel castings.

**Authority:** 46 U.S.C. 3306, 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 227; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3.

**PART 59—REPAIRS TO BOILERS, PRESSURE VESSELS, AND APPURTENANCES**

**Subpart 59.01—General Requirements**

**§ 59.01–1 Scope.**

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

**§ 59.01–2 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](mailto:typeapproval@uscg.mil). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material may be obtained from: *American Society of Mechanical Engineers (ASME)*, Two Park Avenue, New York, NY 10016–5990; 800–843–2763; [CustomerCare@asme.org](mailto:CustomerCare@asme.org); [www.asme.org](http://www.asme.org).

(a) 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 § 59.10–5(i), (j), and (k).

(b) ASME BPVC.VII–2019, 2019 ASME Boiler and Pressure Vessel Code, Section VII, Recommended Guidelines for the Care of Power Boilers, 2019 Edition, issued July 1, 2019 (“Section VII of the ASME BPVC”); IBR approved for § 59.01–5(e).

(c) 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 §§ 59.10–5(i), (j), and (k); 59.10–10(f).

(d) 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 § 59.10–5(i).

**§ 59.01–5 Repairs, replacements, or alterations.**

(a) No repairs, replacements, or alterations, except emergency repairs, must be made to boilers, pressure vessels, their mountings or internal fittings, safety valves, piping systems, or pressure appliances without prior approval by the Officer in Charge, Marine Inspection.

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

(c) Plan approval must be obtained from the Officer in Charge, Marine Inspection, for all alterations to systems in service as listed in § 56.01–10(c) of this subchapter and those items listed in paragraph (a) of this section.

(d) Repairs, replacements, or alterations to machinery or items not covered by other sections of this part must be made in a manner consistent with the part of this subchapter containing the construction standards for the item in question.

(e) Where applicable, manufacturers' instruction books, manuals, and the like, and Section VII of the ASME BPVC (incorporated by reference; see § 59.01–2) must be used for guidance.

### Subpart 59.10—Welding Repairs to Boilers and Pressure Vessels in Service

#### § 59.10–1 Scope.

(a) Repairs to boilers or pressure vessels in service may be performed by welding provided the welding meets the applicable requirements of part 57 of this subchapter.

(b) No repairs by welding must be made except temporary emergency repairs without prior approval of the Officer in Charge, Marine Inspection. Emergency repairs must be replaced with permanent repairs meeting the requirements of this subchapter when the vessel returns to a port in which an Officer in Charge, Marine Inspection, is located.

(c) Repair welding of power boilers not meeting the requirements of subpart 52.05 of this subchapter is prohibited.

(d) Only welded repairs as specified in this subchapter are permitted on boilers and pressure vessels. The welding repairs allowed by this subpart apply only to boilers and pressure vessels fabricated of carbon steel. Welding repairs to boilers and pressure vessels fabricated of alloy steel will be given special consideration by the Commandant. Such other method of repairs by means of welding not covered in this subchapter must be referred to the Commandant.

#### § 59.10–5 Cracks.

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

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

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

(d) Cracks in furnaces may be welded provided any one crack does not exceed 12 inches in length and after completion the weld is stress-relieved. Cracks in corrugated furnaces may be repaired by welding provided any one crack does not exceed 20 inches in length.

(e) Fire cracks may be welded at riveted door openings extending from the edge of the plate, but not more than 2 inches beyond the centerline of the rivet holes.

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

(g) Cracks that occur in superheater manifolds, water wallheaders, water drums, sectional headers, and other appurtenances including steam manifolds of water tube boilers may be repaired in accordance with paragraph (h) of this section.

(h) All cracks permitted to be repaired under this subpart must be excavated to sound metal by grinding, flame or arc gouging or chipping out the defective metal to form a clean welding groove. Either a V groove or U groove wherein complete penetration of the weld metal is secured may be used. After excavation is completed and prior to welding, the excavated area must be examined by magnetic particle, dye penetrant, or other acceptable test method. When the reverse side of the weld is accessible, the root of the weld must be chipped or ground out to ensure a clean surface of the originally deposited metal and the resultant groove welded to obtain a sound weld having complete penetration. When the weld cannot be back chipped because the reverse side is inaccessible, a backing strip or other approved means of assuring full penetration must be employed.

(i) During welding of cracks, a preheat must be maintained by controlled temperatures. The degree of preheat must be determined by the rules listed in accordance with the materials P-number groupings of PW–38, Section I of the ASME BPVC, appendix R, Section VIII of the ASME BPVC, and Appendix D, Section IX of the ASME BPVC (all incorporated by reference; see § 59.01–2). For thicknesses exceeding three-fourths inch, suitable U grooves should be employed. A welding sequence must be used so as to equalize welding stresses.

(j) Postweld heat treatment of repaired cracks must be performed in accordance

with the rules specified in PW–39, Section I of the ASME BPVC and UW–40, Section VIII of the ASME BPVC for boilers and pressure vessels respectively.

(k) Welded repairs of cracks must be nondestructively tested in accordance with the rules specified in PW–40, Section I of the ASME BPVC, and UW–51, Section VIII of the ASME BPVC for boilers and pressure vessels respectively.

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

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

(n) Welding repairs to drums of power boilers, except as otherwise permitted in this subpart, are prohibited.

#### § 59.10–10 Corroded surfaces.

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

(1) The thickness of the original metal to be built up between the rivet holes and the calking edge must not be less than one-fourth of the diameter of the rivet hole, and the portion of the calking edge to be thus reinforced must not exceed 30 inches in length in a circumferential direction.

(2) In all repairs to circumferential seams by welding, the rivets must be removed over the portions to be welded for a distance of at least 6 inches beyond the repaired portion.

(3) After repairs are made the rivet holes must be reamed before the rivets are redriven.

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

(c) Where external corrosion has reduced the thickness of flat plates around hand holes to an extent of not more than 40 percent of the original thickness and for a distance not exceeding 2 inches from the edge of the hole, the plate may be built up by welding.

(d) Where stayed sheets have corroded to a depth not exceeding 40 percent of their original thickness, they may be reinforced or built up by welding. Where the staybolts are fitted with riveted heads, the staybolts in the reinforced area must be renewed, but where the staybolts are fitted with nuts, the nuts may be removed and after

reinforcing has been applied; collars may be welded around the staybolts in lieu of the nuts. Such reinforced areas must not exceed 400 square inches nor more than 30 inches in one direction. Two such areas in any one plate may be reinforced provided that the distance between the reinforced surfaces is not less than 30 inches.

(e) When the corroded portion of a staybolted surface exceeds 400 square inches, it is permissible to make repairs by cutting out the defective portion and replacing it with a new plate, the edges of the new plate to be welded in position. In such cases, new staybolts must be fitted, and where welding is performed through a line of staybolts, welded collars must be used to attach the staybolts.

(f) Eroded seams of welded pressure vessels may be repaired by rewelding the wasted portion. The wasted section of the seam must be excavated sufficiently by grinding, flame or arc gouging or chipping to ensure proper weld penetration. Rewelded seams must be nondestructively tested in accordance with Section VIII of the ASME BPVC (incorporated by reference, see § 59.01–2).

#### § 59.10–15 Rivets and staybolts.

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

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

#### § 59.10–20 Patches in shells and tube sheets.

(a) Unreinforced openings in the shells or drums of boilers or pressure vessels may be closed by the use of a patch or plate inside the drum or shell and sealed against leakage by welding. Such plates must have a diameter of at least 2 inches larger than the diameter of the hole and must have a thickness equal to the thickness of the plate to which it is attached. It is not

permissible to insert such patches in the shell or head flush with the surrounding plate unless the requirements of this subchapter for Class I welded pressure vessels are met.

(b) Portions of tube sheets which have deteriorated may be renewed by replacing the wasted portion with a new section. The ligaments between the tube holes may be joined by means of welding and staytubes.

#### § 59.10–25 Stayed areas.

Welding repairs are permitted in staybolted areas or areas adequately stayed by other means so that should failure of the welds occur the stress will be carried by the stays. The welds must be located entirely within staybolted areas and must not pass through the outer row of stays.

#### § 59.10–30 Seal welding.

Where leaks occur in riveted joints or connections, they must be carefully investigated to determine the cause. Such leaks may be made tight by seal welding the edge, if accepted by the Officer in Charge, Marine Inspection.

#### § 59.10–35 Wrapper plates and back heads.

Wrapper plates and back heads may be renewed in whole or repaired as follows:

(a) Wrapper plates or back heads must be cut between two rows of staybolts or on a line of staybolts where the thickness is approximately the same as the original construction. If welding is employed on a line of staybolts, the staybolts must be fitted with a welded collar.

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

(c) The edges of existing plates and new plates must be beveled by chipping, flame cutting or grinding so as to form a suitable groove whereby complete penetration of the weld metal will be obtained. The edge preparation and preheat must comply with the requirements of § 59.10–5(h).

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

(e) Sections of wrapper plates of combustion chambers outside of stayed

areas may be repaired by welding provided the welded joints are stress-relieved by means of controlled heat and the joints are nondestructively tested.

### Subpart 59.15—Miscellaneous Boiler Repairs

#### § 59.15–1 Furnace repairs.

(a) Where corrugated or plain furnaces or flues are distorted by 1.5 inches or more, they must be repaired by either of the following methods:

(1) The furnace must be forced back to a true circular shape, and the Officer in Charge, Marine Inspection, may require strongbacks or other acceptable means of support to hold the furnace; or

(2) The furnace must be adequately stayed as determined by the Officer in Charge, Marine Inspection.

(b) Distortion means the difference between any single measured diameter of the furnace and the diameter of a true circle at the same location.

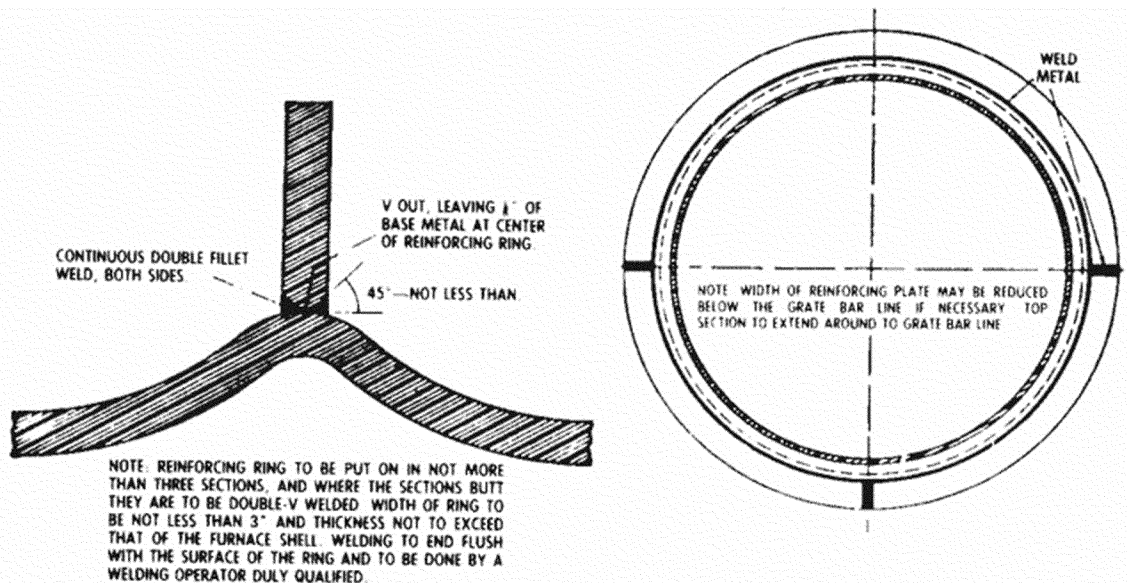
(c) Where the distortion does not exceed 1.5 inches it will not be necessary to force the furnace back to a true circle if the allowable pressure is reduced in the ratio of 1.5 percent for each one-tenth of an inch of distortion. However, if the maximum distortion does not exceed 1 inch, the repairs or reduction in pressure will not be required unless considered necessary by the marine inspector.

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

(e) Furnace crowns which have become distorted, not in excess of the limitations provided in paragraph (c) of this section, may be repaired by forcing back the distorted section to as nearly a true circle as possible and reinforcing the same by means of a ring, arc- or gas-welded to the distorted corrugation as shown in figure 1 to § 59.15–1, the welding to be done by welders and welding processors qualified in accordance with part 57 of this subchapter.

#### Figure 1 to § 59.15–1—Approved Method of Reinforcing Furnaces by Means of Arc or Gas Welding





#### § 59.15-5 Stayed furnaces and combustion chambers.

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

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

#### § 59.15-10 Bagged or blistered shell plates.

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

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

(c) Where the shell plate has blistered, bagged, or bulged to such an extent that there is an appreciable thinning of the plate, the Officer in Charge, Marine Inspection, must require the defective portion to be cut away and the shell repaired by fitting a patch of steel plate conforming to the requirements of § 52.01-90 of this subchapter in place of the defective portion. Care must be

taken that the riveting schedule of the patch is so arranged as to give the plate sufficient strength to withstand the stress placed on it in service.

#### Subpart 59.20—Welding Repairs to Castings

##### § 59.20-1 Carbon-steel or alloy-steel castings.

Defects in carbon-steel or alloy-steel castings may be repaired by welding. The repairs must be performed in accordance with the material specification to which the casting was originally supplied.

#### PART 61—PERIODIC TESTS AND INSPECTIONS

■ 59. The authority citation for part 61 is revised to read as follows:

**Authority:** 43 U.S.C. 1333; 46 U.S.C. 2103, 3306, 3307, 3703; sec. 617, Pub. L. 111-281, 124 Stat. 2905; E.O. 12234, 45 FR 58801, 3 CFR 1980 Comp., p. 277; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3.

■ 60. Revise and republish subparts 61.01 through 61.05.

##### Subpart 61.01—General

61.01-1 Scope.

##### Subpart 61.03—Incorporation of Standards

61.03-1 Incorporation by reference.

##### Subpart 61.05—Tests and Inspections of Boilers

61.05-1 Scope.

61.05-5 Preparation of boilers for inspection and test.

61.05-10 Boilers in service.

61.05-15 Boiler mountings and attachments.

61.05-20 Boiler safety valves.

#### Subpart 61.01—General

##### § 61.01-1 Scope.

(a) Periodic tests and inspection must be made of the main and auxiliary machinery, boilers, and other equipment as prescribed in this part.

(b) The inspections and tests must ensure that the equipment and associated structure are in satisfactory operating conditions and fit for the service for which they are intended.

#### Subpart 61.03—Incorporation of Standards

##### § 61.03-1 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](mailto:typeapproval@uscg.mil). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material may be obtained from: *ASTM International*, 100 Barr

Harbor Drive, West Conshohocken, PA 19428-2959; 610-832-9500; *service@astm.org*; *www.astm.org*.

(a) ASTM D665-19, Standard Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water, approved December 1, 2019 (“ASTM D665”); IBR approved for § 61.20-17(a).

(b) [Reserved]

**Subpart 61.05—Tests and Inspections of Boilers**

**§ 61.05-1 Scope.**

The term *boiler* as used in this subpart includes power boilers subject to part 52 of this subchapter and heating boilers subject to part 53 of this subchapter.

**§ 61.05-5 Preparation of boilers for inspection and test.**

(a) For internal inspection, manhole and handhold plates, and washout plugs must be removed as required by the marine inspector and the furnace and combustion chambers must be thoroughly cooled and cleaned.

(b) In preparing the boilers for the hydrostatic test, they must be filled with water at not less than 70 °F and not more than 160 °F for watertube boilers, and not more than 100 °F for firetube boilers. The safety valves must be secured by means of gags or clamps.

**§ 61.05-10 Boilers in service.**

(a) Each boiler, including superheater, reheater, economizer, auxiliary boiler,

low-pressure heating boiler, and unfired steam boiler, must be available for examination by the marine inspector at intervals specified by table 1 to § 61.05-10, and more often, if necessary, to determine that the complete unit is in a safe and satisfactory condition.

(b) The owner, master, or person in charge of the vessel must give ample notice to the cognizant Officer in Charge, Marine Inspection, so that a marine inspector may witness the tests and make the required inspections.

(c) Firetube boilers which cannot be entered, or which cannot be satisfactorily examined internally, all boilers of lap seam construction and all boilers to which extensive repairs have been made or the strength of which the marine inspector has any reason to question, must be subjected to a hydrostatic test of 1.5 times the maximum allowable working pressure. All other boilers must be subjected to a hydrostatic test of 1.25 times the maximum allowable working pressure.

(d) In applying hydrostatic pressure to boilers, arrangements must be made to prevent main and auxiliary stop valves from being simultaneously subjected to the hydrostatic pressure on one side and steam pressure on the other side.

(e) If the marine inspector has reason to believe that the boiler has deteriorated to any appreciable extent under the bottom where it rests on saddles or foundations, they must cause the boiler to be lifted to such position

that it can be thoroughly examined, provided the examination cannot be made otherwise.

(f) The marine inspector may require any boiler to be drilled or gaged to determine actual thickness any time its safety is in doubt. At the first inspection for certification after a firetube or flue boiler has been installed for 10 years, it must be gaged to determine the extent of deterioration. Thickness will be measured at or near the waterline, at the bottom and at such other places deemed necessary by the marine inspector. Examination may be by drilling or a nondestructive means acceptable to the marine inspector. Prior to the use of a nondestructive method of examination, the user must demonstrate to the marine inspector that results having an accuracy within plus or minus 5 percent are consistently obtainable.

(g) If the thickness is found to be less than the original thickness upon which the maximum allowable working pressure (MAWP) was based, the MAWP must be recalculated. The thickness of the thinnest measured portion must be used in this calculation. Either the design formulas given in this subchapter or the ones in effect when the boiler was contracted for or built may normally be used in this recalculation. In no case will an increase in the pressure allowed be made.

TABLE 1 TO § 61.05-10—INSPECTION INTERVALS FOR BOILERS <sup>1 2 3</sup>

	Firetube boiler ≥150 psi	Watertube boiler	Any firetube boiler for propulsion	Firetube boiler <150 psi
Hydro Test:				
Passenger Vessel .....	2.5	2.5	1	2.5
Other Vessel .....	2.5	5	1	5
Fireside Inspection .....	1	2.5	1	2.5
Waterside Inspection .....	1	2.5	1	2.5
Boiler Safety-Valve Test .....	1	2.5	1	1
Valves Inspection .....	5	5	5	5
Studs and Bolts Inspection .....	10	10	10	10
Mountings Inspection .....	10	10	10	10
Steam Gauge Test .....	2.5	2.5	2.5	2.5
Fusible Plug Inspection .....	2.5	.....	2.5	2.5

<sup>1</sup> All intervals are in years.

<sup>2</sup> Where the 2.5-year interval is indicated: two tests or inspections must occur within any five-year period, and no more than three years may elapse between any test or inspection and its immediate predecessor.

<sup>3</sup> Intervals for hybrid boilers are the same as for firetube boilers.

**§ 61.05-15 Boiler mountings and attachments.**

(a) Each valve must be opened and examined by the marine inspector at the interval specified in table 1 to § 61.05-10.

(b) Each stud or bolt for each boiler mounting that paragraph (c) of this

section requires to be removed may be examined by the marine inspector.

(c)(1) Each boiler mounting may be removed from the boiler and be examined by the marine inspector at the interval specified by table 1 to § 61.05-10 when any of the following conditions exist:

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

Officer in Charge, Marine Inspection, such action is necessary.

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

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

(f) Each steam gauge for a boiler or a main steam line may be examined and checked for accuracy by the marine inspector at the interval specified by table 1 to § 61.05–10.

(g) Each fusible plug may be examined by the marine inspector at the interval specified by table 1 to § 61.05–10.

#### § 61.05–20 Boiler safety valves.

Each safety valve for a drum, superheater, or reheater of a boiler must be tested at the interval specified by table 1 to § 61.05–10.

#### Subpart 61.10—Tests and Inspections of Pressure Vessels

■ 61. Amend § 61.10–5 by revising paragraphs (g) and (h)(3) to read as follows:

##### § 61.10–5 Pressure vessels in service.

\* \* \* \* \*

(g) *Bulk storage tanks.* (1) Each bulk storage tank containing refrigerated liquefied CO<sub>2</sub> for use aboard a vessel as a fire-extinguishing agent must be subjected to a hydrostatic test of 1.5 times the maximum allowable working pressure in the 10th year of the installation and at 10-year intervals thereafter. After the test, the tank should be drained, and an internal examination made. Parts of the jacket and lagging designated by the marine inspector must be removed at the time of the test so the marine inspector may determine the condition of the tank.

(2) In lieu of the requirements contained in paragraph (g)(1) of this section, in the 10th year of installation and at 10-year intervals thereafter, each bulk storage tank containing refrigerated liquefied CO<sub>2</sub> for use aboard a vessel as a fire-extinguishing agent which contains a manhole or means to enter, may undergo an internal examination by a marine inspector. Bulk storage tanks which have been satisfactorily examined internally by a marine inspector and in which no defects have been found which impair the safety of the pressure vessel will not require a hydrostatic test. When a defect is found

during the internal examination that, in the judgment of the marine inspector, may affect the safety of the pressure vessel, the pressure vessel must be hydrostatically tested at a pressure of 1.5 times the maximum allowable working pressure, unless alternative means, acceptable to the Officer in Charge, Marine Inspection, are used to ensure the safe operation of the pressure vessel.

\* \* \* \* \*

(h) \* \* \*

(3) If (due to the product carried) your vessel's inspection intervals are prescribed in subchapter D, subchapter I, or subchapter I–A, all of this chapter, you must comply with the pneumatic test regulations there, instead of the ones in this section.

\* \* \* \* \*

■ 62. Revise and republish subpart 61.15 to read as follows:

#### Subpart 61.15—Periodic Tests of Piping Systems

Sec.

61.15–1 Scope.

61.15–5 Steam piping.

61.15–10 Liquefied-petroleum-gas piping for heating and cooking.

61.15–12 Nonmetallic expansion joints.

61.15–15 Other piping.

#### Subpart 61.15—Periodic Tests of Piping Systems

##### § 61.15–1 Scope.

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

##### § 61.15–5 Steam piping.

(a) Main steam piping must be subjected to a hydrostatic test equal to 1.25 times the maximum allowable working pressure at the same periods prescribed for boilers in § 61.05–10. The hydrostatic test must be applied from the boiler drum to the throttle valve. If the covering of the piping is not removed, the test pressure must be maintained on the piping for a period of ten minutes. If any evidence of moisture or leakage is detected, the covering must be removed, and the piping thoroughly examined.

(b) All steam piping subject to pressure from the main boiler should be subjected to a hydrostatic test at a pressure of 1.25 times the maximum allowable working pressure of the boiler after every five years of service except as otherwise provided for in paragraph

(a) of this section. Unless the covering of the piping is removed, the test pressure must be maintained on the piping for ten minutes. If any evidence of moisture or leakage is detected, the covering should be removed, and the piping thoroughly examined. No piping with a nominal size of 3 inches or less need be hydrostatically tested.

(c) The setting of safety and relief valves installed in piping systems must be checked by the marine inspector at each inspection for certification for vessels whose Certificates of Inspection are renewed each year. For other vessels, the setting must be checked twice within any 5-year period, and no more than 3 years may elapse between any check and its immediate predecessor.

#### § 61.15–10 Liquefied-petroleum-gas piping for heating and cooking.

(a) Leak tests as described in paragraph (b) of this section must be conducted at least once each month, at each inspection for certification, and at each periodic inspection. The tests required at monthly intervals must be conducted by an appropriately credentialed officer of the vessel or qualified personnel acceptable to the Officer in Charge, Marine Inspection. The owner, master, or person in charge of the vessel must keep records of such tests showing the dates when performed and the name(s) of the person(s) and/or company conducting the tests. Such records must be made available to the marine inspector upon request and must be kept for the period of validity of the vessel's current certificate of inspection. Where practicable, these records should be kept in or with the vessel's logbook.

(b) Test the system for leakage in accordance with the following procedure: With the appliance valve closed, the master shutoff valve on the appliance open, and one cylinder valve open, note pressure in gauge.

#### § 61.15–12 Nonmetallic expansion joints.

(a) Nonmetallic expansion joints must be examined externally at each inspection for certification and periodic inspection for signs of excessive wear, fatigue, deterioration, physical damage, misalignment, improper flange-to-flange spacing, and leakage. A complete internal examination must be conducted when an external examination reveals excessive wear or other signs of deterioration or damage.

(b) A nonmetallic expansion joint must be replaced 10 years after it has been placed into service if it is located in a system which penetrates the side of the vessel and both the penetration and the nonmetallic expansion joint are

located below the deepest load waterline. The Officer in Charge, Marine Inspection may grant an extension of the ten-year replacement to coincide with the vessel's next drydocking.

#### § 61.15–15 Other piping.

(a) All other piping systems shall be examined under working conditions as required by the marine inspector.

(b) [Reserved]

#### Subpart 61.20—Periodic Tests of Machinery and Equipment

■ 63. Revise §§ 61.20–1 through 61.20–5 to read as follows:

##### § 61.20–1 Steering gear.

(a) The marine inspector must inspect the steering gear at each inspection for certification for vessels whose Certificate of Inspections are renewed each year. For other vessels, the marine inspector must inspect the steering gear twice within a 5-year period, and no more than 3 years may elapse between any inspection and its immediate predecessor. The marine inspector may inspect the steering gear more often, if necessary.

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

##### § 61.20–3 Main and auxiliary machinery and associated equipment, including fluid control systems.

(a) At each inspection for certification and periodic inspection the marine inspector must conduct such tests and inspections of the main propulsion and auxiliary machinery and of its associated equipment, including the fluid control systems, as they feel necessary to check safe operation.

(b) Remote control for the means of stopping machinery driving forced and induced draft fans, fuel oil transfer pumps, fuel oil unit pumps, and fans in the ventilation systems serving machinery and cargo spaces must be tested at each regular inspection for certification and periodic inspection.

##### § 61.20–5 Drydock examination.

(a) When any vessel is drydocked, examination must be made of the propeller, stern bushing, sea connection, and fastenings if deemed necessary by the marine inspector.

(b) Sea chests, sea valves, sea strainers, and valves for the emergency bilge suction must be opened up for examination every 5 years at the time of drydocking.

■ 64. Amend § 61.20–17 by revising paragraphs (a) and (b) to read as follows:

##### § 61.20–17 Examination intervals.

(a) A lubricant that demonstrates the corrosion inhibiting properties of oil when tested in accordance with ASTM D665 (incorporated by reference, see § 61.03–1) is considered to be equivalent to oil for the purposes of the tailshaft examination interval.

(b) Except as provided in paragraphs (c) through (f) of this section, each tailshaft on a vessel must be examined twice within any 5-year period. No more than 3 years may elapse between any 2 tailshaft examinations.

\* \* \* \* \*

■ 65. Amend § 61.10–23 by revising paragraph (c) to read as follows:

##### § 61.20–23 Tailshaft clearance; bearing wear-down.

\* \* \* \* \*

(c) Oil lubricated bearings must be rebushed when deemed necessary by the Officer in Charge, Marine Inspection. The manufacturer's recommendation must be considered in making this determination.

#### Subpart 61.30—Tests and Inspections of Fired Thermal Fluid Heaters

■ 66. Revise and republish §§ 61.30–1 and 61.30–5 to read as follows:

##### § 61.30–1 Scope.

The term *thermal fluid heater* as used in this part includes any fired automatic auxiliary heating unit which uses a natural or synthetic fluid in the liquid phase as the heat exchange medium and whose operating temperature and pressure do not exceed 204 °C (400 °F) and 225 psig, respectively. Thermal fluid heaters having operating temperatures and pressures higher than 204 °C (400 °F) and 225 psig, respectively, are inspected under subpart 61.05.

##### § 61.30–5 Preparation of thermal fluid heater for inspection and test.

For visual inspection, access plates and manholes must be removed as required by the marine inspector and the heater and combustion chambers must be thoroughly cooled and cleaned.

■ 67. Amend § 61.30–20 by designating the note following § 61.30–20 as note 1 to § 61.30–20 and revising it to read as follows:

##### § 61.30–20 Automatic control and safety tests.

\* \* \* \* \*

**Note 1 to § 61.30–20:** Sections 63.05–90 and 63.10–90 of this subchapter may be referenced concerning operating tests.

#### Subpart 61.35—Design Verification and Periodic Testing for Automatic Auxiliary Boilers

■ 68. Amend § 61.35–1 by revising and republishing paragraphs (a) and (b) to read as follows:

##### § 61.35–1 General.

(a) All automatic auxiliary boilers except fired thermal fluid heaters must be tested and inspected in accordance with this subpart and subpart 61.05.

(b) Fired thermal fluid heaters must be tested and inspected in accordance with subpart 61.30.

\* \* \* \* \*

##### § 61.35–3 [Amended]

■ 69. In § 61.35–3, add and reserve paragraph (b).

#### Subpart 61.40—Design Verification and Periodic Testing of Vital System Automation

■ 70. In § 61.40–1, revise paragraph (b) to read as follows:

##### § 61.40–1 General.

\* \* \* \* \*

(b) Persons designated by the owner of the vessel must conduct all tests and the Design Verification and Periodic Safety tests must be witnessed by the Coast Guard.

\* \* \* \* \*

##### § 61.40–6 [Amended]

■ 71. In § 61.40–6, designate the note immediately following paragraph (b) as note 1 to paragraph (b).

#### PART 62—VITAL SYSTEM AUTOMATION

■ 72. The authority citation for part 62 is revised to read as follows:

**Authority:** 46 U.S.C. 3306, 3703, 8105; sec. 617, Pub. L. 111–281, 124 Stat. 2905; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3.

#### Subpart 62.01—General Provisions

##### § 62.01–3 [Amended]

■ 73. In § 62.01–3, add and reserve paragraph (b).

■ 74. Amend § 62.01–5 by revising paragraphs (b) introductory text and (d) to read as follows:

##### § 62.01–5 Applicability.

\* \* \* \* \*

(b) *Systems and equipment.* Except as noted in paragraph (c) of this section, this part applies to automation of vital systems or equipment that—

\* \* \* \* \*

(d) *Central control rooms.* The requirements of subpart 62.50 only apply to vessels automated to replace specific personnel or to reduce overall crew requirements, except where the main propulsion or ship service electrical generating plants are automatically or remotely controlled from a control room. In this case, § 62.50–20(a)(3) (except the provision in paragraph (a)(3)(ii) relating to electrical power distribution), (b)(3), (c), (e)(1), (2), and (4), and (f)(2) apply, regardless of manning.

■ 75. Revise and republish subparts 62.05 through 62.20 to read as follows:

**Subpart 62.05—Reference Specifications**

Sec.  
62.05–1 Incorporation by reference.

**Subpart 62.10—Terms Used**

62.10–1 Definitions.

**Subpart 62.15—Equivalents**

62.15–1 Conditions under which equivalents may be used.

**Subpart 62.20—Plan Submittal**

62.20–1 Plans for approval.  
62.20–3 Plans for information.  
62.20–5 Self-certification

**Subpart 62.05—Reference Specifications**

**§ 62.05–1 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 [typapproval@uscg.mil](mailto:typapproval@uscg.mil). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material may be obtained from: *American Bureau of Shipping (ABS)*, 1701 City Plaza Drive, Spring, TX 77389; 281–877–6000; [CSC@eagle.org](mailto:CSC@eagle.org); [ww2.eagle.org](http://ww2.eagle.org).

(a) Rules for Building and Classing Marine Vessels, Part 4, Vessel Systems and Machinery, January 2020 (“ABS Marine Vessel Rules”); IBR approved for §§ 62.25–30(a); 62.35–5(d); 62.35–35; 62.35–40(c); 62.35–50 introductory text and table 1; 62.50–30(c) and (k).

(b) [Reserved]

**Subpart 62.10—Terms Used**

**§ 62.10–1 Definitions.**

For the purpose of this part:

*Alarm* means an audible and visual indication of a hazardous or potentially hazardous condition that requires attention.

*Automated* means the use of automatic or remote control, instrumentation, or alarms.

*Automatic control* means self-regulating in attaining or carrying out an operator-specified equipment response or sequence.

*Boiler low-low water level* is the minimum safe level in the boiler, in no case lower than that visible in the gage glass (see § 52.01–110 of this subchapter).

*Engineering Control Center (ECC)* means the centralized engineering control, monitoring, and communications location.

*Failsafe* means that upon failure or malfunction of a component, subsystem, or system, the output automatically reverts to a pre-determined design state of least critical consequence. Typical failsafe states are listed in the following table:

TYPICAL FAILSAFE STATES

System or component	Preferred failsafe state
(1) Cooling water valve .....	As is or open.
(2) Alarm system .....	Annunciate.
(3) Safety system .....	Shut down, limited, or as is & alarm.
(4) Burner valve .....	Closed.
(5) Propulsion speed control .....	As is.
(6) Feedwater valve .....	As is or open.
(7) Controllable pitch propeller .....	As is.
(8) Propulsion safety trip .....	As is & alarm.
(9) Fuel tank valve .....	See § 56.50–60(d) of this subchapter.

*Flooding safety* refers to flooding detection, watertight integrity, and dewatering systems.

*Independent* refers to equipment arranged to perform its required function regardless of the state of operation, or failure, of other equipment.

*Limit control* means a function of an automatic control system to restrict operation to a specified operating range or sequence without stopping the machinery.

*Local control* means operator control from a location where the equipment and its output can be directly manipulated and observed, e.g., at the

switchboard, motor controller, propulsion engine, or other equipment.

*Manual control* means operation by direct or power-assisted operator intervention.

*Monitor* means the use of direct observation, instrumentation, alarms, or a combination of these to determine equipment operation.

*Remote control* means non-local automatic or manual control.

*Safety trip control system* means a manually or automatically operated system that rapidly shuts down another system or subsystem.

*System* means a grouping or arrangement of elements that interact to

perform a specific function and typically includes the following, as applicable:

- (1) A fuel or power source.
- (2) Power conversion elements.
- (3) Control elements.
- (4) Power transmission elements.
- (5) Instrumentation.
- (6) Safety control elements.
- (7) Conditioning elements.

*Vital system or equipment* is essential to the safety of the vessel, its passengers and crew. This typically includes, but is not limited to, the following:

- (1) Fire detection, alarm, and extinguishing systems.
- (2) Flooding safety systems.

(3) Ship service and emergency electrical generators, switchgear, and motor control circuits serving vital electrical loads.

(4) The emergency equipment and systems listed in § 112.15 of this chapter.

(5) Propulsion systems, including those provided to meet § 58.01–35 of this subchapter.

(6) Steering systems.

### Subpart 62.15—Equivalents

#### § 62.15–1 Conditions under which equivalents may be used.

(a) The Coast Guard accepts a substitute or alternate for the requirements of this part if it provides an equivalent level of safety and reliability. Demonstration of functional equivalence must include comparison of a qualitative failure analysis based on the requirements of this part with a comparable analysis of the proposed substitute or alternate.

(b) [Reserved]

### Subpart 62.20—Plan Submittal

#### § 62.20–1 Plans for approval.

(a) The following plans must be submitted to the Coast Guard for approval in accordance with §§ 50.20–5 and 50.20–10 of this chapter:

(1) A general arrangement plan of control and monitoring equipment, control locations, and the systems served.

(2) Control and monitoring console, panel, and enclosure layouts.

(3) Schematic or logic diagrams including functional relationships, a written description of operation, and sequences of events for all modes of operation.

(4) A description of control or monitoring system connections to non-vital systems.

(5) A description of programmable features.

(6) A description of built-in test features and diagnostics.

(7) Design Verification and Periodic Safety test procedures described in subpart 61.40 of this subchapter.

(8) Control system normal and emergency operating instructions.

(b) [Reserved]

#### § 62.20–3 Plans for information.

(a) One copy of the following plans must be submitted to the Officer in Charge, Marine Inspection, for use in the evaluation of automated systems provided to replace specific personnel or to reduce overall crew requirements:

(1) Proposed manning, crew organization and utilization, including routine maintenance, all operational evolutions, and emergencies.

(2) A planned maintenance program for all vital systems.

(b) One copy of a qualitative failure analysis must be submitted in accordance with § 50.20–5 of this subchapter for the following:

(1) Propulsion controls.

(2) Microprocessor-based system hardware.

(3) Safety controls.

(4) Automated electric power management.

(5) Automation required to be independent that is not physically separate.

(6) Any other automation that, in the judgment of the Commandant, potentially constitutes a safety hazard to the vessel or personnel in case of failure.

**Note 1 to paragraph (b):** The qualitative failure analysis is intended to assist in evaluating the safety and reliability of the design. It should be conducted to a level of detail necessary to demonstrate compliance with applicable requirements and should follow standard qualitative analysis procedures. Assumptions, operating conditions considered, failures considered, cause and effect relationships, how failures are detected by the crew, alternatives available to the crew, and possible design verification tests necessary should be included. Questions regarding failure analysis should be referred to the Marine Safety Center at an early stage of design.

#### § 62.20–5 Self-certification.

(a) The designer or manufacturer of an automated system must certify to the Coast Guard, in writing, that the automation is designed to meet the environmental design standards of § 62.25–30. Plan review, shipboard testing, or independent testing to these standards is not required.

(b) [Reserved]

**Note 1 to § 62.20–5:** Self-certification should normally accompany plan submittal.

### Subpart 62.25—General Requirements for All Automated Vital Systems

#### § 62.25–10 [Amended]

■ 76. In § 62.25–10, designate the note immediately following paragraph (b) as note 1 to paragraph (b).

■ 77. Revise and republish § 62.25–15 to read as follows:

#### § 62.25–15 Safety control systems.

(a) Minimum safety and trip controls required for specific types of automated vital systems are listed in table 1 to § 62.35–50.

**Note 1 to paragraph (a):** Safety control systems include automatic and manual safety trip controls and automatic safety limit controls.

(b) Safety trip controls must not operate as a result of failure of the normal electrical power source unless it is determined to be the failsafe state.

(c) Automatic operation of a safety control must be alarmed in the machinery spaces and at the cognizant remote-control location.

(d) Local manual safety trip controls must be provided for all main boilers, turbines, and internal combustion engines.

(e) Automatic safety trip control systems must—

(1) Be provided where there is an immediate danger that a failure will result in serious damage, complete breakdown, fire, or explosion;

(2) Require manual reset prior to renewed operation of the equipment; and

(3) Not be provided if safety limit controls provide a safe alternative and trip would result in loss of propulsion.

■ 78. Amend § 62.25–20 by revising and republishing paragraphs (a), (b), and (d) to read as follows:

#### § 62.25–20 Instrumentation, alarms, and centralized stations.

(a) *General.* Minimum instrumentation and alarms required for specific types of automated vital systems are listed in table 1 to § 62.35–50.

(b) *Instrumentation Location.* (1) Manual control locations, including remote manual control and manual alternate control, must be provided with the instrumentation necessary for safe operation from that location.

**Note 1 to paragraph (b)(1):** Typically, instrumentation includes means to monitor the output of the monitored system.

(2) Systems with remote instrumentation must have provisions for the installation of instrumentation at the monitored system equipment.

(3) The status of automatically or remotely controlled vital auxiliaries, power sources, switches, and valves must be visually indicated in the machinery spaces or the cognizant remote-control location, as applicable.

**Note 2 to paragraph (b)(3):** Status indicators include run, standby, off, open, closed, tripped, and on, as applicable. Status indicators at remote control locations other than the ECC, if provided, may be summarized. Equipment normally provided with status indicators are addressed in table 1 to § 62.35–50, subpart 58.01 subpart 56.50 of this subchapter, and subpart 112.45 of this chapter.

(4) Sequential interlocks provided in control systems to ensure safe operation, such as boiler programming control or reversing of propulsion diesels, must

have summary indicators in the machinery spaces and at the cognizant control location to show if the interlocks are satisfied.

(5) Instrumentation listed in table 1 to § 62.35–50 must be of the continuous display type or the demand display type. Displays must be in the ECC or in the machinery spaces if an ECC is not provided.

\* \* \* \* \*

(d) *Alarms.* (1) All alarms must clearly distinguish among—

(i) Normal, alarm, and acknowledged alarm conditions; and

(ii) Fire, general alarm, carbon dioxide/clean agent fire extinguishing system, vital machinery, flooding, engineers' assistance-needed, and non-vital alarms.

(2) Required alarms in high ambient noise areas must be supplemented by visual means, such as rotating beacons, that are visible throughout these areas. Red beacons must only be used for general or fire alarm purposes.

(3) Automatic transfer to required backup or redundant systems or power sources must be alarmed in the machinery spaces.

(4) Flooding safety, fire, loss of power, and engineers' assistance-needed alarms extended from the machinery spaces to a remote location must not have a duty crewmember selector.

**Note 3 to paragraph (d)(4):** Other alarms may be provided with such a selector, provided there is no off position.

(5) Automation alarms must be separate and independent of the following:

(i) The fire detection and alarm systems.

(ii) The general alarm.

(iii) CO<sub>2</sub> release alarms.

(6) Failure of an automatic control, remote control, or alarm system must be immediately alarmed in the machinery spaces and at the ECC, if provided.

\* \* \* \* \*

■ 79. In § 62.25–25, revise paragraph (d) to read as follows:

**§ 62.25–25 Programmable systems and devices.**

\* \* \* \* \*

(d) All required manuals, records, and instructions for automatic or remote control or monitoring systems must be readily available aboard the vessel.

■ 80. Revise § 62.25–30 to read as follows:

**§ 62.25–30 Environmental design standards.**

(a) All automation must be suitable for the marine environment and must be designed and constructed to operate

indefinitely under the following conditions:

(1) Ship motion and vibration described in Table 1 of section 4–9–9 of the ABS Marine Vessel Rules (incorporated by reference; see § 62.05–1); note that inclination requirements for fire and flooding safety systems are described in § 112.05–5(c) of this chapter.

(2) Ambient air temperatures described in Table 1 of part 4–9–9/3 of the ABS Marine Vessel Rules.

(3) Electrical voltage and frequency tolerances described in Table 1 of part 4–9–9 of the ABS Marine Vessel Rules.

(4) Relative humidity of 0 to 95% at 45 °C.

(5) Hydraulic and pneumatic pressure variations described in Table 1 of part 4–9–9 of the ABS Marine Vessel Rules.

**Note 1 to paragraph (a):** Considerations should include normal dynamic conditions that might exceed these values, such as switching, valve closure, power supply transfer, starting, and shutdown.

(b) Low voltage electronics must be designed with due consideration for static discharge, electromagnetic interference, voltage transients, fungal growth, and contact corrosion.

**Subpart 62.30—Reliability and Safety Criteria, All Automated Vital Systems**

■ 81. Amend § 62.30–10 by revising and republishing paragraph (a) to read as follows:

**§ 62.30–10 Testing.**

(a) Automated vital systems must be tested in accordance with subpart 61.40 of this subchapter.

\* \* \* \* \*

■ 82. Revise and republish subpart 62.35 to read as follows:

**Subpart 62.35—Requirements for Specific Types of Automated Vital Systems**

Sec.

62.35–1 General.

62.35–5 Remote propulsion-control systems.

62.35–10 Flooding safety.

62.35–15 Fire safety.

62.35–20 Oil-fired main boilers.

62.35–35 Starting systems for internal-combustion engines.

62.35–40 Fuel systems.

62.35–50 Tabulated monitoring and safety control requirements for specific systems.

**Subpart 62.35—Requirements for Specific Types of Automated Vital Systems**

**§ 62.35–1 General.**

(a) Minimum instrumentation, alarms, and safety controls required for specific

types of automated vital systems are listed in table 1 to § 62.35–50.

(b) Automatic propulsion systems, automated electric power management systems, and all associated subsystems and equipment must be capable of meeting load demands from standby to full system rated load, under steady state and maneuvering conditions, without need for manual adjustment or manipulation.

**§ 62.35–5 Remote propulsion-control systems.**

(a) *Manual propulsion control.* All vessels having remote propulsion control from the navigating bridge, an ECC or maneuvering platform, or elsewhere must have a manual alternate propulsion control located at the equipment.

**Note 1 to paragraph (a):** Separate local control locations may be provided for each independent propeller.

(b) *Centralized propulsion control equipment.* Navigating bridge, ECC, maneuvering platform, and manual alternate control locations must include—

(1) Control of the speed and direction of thrust for each independent propeller controlled;

(2) A guarded manually actuated safety trip control (which stops the propelling machinery) for each independent propeller controlled;

(3) Shaft speed and thrust direction indicators for each independent propeller controlled;

(4) The means to pass propulsion orders required by §§ 113.30–5 and 113.35–3 of this chapter; and

(5) The means required by paragraph (d) of this section to achieve control location transfer and independence.

(c) *Main navigating bridge propulsion control.* (1) Navigating bridge remote propulsion control must be performed by a single control device for each independent propeller. Control must include automatic performance of all associated services, and must not permit rate of movement of the control device to overload the propulsion machinery.

(2) On vessels propelled by steam turbines, the navigation bridge primary control system must include safety alarms for high and low boiler water levels and low steam pressure.

(3) On vessels propelled by internal combustion engines, an alarm must annunciate on the navigating bridge and at the maneuvering platform or ECC, if provided, to indicate starting capability less than 50% of that required by § 62.35–35.

(d) *Transfer of control location.* Transfer of control location must meet

section 4–9–2/13.11 of the ABS Marine Vessel Rules (incorporated by reference; see § 62.05–1). Manual alternative-propulsion-control locations must be capable of overriding, and of operating independent of, all remote and automatic propulsion-control locations.

(e) *Control system details.* (1) Each operator control device must have a detent at the zero-thrust position.

(2) Propulsion machinery automatic safety trip control operation must only occur when continued operation could result in serious damage, complete breakdown, or explosion of the equipment. Other than the overrides mentioned in § 62.25–10(a)(4) and temporary overrides located at the main navigating bridge control location, overrides of these safety trip controls are prohibited. Operation of permitted overrides must be alarmed at the navigating bridge and at the maneuvering platform or ECC, as applicable, and must be guarded against inadvertent operation.

(3) Remote propulsion control systems must be failsafe by maintaining the preset (as is) speed and direction of thrust until local manual or alternate manual control is in operation, or the manual safety trip control operates. Failure must activate alarms on the navigating bridge and in the machinery spaces.

#### § 62.35–10 Flooding safety.

(a) Automatic bilge pumps must—

(1) Be provided with bilge high level alarms that annunciate in the machinery spaces and at a manned control location and are independent of the pump controls;

(2) Be monitored to detect excessive operation in a specified time period; and

(3) Meet all applicable pollution control requirements.

(b) Remote controls for flooding safety equipment must remain functional under flooding conditions.

(c) Remote bilge level sensors, where provided, must be located to detect flooding at an early stage and to provide redundant coverage.

#### § 62.35–15 Fire safety.

(a) All required fire pump remote control locations must include the controls necessary to charge the firemain and—

(1) A firemain pressure indicator; or

(2) A firemain low-pressure alarm.

(b) [Reserved]

#### § 62.35–20 Oil-fired main boilers.

(a) *General.* (1) All main boilers, regardless of intended mode of operation, must be provided with the

automatic safety trip control system(s) of paragraphs (h)(1), (h)(2)(i) and (ii), and (i) of this section to prevent unsafe conditions after light off.

(2) Manual alternate control of boilers must be located at the boiler front.

(3) A fully automatic main boiler must include—

(i) Automatic combustion control;

(ii) Programming control;

(iii) Automatic feedwater control;

(iv) Safety controls; and

(v) An alarm system.

(4) Following system line-up and starting of auxiliaries, fully automatic main boilers must only require the operator to initiate the following sequences:

(i) Boiler pre-purge.

(ii) Trial for ignition of burners subsequent to successful initial burner light-off.

(iii) Normal shutdown.

(iv) Manual safety trip control operation.

(v) Adjustment of primary control setpoints.

(5) All requirements for programming control subsystems and safety control systems must be met when a boiler—

(i) Automatically sequences burners;

(ii) Is operated from a location remote from the boiler front; or

(iii) Is fully automatic.

(6) Where light oil pilots are used, the programming control and burner safety trip controls must be provided for the light oil system. Trial for ignition must not exceed 15 seconds and the main burner trial for ignition must not proceed until the pilot flame is proven.

(b) *Feedwater control.* Automatic feedwater control subsystems must sense, at a minimum, boiler water level and steam flow.

(c) *Combustion control.* Automatic combustion control subsystems must provide—

(1) An air/fuel ratio which ensures complete combustion and stable flame with the fuel in use, under light off, steady state, and transient conditions; and

(2) Stable boiler steam pressure and outlet temperatures under steady state and transient load conditions; and

(3) A low fire interlock to prevent high firing rates and superheater damage during boiler warm up.

(d) *Programming control.* The programming control must provide a programmed sequence of interlocks for the safe ignition and normal shutdown of the boiler burners. The programming control must prevent ignition if unsafe conditions exist and must include the following minimum sequence of events and interlocks:

(1) *Prepurge.* Boilers must undergo a continuous purge of the combustion

chamber and convecting spaces to make sure of a minimum of 5 changes of air. The purge must not be less than 15 seconds in duration, and must occur immediately prior to the trial for ignition of the initial burner of a boiler. All registers and dampers must be open and an air flow of at least 25 percent of the full load volumetric air flow must be proven before the purge period commences. The prepurge must be complete before trial for ignition of the initial burner.

(2) *Trial for ignition and ignition.* (i) Only one burner per boiler is to be in trial for ignition at any time.

(ii) Total boiler air flow during light off must be sufficient to prevent pocketing and explosive accumulations of combustible gases.

(iii) The burner igniter must be in position and proven energized before admission of fuel to the boiler. The igniter must remain energized until the burner flame is established and stable, or until the trial for ignition period ends.

(iv) The trial for ignition period must be as short as practical for the specific installation, but must not exceed 15 seconds.

(v) Failure of the burner to ignite during a trial for ignition must automatically actuate the burner safety trip controls.

(3) *Post-purge.* (i) Immediately after normal shutdown of the boiler, an automatic purge of the boiler equal to the volume and duration of the prepurge must occur.

(ii) Following boiler safety trip control operation, the air flow to the boiler must not automatically increase. Post purge in such cases must be under manual control.

(e) *Burner fuel oil valves.* Each burner must be provided with a valve that is—

(1) Automatically closed by the burner or boiler safety trip control system; and

(2) Operated by the programming control or combustion control subsystems, as applicable.

(f) *Master fuel oil valves.* Each boiler must be provided with a master fuel oil valve to stop fuel to the boiler automatically upon actuation by the boiler safety trip control system.

(g) *Valve closure time.* The valves described in paragraphs (e) and (f) of this section must close within 4 seconds of automatic detection of unsafe trip conditions.

(h) *Burner safety trip control system.*

(1) Each burner must be provided with at least one flame detector.

(2) The burner valve must automatically close when—

(i) Loss of burner flame occurs;



(ii) Actuated by the boiler safety trip control system;

(iii) The burner is not properly seated or in place; or

(iv) Trial for ignition fails, if a programming control is provided.

(i) *Boiler safety trip control system.* (1) Each boiler must be provided with a safety trip control system that automatically closes the master and all burner fuel oil valves upon—

(i) Boiler low-low water level;

(ii) Inadequate boiler air flow to support complete combustion;

(iii) Loss of boiler control power;

(iv) Manual safety trip operation; or

(v) Loss of flame at all burners.

(2) The low-low water level safety trip control must account for normal vessel motions and operating transients.

**§ 62.35–35 Starting systems for internal-combustion engines.**

The starting systems for propulsion engines and for prime movers of ships' service generators required to start automatically must meet sections 4–6–5/9.5 and 4–8–2/11.11 of the ABS Marine Vessel Rules (incorporated by reference; see § 62.05–1).

**§ 62.35–40 Fuel systems.**

(a) *Level alarms.* Where high or low fuel tank level alarms are required, they must be located to allow the operator adequate time to prevent an unsafe condition.

(b) *Coal fuels.* (1) Controls and instrumentation for coal systems require

special consideration by the Commandant.

(2) Interlocks must be provided to ensure a safe transfer of machinery operation from one fuel to another.

(c) *Automatic fuel heating.* Automatic fuel heating must meet section 4–9–3/15.1 of the ABS Marine Vessel Rules (incorporated by reference; see § 62.05–1).

(d) *Overflow prevention.* Fuel oil day tanks, settlers, and similar fuel oil service tanks that are filled automatically or by remote control must be provided with a high-level alarm that annunciates in the machinery spaces and either an automatic safety trip control or an overflow arrangement.

**§ 62.35–50 Tabulated monitoring and safety control requirements for specific systems.**

The minimum instrumentation, alarms, and safety controls required for specific types of systems are listed in table 1 to § 62.35–50. The ABS Marine Vessel Rules (incorporated by reference; see § 62.05–2) required for engineering systems are also listed in table 1 to § 62.35–50.

(a) Safety limit controls must be provided in navigating bridge primary propulsion control systems. See § 62.35–5(c).

(b) Safety trip controls and alarms must be provided for all main boilers, regardless of mode of operation. See § 62.35–20(a).

(c) Loss of forced lubrication safety trip controls must be provided for main

propulsion turbines and main propulsion diesel engines.

(d) Override of overspeed and loss of forced lubrication pressure safety trip controls must not be provided for main propulsion or generator steam or gas turbines, or diesel engines. See § 62.35–5(e)(2).

(e) Transfer interlocks must be provided for main propulsion systems capable of remote and local control.

(f) Semiconductor controlled rectifiers must have current limit controls.

(g) Interlocks must be provided to prevent the starting of engines or turbines while the jacking or turning gear, if installed, is engaged. See § 62.25–5(a).

(h) Main and remote-control stations, including the navigational bridge, must provide visual and audible alarms in the event of a fire in the main machinery space.

(i) Minimally attended and periodically unattended machinery plants must be provided with a personnel alarm that annunciates on the bridge if not acknowledged by the watch engineer. See § 62.50–20(b)(1).

(j) All automatic controls and alarms must be failsafe to the least critical consequence for the particular system. See § 62.30–1.

(k) The operating or tripped status of vital auxiliary boilers must be indicated at the ECC. See part 63 of this subchapter.

TABLE 1 TO § 62.35–50—MINIMUM SYSTEM MONITORING AND SAFETY CONTROL REQUIREMENTS FOR SPECIFIC SYSTEMS

System	Service	Instrumentation	Alarm	Safety control	See also paragraph
Main (Propulsion) boiler .....	ABS Marine Vessel Rules Part 4–9–6 tables 1A, 1B and 5A.	ABS Marine Vessel Rules Part 4–9–6 tables 1A, 1B and 5A.	ABS Marine Vessel Rules Part 4–9–6 tables 1A, 1B and 5A.	.....	(a)
	Burner seating .....	.....	Failure .....	Burner auto trip .....	(b)
	Trial for ignition .....	Status .....	Failure .....	Burner auto trip .....	(b)
Main (Propulsion steam) turbine.	Low fire interlock .....	Status.	.....	Manual trip .....	(c), (d)
	Program control interlock ..	Status.	.....	Manual trip .....	(c), (d)
Main propulsion, diesel .....	ABS Marine Vessel Rules Part 4–9–6 tables 1A, 1B and 5A.	ABS Marine Vessel Rules Part 4–9–6 tables 1A, 1B and 5A.	ABS Marine Vessel Rules Part 4–9–6 tables 1A, 1B and 5A.	.....	(c), (d)
	.....	.....	Failure .....	Manual trip.	
Main propulsion, remote control.	Auto safety trip override ....	.....	Activated.	.....	
	Starting power .....	Pressure (voltage) .....	Low .....	Limit .....	(a)
	Location in control .....	Status .....	Override .....	.....	(c)
	Shaft speed/direction/pitch	See § 113.37 of this chapter..	See § 113.37 of this chapter..	See § 113.37 of this chapter..	
Main propulsion, electric <sup>(1)</sup> ..	Clutch fluid .....	Pressure .....	Low.	.....	
	ABS Marine Vessel Rules Part 4–9–6, tables 4A and 4B.	ABS Marine Vessel Rules Part 4–9–6, tables 4A and 4B.	ABS Marine Vessel Rules Part 4–9–6, tables 4A and 4B.	ABS Marine Vessel Rules Part 4–9–6, tables 4A and 4B.	(f)
Main propulsion, shafting .....	Stern tube oil tank level .....	.....	Low.	.....	
	Line shaft bearing .....	Temperature .....	High.	.....	
Main propulsion, controllable pitch propeller.	Forced lubrication Pressure	.....	Low.	.....	
	Hydraulic oil .....	Pressure .....	High, Low.	.....	
		Temperature .....	High.	.....	

TABLE 1 TO § 62.35–50—MINIMUM SYSTEM MONITORING AND SAFETY CONTROL REQUIREMENTS FOR SPECIFIC SYSTEMS—Continued

System	Service	Instrumentation	Alarm	Safety control	See also paragraph
Generators .....	Ship service .....	ABS Marine Vessel Rules Part 4–9–6, table 6. Starting pressure/voltage ...	ABS Marine Vessel Rules Part 4–9–6, table 6. Low. Tripped.		
	Emergency <sup>2</sup> . Turbogenerator .....	ABS Marine Vessel Rules Part 4–9–6, table 6.	ABS Marine Vessel Rules Part 4–9–6, table 6.	ABS Marine Vessel Rules Part 4–9–6, table 6. Manual trip.	(d)
	Diesel .....	ABS Marine Vessel Rules Part 4–9–6, table 6.	ABS Marine Vessel Rules Part 4–9–6, table 6.	ABS Marine Vessel Rules Part 4–9–6, table 6. Manual trip.	(d)
Auxiliary boiler .....		Run .....	Trip .....		(k)
Gas turbine <sup>3</sup> .....	ABS Marine Vessel Rules Part 4–9–6, Tables 3 and 6.	ABS Marine Vessel Rules Part 4–9–6, Tables 3 and 6.	ABS Marine Vessel Rules Part 4–9–6, Tables 3 and 6.	ABS Marine Vessel Rules Part 4–9–6, Tables 3 and 6.	(d)
Engines and turbines .....	Jacking/turning gear .....	Engaged .....			(g)
Fuel oil .....	ABS Marine Vessel Rules Part 4–9–6, tables 5A and 6.	ABS Marine Vessel Rules Part 4–9–6, tables 5A and 6.	ABS Marine Vessel Rules Part 4–9–6, tables 5A and 6.		
	Remote/auto fill level .....		High .....	Auto trip or overflow arrangement.	
Bilge .....	Hi. press. leakage level ....		High.		
	Pump remote control .....	Run.			
	Pump auto control .....	Run .....	Excessive operations. High/location.		
Machinery space Class 3 (power-operated) watertight doors.		Open/closed.			
Fire detection .....	Machinery spaces .....		Space on fire .....		(h)
Fire main .....		Pressure .....	Low.		
Personnel .....	Deadman .....		Fail to acknowledge .....		(i)
General, control and alarm systems.	Power supply .....	Available (pressure) .....	Failure (low).		
	System function .....		Failure .....		(j)
	Console air conditioning ....		Failure.		
	Built in test equipment .....	Active.			
	Sequential interlock .....	Activated.			
Redundant auxiliary, system, power supply.	Safety control .....		Activated .....	Auto trip/limit .....	(j)
		Status .....	Auto transfer.		

<sup>1</sup> See subparts 111.33 and 111.35 of this chapter.  
<sup>2</sup> See subparts 112.45 and 112.50 of this chapter.  
<sup>3</sup> See § 58.10–15(f) of this subchapter.

**Subpart 62.50—Automated Self-propelled Vessel Manning**

- 83. Amend § 62.50–1 as follows:
  - a. Designate the note immediately following paragraph (b)(5) as note 1 to paragraph (b)(5); and
  - b. Revise paragraph (c).  
The revision reads as follows:

**§ 62.50–1 General.**  
\* \* \* \* \*

(c) Equipment provided to replace specific personnel or to reduce overall crew requirements that proves unsafe or unreliable in the judgment of the cognizant Officer in Charge, Marine Inspection, must be replaced or repaired or vessel manning will be modified to compensate for the equipment inadequacy.

**§ 62.50–20 [Amended]**

- 84. Amend § 62.50–20 as follows:
  - a. Designate the note preceding paragraph (a) as note 1 to § 62.50–20;

- b. Designate the note immediately following paragraph (a)(4) as note 2 to paragraph (a)(4);
- c. Remove the note immediately following paragraph (c);
- d. Revise paragraphs (e) (g)(2), and (h)(3) to read as follows:

**§ 62.50–20 Additional requirements for minimally attended machinery plants.**  
\* \* \* \* \*

(e) *Flooding safety.* (1) Machinery space bilges, bilge wells, shaft alley bilges, and other minimally attended locations where liquids might accumulate must be monitored from the ECC to detect flooding angles from vertical of up to 15° heel and 5° trim.

(2) The ECC must include the controls necessary to bring at least one independent bilge pump and independent bilge suction required by § 56.50–50(e) of this subchapter into operation to counter flooding.

(3) Where watertight doors in subdivision bulkheads are required in the machinery spaces, they must be

Class 3 watertight doors and must be controllable from the ECC and the required navigating bridge control location.

(4) Controls must be provided to operate the sea inlet and discharge valves required by § 56.50–95(d) of this subchapter and the emergency bilge suction required by § 56.50–50(f) of this subchapter. These controls must be arranged to allow time for operation in the event of flooding with the vessel in the fully loaded condition. Time considerations must include detection, crew response, and control operation time.

\* \* \* \* \*  
(g) \* \* \*

(2) The main distribution and propulsion switchboards and generator controls must either be located at the ECC, if the ECC is within the boundaries of the main machinery space, or the controls and instrumentation required by part 111 of this chapter must be duplicated at the ECC. Controls at the

switchboard must be able to override those at the ECC, if separate. Also see §§ 111.12–11(g) and 111.30–1 of this chapter regarding switchboard location.

(h) \* \* \*

(3) Maintenance and repair manuals must include details as to what, when, and how to troubleshoot, repair and test the installed equipment and what parts are necessary to accomplish the procedures. Schematic and logic diagrams required by § 62.20–1 of this part must be included in this documentation.

■ 85. Amend § 62.50–30 as follows:

■ a. Designate the note preceding paragraph (a) as note 1 to § 62.50–30; and

■ b. Revise paragraphs (a), (c), (d), (h), (i), and (k) to read as follows:

**§ 62.50–30 Additional requirements for periodically unattended machinery plants.**

\* \* \* \* \*

(a) *General.* The requirements of this section must be met in addition to those of § 62.50–20.

\* \* \* \* \*

(c) *Fuel systems.* Each system for the service or treatment of fuel must meet section 4–6–4/13.5 of the ABS Marine Vessel Rules (incorporated by reference; see § 62.05–1).

(d) *Starting systems.* Automatic or remote starting system receivers, accumulators, and batteries must be automatically charged.

\* \* \* \* \*

(h) *Fire control station.* A control station for fire protection of the machinery spaces must be provided outside the machinery spaces. At least one access to this station must be independent of category A machinery spaces, and any boundary shared with these spaces must have an A–60 fire classification as defined in subpart 72.05 of this chapter. The number of control and monitoring cables and piping for the station that adjoin or penetrate the boundaries of a category A machinery space, uptakes, or casings must be minimized. The fire control station must include—

(1) Annunciation of which machinery space is on fire;

(2) Control of a fire pump required by this chapter to be independent of the main machinery spaces;

(3) Controls for machinery space fixed gas fire extinguishing systems;

(4) Control of oil piping positive shutoff valves located in the machinery spaces and required by § 56.50–60(d) of this subchapter;

(5) Controls for machinery space fire door holding and release systems, skylights and similar openings;

(6) The remote stopping systems for the machinery listed in § 111.103 of this chapter; and

(7) Voice communications with the bridge.

(i) *Oil leakage.* Leakages from high-pressure fuel oil pipes must be collected and high levels must be alarmed at the ECC.

\* \* \* \* \*

(k) *Continuity of electrical power.* The electrical plant must meet sections 4–8–2/3.11 and 4.8.2/9.9 of the ABS Marine Vessel Rules, and must:

(1) Not use the emergency generator for this purpose;

(2) Restore power in not more than 30 seconds; and

(3) Account for loads permitted by § 111.70–3(f) of this chapter to automatically restart.

**PART 63—AUTOMATIC AUXILIARY BOILERS**

■ 86. The authority citation for part 63 is revised to read as follows:

**Authority:** 46 U.S.C. 3306, 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3.

■ 87. Amend § 63.01–3 by revising paragraphs (a)(1) and (b) to read as follows:

**§ 63.01–3 Scope and applicability.**

(a) \* \* \*

(1) Automatic auxiliary boilers listed in table 1 to § 54.01–5 of this subchapter which reference this part for regulation of their automatic controls.

\* \* \* \* \*

(b) Automatic boilers having heat input ratings of 12,500,000 Btu/hr. (3.66 megawatts) and above must meet the requirements of part 52 of this subchapter. Their control systems must meet the requirements of part 62 of this subchapter.

■ 88. Revise § 63.05–1 to read as follows:

**§ 63.05–1 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 [ypeapproval@uscg.mil](mailto:ypeapproval@uscg.mil). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material may be obtained from the following sources:

(a) *American Society of Mechanical Engineers (ASME)*, Two Park Avenue, New York, NY 10016–5990; 800–843–2763; [CustomerCare@asme.org](mailto:CustomerCare@asme.org); [www.asme.org](http://www.asme.org).

(1) ASME CSD–1–2018, Controls and Safety Devices for Automatically Fired Boilers, issued October 12, 2018 (“ASME CSD–1”); IBR approved for §§ 63.10–1(b); 63.15–1(b); 63.20–1.

(2) [Reserved]

(b) *ASTM International (ASTM)*, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428–2959; 610–832–9500; [service@astm.org](mailto:service@astm.org); [www.astm.org](http://www.astm.org).

(1) ASTM F1323–14, Standard Specification for Shipboard Incinerators, approved November 1, 2014 (2001) (“ASTM F1323”); IBR approved for § 63.25–9(a).

(2) [Reserved]

(c) *Canadian Standards Association (CSA)*, CSA Group, 5060 Spectrum Way, Suite 100, Mississauga, ON, Canada L4W 5N6; 416–474–2233; [techsupport@csagroup.org](mailto:techsupport@csagroup.org); <https://shop.csa.ca>.

(1) ANSI Z21.22–2015/CSA 4.4–2015, Relief valves for hot water systems, July 2015 (“ANSI Z21.22”); IBR approved for § 63.25–3(a).

(2) [Reserved]

**Note 1 to paragraph (c):** CSA material also available from the American National Standards Institute (ANSI), 1899 L Street NW, 11th Floor, Washington, DC 20036; 202–293–8020; [info@ansi.org](mailto:info@ansi.org); [www.ansi.org](http://www.ansi.org).

(d) *International Maritime Organization (IMO)*, 4 Albert Embankment, London, SE1 7SR United Kingdom; +44 (0) 20 7735 7611; [sales@imo.org](mailto:sales@imo.org); [www.imo.org](http://www.imo.org).

(1) Resolution MEPC.76(40), Standard Specification for Shipboard Incinerators, September 25, 1997 (“IMO MEPC.76(40)”); IBR approved for § 63.25–9(a), (d), and (f).

(2) Resolution MEPC.244(66), 2014 Standard Specification for Shipboard Incinerators, adopted April 14, 2014 (“IMO MEPC.244(66)”); IBR approved for § 63.25–9(g).

(3) The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), Annexes I, II, III, and V, 1978 (“IMO MARPOL 73/78”); IBR approved for § 63.25–9(c).

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

(1) ISO 9096:2017(E), Stationary source emissions—Manual determination of mass concentration of particulate matter, Third Edition, September 1, 2017 (“ISO 9096”); IBR approved for § 63.25–9(f).

(2) ISO 10396:2007(E), Stationary source emissions—Sampling for the automated determination of gas emission concentrations for permanently-installed monitoring systems, Second Edition, February 1, 2007 (“ISO 10396”); IBR approved for § 63.25–9(f).

(3) ISO 13617:2019(E), Ships and Marine Technology—Shipboard Incinerators—Requirements, Third Edition, August 2019 (“ISO 13617”); IBR approved for § 63.25–9(a).

(f) *UL Solutions (UL)*, 333 Pfingsten Road, Northbrook, IL 60062; 847–272–8800; [www.ul.com](http://www.ul.com).

(1) UL 174, Standard for Safety, Household Electric Storage Tank Water Heaters, Eleventh Edition, dated April 29, 2004, including revisions through December 15, 2016 (“UL 174”); IBR approved for § 63.25–3(a) and (j).

(2) UL 296, Standard for Safety, Oil Burners, Eleventh Edition, dated February 24, 2017 (“UL 296”); IBR approved for § 63.15–5(c).

(3) UL 343, Standard for Safety, Pumps for Oil-Burning Appliances, Ninth Edition, dated December 17, 2008, including revisions through June 12, 2013 (“UL 343”); IBR approved for § 63.15–3(e).

(4) UL 1453, Standard for Safety, Electric Booster and Commercial Storage Tank Water Heaters, 6th Edition, dated March 29, 2016, including revisions through March 9, 2017 (“UL 1453”); IBR approved for § 63.25–3(a) and (j).

■ 89. Revise § 63.10–1 to read as follows:

**§ 63.10–1 Test procedures and certification report.**

Two copies of the items listed below must be provided, if submitted in printed format, to the Commanding Officer, Marine Safety Center, U.S. Coast Guard, 2703 Martin Luther King Jr. Ave SE, Washington, DC 20593. Alternatively, one copy may be transmitted by email to the Commanding Officer (MSC), at [msc@uscg.mil](mailto:msc@uscg.mil). Information for submitting documents electronically can be found at [www.uscg.mil/HQ/MSC](http://www.uscg.mil/HQ/MSC).

(a) Detailed instructions for operationally testing each automatic

auxiliary boiler, its controls, and safety devices.

(b) A certification report for each automatic auxiliary boiler that:

(1) Meets paragraph CG–510 of ASME CSD–1 (incorporated by reference, see § 63.05–1); and

(2) Certifies that each automatic auxiliary boiler, its controls, and safety devices comply with the additional requirements of this part.

■ 90. Revise and republish subparts 63.15 and 63.20 to read as follows:

**Subpart 63.15—General Requirements**

Sec.

63.15–1 General.

63.15–3 Fuel system.

63.15–5 Strainers.

63.15–7 Alarms.

63.15–9 Inspections and tests.

**Subpart 63.20—Additional Control System Requirements**

63.20–1 Specific control system requirements.d

**Subpart 63.15—General Requirements**

**§ 63.15–1 General.**

(a) Each automatic auxiliary boiler must be designed and constructed for its intended service according to the requirements of the parts referenced in table 1 to § 54.01–5 of this subchapter.

(b) Controls and safety devices for automatic auxiliary boilers must meet the applicable requirements of ASME CSD–1 (incorporated by reference, see § 63.05–1), except Paragraph CG–310.

(c) All devices and components of an automatic auxiliary boiler must satisfactorily operate within the marine environment. The boiler must satisfactorily operate with a momentary roll of 30°, a list of 15°, and a permanent trim of 5° with it installed in a position as specified by the manufacturer.

(d) An electrical control used to shut down the automatic auxiliary boiler must be installed in accordance with § 58.01–25 of this subchapter. This device must stop the fuel supply to the fuel burning equipment.

(e) Mercury tube actuated controls are prohibited from being installed and used on automatic auxiliary boilers.

**§ 63.15–3 Fuel system.**

(a) Firing of an automatic auxiliary boiler by natural gas is prohibited unless specifically approved by the Marine Safety Center.

(b) Heated heavy fuel oil may be used provided the heaters are equipped with a high temperature limiting device that shuts off the heating source at a temperature below the flashpoint of the oil and is manually reset. When a thermostatically-controlled electric oil

heater and a level device is used, it must meet the requirements of subpart 111.85 of this chapter.

**Note 1 to paragraph (b):** An auxiliary boiler may be safely ignited from the cold condition using unheated diesel or light fuel oil and subsequently shifted to heated heavy fuel.

(c) The fuel oil service pump and its piping system must be designed in accordance with § 56.50–65 of this subchapter. All materials must meet the requirements of subpart 56.60 of this subchapter. The use of cast iron or malleable iron is prohibited.

(d) The fuel oil service system (including the pump) must meet the pressure classification and design criteria found in table 1 to § 56.04–2 of this subchapter.

(e) When properly selected for the intended service, fuel pumps meeting the performance and test requirements of UL 343 (incorporated by reference, see § 63.05–1) meet the requirements of this section.

**§ 63.15–5 Strainers.**

(a) Strainers must be installed in the fuel supply line. Each strainer must be self-cleaning, fitted with a bypass, or be capable of being cleaned without interrupting the fuel oil supply.

(b) The strainer must not allow a quantity of air to be trapped inside which would affect the rate of fuel flow to the burner or reduce the effective area of the straining element.

(c) The strainer must meet the requirements for strainers found in UL 296 (incorporated by reference, see § 63.05–1) and the requirements for fluid conditioner fittings found in § 56.15–5 of this subchapter.

**§ 63.15–7 Alarms.**

(a) An audible alarm must automatically sound when a flame safety system shutdown occurs. A visible indicator must indicate that the shutdown was caused by the flame safety system.

(b) Means must be provided to silence the audible alarm. The visible indicators must require manual reset.

(c) For steam boilers, operation of the lower low water cutoff must automatically sound an audible alarm. A visual indicator must indicate that the shutdown was caused by low water.

(d) For a periodically unattended machinery space, the auxiliary boiler trip alarm required by table 1 to § 62.35–50 of this subchapter satisfies the requirements for the audible alarms specified in this section.

**§ 63.15–9 Inspections and tests.**

All automatic auxiliary boilers must be inspected and tested in accordance

with the requirements of part 61 of this subchapter.

**Subpart 63.20—Additional Control System Requirements**

**§ 63.20-1 Specific control system requirements.**

In addition to the requirements found in ASME CSD-1 (incorporated by reference; see § 63.05-1), the following requirements apply for specific control systems:

(a) *Primary safety control system.* Following emergency safety trip control operation, the air flow to the boiler must not automatically increase. For this condition, postpurge must be accomplished manually.

(b) *Combustion control system.* A low fire interlock must ensure low fire start when variable firing rates are used.

(c) *Water level controls and low water cutoff controls.* Water level controls must be constructed and located to minimize the effects of vessel roll and pitch. Float chamber low water cutoff controls using stuffing boxes to transmit the motion of the float from the chamber to the external switches are prohibited. No outlet connection other than pressure controls, water columns, drains, and steam gages may be installed on the float chamber or on the pipes connecting the float chamber to the boiler. The water inlet valve must not feed water into the boiler through the float chamber. The boiler feed piping must comply with the applicable requirements of § 56.50-30 of this subchapter.

**Subpart 63.25—Requirements for Specific Types of Automatic Auxiliary Boilers**

■ 91. Amend § 63.25-3 by revising paragraphs (a) through (c), (h), and (j) to read as follows:

(a) Electric hot water supply boilers that have a capacity not greater than 454 liters (120 U.S. gallons), a heat input rate not greater than 200,000 Btu/hr. (58.6 kilowatts), meet the requirements of UL 174 or UL 1453 (both incorporated by reference, see § 63.05-1), and are protected by the relief device(s) required in § 53.05-2 of this subchapter do not have to meet any other requirements of this section except the periodic testing required by paragraph (j) of this section. Electric hot water supply boilers that meet the requirements of UL 174 may have temperature-pressure relief valves that meet the requirements of ANSI Z21.22 (incorporated by reference, see 4 § 63.05-1) in lieu of subpart 53.05 of this subchapter.

(b) Each hot water supply boiler must be constructed in accordance with the applicable requirements of part 52 or part 53 of this subchapter.

(c) Branch circuit conductors for hot water supply boilers which have a capacity not greater than 454 liters (120 U.S. gallons) must have a current carrying capacity of not less than 125 percent of the current rating of the appliance. Branch circuit conductors for hot water supply boilers with capacities of more than 454 liters (120 U.S. gallons) must have a current carrying capacity of not less than 100 percent of the current rating of the appliance. Wiring materials and methods must comply with subpart 111.60 of this chapter. A hot water supply boiler having a current rating of more than 48 amperes and employing resistance type heating elements must have the heating elements on subdivided circuits. Each subdivided load, except for an electric hot water supply boiler employing a resistance type immersion electric heating element, must not exceed 48 amperes, and it must be protected at not more than 60 amperes. An electric hot water supply boiler employing a resistance type immersion electric heating element may be subdivided into circuits not exceeding 120 amperes and protected at not more than 150 amperes. Overcurrent protection devices must comply with subpart 111.50 of this chapter.

(h) Electric hot water supply boilers must have pressure and temperature relieving valves. The valve temperature setting must not be more than 99 °C (210 °F). The pressure relief setting must not be higher than the marked working pressure of the boiler. The pressure and temperature relief valves must meet subpart 53.05 of this subchapter. The pressure and temperature relief valves may be combined into a pressure-temperature relief valve.

(j) All electric hot water supply boilers must have their pressure relief devices tested as required by part 52 or part 53 of this subchapter, as applicable. Electric hot water supply boilers that meet the requirements of UL 174 or UL 1453 and have heating elements, temperature regulating controls, and temperature limiting controls are satisfactory for installation and service without further installation testing. All electric hot water supply boilers not meeting the requirements of UL 174 or UL 1453 must have their heating elements, temperature regulating controls, and temperature limiting

controls tested by the marine inspector at the time of installation.

**§ 63.25-5 [Amended]**

■ 92. Amend § 63.25-5(a) by removing the words “of this chapter” and adding, in their place, the words “of this subchapter”.

■ 93. Amend § 63.25-7 by revising paragraph (a) to read as follows:

**§ 63.25-7 Exhaust gas boilers.**

(a) *Construction.* An auxiliary exhaust gas boiler must meet the applicable construction requirements of part 52 or part 53 of this subchapter as determined from table 1 to § 54.01-5 of this subchapter.

\* \* \* \* \*

■ 94. Revise § 63.25-9 to read as follows:

**§ 63.25-9 Incinerators.**

(a) *General.* (1) Incinerators installed on or after March 26, 1998, must meet the requirements of IMO MEPC.76(40) (incorporated by reference; see § 63.05-1). Incinerators in compliance with ISO 13617 (incorporated by reference; see § 63.05-1), are considered to meet IMO MEPC.76(40). Incinerators in compliance with both ASTM F1323 (incorporated by reference; see § 63.05-1) and Annexes A1-A3 of IMO MEPC.76(40) are considered to meet IMO MEPC.76(40).

(2) An application for type approval of shipboard incinerators must be sent to the Commanding Officer, Marine Safety Center, U.S. Coast Guard, 2703 Martin Luther King Jr. Ave. SE, Washington, DC 20593, or it may be transmitted by email to the Commanding Officer (MSC), at [msc@uscg.mil](mailto:msc@uscg.mil).

(b) *Testing.* Before type approval is granted, the manufacturer must submit evidence that tests have been conducted by an independent third party acceptable to the Commandant (CG-ENG). Testing may be conducted at the manufacturer’s facility. The independent third party must:

- (1) Have experienced and qualified personnel to conduct the inspections and tests required by this section;
- (2) Have documented proof of the qualifications to perform the inspections and tests required by this section; and
- (3) Not be owned or controlled by a manufacturer, supplier, or vendor of shipboard incinerators.

(c) *Prohibited substances.* Shipboard incineration of the following substances is prohibited:

- (1) Annex I, II, and III cargo residues of IMO MARPOL 73/78 (incorporated by reference; see § 63.05-1) and related contaminated packing materials.

(2) Polychlorinated biphenyls (PCBs).  
 (3) Garbage, as defined in Annex V of IMO MARPOL 73/78, containing more than traces of heavy metals.

(4) Refined petroleum products containing halogen compounds.

(d) *Operating manual.* Each ship with an incinerator subject to this rule must possess a manufacturer's operating manual, which must specify how to operate the incinerator within the limits described in Annex A1.5 of IMO MEPC.76(40).

(e) *Training.* Each person responsible for operating any incinerator must be trained and be capable of implementing the guidance provided in the manufacturer's operating manual.

(f) *Acceptable methods and standards for testing emissions.* The methods and standards for testing emissions that the laboratory may use in determining emissions-related information described in Annex A1.5 of IMO MEPC.76(40) are:

(1) 40 CFR part 60 Appendix A, Method 1—Sample and velocity traverses for stationary sources;

(2) 40 CFR part 60 Appendix A, Method 3A—Determination of oxygen and carbon dioxide concentrations in emissions from stationary sources (instrumental-analyzer procedure);

(3) 40 CFR part 60 Appendix A, Method 5—Determination of particulate emissions from stationary sources;

(4) 40 CFR part 60 Appendix A, Method 9—Visual determination of the opacity of emissions from stationary sources;

(5) 40 CFR part 60 Appendix A, Method 10—Determination of carbon-monoxide emissions from stationary sources;

(6) ISO 9096 (incorporated by reference; see § 63.05–1); and

(7) ISO 10396 (incorporated by reference; see § 63.05–1).

(g) Incinerators designed and tested to meet the requirements of IMO MEPC.244(66) (incorporated by reference; see § 63.05–1) are considered equivalent to the requirements of this section and may receive U.S. Coast Guard type approval.

## PART 64—MARINE PORTABLE TANKS AND CARGO HANDLING SYSTEMS

■ 95. The authority citation for part 64 is revised to read as follows:

**Authority:** 46 U.S.C. 3306, 3703; 49 U.S.C. App. 1804; Department of Homeland Security Delegation No. 00170.1, Revision No. 01.3.

■ 96. Revise § 64.2 to read as follows:

### § 64.2 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 [typapproval@uscg.mil](mailto:typapproval@uscg.mil). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material may be obtained from: *American Society of Mechanical Engineers (ASME)*, Two Park Avenue, New York, NY 10016–5990; 800–843–2763; [CustomerCare@asme.org](mailto:CustomerCare@asme.org); [www.asme.org](http://www.asme.org).

(a) ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, Pressure Vessels, 1989, with Addenda issued December 31, 1989 (“Section VIII of the ASME BPVC”); IBR approved for §§ 64.5(d); 64.11(a); 64.13; 64.21; 64.25(b); 64.31.

(b) [Reserved]

■ 97. In § 64.5 revise paragraph (d) to read as follows:

### § 64.5 Definitions.

\* \* \* \* \*

(d) *Maximum allowable working pressure* means the maximum gauge pressure at the top of the tank in the operating position at 122 °F, equal to or greater than the total containment pressure as defined in paragraph (c) of this section. The maximum allowable working pressure is used in the calculation of the minimum thickness of each element of the tank, excluding the allowance for corrosion and the thickness for loadings other than pressure, as provided for in Section VIII of the ASME BPVC (incorporated by reference, see § 64.2).

\* \* \* \* \*

■ 98. Amend § 64.9 by revising paragraph (d) to read as follows:

### § 64.9 Maintenance, repair, and alteration of MPTs.

\* \* \* \* \*

(d) After each welded repair or alteration, an MPT must be hydrostatically pressure-tested in accordance with § 64.83(a).

■ 99. Amend § 64.11 by revising paragraph (a) to read as follows:

### § 64.11 Design of MPTs.

\* \* \* \* \*

(a) In accordance with Section VIII of the ASME BPVC (incorporated by reference; see § 64.2) and this subpart;

\* \* \* \* \*

■ 100. Revise § 64.13 to read as follows:

### § 64.13 Allowable stress; tank.

(a) The calculated stress in the tank under design conditions, including dynamic loading conditions applied simultaneously, must not exceed the allowable stress listed in Section VIII of the ASME BPVC (incorporated by reference; see § 64.2), for a design temperature of 122 °F.

(b) The calculated stress in the tank at test pressure must not exceed 75 percent of the minimum yield stress, or 37.5 percent of the minimum tensile stress of the material, whichever is less.

**Note 1 to paragraph (b):** The minimum yield stress and minimum tensile stress are listed in Section VIII of the ASME BPVC.

■ 101. Revise § 64.21 to read as follows:

### § 64.21 Material.

The material for a tank must meet the requirements in Section VIII of the ASME BPVC (incorporated by reference; see § 64.2).

■ 102. Revise § 64.25 to read as follows:

### § 64.25 Cross section.

A tank must have a cross section design that is—

(a) Circular; or

(b) Other than circular and stress analyzed experimentally by the method contained in UG–101 of Section VIII of the ASME BPVC (incorporated by reference; see § 64.2).

■ 103. Revise § 64.31 to read as follows:

### § 64.31 Inspection opening.

An MPT must have an inspection opening that is designed in accordance with Section VIII of the ASME BPVC (incorporated by reference; see § 64.2).

■ 104. Revise and republish § 64.57 to read as follows:

### § 64.57 Acceptance of pressure relief devices.

A pressure relief device for an MPT must be—

(a) From a supplier accepted under chapter I of title 46, Code of Federal Regulations; or

**Note 1 to paragraph (a):** Accepted suppliers are listed in CG–190, *Equipment list*.

(b) Accepted by the Coast Guard in accordance with the procedures in § 50.25–10 of this subchapter.  
 ■ 105. Revise and republish § 64.63 to read as follows:

**§ 64.63 Minimum emergency venting capacity.**  
 (a) The total emergency venting capacity (Q) of the relief devices of an uninsulated MPT must be in accordance

with table 1 to § 64.63 or the following formula based upon the pressure relief device operating at a pressure not to exceed the test pressure:  
**Formula 1 to Paragraph (a)**

$$Q = 633,000 \left( \frac{A^{0.82}}{LC} \right) \sqrt{\frac{ZT}{M}}$$

Where:  
 Q = Minimum required rate of discharge in cubic feet per minute of free air at standard conditions (60 °F and 14.7 psia).  
 M = Molecular weight of the product, or 86.7.  
 T = Temperature, degrees Rankine (460° + temperature in °F of gas at relieving temperature), or 710 °R.  
 A = Total external surface area of the tank compartment in square feet.

L = Latent heat of the product being vaporized at relieving conditions in Btu per pound, or 144 Btu per pound.  
 Z = Compressibility factor of the gas at relieving conditions, or 1.0.  
 C = Constant based on relation of specific heats, equal to 315.  
 (b) The total emergency venting capacity (Q) of an insulated portable tank may have a reduction if—

- (1) It is shown to the Coast Guard that the insulation reduces the heat transmission to the tank;
- (2) The present reduction of the emergency venting capacity (Q) is limited to the percent reduction of the heat transmission to the tank or 50 percent, whichever is less; and
- (3) The insulation is sheathed.

TABLE 1 TO § 64.63—MINIMUM EMERGENCY VENTING CAPACITY IN CUBIC FEET: FREE AIR/HOUR  
 [14.7 lb/in<sup>2</sup>a and 60 °F]

Exposed area square feet <sup>1</sup>	Cubic feet free air per hour	Exposed area square feet <sup>1</sup>	Cubic feet free air per hour
20	27,600	275	237,000
30	38,500	300	256,000
40	48,600	350	289,500
50	58,600	400	322,100
60	67,700	450	355,900
70	77,000	500	391,000
80	85,500	550	417,500
90	94,800	600	450,000
100	104,000	650	479,000
120	121,000	700	512,000
140	136,200	750	540,000
160	152,100	800	569,000
180	168,200	850	597,000
200	184,000	900	621,000
225	199,000	950	656,000
250	219,500	1,000	685,000

<sup>1</sup> Interpolate for intermediate sizes.

■ 106. Revise and republish § 64.95 to read as follows:

**§ 64.95 Piping.**

- (a) Piping, valves, flanges, and fittings used in the pumping system must be designed in accordance with part 56 of this subchapter.
- (b) A cargo loading and discharge header or manifold must—
  - (1) Have stop valves to prevent cargo leakage; and
  - (2) Be visible to the operator at the cargo pump controls.

- (c) Each pipe and valve in the pumping system that has an open end must have a plug or cap to prevent leakage.
- (d) Each hose connection must be threaded or flanged except for a quick connect coupling that may be specifically accepted by the U.S. Coast Guard in accordance with the procedures in § 50.25–10 of this subchapter.
- (e) A non-return valve must be in the pump discharge if a backflow condition may occur during pumping.

(f) Any non-metallic flexible hose that is used in the piping system must comply with § 56.60–25(c) of this subchapter.

Dated: May 7, 2024.

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