holds no authority from this Commission. However, it is affiliated with YELLOWSTONE PARK LINES, INC., Post Office Box 65, Gardiner, Mont. 59030, which is authorized to operate as a *common carrier* in Montana. Application has been filed for temporary authority under section 210a(b).

TRANSFER APPLICATIONS UNDER SECTION 212(b) WHICH HAVE BEEN DESIGNATED FOR ORAL HEARING

MC-FC-70610. Authority sought by transferee, TRANSPORT VAN LINES, INC., 501 West 6th Street, Papillion, Nebr. 68046, for transfer of a portion of the operating rights of transferor, HOWARD McCONNELL, Hershey, Nebr. 69143. Applicants' representative: Robert J. Gallagher, 111 State Street, Boston, Mass. 02109. Portion of operating rights in certificate No. MC-18352 sought to be transferred; *Household goods*, between Hershey, Nebr., and points in Nebraska within 55 miles of Hershey, on the one hand, and, on the other, points in Colorado and Wyoming.

The above-entitled transfer application under section 212(b) of the Interstate Commerce Act is to be assigned for hearing at a time and place to be fixed for the purpose of determining whether transferee intends to engage in bona-fide motor carrier operations under the rights proposed for transfer herein, or whether transferee would acquire the said rights for the purpose of profiting from the resale thereof. Interested parties have 30 days from the date of this publication in which to file petitions for leave to intervene. Such petitions should state the reason or reasons for the intervention, where the petitioner wishes the hearing to be held, the number of witnesses it expects to present, and the estimated time required for presentation of its evidence.

No. MC-FC-70677. Authority sought for transferee, STANLAR CORP., doing business as NATIONAL SKI TOURS, 369 Lexington Avenue, New York, N.Y. 10017, to acquire the passenger broker license of transferor (CHARLES M. POST, doing business as POST SKI CLUB), 1323 Third Avenue, New York, N.Y. 10021. License No. MC-12586 sought to be transferred authorizes operations as a broker in the transportation of passengers and their baggage, in round trip all-expense ski tours, seasonally, beginning and ending at New York, N.Y., and extending to points in Connecticut, Massachusetts, New Hampshire, Vermont, and New York. Applicants' attorney: Samuel B. Zinder, 160-16 Jamaica Avenue, Jamaica, N.Y. 11432.

The above-entitled proceeding is to be assigned for hearing at a time and place to be fixed for the purpose of determining whether, inter alia, transferee is fit, willing, and able to perform the duties authorized by the license in question, as required by the rules governing transfers of passenger brokers' licenses (49 C.F.R. 1133.1). Interested persons have 30 days from the date of this publication in which to file petitions for leave to intervene. Such petitions should state the reason or reasons for the intervention, the place where petitioner wishes the hearing to be held, the number of witnesses petitioner expects to present, and the estimated time for presentation of its evidence.

MC-FC-70692. Authority sought by transferee, CITY EXPRESS, INC., 102 Wren Drive, North Huntingdon Township, Westmoreland County, Pa. 15642, for transfer of the operating rights of transferor, EDWARD ZURCHER CO., INC., Wilkinsburg, Pa. 15221. Transferee's representative: Dante G. Bertani, 35 West Pittsburgh Street, Greensburg, Pa. 15601.

The above-entitled application under section 212(b) of the Interstate Commerce Act is to be assigned for hearing at a time and place to be fixed for the purpose of determining, among other things, whether transferee may be controlled by, or under common control with, Quinn Freight Lines, Inc., a class 1 motor carrier subject to Part II of the Act. Interested parties have 30 days from the date of this publication in which to file petitions for leave to intervene. Such petitions should state the reason or reasons for the intervention, where the petitioner wishes the hearing to be held, the number of witnesses it expects to present, and the estimated time required for presentation of its evidence.

MC-FC-70707. Authority sought by transferee, DIANE M. McINTEER, 6402 North Bellefontaine, Kansas City, Mo. 64119, for transfer of the operating rights of transfer, WILLIAMS TRANSFER, INC., 101 Burlington, North Kansas City, Mo. 64116. Transferee's and transferor's representative, Charles A. Darby, 1215 Commerce Building, Kansas City, Mo. 64106. Operating rights in certificate No. MC-3790 (Sub-No. 5) sought to be transferred over regular routes of *Livestock*, from Arley, Mo., to Kansas City, Kans., serving the intermediate point of Kansas City, Mo., restricted to delivery only; and intermediate and off-route points within 10 miles of Arley, restricted to pick-up only; and general commodities, with the usual exceptions from Kansas City, Kans., to Arley, Mo., serving the intermediate point of Kansas City, Mo., restricted to pick-up only; and to intermediate and off-route points within 10 miles of Arley, restricted to delivery only.

The above-entitled transfer application under section 212(b) of the Interstate Commerce Act is to be assigned for hearing at a time and place to be fixed for the purpose of determining whether transferee, under § 1132.3 of the rules and regulations governing Transfer of Operating Rights, is fit to acquire the rights proposed for transfer, and whether, under § 1132.5(b) of the same rules and regulations, the subject rights are dormant and susceptible of transfer.

By the Commission.

[SEAL] H. NEIL GARSON, *Secretary.*

[F.R. Doc. 68-15049; Filed, Dec. 17, 1968; 8:47 a.m.]

[Notice 529]

MOTOR CARRIER ALTERNATE ROUTE DEVIATION NOTICES

DECEMBER 13, 1968.

The following letter-notices of proposals to operate over deviation routes for operating convenience only have been filed with the Interstate Commerce Commission, under the Commission's Deviation Rules Revised, 1957 (49 CFR 211.1(c)(8)) and notice thereof to all interested persons is hereby given as provided in such rules (49 CFR 211.1(d)(4)).

Protests against the use of any proposed deviation route herein described may be filed with the Interstate Commerce Commission in the manner and form provided in such rules (49 CFR 211.1(e)) at any time, but will not operate to stay commencement of the proposed operations unless filed within 30 days from the date of publication.

Successively filed letter-notices of the same carrier under the Commission's Deviation Rules Revised, 1957, will be numbered consecutively for convenience in identification and protests if any should refer to such letter-notices by number.

MOTOR CARRIERS OF PROPERTY

No. MC 703 (Deviation No. 2), HINCHCLIFF MOTOR SERVICE, INC., 3400 South Pulaski Road, Chicago, Ill. 60623, filed December 5, 1968. Carrier's representative: Charles W. Singer, 33 North Dearborn Street, Chicago, Ill. 60602. Carrier proposes to operate as a *common carrier*, by motor vehicle of *general commodities*, with certain exceptions, over a deviation route as follows: From Chicago, Ill., over Interstate Highway 90 to junction Interstate Highway 80-90, thence over Interstate Highway 80-90 to junction U.S. Highway 42 near Strongville, Ohio, thence over U.S. Highway 42 to Cleveland, Ohio (also from Chicago over the above-described route to junction U.S. Highway 21 near Richfield, Ohio, thence over U.S. Highway 21 to Cleveland), and return over the same routes, for operating convenience only. The notice indicates that the carrier is presently authorized to transport the same commodities, over a pertinent service route as follows: From Chicago, Ill., over U.S. Highway 41 to junction U.S. Highway 30, thence over U.S. Highway 30 to Delphos, Ohio, thence over U.S. Highway 30N to Mansfield, Ohio, thence over U.S. Highway 42 to Cleveland, Ohio (also from Chicago over U.S. Highway 41 to junction U.S. Highway 6, thence over U.S. Highway 6 to Fremont, Ohio, thence over U.S. Highway 20 to Cleveland), and return over the same routes.

No. MC 69281 (Deviation No. 7), THE DAVIDSON TRANSFER & STORAGE CO., 6201 Pulaski Highway, Post Office Box 58, Baltimore, Md. 21203, filed December 6, 1968. Carrier proposes to operate as a *common carrier*, by motor vehicle, of *general commodities*, with certain exceptions, over a deviation route

as follows: From junction U.S. Highway 13 and Delaware Highway 141, over Delaware Highway 141 to junction Interstate Highway 95, thence over Interstate Highway 95 to Sellers Avenue in Ridley Park, Pa., thence over Sellers Avenue to junction Pennsylvania Highway 291, thence over Pennsylvania Highway 291 to Philadelphia, Pa., and return over the same route, for operating convenience only. The notice indicates that the carrier is presently authorized to transport the same commodities, over a pertinent service route as follows: From State Road, Del., over U.S. Highway 13 to Philadelphia, Pa., thence over U.S. Highway 1 to Elizabeth, N.J., and return over the same route.

No. MC 70083 (Deviation No. 1), DRAKE MOTOR LINES, INC., 20 Olney Avenue, Cherry Hill Industrial Park, Cherry Hill, N.J., 08034, filed December 5, 1968. Carrier proposes to operate as a *common carrier*, by motor vehicle, of *such commodities*, as are dealt in by retail department stores, over deviation routes as follows: (1) From its terminal in Cherry Hill, N.J., over unnumbered highway (known as Springdale Road) for a distance of 1 mile to junction New Jersey Highway 73, thence over New Jersey Highway 73 to junction New Jersey Turnpike, Interchange No. 4, thence over the New Jersey Turnpike to Exit No. 16, the approach roads to the Lincoln Tunnel, thence through the Lincoln Tunnel to New York, N.Y. (also from Exit 14 of the New Jersey Turnpike, through the Holland Tunnel to New York, N.Y.) (also from Exit No. 16 of the New Jersey Turnpike over the New Jersey Turnpike to Exit No. 18, thence over U.S. Highway 46 and the George Washington Bridge to New York, N.Y.), (2) from junction U.S. Highway 1 and New Jersey Highway 18, over New Jersey Highway 18 to Interchange No. 9 of the New Jersey Turnpike, thence over the New Jersey Turnpike to exits Nos. 14, Holland Tunnel, exit No. 16, Lincoln Tunnel, and exit No. 18, the George Washington Bridge, thence through the Holland Tunnel, Lincoln Tunnel or the George Washington Bridge to New York, N.Y., (3) from its terminal in Cherry Hill, N.J., over unnumbered highway (known as Springdale Road) a distance of 1 mile to junction New Jersey Highway 73, thence over New Jersey Highway 73 to junction New Jersey Turnpike at Interchange No. 4, thence over the New Jersey Turnpike to junction Interstate Highway 295, thence over Interstate Highway 295 across the Delaware Memorial Bridge to junction U.S. Highway 13, thence over U.S. Highway 13 (also Alternate U.S. Highway 13) to Wilmington, Del., and return over the same routes, for operating convenience only. The notice indicates that the carrier is presently authorized to transport the same commodities, over pertinent service routes as follows: (1) From Philadelphia, Pa., over U.S. Highway 1 to New York, N.Y., (2) from Philadelphia, Pa., over U.S. Highway 130 to junction U.S. Highway 1, (3) from Trenton, N.J., over U.S. Highway 206 to junction U.S. Highway 130, (4) from Burlington, N.J., over New Jersey Highway 413 across the Burlington-Bristol Bridge to junction Pennsylvania Highway 413, thence over Pennsylvania Highway 413 to junction U.S. Highway 13 at or near Bristol, Pa., thence over U.S. Highway 13 to Philadelphia, Pa., and (5) from Philadelphia, Pa., over U.S. Highway 1 to junction U.S. Highway 202, thence over U.S. Highway 202 to Wilmington, Del. (also from Philadelphia over city streets across the Delaware River to Camden, N.J., thence over New Jersey Highway 42 to junction U.S. Highway 130, thence over U.S. Highway 130 to junction U.S. Highway 40, thence over U.S. Highway 40 across the Delaware Memorial Bridge to junction U.S. Highway 13, thence over U.S. Highway 13 to Wilmington, Del., and return over the same routes).

No. MC 106943 (Deviation No. 31), EASTERN EXPRESS, INC., 1450 Wabash Avenue, Terre Haute, Ind. 47808, filed December 4, 1968. Carrier proposes to operate as a *common carrier*, by motor vehicle, of *general commodities*, with certain exceptions, over a deviation route as follows: From Cleveland, Ohio, over Interstate Highway 71 to junction Interstate Highway 70 at or near Columbus, Ohio, thence over Interstate Highway 70 to St. Louis, Mo., and return over the same route, for operating convenience only. The notice indicates that the carrier is presently authorized to transport the same commodities, over a pertinent service route as follows: From Cleveland, Ohio, over U.S. Highway 42 to Cincinnati, Ohio, thence over U.S. Highway 50 to St. Louis, Mo., and return over the same route.

No. MC 106943 (Deviation No. 32), EASTERN EXPRESS, INC., 1450 Wabash Avenue, Terre Haute, Ind. 47808, filed December 4, 1968. Carrier proposes to operate as a *common carrier*, by motor vehicle, of *general commodities*, with certain exceptions, over a deviation route as follows: From St. Louis, Mo., over Interstate Highway 70 to junction Interstate Highway 270 (Columbus, Ohio By-Pass), thence over Interstate Highway 270 to junction Interstate Highway 71, thence over Interstate Highway 71 to junction Interstate Highway 80S, thence over Interstate Highway 80S to Akron, Ohio, and return over the same route, for operating convenience only. The notice indicates that the carrier is presently authorized to transport the same commodities, over a pertinent service route as follows: From St. Louis, Mo., over U.S. Highway 50 to Cincinnati, Ohio, thence over U.S. Highway 42 to Lodi, Ohio, thence over U.S. Highway 224 to Akron, Ohio, and return over the same route.

No. MC 107838 (Deviation No. 1), H. & S. MOTOR FREIGHT, INC., Sixth and Maple Streets, Eldon, Mo. 65026, filed December 4, 1968. Carrier's representative: Herman W. Huber, 101 East High Street, Jefferson City, Mo. 65101. Carrier proposes to operate as a *common carrier*, by motor vehicle, of *general commodities*, with certain exceptions, over a deviation route as follows: From Jefferson City, Mo., over U.S. Highway 54 to junction Interstate Highway 70, thence over Interstate Highway 70 to St. Louis, Mo., and return over the same route, for operating convenience only. The notice indicates that the carrier is presently authorized to transport the same commodities, over a pertinent service route as follows: From Kansas City, Kans., over U.S. Highway 50 to junction U.S. Highway 65, thence over U.S. Highway 65 to junction Missouri Highway 52, thence over Missouri Highway 52 to junction U.S. Highway 54, thence over U.S. Highway 54 to junction U.S. Highway 50, thence over U.S. Highway 50 to junction U.S. Highway 66, thence over U.S. Highway 66 to East St. Louis, Ill., and return over the same route.

MOTOR CARRIERS OF PASSENGERS

No. MC 1515 (Deviation No. 493) (Cancels Deviation No. 195), GREYHOUND LINES, INC. (Southern Division), 219 East Short Street, Lexington, Ky. 40507, filed December 6, 1968. Carrier proposes to operate as a *common carrier*, by motor vehicle of *passengers and their baggage, and express* and *newspapers* in the same vehicle with passengers, over a deviation route as follows: From Fayetteville, N.C., over U.S. Highway 301 to junction Interstate Highway 95 at a point approximately 1 mile west of Hope Mills, N.C., thence over Interstate Highway 95 to junction U.S. Highway 301 southwest of Lumberton, N.C., thence over U.S. Highway 301 to Dillon, S.C., thence over South Carolina Highway 34 to junction Interstate Highway 95, thence over Interstate Highway 95 to junction U.S. Highway 378 west of Tubeville, S.C., thence over U.S. Highway 378 to Sumter, S.C., and return over the same route, for operating convenience only. The notice indicates that the carrier is presently authorized to transport passengers and the same property, over pertinent service routes as follows: (1) From Raleigh, N.C., over U.S. Highway 401 to Laurinburg, N.C., thence over U.S. Highway 15 to Society Hill, S.C., thence over U.S. Highway 52 to Charleston, S.C., and (2) from Florence, S.C., over U.S. Highway 76 to Sumter, S.C., and return over the same routes.

No. MC 2866 (Deviation No. 9), EDWARDS MOTOR TRANSIT COMPANY, 56 East Third Street, Williamsport, Pa. 17701, filed December 6, 1968. Carrier's representative: Gavin W. O'Brine, 2000 L Street NW., Washington, D.C. 20036. Carrier proposes to operate as a *common carrier*, by motor vehicle, of *passengers and their baggage and express and newspapers* in the same vehicle with passengers, over deviation routes as follows: (1) From Youngstown, Ohio, over Ohio Highway 18 to junction Ohio Turnpike, Exit No. 15, near North Jackson, Ohio, thence over Ohio Turnpike to junction U.S. Highway 21, Exit No. 11, thence over U.S. Highway 21 to Cleveland, Ohio, with the following access route: From Warren, Ohio, over Ohio Highway 5 to junction Ohio Turnpike, Exit No. 14, near Braceville, Ohio; and (2) from junction U.S. Highway 62 and Ohio Highway 82, near Masbury, Ohio, over Ohio Highway 82 to Warren, Ohio, with the following access route: From junction Ohio Highway 82 and Ohio Highway 7 near Brookfield, Ohio, over Ohio Highway 7 to junction U.S. Highway 62 near Hubbard, Ohio,

and return over the same routes, for operating convenience only. The notice indicates that the carrier is presently authorized to transport passengers and the same property, over a pertinent service route as follows: From Oil City, Pa., over U.S. Highway 62 to Youngstown, Ohio, thence over U.S. Highway 422 to Cleveland, Ohio, and return over the same route.

By the Commission.

[SEAL] H. NEIL GARSON, *Secretary.*

[F.R. Doc. 68-15050; Filed, Dec. 17, 1968; 8:47 a.m.]

NOTICE OF FILING OF MOTOR CARRIER INTRASTATE APPLICATIONS

DECEMBER 13, 1968.

The following applications for motor common carrier authority to operate in intrastate commerce seek concurrent motor carrier authorization in interstate or foreign commerce within the limits of the intrastate authority sought, pursuant to section 206(a)(6) of the Interstate Commerce Act, as amended October 15, 1962. These applications are governed by § 1.245 of the Commission's rules of practice, published in the FEDERAL REGISTER, issue of April 11, 1963, page 3533, which provides, among other things, that protests and requests for information concerning the time and place of State Commission hearings or other proceedings, any subsequent changes therein, and any other related matters shall be directed to the State Commission with which the application is filed and shall not be addressed to or filed with the Interstate Commerce Commission.

State Docket No. (not given), filed October 9, 1968. Applicant: A.C.M.E., INC., 425 South Summit Street, Arkansas City, Kans. 67005. Certificate of public convenience and necessity sought to operate a freight service as follows: Transportation of *general commodities*, between Arkansas City, Kans., and Pittsburg, Kans., from Arkansas City, Kans., in an easterly direction over U.S. Highway 166 to Coffeyville, Kans.; thence north over U.S. Highway 169 to a point approximately 3 miles south of Morehead, Kans.; thence over U.S. Highway 160 to its intersection with U.S. Highway 69; thence north over said U.S. Highway 69 to Pittsburgh, Kans., and return over the same route, with service to all intermediate points, also between all points and places within a 15-mile radius of Arkansas City, Kans., as off-route points in connection with carrier's regular route operations, also between all points and places within a 15-mile radius of Coffeyville, Kans., as off-route points in connection with carrier's regular route operations, also, between the points of Otto, Dexter, Cloverdale, Elgin, Chatauqua, Hooser, Hewins and Monett, Kans., as off-route points in connection with carrier's regular route operations, also, to, from, and between all aforesaid points of service. Both intrastate and interstate authority sought.

HEARING: Tuesday, Januray 21, 1969, at the Hallmark Motor Inn, 1617 North Summit Street, Arkansas City, Kans. Requests for procedural information, including the time for filing protests concerning this application should be addressed to the Kansas State Corporation Commission, Transportation Division, Fourth floor, State Office Building, Topeka, Kans. 66612, and should not be directed to the Interstate Commerce Commission.

State Docket No. MC 4485 (Sub-No. 4), filed November 21, 1968. Applicant: WAVERLY TRANSFER CO., INC., 110 Tredco Drive, Nashville, Tenn. 37210. Applicant's representative: Walter Harwood, 1822 Parkway Towers, Nashville, Tenn. 37219. Certificate of public convenience and necessity sought to operate a freight service as follows: Transportation of *general commodities* (except household goods, commodities in bulk, and articles requiring special equipment), between Jackson, Tenn., and Memphis, Tenn., via U.S. Highway 70, and also via Interstate Highway 40, including any and all approaches and exits between said Interstate Highway 40 and Jackson. Restriction: Service at Jackson restricted to joinder only with applicant's Certificate No. 219-B. Both intrastate and interstate authority sought.

HEARING: Tuesday, January 21, 1968, at 9:30 a.m., Commission's Courtroom, C-1-110 Cordell Hull Building, Nashville, Tenn. Requests for procedural information, including the time for filing protests concerning this application, should be addressed to the Tennessee Public Service Commission, Cordell Hull Building, Nashville, Tenn. 37219, and should not be directed to the Interstate Commerce Commission.

State Docket No. MC-4496 (Sub-No. 8), filed December 5, 1968. Applicant: MID-SOUTH TRANSPORTS, INC., 1046 Arkansas, Memphis, Tenn. 38102. Applicant's representative: Dale Woodall, 900 Memphis Bank Building, Memphis, Tenn. 38103. Certificate of public convenience and necessity sought to operate a freight service as follows: Transportation of *general commodities* (except household goods, commodities in bulk, and those requiring special equipment); (1) from Nashville, Tenn., to Knoxville, Tenn., via Interstate Highway 40, serving the intermediate points of Cookeville, Crossville, and Monterey, Tenn., and the off-route points of Sparta, Tenn., and return over the same route. (U.S. Highway 70 to be substituted for that portion of Interstate Highway 40 which is now incomplete.) (2) From Nashville, Tenn., to Chattanooga, Tenn., via. U.S. Highway 41, and return over the same route, serving no intermediate points. (A) Alternate route: Via the portions of Interstate Highway 24 which are now complete and additional portions as they are available for use, including access roads necessary to enter and exit Interstate Highway 24 between Nashville and Chattanooga. This authority is to be used in conjunction with all of applicant's existing authority. Both intrastate and interstate authority sought.

HEARING: Thursday, February 6, 1968 at 9:30 a.m. Commission's Courtroom, C-1-110 Cordell Hull Building, Nashville, Tenn. Requests for procedural information, including the time for filing protests concerning this application should be addressed to the Tennessee Public Service Commission, Cordell Hull Building, Nashville, Tenn. 37219, and should not be directed to Interstate Commerce Commission.

State Docket No. MC 5204 filed December 5, 1968. Applicant: TOMMY W. ROSS, doing business as MILAN EXPRESS, 437 South Second Street, Milan, Tenn. 38358. Applicant's representative: Walter Harwood, 1822 Parkway Towers, Nashville, Tenn. 37219. Certificate of public convenience and necessity sought to operate a freight service as follows: Transportation of *general commodities* (except household goods, commodities in bulk, and articles requiring special equipment because of size or weight), between Atwood and Memphis, Tenn., via U.S. Highway 79 and also from Atwood via U.S. Highway 79 to Milan, thence via U.S. Highway 45E to Fairview, thence via U.S. Highway 45 to its junction with Interstate Highway 40, thence via Interstate Highway 40 to Memphis and return over the same route, serving Milan and Gibson as intermediate points on said routes. Both interstate and intrastate authority sought.

HEARING: Tuesday, February 18, 1969, at 9:30 a.m., Commission's Courtroom, C-1-110 Cordell Hull Building, Nashville, Tenn. Requests for procedural information, including the time for filing protests concerning this application should be addressed to the Tennessee Public Service Commission, Cordell Hull Building, Nashville, Tenn. 37219, and should not be directed to the Interstate Commerce Commission.

State Docket No. 8483M, filed November 6, 1968. Applicant: CHARLES CHRISTENSEN AND HUGO REINERT, a partnership, doing business as C & R TRUCK LINE, 740 North 11th Street, Salina, Kans. Certificate of public convenience and necessity sought to operate a property service as follows: Transportation of *general commodities*, between Sylvan Grove, Kans., and Salina, Kans.; from Salina, Kans., west on I-70 to Culver, Kans., exit north on unmarked road to Culver, Kans., thence north to Highway 18, thence west to unmarked road approximately 1 mile east of Tescott, Kans., traveling 3 miles north to Northern Natural Gas Co. and return to Highway K-18; also from Sylvan Grove, Kans., south on unmarked highway, 10 miles and 1 mile west to Natural Gas Pipeline of America and return to unmarked highway traveling south to I-70 and return to Salina serving all intermediate points. Both intrastate and interstate authority sought.

HEARING: Friday, February 7, 1969, at the Kansas State Corporation Commission, Fourth Floor, State Office Building, Topeka, Kans. Requests for procedural information, including the time for filing protests concerning this application should be addressed to the Kansas

State Corporation Commission, Transportation Division, Fourth Floor, State Office Building, Topeka, Kans. 66612, and should not be directed to the Interstate Commerce Commission.

State Docket No. 9995M, filed November 12, 1968. Applicant: JOHN E. DUGAN, doing business as DUGAN TRUCK LINE, General Delivery, Colwich, Kans. Certificate of public convenience and necessity sought to operate a freight service as follows: Transportation of *general commodities,* between Wichita, Kans., and Hutchinson, Kans., from Haven, Kans., presently within the applicant's route, northwest on K–96, to Yoder, Kans., and all points within a 5-mile radius thereof; thence to the junction of K–96 and K–17, thence north on K–17 to Hutchinson, Kans., and all points within a 5-mile radius thereof, and return over the same route serving all intermediate points, also, as an alternate route, from Burrton, Kans., presently within applicant's authority, west on U.S. Highway 50 to Hutchinson, Kans., and all points within a 5-mile radius thereof, and return over the same route, serving all intermediate points. Both intrastate and interstate authority sought.

HEARING: Tuesday, January 28, 1969, at the Lassen Hotel, Wichita, Kans. Requests for procedural information, including the time for filing protests concerning this application should be addressed to the Kansas State Corporation Commission, Transportation Division, Fourth Floor, State Office Building, Topeka, Kans. 66612, and should not be directed to the Interstate Commerce Commission.

State Docket No. 11878M, filed November 4, 1968. Applicant: LOWELL L. RHODES, doing business as RHODES TRUCK SERVICE, 624 East Morris Street, Wichita, Kans. Certificate of public convenience and necessity sought to operate a property service as follows: Transportation of *general commodities,* between Wichita and points and places in Central Kansas; from Newton, Kans., presently within the authority of applicants Route 408; northwest on U.S. 81 to Zimerdale, then U.S. 81 to Hesston, Kans., and return over the same route; from Hesston, Kans. east on county road to K–15, and return over the same route; from Hesston, Kans., north on county road to Canton, Kans. (now within authority of applicant); and return over the same route serving all intermediate points. Serving to, from, and between all points along present route, from Newton, Kans., east on U.S. 50 to Walton, Kans.; from Walton, Kans., east on U.S. 50 to Peabody, Kans., from Peabody, Kans., east on U.S. 50 to Florence, Kans., from Florence, Kans., at junction U.S. 50 and U.S. 77, north to junction U.S. 56 and U.S. 77 (now presently within authority of applicant); and return over the same route, serving all intermediate points, and, to, from, and between all points along present route. Road rights only: County road from U.S. 50 to Hillsboro, Kans., and return over the same route; county road from U.S. 50 to Canada, Kans., and return over the same route, county road from U.S. 50 to Marion, Kans., and return over the same route, U.S. 77 from Herington, Kans., north to junction K–209 and U.S. 77; west on K–209 to Woodbine, Kans., then west on county road to junction of K–43 and return over the same route; from K–209 junction and U.S. 77 to junction of Interstate 70, west on Interstate 70 to Abilene, Kans., and return over the same route; from junction of U.S. 77 and Interstate 70 to Kansas Highway 18, then west on Highway 18 to junction of Kansas Highway 15, and return on same route, from Enterprise, Kans., north on K–43 to junction of Interstate 70, K–43, and county road, north on county road to K–18 and return on same route. Property to, from, and between all points and places within a 25-mile radius of Clay Center, Kans., to, from, and between all points and places along present route. Both intrastate and interstate authority sought.

HEARING: Thursday, January 16, 1968, at the Lassen Hotel, Wichita, Kans. Requests for procedural information, including the time for filing protests concerning this application should be addressed to the Kansas State Corporation Commission, Transportation Division, Fourth Floor, State Office Building, Topeka, Kans. 66612, and should not be directed to the Interstate Commerce Commission.

By the Commission:

[SEAL] H. NEIL GARSON,
Secretary.

[F.R. Doc. 68–15051; Filed, Dec. 17, 1968; 8:47 a.m.]

[Notice 748]

MOTOR CARRIER TEMPORARY AUTHORITY APPLICATIONS

DECEMBER 12, 1968.

The following are notices of filing of applications for temporary authority under section 210a(a) of the Interstate Commerce Act provided for under the new rules of Ex Parte No. MC–67 (49 CFR 340) published in the FEDERAL REGISTER, issue of April 27, 1965, effective July 1, 1965. These rules provide that protests to the granting of an application must be filed with the field official named in the FEDERAL REGISTER publication, within 15 calendar days after the date of notice of the filing of the application is published in the FEDERAL REGISTER. One copy of such protest must be served on the applicant, or its authorized representative, if any, and the protests must certify that such service has been made. The protests must be specific as to the service which such protestant can and will offer, and must consist of a signed original and six copies.

A copy of the application is on file, and can be examined at the Office of the Secretary, Interstate Commerce Commission, Washington, D.C., and also in the field office to which protests are to be transmitted.

MOTOR CARRIERS OF PROPERTY

No. MC 111495 (Sub-No. 7 TA), filed December 9, 1968. Applicant: AQUILINO TRANSPORT CO., INC., 21 Olden Terrace, Trenton, N.J. 08610. Applicant's representative: Raymond A. Thistle, Jr., Suite 1710, 1500 Walnut Street, Philadelphia, Pa. 19102. Authority sought to operate as a *contract carrier,* by motor vehicle, over irregular routes, transporting: *Redwood furniture, knocked-down, and parts and materials thereof,* from Bristol Township, Pa., to points in Connecticut, Delaware, Maryland, Massachusetts, New Jersey, New York, North Carolina, Rhode Island, Virginia, and the District of Columbia, under a continuing contract with Suncraft of California, Ltd., for 180 days. Supporting shipper: Suncraft of California, Ltd., 247 Bernard Street, Trenton, N.J. 08618. Send protests to: Raymond T. Jones, District Supervisor, Interstate Commerce Commission, Bureau of Operations, 410 Post Office Building, Trenton, N.J. 08608.

No. MC 114533 (Sub-No. 179 TA), filed December 9, 1968. Applicant: BANKERS DISPATCH CORPORATION, 4970 South Archer Avenue, Chicago, Ill. 60632. Applicant's representative: Stanley Komosa (same address as above). Authority sought to operate as a *common carrier,* by motor vehicle, over irregular routes, transporting: (1) *Commercial papers, documents, and written instruments* (except coins, currency, and negotiable securities) as are used in the conduct and operation of banks and banking institutions, and audit media and other business records, between points in Elkhart County, Ind., on the one hand, and, on the other, points in Berrien, Cass, and St. Joseph Counties, Mich., and (2) *Audit media and other business records,* between Indianapolis, Ind., on the one hand, and, on the other, Grand Rapids, Mich., for 180 days. Supporting shippers: (1) St. Joseph Valley Bank, Elkhart, Ind. 46514; (2) Avels Inc., 5610 Dividend Drive, Park Fletcher, Indianapolis, Ind. 46241. Send protests to: Roger L. Buchanan, District Supervisor, Interstate Commerce Commission, Bureau of Operations, 219 South Dearborn Street, Room 1086, Chicago, Ill. 60604.

No. MC 117956 (Sub-No. 6 TA), filed December 9, 1968. Applicant: HUGH H. SCOTT, doing business as SCOTT TRANSFER CO., 920 Ashby Street SW., Atlanta, Ga. 30310. Applicant's representative: William Addams, Room 527, 1776 Peachtree Street NW., Atlanta, Ga. 30309. Authority sought to operate as a *common carrier,* by motor vehicle, over irregular routes, transporting: *Money, currency, coin, and commercial paper,* between points in Macon County, N.C., and Cornelia, Ga., for 150 days. Supporting shippers: There are approximately (28) statements of support attached to the application, which may be examined here at the Interstate Commerce Commission in Washington, D.C., or copies thereof which may be examined at the field office named below. Send protests to: William L. Scroggs, District Supervisor, Interstate Commerce Commission, Bureau of Operations, Room 309, 1252 West Peachtree Street NW., Atlanta, Ga. 30309.

No. MC 119641 (Sub-No. 76 TA), filed December 9, 1968. Applicant: RINGLE EXPRESS, INC., 450 East Ninth, Post Office Box 471 (47944), Fowler, Ind. 47986. Applicant's representative: R. Connor Wiggins, Jr., Suite 909, 100 North Main Building, Memphis, Tenn. 38103. Authority sought to operate as a *common carrier*, by motor vehicle, over irregular routes, transporting: *Hardboard* and *composition board*, between Memphis and Covington, Tenn., on the one hand, and, on the other, points in Illinois, Indiana, and the Southern Peninsula of Michigan, for 180 days. Supporting shipper: The E. L. Bruce Co., Inc., Bruceply Division, Memphis, Tenn. Send protests to: District Supervisor J. H. Gray, Bureau of Operations, Interstate Commerce Commission, Room 204, 345 West Wayne Street, Fort Wayne, Ind. 46802.

No. MC 125871 (Sub-No. 4 TA), filed December 9, 1968. Applicant: CHESTER FRY AND MARIE E. FRY, a partnership, doing business as FRY TRUCKING, Wilton Junction, Iowa 52778. Applicant's representative: Kenneth F. Dudley, 901 South Madison Avenue, Post Office Box 279, Ottumwa, Iowa 52501. Authority sought to operate as a *contract carrier*, by motor vehicle, over irregular routes, transporting: *Animal and poultry feed, feed ingredients, calcium, linseed meal, and soybean meal*, from Davenport, Iowa, to points in Illinois, Kansas, Minnesota, Missouri, Nebraska, South Dakota, and Wisconsin, for 180 days. Supporting shipper: Victoria Feed Co., 1044 South Dittmer Street, Davenport, Iowa 52802. Send protests to: Chas. C. Biggers, District Supervisor, Interstate Commerce Commission, Bureau of Operations, 332 Federal Building, Davenport, Iowa 52801.

No. MC 129475 (Sub-No. 4 TA), filed December 9, 1968. Applicant: E. D. CARRELL, doing business as E. D. CARRELL TRUCKING CO., Post Office Box 186, Monroe, Ga. 30655. Authority sought to operate as a *contract carrier*, by motor vehicle, over irregular routes, transporting: *Such merchandise* as is dealt in by retail department stores, between the warehouses of Sears Roebuck and Co. at Atlanta, Ga., and Beaufort, S.C., under contract with Sears Roebuck and Co., for 180 days. Supporting shipper: Sears Roebuck and Co., 675 Ponce de Leon Avenue NE., Atlanta, Ga. 30308. Send protests to: William L. Scroggs, District Supervisor, Interstate Commerce Commission, Bureau of Operations, Room 309, 1252 West Peachtree Street NW., Atlanta, Ga. 30309.

No. MC 133296 (Sub-No. 1 TA), filed December 9, 1968. Applicant: DRACHE TRUCK LINE, INC., Post Office Box 42, Medford, Minn. 55049. Applicant's representative: Robert E. Swanson, 1211 South Sixth Street, Stillwater, Minn. 55082. Authority sought to operate as a *contract carrier*, by motor vehicle, over irregular routes, transporting: *Beer*, from Monroe and Milwaukee, Wis., to Medford, Minn., and *empties*, on return, for 150 days. Supporting shipper: H. & S. Distributing Company, Medford, Minn. 55049. Send protests to: A. N. Spath, District Supervisor, Bureau of Operations, Interstate Commerce Commission, 448 Federal Building and U.S. Courthouse, 110 South Fourth Street, Minneapolis, Minn. 55401.

By the Commission.

[SEAL] H. NEIL GARSON, *Secretary.*

[F.R. Doc. 68-15052; Filed, Dec. 17, 1968; 8:47 a.m.]

[Notice 262]

MOTOR CARRIER TRANSFER PROCEEDINGS

DECEMBER 13, 1968.

Synopses of orders entered pursuant to section 212(b) of the Interstate Commerce Act, and rules and regulations prescribed thereunder (49 CFR Part 1132), appear below:

As provided in the Commission's special rules of practice any interested person may file a petition seeking reconsideration of the following numbered proceedings within 20 days from the date of publication of this notice. Pursuant to section 17(8) of the Interstate Commerce Act, the filing of such a petition will postpone the effective date of the order in that proceeding pending its disposition. The matters relied upon by petitioners must be specified in their petitions with particularity.

No. MC-FC-70878. By order of November 29, 1968, the Transfer Board approved the transfer to Pat Baker Trucking and Service, Inc., Kingsbury, Tex., of certificate No. MC-77184, issued December 2, 1966, to Pat Baker, Leslie Baker and Glenn Baker, a partnership, doing business as Pat Baker and Sons, Kingsbury, Tex., authorizing the transportation of: Machinery, materials, supplies, and equipment, incidental to, or used in, the construction, development, operation, and maintenance of facilities for the discovery, development, and production of natural gas and petroleum, between points in the part of Texas bounded by a line beginning at Galveston and extending along U.S. Highway 75 to junction Texas Highway 3, thence along Texas Highway 3 through La Marque, Dickinson, and Genoa to Houston, thence along U.S. Highway 75 to Fairfield, thence along U.S. Highway 84 to Brownwood, thence along U.S. Highway 283 to Brady, thence along U.S. Highway 377 through Mason to Junction, thence along U.S. Highway 83 to Laredo, thence along U.S. Highway 59 to junction Texas Highway 44, thence along Texas Highway 44 to the Gulf of Mexico, and thence along the Gulf of Mexico to Galveston, including points on the indicated portions of the highways specified. Austin L. Hatchell, 1102 Perry Brooks Building, Austin, Tex. 78701; attorney for applicants.

No. MC-FC-70918. By order of November 29, 1968, the Transfer Board approved the transfer to Stubbs Transports, Inc., 1501 Main Street, Post Office Box 460, Henryetta, Okla. 74437, of the operating rights in certificate No. MC-107706 (Sub-No. 2) issued January 8, 1964, to W. R. Stubbs, 1501 Main Street, Post Office Box 460, Henryetta, Okla. 74437, authorizing the transportation of: Gasoline, petroleum products, store fixtures, and various building materials, between points in Oklahoma, Texas, Arkansas, Kansas, and Missouri.

No. MC-FC-70920. By order of November 29, 1968, the Transfer Board approved the transfer to Nix Transportation, Inc., Albany, Oreg., of the operating rights in certificates Nos. MC-126286 (Sub-No. 1), MC-126286 (Sub-No. 7), and MC-126286 (Sub-No. 9) issued July 1, 1965, November 16, 1967, and January 15, 1968, respectively, to John Nix, Jr., Albany, Oreg., authorizing the transportation of veneer, from points in Lewis and Skamania Counties, Wash., to Milwaukie, Oreg.; and lumber, from points in Lane, Linn, Benton, and Polk Counties, Oreg., to Yaquina Bay, Coos Bay, and Portland Docks, Oreg., and from points in Crook, Deschutes, and Marion Counties, Oreg., to Yaquina Bay, Coos Bay, and Portland, Oreg., and Vancouver and Longview, Wash. Lawrence V. Smart, Jr., 419 Northwest 23d Avenue, Portland, Oreg. 97210; attorney for applicants.

No. MC-FC-70930. By order of November 29, 1968, the Transfer Board approved the transfer to Georgianni Transportation, Inc., Wilmington, Calif., of the operating rights in certificate No. MC-42473 issued March 14, 1957, to Robert E. Kerivan, doing business as K & W Trucking Co., Paramount, Calif., authorizing the transportation of: General commodities, with the usual exceptions, between points in a specified area of California. R. Y. Schureman, 1545 Wilshire Blvd., Los Angeles, Calif. 90017; attorney for applicants.

No. MC-FC-70942. By order of November 29, 1968, the Transfer Board approved the transfer to Donald J. Shea and Stanley J. Shea, a partnership, doing business as Shea's Transfer, Meadville, Pa., of the operating rights of K. J. Stainbrook, in certificate No. MC-5220, issued November 17, 1966, authorizing the transportation, over irregular routes, of household goods, between Meadville, Pa., on the one hand, and, on the other, points in Ohio, New York, and West Virginia. William W. Knox, 23 West 10th Street, Erie, Pa.; attorney for applicants.

[SEAL] H. NEIL GARSON, *Secretary.*

[F.R. Doc. 68-15053; Filed, Dec. 17, 1968; 8:47 a.m.]

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FEDERAL REGISTER

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Wednesday, December 18, 1968 • Washington, D.C.

PART II

Department of Transportation

Coast Guard

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Marine Engineering Requirements



THE NATIONAL ARCHIVES OF THE UNITED STATES
LITTERA SCRIPTA MANET
1934

Title 46—SHIPPING

Chapter I—Coast Guard, Department of Transportation

[CGFR 68-82]

REVISION AND MODERNIZATION OF MARINE ENGINEERING REQUIREMENTS

1. Since World War II technological advancements and concepts of engineering and science have progressed to the point where recognition thereof demands a revision of marine engineering requirements. This revision is intended to modernize the requirements and to assist in the development of an efficient and effective merchant marine. However, the recognition and acceptance of certain technological advancements while wholeheartedly concurred in are made only to the extent permitted by various laws governing marine engineering.

2. The required Coast Guard inspection and certification of certain vessels as a condition precedent to engaging in specific occupations or on specific types of voyages includes establishment and enforcement of marine engineering requirements. For vessels subject to inspection and certification, the marine engineering requirements include such things as the design, construction, fabrication (including welding), alteration, repair, maintenance, methods of operation and use, tests, and inspections of boilers, pressure vessels, propulsive machinery, auxiliary machinery, piping, other appurtenances, and the various materials used in such items. Since the laws governing vessel inspection and certification have been enacted from time to time over many years, the requirements when applied to particular vessels or categories of vessels may vary considerably. In certain instances, the laws give discretion in application while in other instances the laws contain the requirements with little administrative discretion. The application of these laws to a particular vessel may be therefore based on many factors, such as trade or occupation in which the vessel may be used or proposed by the owner; the commodity or commodities desired to be transported as cargo; the number of passengers desired to be carried; the route or waters on which the vessel is used; the vessel's length, tonnage, propulsion, or fuel used for propulsion; or a combination of these factors. Because of the many varied conditions which may apply in a specific situation, it is suggested that a person planning to construct a vessel, which may be subject to inspection and certification by the Coast Guard, should discuss the matter with the nearest Officer in Charge, Marine Inspection, at the local Coast Guard Marine Inspection Office prior to making definitive commitments about a particular vessel.

3. The purpose of this document is to rescind existing requirements in 46 CFR Chapter I governing marine engineering and to replace them with new standards as described in this document. The principal changes consist of canceling the requirements in 46 CFR Parts 50 to 61, inclusive (Subchapter F—Marine Engineering), and 46 CFR Parts 66 to 69, inclusive (Subchapter G—Marine Engineering Installations Contracted for Prior to July 1, 1935), by establishing new marine engineering requirements as 46 CFR Parts 50 to 63, inclusive (Subchapter F—Marine Engineering), and by miscellaneous amendments, revisions and additions to other portions of 46 CFR Chapter I so that such regulations will be in agreement with the new requirements. These actions shall be effective on July 1, 1969; however, during the period prior to that date either the existing requirements or the requirements in this document may be used.

4. With respect to application of regulations, no change in practice has been made. Normally, marine engineering requirements are not retroactive in effect unless specifically so stated; i.e., installations, equipment, etc., in vessels which have been accepted and passed as satisfactory and meeting the then current marine engineering requirements, 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 or required by a change in the regulatory requirements and is so identified. In the maintenance of installations, equipment, etc., minor repairs may be made under the standards under which originally built or installed, even though such standards may have been subsequently revised or superseded by other requirements. However, major alterations or replacements shall normally be made in accordance with the current standards governing such installations, equipment, etc., unless special request for and approval is given by the Commandant for the use of alternative arrangements which provide a degree of safety comparable to that prescribed in current marine engineering requirements.

5. The revised marine engineering regulations in 46 CFR Parts 50 to 63, inclusive (Subchapter F—Marine Engineering), through incorporation by reference, provide that specific industrial codes, standards, or specifications, which are deemed to be satisfactory by the Coast Guard, may be used in the design, construction, fabrication (including welding), use, maintenance, and repair of boilers, pressure vessels, pressure piping, propelling and auxiliary machinery, together with accessory or related items, on board vessels, but subject to the modifications or additions specifically set forth in the regulations. Additionally, the marine engineering requirements for auxiliary systems peculiar to shipboard operations have been generally rearranged and modernized. In effect, this acceptance of those voluntary codes, standards, or specifications (or portions thereof), which are deemed satisfactory standards for marine service, and are identified in 46 CFR Subchapter F in this document, means such codes, standards, or specifications have the same effect as other marine engineering regulations actually published in the FEDERAL REGISTER. Unless specifically indicated otherwise, a reference to an adopted code, standard, or specification, or a section or portion thereof, in a drawing, plan, specification, correspondence, etc., shall be deemed to include the appropriate regulations in this document which adopt, modify or add to the requirements in question.

6. The physical format of each of the parts of the revised marine engineering requirements (46 CFR Parts 52 to 63, inclusive (Subchapter F)) follows the arrangement of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, and the Power Piping Section of the United States of America Standards Institute (USASI) Code for Pressure Piping. Each part (chapter) is generally complete in itself with a minimum of cross reference to other regulations. In this respect the revised marine engineering requirements in 46 CFR Parts 50 to 63, inclusive (Subchapter F), and the adopted industrial codes, standards, and specifications (through incorporation by reference) provide the safeguards required by the marine inspection laws, including those set forth in 46 United States Code, sections 406 to 412, inclusive.

7. The present regulations governing nuclear energy has been designated 46 CFR Subpart 57.30 (Subchapter F) and includes requirements governing the construction, arrangement and other provisions for nuclear vessels. In the rearrangement of marine engineering requirements, two distinct actions were taken. Those regulations which apply to nuclear vessels (other than power plant and piping) are transferred to other subchapters; i.e., 46 CFR Part 37 (Subchapter D) for tank vessels, Part 79 (Subchapter H) for passenger vessels, and Part 99 (Subchapter I) for cargo and miscellaneous vessels. Since all reactor pressure vessels being built in the United States are designed in accordance with section III of the ASME Code, this standard is accepted and by incorporation by reference made a part of the marine engineering requirements subject to the provisions in 46 United States Code sections 406 to 412, inclusive. This ASME standard permits higher allowable stresses than are permitted for conventional installations, but requires also a more detailed analysis, greater quality assurance in materials and fabrication, and more sophisticated inspection techniques. Since new stationary reactor pressure vessels are now built in accordance with section III of the ASME Code and are accepted by appropriate Federal and State authorities, it is felt that similar standards for reactor pressure vessels on any nuclear vessel should be used to the extent permitted by the marine environment.

8. Pursuant to the notice of proposed rule making published in the FEDERAL REGISTER of September 27, 1967 (32 F.R. 13514–13526), and the Merchant Marine Council Public Hearing Agenda dated December 4, 1967 (CG-249), the Mer-

chant Marine Council held a public hearing on December 4, 1967, for the purpose of receiving comments, views, and data. For convenience these proposals were identified as follows, together with the number of comments received:

Item No.	Subject	Number of comments
PH 20-67	General provisions regarding marine engineering.	32
PH 21-67	Power boilers	60
PH 22-67	Heating boilers	5
PH 23-67	Unfired pressure vessels	47
PH 24-67	Nuclear pressure vessels	22
PH 25-67	Piping systems and appurtenances.	157
PH 26-67	Welding and brazing qualifications.	21
PH 27-67	Main and auxiliary machinery	38
PH 28-67	Repairs to boilers, unfired pressure vessels, and appurtenances.	2
PH 29-67	Periodic tests and inspections	34
PH 30-67	Automatic auxiliary heating equipment.	19
PH 31-67	Miscellaneous changes in other regulations.	30

9. Interested persons have been afforded an opportunity to participate in the consideration of these marine engineering proposals and changes were made therein as a result thereof. The very favorable acceptance of these proposals was reflected in many of the comments received, as well as in verbal opinions expressed at informal meetings held with various interested groups where these proposals were discussed. The actions of the Merchant Marine Council with respect to comments received are approved. The proposals, as revised, are adopted and set forth in this document.

10. The following is a brief resume of important changes made in the marine engineering proposals as a result of reviewing and considering nearly 500 comments submitted:

A. In the revised 46 CFR Part 54 and other regulations the term "unfired pressure vessel" was changed to "pressure vessel." Section VIII of the ASME Code for some time has contained requirements for a group of fired pressure vessels. In the 1968 ASME publication the title to section VIII refers to pressure vessels, and in order to have the marine engineering regulations agree with the ASME Code this change was made. In effect it does not change the requirements.

B. The Tubular Exchanger Manufacturer's Association (TEMA) has provided for a new class B heat exchanger which augments the coverage of classes C and R in the 1968 edition of TEMA. The regulations have adopted the 1968 edition of TEMA for these 3 classes of heat exchangers.

C. With respect to brazed boiler steam air heaters, the provisions of 46 CFR 52.01–95(d) will permit brazed construction up to 525° F. on skin air heaters used in boilers. This change is based on the development of new brazing alloys and successful experience in their use in low pressure operation of the heaters or in heaters within an enclosure.

D. The radiographic examination of boilers, fabricated by welding was modified as set forth in 46 CFR 52.05–20. It requires that all boiler parts made of pipe material containing only circumferential points shall be inspected as required by Table 56.95–10 of Part 56 (Piping) in lieu of ASME requirements. This modification was made because the ASME Code would exempt practically all such welds in a marine boiler from radiography due to the fact that the central station (utility type) boilers for which the ASME Code is basically written contains much larger components than marine (main) boilers.

E. The requirements for hot water supply boilers in 46 CFR 53.01–10(b) were revised to allow electric fired hot water supply boilers which have a capacity of not greater than 120 gallons and a heat input not greater than 200,000 B.t.u. per hour, after being listed as approved by the Underwriters' Laboratories, Inc., under their Standard 174.

F. With respect to pressure vessels used for low temperature applications, the toughness tests in 46 CFR Subpart 54.05, and §§ 54.25–10 (low temperature operation—ferritic steels) and 54.25–15 (low temperature operation—high alloy steels) were revised, but basically the requirements remain very similar. These changes clarify the intent and make a better arrangement than originally proposed. These requirements are very similar to the recommendations in the Navigation and Vessel Inspection Circular No. 7–67.

G. With respect to exemptions from shop inspection and plan approval of vessels containing water at a pressure not greater than 100 p.s.i.g., nor a temperature above 200° F., the requirements were limited in 46 CFR 54.01–15(a)(1) to include pressure and temperature since the ASME Code uses only size as a restriction.

H. The requirements for flanged joints in 46 CFR 56.30–10 were revised to permit increased use of socket and slip-on flanged joints and sleeve connections.

I. The requirements for tubing joints in 46 CFR 56.30–25 were revised to liberalize the types permitted, but certain bite type connections are excluded.

J. The requirements for determining the size of the bilge suction pipes are by formulas in 46 CFR 56.50–50, and by a note a special reduction is given to tank vessels. A second note is added to give a special reduction to bulk carriers with full depth wing tanks served by a ballast system. In this instance, a special reduction will allow a modification of "B" (beam) in the formula determining the bilge pipe suction size to be the actual breadth of the compartment rather than the vessel. This change is analogous to the treatment of tank vessels with regard to "L" (length) in the same formula.

K. Valves for the purpose of draining water from diesel fuel tank lines are permitted by the change in 46 CFR 56.50–60(f), but only in the case of diesel driven machinery and then if suitably located.

L. The requirements for fluid power and control systems in 46 CFR Subpart 58.30 were revised. The design requirements for hydraulic shock are optional rather than manadatory. Testing of certain cast materials with minimal elongation remains mandatory. Testing of fluid power and control systems containing accumulators fitted with rupture discs, parts easily damaged by over pressure, etc., will be limited so as not to damage the system.

M. With respect to general construction requirements for nuclear vessels, the revised regulations in 46 CFR Parts 37, 79, and 99 are more general than previously. Comments were made that certain restrictions in the proposals were based on existing arrangements and therefore overly restrictive to innovations in design, arrangements, etc. After informal discussions with interested persons who submitted comments, including the Maritime Administration officials, changes were made which generalize the requirements.

N. In order to avoid delays in the permitted use of changes, interpretations, or exceptions in referenced and adopted industry specifications, standards, and codes, the wording of 46 CFR 50.15–1 was revised to clarify the meaning of "current issue." This phrase means that issue, including any addenda and changes, in effect on the date the work is contracted for, or, if no contract exists, the date fabrication is begun.

11. A number of comments were rejected. The following is a brief resume of actions taken with respect to such comments:

a. Requests to have class II pressure vessels included in exemptions from plan approval and shop inspections were not accepted. This subject, however, will be studied further, especially in the light of experience gained under the revised requirements in this document.

b. Requests to reevaluate the temperature and pressure level separations for the various classes of pressure vessels and piping were not accepted. Since sufficient data and information on this subject to reach conclusive determinations were lacking, this subject will be studied further.

c. Requests to require the transfer of welder qualification information from one company to another were not accepted. The company performing the qualifying of a welder has title to the qualification information. Therefore, it is within the prerogative of such company to decide whether or not it will transfer the welder qualification information to another organization.

d. With respect to incorporation by reference of adopted codes, standards, and specifications in the marine engineering regulations (Subchapter F), a number of comments suggesting further identification were not accepted. It is felt that the reservations in 46 CFR 50.15–30 provide sufficient controls over the changes in such referenced material which do not provide for the marine environment, or do not meet minimum statutory or regulatory requirements.

12. By virtue of the authority vested in me as Commandant, U.S. Coast Guard, by section 632 of title 14, United States Code, and the delegation of the Secretary of Transportation in 49 CFR 1.4(a)(2) (32 F.R. 5606), to promulgate regulations in accordance with the laws

cited with the regulations below, the following amendments and new regulations are prescribed and shall be effective on July 1, 1969; however, the regulations in this document may be complied with in lieu of existing requirements prior to that date.

SUBCHAPTER A—PROCEDURES APPLICABLE TO THE PUBLIC

PART 2—VESSEL INSPECTIONS

Subpart 2.20—Reports and Forms

1. Section 2.20–40(c) is amended to read as follows:

§ 2.20–40 Chief engineer's reports.

* * * * *

(c) The chief engineer shall report the renewal of fusible plugs in boilers by letter to the Officer in Charge, Marine Inspection, who issued the certificate of inspection when such fusible plugs are renewed at other than the inspection for certification and there is no marine inspector in attendance at the renewal. This letter report shall contain the following information:

(1) Name and official number of vessel.

(2) Date of renewal of fusible plugs.

(3) Number and location of fusible plugs renewed in each boiler.

(4) Manufacturer and heat number of each plug.

(5) Reason for renewal.

(R.S. 4433, as amended; 46 U.S.C. 411)

Subpart 2.75—Approvals of Safety Equipment, Materials and Installations, and Qualifications for Construction Personnel

2. Section 2.75–20(b) is amended to read as follows:

§ 2.75–20 Affidavits or certifications.

* * * * *

(b) For requirements regarding marine engineering materials or appliances, see § 50.25–10 of Subchapter F (Marine Engineering) of this chapter.

(R.S. 4433, as amended; 46 U.S.C. 411)

3. Section 2.75–70 is amended to read as follows:

§ 2.75–70 Welding procedure and performance qualifications.

(a) Welding procedures and welder performance utilized in the fabrication of vessels and their various systems and components subject to Coast Guard inspection shall be qualified as required by the applicable subchapter. For applicable requirements see § 32.60–1(a) of Subchapter D (Tank Vessels), § 72.01–15 of Subchapter H (Passenger Vessels), § 92.01–10 of Subchapter I (Cargo and Miscellaneous Vessels), or § 190.01–10 of Subchapter U (Oceanographic Vessels) of this chapter. See Part 57 of Subchapter F (Marine Engineering) for requirements for the welding of pressure piping, boilers, pressure vessels, and nonpressure vessel type tanks, and associated secondary barriers as defined in § 38.05–4 of Subchapter D (Tank Vessels) of this chapter.

(R.S. 4417, as amended, 4418, as amended, 4429, as amended; 46 U.S.C. 391a, 392, 407)

SUBCHAPTER D—TANK VESSELS

PART 30—GENERAL PROVISIONS

Subpart 30.01—Administration

1. Subpart 30.01 is amended by adding a new § 30.01–25 reading as follows:

§ 30.01–25 Application to vessels concerning nuclear energy—TB/ALL.

(a) Pertinent definitions are in § 30.10–44.

(b) Special provisions for "nuclear vessels" are in Part 37 of this subchapter.

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

(d) The regulations covering pressure containing portions of nuclear vessel systems are in Part 55 of Subchapter F (Marine Engineering) of this chapter. See § 56.04–20 of Subchapter F (Marine Engineering) of this chapter for nuclear piping. See Subpart 61.25 of Subchapter F (Marine Engineering) of this chapter for requirements regarding periodic tests and inspections of nuclear reactor power plants.

Subpart 30.10—Definitions

2. Section 30.10–44 is amended to read as follows:

§ 30.10–44 Nuclear energy, radioactive material, and nuclear vessel—TB/ALL.

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

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

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

(R.S. 4405, as amended, 4417a, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 391a, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2), (f))

PART 31—INSPECTION AND CERTIFICATION

Subpart 31.01—General

1. Section 31.01–5(b) is amended to read as follows:

§ 31.01–5 Scope of initial inspection—TB/ALL.

* * * * *

(b) For nuclear vessels, the inspections required by this section shall be made except insofar as they may be limited by the presence of radiation. In addition, the inspection shall include any special preoperational tests and inspections prescribed in the Atomic Energy Commission operating license, by the nuclear plant operating procedures, or by the vessel's Safety Assessment.

Subpart 31.05—Certificates of Inspection

2. Section 31.05–10 is revised to read as follows:

§ 31.05–10 Period of validity of certificate of inspection—TB/ALL.

(a) Certificates of inspection will be issued for periods of either 1 or 2 years. For nuclear vessels it shall be for a period of 1 year; see also § 37.10–1 of this subchapter.

(b) Application may be made by the master, owner, or agent for inspection and issuance of a new certificate of inspection at any time during the period of validity of the current certificate. For nuclear vessels see Part 37 of this subchapter.

(c) Certificates of inspection may be revoked or suspended by the Coast Guard where such process is authorized by law. This may occur if the vessel does not meet the requirements of law or regulations in this chapter or if there is a failure to maintain the safety requirements requisite to the issuance of a certificate of inspection.

Subpart 31.10—Inspections

3. Section 31.10–15(c) is amended to read as follows:

§ 31.10–15 Inspection for certification—TB/ALL.

* * * * *

(c) For nuclear vessels, the inspections required by this section shall be made except insofar as they may be limited by the presence of radiation. See also Subpart 37.10 of this subchapter.

(R.S. 4405, as amended, 4417a, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 391a, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2))

Subpart 31.30—Marine Engineering

4. Section 31.30–1 is revised to read as follows:

§ 31.30–1 Marine engineering regulations and material specifications—TB/ALL.

(a) All tank vessels are subject to the regulations contained in Parts 50 to 63, inclusive, of Subchapter F (Marine Engineering) of this chapter, whenever applicable, except as such regulations are modified by the regulations in this subchapter for tank vessels.

(Sec. 2, 23 Stat. 118, as amended, secs. 2, 633, 63 Stat. 496, 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 2, 14 U.S.C. 2, 633, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). R.S. 4472, as amended, sec. 14, 29 Stat. 690, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, as amended; 46 U.S.C. 170, 363, 367)

PART 32—SPECIAL EQUIPMENT, MACHINERY, AND HULL REQUIREMENTS

1. The authority citation for Part 32 is amended to read as follows:

AUTHORITY: The provisions of this Part 32 issued under R.S. 4405, as amended, 4417a, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 391a, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2); sec. 3, 68 Stat. 675; 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.

Subpart 32.35—Main and Auxiliary Machinery

2. Section 32.35–10 is revised to read as follows:

§ 32.35–10 Steering apparatus on tank vessels—TB/ALL.

Tank vessels shall be provided with steering apparatus as required by Part 58 of Subchapter F (Marine Engineering) of this chapter.

Subpart 32.60—Hull Requirements for Tank Vessels Constructed on or After July 1, 1951

3. Section 32.60–40(b) is amended to read as follows:

§ 32.60–40 Construction and testing of cargo tanks and bulkheads—TB/ALL.

* * * * *

(b) Cargo tanks vented at a gage pressure exceeding 10 pounds per square inch are considered to be pressure vessels and shall be of cylindrical or similar design and shall meet the requirements of Subchapter F (Marine Engineering) of this chapter.

Subpart 32.65—Hull Requirements for Tank Vessels Constructed on or After November 10, 1936, and Prior to July 1, 1951

4. Section 32.65–40(b) is amended to read as follows:

§ 32.65–40 Construction and testing of cargo tanks and bulkheads—TB/ALL.

* * * * *

(b) All cargo tanks to be vented at gage pressures above 4 pounds per square inch shall be considered as pressure vessels and shall meet the requirements for such vessels as to construction and testing, as set forth in Subchapter F (Marine Engineering) of this chapter.

* * * * *

PART 35—OPERATIONS

1. The authority citation for Part 35 is amended to read as follows:

AUTHORITY: The provisions of this Part 35 issued under R.S. 4405, as amended, 4417a, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 391a, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). R.S. 4472, as amended, 4488, as amended, 4491, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 170, 481, 489, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.

Subpart 35.25—Engine Department

2. Section 35.25–10 (a) and (b) are revised to read as follows:

§ 35.25–10 Requirements for fuel oil—T/ALL.

(a) Oil to be used as fuel to be burned under boilers on tankships shall have a flashpoint of not less than 150° F. (Pensky-Martens Closed Cup Method, ASTM D 93).

(b) It shall be the duty of the chief engineer to make an entry in the log of each supply of fuel oil received on board, stating the quantity received, the name of the vendor, the name of the oil producer, and the flashpoint (Pensky-Martens Closed Cup Method, ASTM D 93) for which it is certified by the producer.

* * * * *

Subchapter D of Chapter I is amended by adding a new Part 37, reading as follows:

PART 37—SPECIAL CONSTRUCTION, ARRANGEMENT, AND OTHER PROVISIONS FOR NUCLEAR VESSELS

Subpart 37.01—Application

Sec.
37.01–1 General—TB/ALL.

Subpart 37.05—Design and Construction

37.05–1 Special requirements—TB/ALL.
37.05–5 Subdivision and stability—TB/ALL.
37.05–10 Location of nuclear system components—TB/ALL.

Subpart 37.10—Inspection and Certification

37.10–1 Annual inspection and certification required—TB/ALL.
37.10–5 Additional requirements—TB/ALL.
37.10–15 International Convention certification—T/ALL.

Subpart 37.15—Other Special Provisions

37.15–1 Radiation—TB/ALL.
37.15–3 Means for preventing uncontrolled release of radiation—TB/ALL.
37.15–5 Atomic Energy Commission safety requirements—TB/ALL.
37.15–10 Safety assessment—TB/ALL.

Subpart 37.20—Operations

37.20–1 Operating Manual—TB/ALL.
37.20–5 Special operating procedures—TB/ALL.

AUTHORITY: The provisions of this Part 37 issued under R.S. 4405, as amended, 4417a, as amended, 4462, as amended, sec. 2, 23 Stat. 118, as amended, secs. 2, 633, 63 Stat. 496, 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 391a, 416, 2, 14 U.S.C. 2, 633, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). R.S. 4417, as amended, 4418, as amended, 4433, as amended, 4453, as amended, 4472, as amended, 41 Stat. 305, as amended, secs 1, 2, 49 Stat. 1544, 1545, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 391, 392, 411, 435, 170, 363, 367, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.

Subpart 37.01—Application

§ 37.01–1 General—TB/ALL.

(a) The provisions of this part shall apply to all installations, systems, and components thereof, utilizing nuclear energy for propulsion or for any other purpose. They shall include vessels handling substantial quantities of radioactive materials other than cargo.

Subpart 37.05—Design and Construction

§ 37.05–1 Special requirements—TB/ALL.

(a) The features described in this section shall be provided in nuclear vessels regardless of length or gross tonnage.

(b) A temporary and final source of emergency power, as required for oceangoing passenger vessels over 1,600 gross tons, shall be provided to insure an uninterrupted power supply to nuclear instrumentation, control, and safety systems. For applicable requirements see § 112.05–5(a) of Subchapter J (Electrical Engineering) of this chapter.

(c) Bilge system arrangements, as required for self-propelled oceangoing passenger vessels over 300 feet, shall be provided. For applicable requirements see §§ 56.50–50 and 56.50–55 of Subchapter F (Marine Engineering) of this chapter.

(d) The boundary bulkheads and decks separating the reactor compartment, other compartments containing vital primary system equipment, nuclear chemistry laboratories, and reactor control spaces from accommodations, galley, main pantries, and machinery spaces requiring fixed type extinguishing systems shall be of A–60 construction. For definition of Class A–60 construction, see Subpart 72.05 of Subchapter H (Passenger Vessels) of this chapter.

§ 37.05–5 Subdivision and stability—TB/ALL.

(a) Watertight subdivision and damage stability requirements shall satisfy not less than a two-compartment standard. Whenever practicable they should be at least equivalent to that required for a conventionally powered oceangoing passenger vessel of similar size, capacity, and tonnage.

(b) A full double bottom shall be provided, regardless of the actual length of the vessel, as required by Subpart 73.25 of Subchapter H (Passenger Vessels) of this chapter for vessels over 249 feet in length.

(c) In assessing stability, direct calculations shall be utilized which take into account the form and proportions of the hull. The details of such calculations shall be in accordance with the provisions of Parts 73 and 74 of Subchapter H (Passenger Vessels) of this chapter except that subdivision and damage stability calculations will be based on the most severe permeability assumptions applicable to each compartment, having regard for its actual use.

§ 37.05–10 Location of nuclear system components—TB/ALL.

(a) The location of the nuclear system components in the vessel and the manner in which they are supported shall be approved by the Commandant. In determining the location and the necessary structural support and protection required, the effects of grounding, colli-

sion or other mishap resulting in holing of the vessel shall be considered.

(b) Reactor installations, including all potentially vulnerable primary system components, shall be placed as far inboard from the shell as practicable. Generally, the installation shall be situated inboard of a vertical surface perpendicular to the waterplane. The vertical surface shall be located at a minimum distance (measured at right angles to the centerline at the deepest loadline) inboard of the shell equal to one-fifth of the extreme breadth of the vessel. If the installation extends outboard of this vertical surface, special consideration shall be given to collision protection.

(c) Reactor installations shall be located a reasonable height above the ship's bottom, but in no case shall this height be less than the required double bottom height. Waste storage tanks and engineered safeguard systems may be permitted in the double bottom space if specifically approved by the Commandant. Consideration shall be given to collision-analysis statistics with regard to the longitudinal (fore and aft) location of the reactor installation.

Subpart 37.10—Inspection and Certification

§ 37.10–1 Annual inspection and certification required—TB/ALL.

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

(b) Every nuclear vessel found to be in compliance with applicable requirements in this subchapter will be issued a certificate of inspection in accordance with Part 31 of this subchapter.

§ 37.10–5 Additional requirements—TB/ALL.

(a) In addition to the requirements for inspection, test, overhaul and repair specified in this subchapter, nuclear vessels may be subject to such additional requirements as may be prescribed by the Commandant for inspection, test, overhaul, and repair. For applicable requirements see Subpart 61.25 of Subchapter F (Marine Engineering) of this chapter.

(b) A prerequisite for annual recertification of the vessel will be a valid Atomic Energy Commission's facility operating license, or if nonlicensed a certificate from the Atomic Energy Commission stating that the nuclear installation complies with the requirements of the Commission.

§ 37.10–15 International Convention Certification—T/ALL.

(a) For applicable requirements governing Safety of Life at Sea Convention certificates see §§ 31.40–1, 31.40–20, and 31.40–40(e) of this subchapter.

Subpart 37.15—Other Special Provisions

§ 37.15–1 Radiation—TB/ALL.

(a) The vessel shall be so designed, constructed and operated that no unreasonable hazard of radiation at sea or in port for crew, food, water supply, passengers, public, or waterways exists.

(b) The Atomic Energy Commission's Standards for Protection Against Radiation, set forth in 10 CFR Part 20, will be the radiation protection standards followed by the U.S. Coast Guard, except as otherwise provided for by law.

§ 37.15–3 Means for preventing uncontrolled release of radiation—TB/ALL.

(a) The vessel's nuclear systems, including all components thereof, shall be provided with means for preventing the uncontrolled release of hazardous amounts of radioactive material to normally accessible spaces on the ship or to the ship's environment in the event of accident or malfunction of any such system.

§ 37.15–5 Atomic Energy Commission safety requirements—TB/ALL.

(a) Before a Coast Guard certificate of inspection for a nuclear vessel will be issued, it must be shown that the nuclear system meets the safety requirements of the Atomic Energy Commission. After facility licensing, possession of a valid AEC license will attest to this fact. Prior to this licensing, a letter from the Commission to the Coast Guard with assurance that the system does meet the safety requirements of the Atomic Energy Commission is required.

§ 37.15–10 Safety assessment—TB/ALL.

(a) A safety assessment shall be prepared to permit evaluation of the nuclear power plant and safety of the ship, and to ensure that there are no unreasonable radiation or other hazards, at sea or in port, to the crew, passengers or public, or to the waterways or food or water resources.

(b) The safety assessment shall be submitted to the Commandant for approval and shall always be kept up-to-date.

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

Subpart 37.20—Operations

§ 37.20–1 Operating manual—TB/ALL.

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

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

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

§ 37.20–5 Special operating procedures—TB/ALL.

(a) In addition to the requirements specified in this chapter, all nuclear vessels may be subject to additional requirements governing fueling, startup, and operation.

PART 38—LIQUEFIED FLAMMABLE GASES

1. The authority citation for Part 38 is amended to read as follows:

AUTHORITY: The provisions of this Part 38 issued under R.S. 4405, as amended, 4417a, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 391a, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). Sec. 3, 68 Stat. 675; 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 38.05—Design and Installation

1a. Section 38.05–1(c) is amended to read as follows:

§ 38.05–1 Design and construction of vessels—general—TB/ALL.

* * * * *

(c) Materials used in the fabrication of cargo tanks and piping shall have adequate notch toughness at the service temperature. Where a secondary barrier is required, the material of that barrier and of contiguous hull structure shall have sufficient notch toughness at the lowest temperature which may result during the containment of leakage cargo within the secondary barrier. Materials used in the fabrication of the cargo containment and handling system shall satisfy the requirements for toughness specified in Subchapter F (Marine Engineering) of this chapter.

* * * * *

2. Section 38.05–3 (a) and (g) are amended to read as follows:

§ 38.05–3 Design and construction of pressure vessel type cargo tanks—TB/ALL.

(a) Cargo tanks of pressure vessel configuration (e.g. cylindrical, spherical, etc.) shall be designed, fabricated, inspected, and tested in accordance with the applicable requirements of Part 54 of Subchapter F (Marine Engineering) of this chapter, except as otherwise provided for in this part.

* * * * *

(g) Cargo tanks in which the temperature is maintained below the normal atmospheric temperature by refrigeration or other acceptable means shall be designed for a pressure of not less than 110 percent of the vapor pressure corresponding to the temperature of the liquid at which the system is maintained, or the pressure corresponding to the greatest dynamic and static loads expected to be encountered either in service or during testing. For mechanically stress relieved cargo tanks, additional factors relating design pres-

sure and maximum allowable pressure shall be as specified by the Commandant. The material of the tank shall satisfy the requirements of Subchapter F (Marine Engineering) of this chapter for the service temperature, and this temperature shall be permanently marked on the tank as prescribed in § 38.05–5.

* * * * *

3. Section 38.05–4(g) is amended to read as follows:

§ 38.05–4 Design and construction of nonpressure vessel type cargo tanks—TB/ALL.

* * * * *

(g) All weld intersections or crossings in joints of primary tank shells shall be radiographed for a distance of 10 thicknesses from the intersection. All other welding in the primary tank and in the secondary barrier shall be spot radiographed in accordance with the requirements of Part 54 of Subchapter F (Marine Engineering) of this chapter.

(R.S. 4433, as amended; 46 U.S.C. 411)

4. Section 38.05–5(a)(1) is revised to read as follows:

§ 38.05–5 Markings—TB/ALL.

(a) (1) Upon satisfactory completion of tests and inspection, pressure vessel and nonpressure vessel type cargo tanks, shall have markings as required by § 54.10–20 of Subchapter F (Marine Engineering) of this chapter except that for nonpressure vessel type tanks, the Coast Guard number and pressure vessel class shall be omitted.

* * * * *

Subpart 38.10—Piping, Valves, Fittings, and Accessory Equipment

4a. The authority note for Subpart 38.10 is amended to read as follows:

AUTHORITY NOTE: The provisions of this Subpart 38.10 also issued under R.S. 4433, as amended, 4488, as amended; 46 U.S.C. 411, 481.

5. Section 38.10–1(a) is amended to read as follows:

§ 38.10–1 Valves, fittings, and accessories—TB/ALL.

(a) All valves, flanges, fittings, and accessory equipment shall be of a type suitable for use with liquefied flammable gases, and shall be made of steel or grade A malleable iron, acceptable for the service temperature and pressure according to the requirements of Part 56 of Subchapter F (Marine Engineering) of this chapter. Other materials may be specially considered and approved by the Commandant.

* * * * *

6. Section 38.10–10(b) is amended to read as follows:

§ 38.10–10 Cargo piping—TB/ALL.

* * * * *

(b) Piping subject to tank pressure shall be seamless drawn steel or electric resistance welded steel. Pipe used in refrigerated tank systems shall be of a material which is suitable for the minimum service temperature to which it may be subjected, according to the requirements of Part 56 of Subchapter F (Marine Engineering) of this chapter.

* * * * *

7. Section 38.10–15 is revised to read as follows:

§ 38.10–15 Safety relief valves—TB/ALL.

(a) Each tank shall be fitted with or (subject to approval by the Commandant) connected to one or more safety relief valves designed, constructed and flow tested for capacity in conformance with Subpart 162.017 or 162.018 of Subchapter Q (Specifications) of this chapter.

(b) Safety relief valves conforming to Subpart 162.017 of subchapter Q (Specifications) of this chapter may be used on tanks for a maximum pressure of 10 pounds per square inch gage. Safety relief valves conforming to Subpart 162.018 of Subchapter Q (Specifications) of this chapter may be used for any pressure.

(c) The safety relief valves shall have a combined relieving capacity to discharge the greater of the following with not more than 20 percent rise in pressure (in the tank) above the maximum allowable pressure:

(1) The vapors evaporated by an ambient air temperature of 115° F. plus the maximum flow rate of the cargo filling pipes or,

(2) The vapors generated under fire exposure computed using the formulas of § 54.15–25(c) of Subchapter F (Marine Engineering) of this chapter.

(d) The safety relief valves shall meet the arrangement and inspection requirements of § 54.15–25 of Subchapter F (Marine Engineering) of this chapter.

(e) Means shall be provided to protect nonpressure vessel tanks from excessive external pressure.

(f) Void spaces between the primary and secondary barriers of nonpressure vessel type tanks shall be protected by relief devices. The relief setting shall not be higher than the void test pressure, and shall not exceed 90 percent of the setting of the safety relief valve protecting the primary tank.

§ 38.10–16 [Deleted.]

8. Section 38.10–16 *Safety relief valves for nonpressure vessel type tanks—TB/ALL* is deleted in its entirety.

PART 39—FLAMMABLE OR COMBUSTIBLE LIQUIDS HAVING LETHAL CHARACTERISTICS

1. The authority citation for Part 39 is amended to read as follows:

AUTHORITY: The provisions of this Part 39 issued under R.S. 4405, as amended, 4417a, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 391a, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). R.S. 4472, as amended, 4488, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 170, 481, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 39.05—Design, Arrangement, and Installation of Cargo Tanks

1a. Section 39.05–1(d)(1) is amended to read as follows:

§ 39.05–1 Design, construction, and arrangement—TB/ALL.

* * * * *

(d) (1) Cargo tanks transporting liquids having a Reid vapor pressure exceeding 14 pounds per square inch, or vented at a gage pressure exceeding 4 pounds per square inch, or where air or water pressure is used to discharge the cargo, shall be fabricated as an arc-welded pressure vessel and meet the applicable requirements of Subchapter F (Marine Engineering) of this chapter.

* * * * *

2. Section 39.05–5(a) is amended to read as follows:

§ 39.05–5 Markings—TB/ALL.

(a) Upon satisfactory completion of tests and inspection, pressure vessel tanks shall have markings as required by § 54.10–20 of Subchapter F (Marine Engineering) of this chapter.

* * * * *

Subpart 39.10—Piping, Valves, Fittings, and Accessory Equipment

3. Section 39.10–5(a) is amended to read as follows:

§ 39.10–5 Piping and fittings—TB/ALL.

(a) Piping shall be suitable for use with the liquid cargo to be carried and shall conform to the requirements of Part 56 of Subchapter F (Marine Engineering) of this chapter. Piping shall be of seamless drawn material, except that electric resistance-welded steel piping will be acceptable.

* * * * *

PART 40—SPECIAL CONSTRUCTION, ARRANGEMENT, AND OTHER PROVISIONS FOR CARRYING CERTAIN FLAMMABLE OR COMBUSTIBLE DANGEROUS CARGOES IN BULK

1. The authority citation for Part 40 is amended to read as follows:

AUTHORITY: The provisions of this Part 40 issued under R.S. 4405, as amended, 4417a, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 391a, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). Sec. 3, 68 Stat. 675; 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 40.05—Ethylene Oxide

§ 40.05–5 [Amended.]

2. The additional authority note following section 40.05–5 *How ethylene oxide may be carried—TB/ALL* is revised to read: "(R.S. 4488, as amended; 46 U.S.C. 481)."

3. Section 40.05–60 is revised in its entirety to read as follows:

§ 40.05–60 Safety relief valves—TB/ALL.

(a) Each tank shall be fitted with one or more approved safety relief valves designed, constructed and flow-tested

for capacity in conformance with Subpart 162.018 of Subchapter Q (Specifications) of this chapter.

(R.S. 4491, as amended; 46 U.S.C. 489)

(b) Each safety relief valve shall be set to start to discharge at not less than 75 pounds per square inch gage, nor more than the designed pressure of the tank.

(c) The safety relief valves shall meet the relief capacity, arrangement and inspection requirements of § 54.15–25 of Subchapter F (Marine Engineering) of this chapter, except that the inspection shall also indicate that the safety relief valves will start to discharge at a pressure of not less than 75 pounds per square inch gage.

§ 40.05–75 [Amended.]

3. The additional authority note following section 40.05–75 *Cargo hose—TB/ALL* is revised to read: "(R.S. 4488, as amended; 46 U.S.C. 481)."

§ 40.05–83 [Amended.]

3a. The additional authority note following section 40.05–83 *Special cargo handling requirements—TB/ALL* is revised to read: "(R.S. 4488, as amended; 46 U.S.C. 481)."

§ 40.05–85 [Amended.]

4. The additional authority note following section 40.05–85 *Information board—TB/ALL* is revised to read: "(R.S. 4488, as amended; 46 U.S.C. 481)."

§ 40.05–87 [Amended.]

5. The additional authority note following section 40.05–87 *Tests and inspections—TB/ALL* is revised to read: "(R.S. 4453, as amended, 4488, as amended; 46 U.S.C. 435, 481)."

Subpart 40.10—Propylene Oxide

§ 40.10–5 [Amended.]

6. The additional authority note following section 40.10–5 *How propylene oxide may be carried—TB/ALL* is revised to read: "(R.S. 4488, as amended; 46 U.S.C. 481)."

§ 40.10–40 [Amended.]

7. The additional authority note following section 40.10–40 *Valves, fittings, and accessories—TB/ALL* is revised to read: "(R.S. 4433, as amended, 4488, as amended; 46 U.S.C. 411, 481)."

8. Section 40.10–60 is revised in its entirety to read as follows:

§ 40.10–60 Safety relief valves—TB/ALL.

(a) Each tank shall be fitted with one or more approved safety relief valves designed, constructed and flow-tested for capacity in conformance with subpart 162.018 of Subchapter Q (Specifications) of this chapter.

(R.S. 4491, as amended; 46 U.S.C. 489)

(b) Each safety relief valve shall be set to start to discharge at not less than 30 pounds per square inch gage, nor more than the design pressure of the tank.

(c) The safety relief valves shall meet the relief capacity, arrangement and inspection requirements of § 54.15–25 of Subchapter F (Marine Engineering) of this chapter, except that the inspection shall also indicate that the safety relief valves will start to discharge at a pressure of not less than 30 pounds per square inch gage.

§ 40.10–75 [Amended.]

9. The additional authority note following section 40.10–75 *Cargo hose—TB/ALL* is revised to read: "(R.S. 4488, as amended; 46 U.S.C. 481)."

§ 40.10–83 [Amended.]

10. The additional authority note following section 40.10–83 *Special cargo handling requirements—TB/ALL* is revised to read: "(R.S. 4488, as amended; 46 U.S.C. 481)."

§ 40.10–85 [Amended.]

11. The additional authority note following section 40.10–85 *Warning signs and information cards—TB/ALL* is revised to read: "(R.S. 4488, as amended; 46 U.S.C. 481)."

§ 40.10–87 [Amended.]

12. The additional authority note following section 40.10–87 *Tests and inspection—TB/ALL* is revised to read: "(R.S. 4453, as amended, 4488, as amended; 46 U.S.C. 435, 481)."

SUBCHAPTER F—MARINE ENGINEERING

Parts 50 to 61, inclusive, are deleted in their entirety and replaced by Parts 50 to 63, inclusive, reading as follows:

PART 50—GENERAL PROVISIONS

Subpart 50.01—Basis and Purpose of Regulations

Sec.
50.01–1 Authority for regulations.
50.01–5 Assignment of functions.
50.01–10 Purpose of regulations.
50.01–15 Scope of regulations.

Subpart 50.05—Application

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 motorboats.

Subpart 50.10—Definition of Terms Used in This Subchapter

50.10–1 Commandant.
50.10–5 Coast Guard District Commander or District Commander.
50.10–10 Officer in Charge, Marine Inspection (OCMI).
50.10–15 Marine inspector or inspector.
50.10–20 Headquarters.
50.10–25 Coast Guard symbol.
50.10–30 Coast Guard number.

Subpart 50.15—Reference Specifications, Standards, and Codes

50.15–1 General acceptance of standard requirements; incorporation by reference.
50.15–5 ASME Boiler and Pressure Vessel Code and ASME Code Cases.
50.15–10 USASI Standards.
50.15–15 ASTM Specifications.
50.15–20 Additional standards.
50.15–30 Changes, interpretations and exceptions to specifications, standards, and codes.
Sec.
50.15–60 Procedures followed when Coast Guard takes exception to referenced published requirements.

Subpart 50.20—Plan Submittal and Approval

50.20–1 General.
50.20–5 Procedure for submittal of plans.
50.20–10 Number of copies of plans required.
50.20–15 Previously approved plans.
50.20–25 Calculations.
50.20–30 Alternative materials or methods of construction.
50.20–33 Correspondence regarding approved plans.
50.20–35 Marine inspector's decisions.
50.20–40 Appeals.

Subpart 50.25—Certification of Material by Mill or Manufacturer

50.25–1 General.
50.25–3 Manufacturer or mill certification.
50.25–5 Products requiring manufacturer or mill certification.
50.25–7 Testing of products to be certified in the presence of marine inspector.
50.25–10 Affidavit, Form CG–935A, and acceptance of products described therein.
50.25–15 Products of unusual design or limited application.
50.25–20 Welded valves and nonstandard welded fittings.
50.25–25 Nonstandard pipe joining fittings.
50.25–30 Special purpose fittings for service above 15 pounds per square inch pressures.
50.25–35 Fluid conditioner fittings.
50.25–40 Foreign manufacturers.

Subpart 50.30—Fabrication Inspection

50.30–1 Scope.
50.30–5 Boilers.
50.30–10 Class I, I–L, II–L, or nuclear pressure vessels.
50.30–15 Class II pressure vessels.
50.30–20 Class III pressure vessels.

AUTHORITY: The provisions of this Part 50 issued under R.S. 4405, as amended, 4462, as amended, sec. 633, 63 Stat. 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 633, 49 U.S.C. 1655(b); 49 CFR 1.4 (a)(2), (f). R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4417a, as amended, 4418, as amended, 4421, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4453, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 391a, 392, 399, 404–409, 411, 412, 435, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 50.01—Basis and Purpose of Regulations

§ 50.01–1 Authority for regulations.

(a) *General.* (1) The authority to prescribe regulations generally for vessel inspection and certification is set forth in 46 United States Code, sections 375 and 416, and specifically in other provisions of the inspection laws. Under the provisions of 46 United States Code, section 372, the Commandant, U.S. Coast Guard, superintends the administration of the vessel inspection laws, rules, and regulations, and is required to produce a correct

and uniform administration of such requirements.

(2) The authority to prescribe regulations governing boilers, pressure vessels, machinery, including appurtenances, piping, etc., is set forth in 46 United States Code, sections 391 to 393, inclusive, 395, 404 to 409, inclusive, 411 to 413, inclusive, 481 and 489. The authority to prescribe regulations for vessels with respect to marine engineering details is in 46 United States Code, sections 361, 362, 363, 366, 367, 369, 390b, 391a, 395, 399, 435, 526p, and 1333, and 50 United States Code, section 198.

(b) *Passenger vessels.* (1) The statement regarding authority to prescribe requirements for passenger vessels of 100 gross tons and over is in § 70.01–10, Subchapter H (Passenger Vessels), of this chapter.

(2) The statement regarding authority to prescribe requirements for passenger vessels under 100 gross tons is in § 175.01–1, Subchapter T (Small Passenger Vessels), of this chapter.

(c) *Cargo and miscellaneous vessels.* The statement regarding authority to prescribe requirements for cargo and miscellaneous vessels is in § 90.01–10, Subchapter I (Cargo and Miscellaneous Vessels), of this chapter.

(d) *Tank vessels.* The statement regarding authority to prescribe requirements for tank vessels is in § 30.01–1, Subchapter D (Tank Vessels), of this chapter.

(e) *Nautical schoolships.* The statements regarding authority to prescribe requirements for Nautical schoolships are in §§ 167.01–1 and 168.01–10, Subchapter R (Nautical Schools), of this chapter.

(f) *Steam motorboats.* The authority to prescribe requirements for the engine, boiler, or other operating machinery on all motorboats, which are more than 40 feet in length and which are propelled by machinery driven by steam, is in 46 United States Code, section 526.

(g) *Nuclear vessels.* The general authority to prescribe requirements for nuclear vessels is in 14 United States Code, sections 2 and 633, and 46 United States Code, sections 2, 170, 363, 367, 369, 390b, 391a, 392, and 1333, and 50 United States Code, section 198, as well as the 1960 International Convention for Safety of Life at Sea and Executive Order 11239 (30 F.R. 9671, 3 CFR, 1965 cum. supp.).

(h) *Oceanographic vessels.* The statement regarding authority to prescribe requirements for oceanographic vessels with respect to boilers, pressure vessels, machinery, including appurtenances, piping, etc., is in § 188.01–10 Subchapter U (Oceanographic vessels) of this chapter. Under 46 United States Code, sections 441 to 445, inclusive, the Coast Guard may find certain vessels as "* * * being employed exclusively in instruction in oceanography or limnology, or both, or oceanographic research * * *". By these laws such vessels "* * * shall not be considered a passenger vessel, a vessel carrying passengers, or a passenger carrying vessel under the laws relating to the inspection and manning of merchant vessels by reason of the carriage of scientific personnel." Also, such vessels "* * * shall not be deemed to be engaged in trade or commerce." However, those oceanographic vessels which are steam vessels, seagoing motor vessels of 300 gross tons and over, or seagoing barges of 100 gross tons and over are subject to the requirements of this subchapter.

(i) *Exemptions.* (1) Public vessels owned by the United States, other than those engaged in commercial service, are exempt from the regulations in this subchapter.

(2) Certain other vessels may be exempt from the regulations in this subchapter when such exemption is provided in the law governing such vessels.

§ 50.01–5 Assignment of functions.

(a) The Department of Transportation Act (Public Law 89–670, 80 Stat. 931–950, 49 U.S.C. 1651–1659), transferred to and vested in the Secretary of Transportation "* * * all functions, powers, and duties, relating to the Coast Guard of the Secretary of the Treasury and of other officers and offices of the Department of the Treasury" (subsection 6(b)(1), 49 U.S.C. 1655(b)). This transfer is subject to certain conditions, modifications, and exceptions as set forth in such act. By a rule in 49 CFR 1.4(a) the Secretary of Transportation delegated to the Commandant, U.S. Coast Guard, authority to exercise certain functions, powers, and duties as set forth in subsections 6(a)(4), 6(b)(1), and 6(g) of such act (49 U.S.C. 1655), subject to conditions, exceptions and modifications as described in 49 CFR Part 1. By a rule in 49 CFR 1.9 the Secretary of Transportation continued in effect actions taken prior to April 1, 1967.

(b) The Commandant, U.S. Coast Guard, in a notice dated March 31, 1967, and effective April 1, 1967 (32 F.R. 5611), approved the continuation of orders, rules, regulations, policies, procedures, privileges, waivers, and other actions, which had been made, allowed, granted, or issued prior to April 1, 1967, and provided that they shall continue in effect according to their terms until modified, terminated, repealed, superseded, or set aside by appropriate authority.

§ 50.01–10 Purpose of regulations.

(a) The purpose of the regulations in this subchapter is to set forth minimum requirements for marine engineering details for various types of vessels in accordance with the intent of title 52 of the Revised Statutes and acts amendatory thereof or supplemental thereto as well as to implement various international conventions for safety of life at sea and other treaties, which contain requirements affecting marine engineering. The regulations in this subchapter have the force of law.

(b) All marine engineering details, such as boilers, pressure vessels, nuclear pressure vessels, main and auxiliary machinery, piping, valves, and fittings, shall be designed, constructed, and installed in accordance with the provisions of this subchapter, except when specifically modified by the regulations in another subchapter in this chapter for a particular type of vessel or where a specific installation may be required or permitted.

§ 50.01–15 Scope of regulations.

(a) This subchapter provides the specifications, standards and requirements for strength and adequacy of design, construction, installation, inspection, and choice of materials for machinery, boilers, pressure vessels, safety valves, and piping systems upon which safety of life is dependent.

(b) Since this subchapter contains the marine engineering details, it implements the requirements for inspection and certification of vessels as set forth in other subchapters for specific types of vessels.

Subpart 50.05—Application

§ 50.05–1 General.

(a) The regulations in this subchapter shall 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 § 50.01–1.

(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, shall be 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.

§ 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 or the currently effective design formulas in this subchapter shall be used: *Provided*, That such recalculation based on currently effective design formulas in this subchapter does not permit a higher pressure than that originally allowed by the regulations in effect at the time such work was contracted for or built.

(c) When existing vessels are reboilered, the mountings and attachments shall be renewed in accordance with the regulations in this subchapter in effect at the time such reboilering work is contracted for. The existing steam piping shall be examined. Those portions which are in good condition and comply with minimum thickness requirements in effect at the time such reboilering work is contracted for may be continued in service. The steam piping replaced shall be in accordance with the regulations in this subchapter in effect for new construction.

§ 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 shall be done under the cognizance of the Officer in Charge, Marine Inspection. It shall 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.

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

(a) Passenger vessels, tank vessels, cargo and miscellaneous vessels, nuclear vessels, nautical schoolships 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 shall 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, 1960, 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 subparagraphs (a) (1) and (2) of this section, foreign vessels of novel design or construction or whose operation involves potential unusual risks shall be 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 (Procedures Applicable to the Public) of this chapter.

(Sec. 2, 23 Stat. 118, as amended, sec. 1, 63 Stat. 496; 46 U.S.C. 2, 14 U.S.C. 2)

§ 50.05–20 Steam-propelled motorboats.

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

(b) If the engines, boilers, and auxiliary machinery are found to be in safe operating condition at the initial or subsequent periodical inspection, the Officer in Charge, Marine Inspection, shall issue a letter to that effect. Such letter shall 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, shall make application to the nearest Officer in Charge, Marine Inspection for a renewal thereof.

(Sec. 1, 54 Stat. 163, as amended; 46 U.S.C. 526)

Subpart 50.10—Definition of Terms Used in This Subchapter

§ 50.10–1 Commandant.

The term "Commandant" means the Commandant, U.S. Coast Guard.

§ 50.10–5 Coast Guard District Commander or District Commander.

The term "Coast Guard District Commander" or "District Commander" means an officer of the Coast Guard designated as such by the Commandant to command all Coast Guard activities within his district, which include the inspections, enforcement, and administration of title 52, Revised Statutes, and acts amendatory thereof or supplemental thereto, and rules and regulations thereunder.

§ 50.10–10 Officer in Charge, Marine Inspection (OCMI).

The term "Officer in Charge, Marine Inspection," (OCMI) means any person from the civilian or military branch of the Coast Guard designated as such by the Commandant and who, under the superintendence and direction of the Coast Guard District Commander, is in charge of an inspection zone for the performance of duties with respect to the inspections, enforcement, and administration of title 52, Revised Statutes, and acts amendatory thereof or supplemental thereto, and rules and regulations thereunder.

§ 50.10–15 Marine inspector or inspector.

The term "marine inspector" or "inspector" means any person from the civilian or military branch of the Coast Guard assigned under the superintendence and direction of an Officer in Charge, Marine Inspection, or any other person as may be designated for the performance of duties with respect to the inspections, enforcement and the administration of title 52, Revised Statutes, and acts amendatory thereof or supplemental thereto, and rules and regulations thereunder.

§ 50.10–20 Headquarters.

The term "Headquarters" means the Office of the Commandant, U.S. Coast Guard, Washington, D.C. 20591.

§ 50.10–25 Coast Guard Symbol.

(a) The term "Coast Guard Symbol" means that impression stamped on the nameplates of boilers, pressure vessels, and safety valves by a marine inspector upon the satisfactory completion of the tests and inspection of the product. It may also be used by a marine inspector to identify workmanship test plates and welding samples.

(b) The impression of the Coast Guard Symbol for stamping nameplates and specimens is shown in Figure 50.10-25(b).

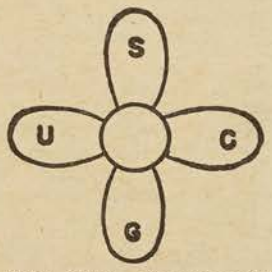


FIGURE 50.10–25(b)—Coast Guard Symbol.

§ 50.10–30 Coast Guard number.

(a) The Coast Guard number means that number assigned to boilers and pressure vessels by the Officer in Charge, Marine Inspection, who makes the final tests and inspections.

(b) The Coast Guard number shall be stamped on the nameplates of boilers and pressure vessels.

(c) The Coast Guard number is comprised of the following:

(1) Three capital letters which identify the office of the issuing Officer in Charge, Marine Inspection (see Table 50.10–30); followed by,

(2) An OCMI serial number, by which the particular boiler or pressure vessel can be identified; the first two digits of which will identify the calendar year the number was assigned.

TABLE 50.10–30—MARINE INSPECTION OFFICE IDENTIFICATION LETTERS IN COAST GUARD NUMBERS FOR BOILERS AND PRESSURE VESSELS

Identification	*Marine Inspection Office*
ALB	Albany.
ANC	Anchorage.
BAL	Baltimore.
BOS	Boston.
BUF	Buffalo.
CAI	Cairo.
CHA	Charleston.
CHI	Chicago.
CIN	Cincinnati.
CLE	Cleveland.
COR	Corpus Christi.
DET	Detroit.
DUB	Dubuque.
DUL	Duluth.
GAL	Galveston.
GUA	Guam.
HON	Honolulu.
HOU	Houston.
HUN	Huntington.
JAC	Jacksonville.
JUN	Juneau.
LOS	Los Angeles.
LOU	Louisville.
LUD	Ludington.
MEM	Memphis.
MIA	Miami.
MIL	Milwaukee.
MOB	Mobile.
NAS	Nashville.
NEW	New Orleans.
NYC	New York.
OSW	Oswego.
PAT	Port Arthur.
PHI	Philadelphia.
PIT	Pittsburgh.
POM	Portland, Maine.
POR	Portland, Oreg.
PRO	Providence.
PVA	Portsmouth, Va.
SAV	Savannah.
SDC	San Diego.
SEA	Seattle.
SFC	San Francisco.
SIM	Saint Ignace.
SJP	San Juan.
SLM	St. Louis.
TAM	Tampa.
TOL	Toledo.
WNC	Wilmington, N.C.

(R.S. 4457, as amended; 46 U.S.C. 414)

Subpart 50.15—Reference Specifications, Standards, and Codes

§ 50.15–1 General acceptance of standard requirements; incorporation by reference.

(a) Industry specifications, standards, and codes, to the extent specified in the text of this chapter are adopted and by reference are incorporated into and shall form a part of the regulations of this chapter. Where references to adopted specifications, standards, and codes are made in plans, contracts, correspondence, etc., or specific provisions of such items, it shall be assumed to include reference to the appropriate adopting regulations in this chapter, unless specifically stated otherwise.

(b) The current issue of the industry specification, standard, or code, including addenda or changes, described in this chapter as adopted by reference, shall be used unless specifically stated otherwise or specifically authorized otherwise by the Commandant. The current issue is that issue, including any addenda or changes, in effect on the date the work is contracted for, or, if no contract exists, the date fabrication is begun. The Commandant may authorize the use of an issue of an earlier or later date when circumstances warrant such action.

(c) Copies of the industry specifications, standards, and codes referred to in this chapter may be obtained from the issuing authority unless specifically indicated otherwise and the source will be indicated. Copies of the industry specifications, standards, and codes, including any addenda and changes, that are adopted by reference may, upon request, be examined at Coast Guard Headquarters. An official historic file of the adopted industry specifications, standards, and codes, including any addenda and changes, will be maintained at Coast Guard Headquarters so long as they are in effect and for a period of 10 years thereafter.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 50.15–5 ASME Boiler and Pressure Vessel Code and ASME Code Cases.

(a) The "ASME Boiler and Pressure Vessel Code" published by the American Society of Mechanical Engineers (ASME), United Engineering Center, 345 East 47th Street, New York, N.Y. 10017, for the following sections, including all "ASME Code Cases" issued under these sections, is adopted subject to the limitations and modifications specified in this subchapter, which appear with the listing:

(1) Section I, Power Boilers (ASME, sec. I).

(2) Section II, Material Specifications (ASME, sec. II).

(3) Section III, Nuclear Vessels (ASME, sec. III).

(4) Section IV, Heating Boilers (ASME, sec. IV).

(5) Section VIII (Division 1), Pressure Vessels (ASME, sec. VIII).

(6) Section IX, Welding Qualifications (ASME, sec. IX).

(b) The actions of the ASME Boiler and Pressure Vessel Code and its code cases not referenced by paragraph (a) of this section are not adopted. Their use is prohibited unless specifically allowed by the Commandant.

(c) Fabricators constructing boilers, pressure vessels, and safety valves for installation on vessels subject to the regulations in this subchapter need not possess the various ASME Code Symbol stamps. However, an exemption from the regular Coast Guard procedure for plan approval, shop inspection, and stamping is granted for certain heating boilers and pressure vessels which bear an ASME stamp as provided for in §§ 53.10–5, 53.15–5, and 54.01–15(a) of this subchapter.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 50.15–10 USASI Standards.

(a) All "USASI Standards" of the United States of America Standards Institute (USASI), 10 East 40th Street, New York, N.Y. 10016, including their respective "Code Cases," specifically described in this subchapter are adopted subject to the limitations and modifications specified in this subchapter which appear with the listing. Many of these standards are published by and may be obtained from The American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017; when otherwise, the source will be indicated in the specific listing.

(b) The actions of the USASI Codes and Code Cases, not listed in this subchapter, are not adopted. Their use is prohibited unless specifically allowed by the Commandant.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 50.15–15 ASTM Specifications.

(a) All ASTM specifications of the American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, Pa. 19103, specifically described in an adopted code, standard or specification or in this subchapter are adopted subject to the limitations and modifications specified in such code, standard or specification or in this subchapter, which appear with the listing.

(b) The ASTM Specifications not listed in an adopted code, standard or specification or in this subchapter are not adopted. Their use is prohibited unless specifically allowed by the Commandant.

(c) Where an ASTM Specification is not adopted verbatim by the American Society of Mechanical Engineers (ASME) in section II of the ASME Boiler and Pressure Vessel Code, Material Specifications, the ASME applicable requirements shall be governing.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 50.15–20 Additional standards.

(a) In addition to the previously referenced ASME, USASI, and ASTM Standards, the following organizations have specifically selected standards described in this subchapter which are adopted subject to the limitations and modifications specified in this subchapter which appear with the listing:

(1) American Boat and Yacht Council, Inc. (ABYC), 420 Lexington Avenue, New York, N.Y. 10017.

(2) American Welding Society (AWS), United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

(3) Commercial Standards, Commerce Department, National Bureau of Standards, Washington, D.C. 20234.

(4) Compressed Gas Association (CGA), 500 Fifth Avenue, New York, N.Y. 10036.

(5) Manufacturers' Standardization Society of the Valve and Fittings Industry (MSS), 420 Lexington Avenue, New York, N.Y. 10017.

(6) Military specifications, which may be obtained from the Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pa. 19120.

(7) National Fire Protection Association (NFPA), 60 Batterymarch Street, Boston, Mass. 02110.

(8) National Fluid Power Association (NFPA), Post Office Box 49, Thiensville, Wis. 53092.

(9) Tubular Exchanger Manufacturer's Association (TEMA), 331 Madison Avenue, New York, N.Y. 10017.

(10) Underwriters' Laboratories, Inc. (UL), 207 East Ohio Street, Chicago, Ill. 60611.

(11) Yacht Safety Bureau (YSB), 336 Old Hook Road, Westwood, N.J. 07676.

(b) All Standards of the organizations referenced in paragraph (a) of this section and not listed or referenced to in this subchapter are not adopted. Their use is prohibited unless specifically allowed by the Commandant.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 50.15–30 Changes, interpretations and exceptions to specifications, standards, and codes.

(a) When changes are made to any of the specifications, standards or codes referenced in §§ 50.15–5 through 50.15–20 or listed elsewhere in this subchapter, the effective date for their use as a part of the regulations in this subchapter is the effective date set by the issuing authority of the applicable standard or code.

(b) Regulations in this subchapter containing material reproduced from any of the specifications, standards or codes adopted by §§ 50.15–5 through 50.15–20, or elsewhere in this subchapter will be changed by amendments in the FEDERAL REGISTER without prior notice of proposed rule making. The effective date of such amendments will be the same as that set by the issuing authority of the applicable specification, standard or code.

(c) If any person or organization desires changes, interpretations, or exceptions to requirements in any specifications, standards or codes, including "Code Cases," referenced in regulations in this subchapter, such person or organization should first present such request to the issuing organization and obtain a ruling thereon. The Coast Guard's policy with respect to changes, interpretations or exceptions to any specification, standard, or code, including a "Code Case," is to have them presented to the issuing organization for resolution; however, the right to provide specific exceptions or to restrict or to limit the use of a specification, standard or code, including a "Code Case," is expressly reserved. Such exception or restrictive action, if it has general applicability, will be published as a rule or regulation in this subchapter under rule making procedures governing emergency situations.

§ 50.15–60 Procedures followed when Coast Guard takes exception to referenced published requirements.

(a) The normal manufacturing practices are based on the use of certain industrial specifications, standards, and codes, including "Code Cases," which are referenced in the text in this subchapter. However, it is realized that certain provisions of such requirements are based on conditions normally found "ashore," rather than what may be experienced on board vessels.

(b) When the Coast Guard determines that a specification, standard, code or "Code Case" referenced in this subchapter permits material or equipment that is unsatisfactory for marine use, a restriction or prohibition will be published in the FEDERAL REGISTER as a rule or regulation under rule making procedures governing emergency situations. The basis or reason underlying this determination will be included along with the published rule or regulation. The matter will be announced for further consideration at a Merchant Marine Council Public Hearing as described in 33 CFR 1.05–15. All affected parties may present comments, suggestions or recommendations.

(c) If a person or organization feels aggrieved by the Coast Guard's action prior to the Public Hearing or date set for the submittal in an individual case involving the restriction or prohibition of the referenced requirement, such person or organization may appeal the actions of the Officer in Charge Marine Inspection, which are based on this published prohibition. This appeal shall be in accordance with § 50.20–40.

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 boilers, pressure vessels and other components, which require specific fabrication inspection in accordance with the requirements of this subchapter, shall submit and obtain approval of the applicable construction plans prior to the commencement of such fabrication.

§ 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 to the Officer in Charge, Marine Inspection, at or nearest the place where the vessel is to be built. This procedure will be most expeditious in those cases where local offices have personnel and facilities available for examination and approval of the plans.

(c) The plans may be submitted directly to the Commandant (MMT), U.S. Coast Guard, 1300 E Street NW., Washington, D.C. 20591. In this case, the plans will be reviewed and returned directly to the submitter, with a copy of the action being forwarded to the interested Officer in Charge, Marine Inspection.

(1) Plans for boilers and nuclear vessels should be submitted in this manner.

(d) Plans, except those for boilers and nuclear vessels, may be submitted directly to the field technical office having jurisdiction over the geographic location where the ship or pressure component is manufactured:

(1) Commander, 3d Coast Guard District (mmt), Governors Island, N.Y. 10004, for the geographical area covered by 1st, 3d, and 5th Coast Guard Districts.

(2) Commander, 8th Coast Guard District (mmt), Room 308, Customhouse, 423 Canal Street, New Orleans, La. 70130, for geographical area covered by 2d, 7th, and 8th Coast Guard Districts.

(3) Commander, 12th Coast Guard District (mmt), 630 Sansome Street, San Francisco, Calif. 94126, for geographical area covered by 11th, 12th, 13th, 14th, and 17th Coast Guard Districts.

(4) Commander, 9th Coast Guard District (mmt), Room 2019, 1240 East Ninth Street, Cleveland, Ohio 44199, for geographical area covered by the 9th Coast Guard District.

(e) 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. In this case, the plans will be returned directly to the submitter as noted in paragraph (c) of this section.

§ 50.20–10 Number of copies of plans required.

(a) Three copies of each plan are normally required so that one copy can be returned to the submitter. If the submitter desires additional copies of approved plans, a suitable number should be submitted to permit the required distribution.

§ 50.20–15 Previously approved plans.

(a) A manufacturer wishing to fabricate equipment in accordance with a plan previously approved (including work accomplished under a different contract) shall not be 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) The original plan approval was given by the same office from which the new approval is desired.

§ 50.20–25 Calculations.

(a) Calculations shall be forwarded with plans submitted for approval and shall clearly substantiate compliance with the regulations in this subchapter. Care shall 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, shall be clearly identified.

§ 50.20–30 Alternative materials or methods of construction.

(a) When new or alternative procedures, designs, or methods of construction are submitted for approval and for which no regulations have been provided, the Commandant will act regarding the approval or disapproval thereof.

(b) If, in the development of industrial arts, improved materials or methods of construction are developed, their use in lieu of those specified will be given consideration upon formal application to the Commandant, with full information as to their characteristics, together with such scientific data and evidence as may be necessary to establish the suitability of such materials or methods of construction for the purpose intended.

§ 50.20–33 Correspondence regarding approved plans.

(a) The Coast Guard maintains records concerning plans, calculations, etc., of equipment approved in accordance with the regulations in this subchapter for 5 years. After 5 years from the date of original approval of a drawing, plan or calculation and related correspondence, any submittal or correspondence which refers to such documents shall be accompanied by copies of the documents, including pertinent correspondence.

§ 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 shall inform the owner or his 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 shall clearly state the reasons which caused him to arrive at such decisions.

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

§ 50.20–40 Appeals.

(a) In the event that a design, decision, or other matter, submitted in accordance with the requirements of this subchapter, is disapproved by the Officer in Charge, Marine Inspection, the person if aggrieved, may appeal, within 30 days, to the Coast Guard District Commander of the district. Should the Coast Guard District Commander sustain the Officer in Charge, Marine Inspection, such a person may, within 30 days, further appeal to the Commandant.

(b) Pending the determination of the appeal, the decision of the Officer in Charge, Marine Inspection, shall remain in effect. The decision of the Commandant shall be final.

Subpart 50.25—Certification of Material by Mill or Manufacturer

§ 50.25–1 General.

(a) Certain products used in the construction of boilers, pressure vessels, pressure piping systems, and related components shall be certified by the manufacturer or the mill where produced by the method outlined in Table 50.25–1(a). The piping component definitions are in § 56.07–5 of this subchapter.

TABLE 50.25-1(a)—CERTIFICATION REQUIREMENTS FOR CERTAIN PRODUCTS

Identification No.	Product	Verification by	Listing in CG-190 [1]
1	Plate, staybolt and rivet steel, bar stock, etc.	Manufacturer's or mill's certificate.	No.
2	Piping and tubing	do	No.
3	Standard pipe joining fittings (elbow, tee, reducer, etc.)	do	No.
4	Bolting	do	No.
5	Castings	do	No.
6	Forgings	do	No.
7	Valves (nonwelded construction)	Affidavit	Yes.[2]
8	Flanges	do	Yes.[3]
9	Nonstandard fluid conditioner fittings [4] (traps, drains, strainers, etc.).	do	Yes.[2,5]
10	Nonstandard special purpose fittings [4] (expansion joints, flexible couplings, etc.):		
	a. For maximum allowable pressure not exceeding 15 pounds per square inch.	do	Yes.[2]
	b. For maximum allowable pressure above 15 pounds per square inch.	Specific letter and approved plan.	No.[6]
11	Valves and nonstandard fittings (welded construction)	do	No.[6]
12	Nonstandard pipe joining fittings [4]	do	No.[6]
13	Nonmetallic flexible hose	Affidavit	Yes.

[1] The Coast Guard publishes periodically a pamphlet, CG–190, Equipment Lists, which includes lists of names of manufacturers of certain types of required equipment. The current actions with respect to affidavits are also published in the Coast Guard's Proceedings of the Merchant Marine Council.
[2] It is anticipated that when acceptable industry design and marking standards are adopted such listings will be terminated.
[3] It is anticipated that when revised industry marking standards are adopted such listings will be terminated.
[4] See § 56.07–5 of this subchapter for definitions of the various types of fittings.
[5] See § 56.15–1(e) of this subchapter for exemptions.
[6] Manufacturers shall be consulted for information on specific items for which approval is granted.

§ 50.25–3 Manufacturer or mill certification.

(a) A manufacturer or mill producing materials used in certain products for installation on inspected vessels, shall issue a certificate or mill test report which shall report the results of chemical analysis and physical tests required by the ASTM specification.

(b) This certificate shall be made available to the marine inspector and Officer in Charge, Marine Inspection, upon request to the fabricator. (For exception refer to § 50.25–5(d).)

§ 50.25–5 Products requiring manufacturer or mill certification.

(a) Products required to be certified by a manufacturer or by mill certificate as listed in Table 50.25–1(a), shall be fabricated and tested in accordance with the applicable specifications. Such products will not normally be subject to mill inspection by the Coast Guard except as required by § 50.25–7.

(b) The Officer in Charge, Marine Inspection, having cognizance over the installation of the products required to be certified shall ensure that adequate control has been exercised to identify the product with its manufacturer or mill certificate.

(c) In the event that the Officer in charge, Marine Inspection, determines that handling of a product has been such that proper identification is not possible, he may:

(1) Require testing in his presence based on the applicable material or fabrication specification; or

(2) Reject the product on the basis that it cannot be properly identified.

(d) A product conforming to an acceptable material specification may, at the discretion of the Officer in Charge, Marine Inspection, be accepted without referring to its manufacturer or mill certificate, if:

(1) The product is marked in accordance with the identification marking requirements of the specification;

(2) The marking alone is sufficient to identify that specification; and

(3) In the opinion of the Officer in Charge, Marine Inspection, the application of the product does not require knowledge of the exact chemical analysis or physical properties enumerated on the manufacturer or mill certificate.

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

(a) Certified products (refer to Table 50.25–1(a)) are not normally tested in the presence of a marine inspector. The Commandant may, however, assign a marine inspector to witness tests required by applicable specifications to satisfy himself that the requirements are met.

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

rial is being manufactured in accordance with the requirements of the Commandant.

(c) Unless otherwise authorized, required tests and inspections described in applicable specifications shall be made at the place of manufacture prior to shipment. Unless otherwise specified, tests shall be performed at room temperature. These tests when performed in the presence of a marine inspector will be so conducted as not to interfere unnecessarily with the operation of the plant.

(d) Marine inspectors shall assure themselves that test specimens are marked for positive identification with the materials which they represent.

§ 50.25–10 Affidavit, Form CG–935A, and acceptance of products described therein.

(a) The intent of the affidavit, Form CG–935A, is to rely upon the integrity of the manufacturer in assuring compliance with applicable requirements. The use of affidavits will terminate when appropriate standards are available.

(b) A manufacturer who receives acceptance under this system has certified that his products, which are coverable under this system (see Table 50.25–1 (a)), will conform to the applicable requirements when provided for use aboard inspected vessels.

(c) Acceptance of a manufacturer's affidavit is based upon his satisfying the Coast Guard that he understands the applicable requirements and that he can and will comply with them. To obtain acceptance the manufacturer shall do the following:

(1) Submit to Commandant (MMT), a duly executed affidavit, Form CG–935A, for one or more of the general product categories for which acceptance is desired. An affidavit shall be signed by an official of the company authorized to make an affidavit in the name of the company. That official shall be sufficiently informed of the company's products and their fabrication to assure compliance with regulations of this subchapter.

(2) Submit an engineering type catalogue which depicts the products covered by the affidavit. If a catalogue is not available, representative drawings of the products shall be submitted.

(3) Identify materials by ASTM specifications which shall meet the requirements of Subpart 56.60 of this subchapter. Where this is not possible, submit complete chemical and physical test data, and testing results. Identify the industry standards, if any, to which the products are manufactured.

(4) Submit a description of nondestructive testing performed on the products.

(5) Submit a description of the marking applied to the products.

(6) Submit information showing compliance with the requirements of Subparts 56.15, 56.20, 56.25, 56.30, or 56.35 of this subchapter as applicable.

(7) Submit such additional information as the Commandant may deem consistent with the special design or application of the product.

(d) When these requirements have been met and if the product is found to be in accordance with the regulations of this subchapter, the manufacturer may be accepted as a supplier of the product for use aboard vessels inspected by the Coast Guard.

(e) The manufacturer's affidavit will be kept on file and his name will be listed in the affidavit section of subsequent editions of CG–190 "Equipment Lists."

§ 50.25–15 Products of unusual design or limited application.

(a) Manufacturers of products which are of unusual design or of only occasional or limited application aboard ship, may obtain individual acceptance of their products for use in specific installations. The manufacturer shall submit the information described in § 50.25–10(c) (2) through (7).

(b) Since affidavits for products of unusual design or limited application are not necessary for individual installation, manufacturers of these products are not listed in CG–190, "Equipment Lists."

§ 50.25–20 Welded valves and nonstandard welded fittings.

(a) Manufacturers of valves and nonstandard fittings fabricated by welding may obtain individual acceptance of their products for use in specific installations. The manufacturer shall submit the information described in § 50.25–10(c) (2) through (7) and § 56.15–1 of this subchapter. In addition, the applicable requirements of Part 57 of this subchapter shall be satisfied.

(b) Since affidavits for such welded valves and fittings are not necessary for individual installations, manufacturers of welded valves and nonstandard welded fittings are not listed in CG–190, "Equipment Lists."

§ 50.25–25 Nonstandard pipe joining fittings.

(a) Manufacturers of nonstandard pipe joining fittings may obtain individual acceptance of their products for use in specific installations. The manufacturer shall submit the information described in § 50.25–10(c) (2) through (7).

(b) Since affidavits for nonstandard pipe joining fittings are not necessary for individual installations, manufacturers of these products are not listed in CG–190, "Equipment Lists."

§ 50.25–30 Special purpose fittings for service above 15 pounds per square inch pressures.

(a) Manufacturers of nonstandard special purpose fittings for maximum allowable pressures above 15 pounds per square inch gage may obtain individual acceptance of their products for use in specific installations. The manufacturers shall submit the information described in § 50.25–10(c) (2) through (7), § 56.30–35, and § 56.35–10 of this subchapter as applicable.

(b) Since affidavits for special purpose fittings are not necessary in individual installations, manufacturers of these products are not listed in CG–190, "Equipment Lists."

§ 50.25–35 Fluid conditioner fittings.

(a) Nonstandard fluid conditioner fittings, which due to their size, service, or operating conditions as specified in § 56.15–1 (e) and (f) are subject to the full requirements of Part 54 of this subchapter (except for stamping and shop inspection). Such fittings shall not be acceptable as affidavit products within the meaning of this subpart. Such fittings shall not be included in CG–190 "Equipment Lists." Other nonwelded fluid conditioner fittings will be listed in CG–190 "Equipment Lists."

§ 50.25–40 Foreign manufacturers.

(a) Foreign manufacturers of material which requires certification but not an affidavit submission may follow the same procedure as outlined in § 50.25–5. Prior to its installation, however, the Officer in Charge, Marine Inspection, may require the product to be tested in his presence to the applicable material specification, or any portion thereof, regardless of whether or not the product is accompanied by a manufacturer's or mill certificate.

(b) Foreign manufacturers of affidavit products may obtain singular acceptance of their materials and products for use in specific installations: *Provided*, That through the use of mill certificates or the equivalent they satisfactorily demonstrate compliance with the applicable regulations of this subchapter. Sufficient information shall be submitted to satisfy the intent of § 50.25–10(c) (2) through (7). Affidavits, Form CG–935A, shall not be accepted from foreign manufacturers. Foreign manufacturers will not be listed in CG–190, "Equipment Lists."

Subpart 50.30—Fabrication Inspection

§ 50.30–1 Scope.

(a) It shall be the responsibility of the manufacturer to notify the Officer in Charge, Marine Inspection, of the intended fabrication of boilers or 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 54.01–5(a) and 54.01–5(b) of this subchapter.

§ 50.30–5 Boilers.

(a) The manufacturer shall submit boilers as defined under Parts 52 and 53 of this subchapter for shop inspection at such stages of fabrication as may be requested by the Officer in Charge, Marine Inspection.

§ 50.30–10 Class I, I–L, II–L, or nuclear pressure vessels.

(a) Classes I, I–L, II–L, and nuclear pressure vessels shall 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.

(b) The manufacturer shall submit Class I, I–L, II–L, and nuclear pressure vessels, as defined in Parts 54 and 55 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 shall 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 shall be performed during the welding of the longitudinal joint. At this time the marine inspector shall check the material and fit-up of the work, and ascertain that only welders who have passed the required tests are employed.

(c) A second inspection of Class II welded pressure vessels shall be made during the welding of the circumferential joints. At this time the marine inspector shall check any new material being used which may not have been examined at the time of the first inspection, also the fit-up of the vessel at this stage of fabrication, and in addition, observe the welding 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 shall 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 shall be made during the welding of the longitudinal joint. If there is no longitudinal joint, the inspection shall be made during the welding of a circumferential joint. At this time the marine inspector shall check the material and fit-up of the work and see that only welders who have passed the required tests are employed.

PART 51—[RESERVED]

PART 52—POWER BOILERS

Subpart 52.01—General Requirements

Sec.
52.01–1 Adoption of section I of the ASME Code.
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 (replaces A–19 through A–21).
52.01–55 Increase in maximum allowable working pressure.
52.01–90 Materials (modifies PG–5 through PG–13).
52.01–95 Design (modifies PG–16 through PG–31 and PG–100).
52.01–100 Openings and compensation (modifies PG–32 through PG–41, and PG–43 through PG–55, replaces PG–42).
52.01–105 Piping, valves and fittings (replaces PG–58 and PG–59).
52.01–110 Water level indicators, water columns, gage glass connections, gage cocks, and pressure gages (modifies PG–60).
52.01–115 Feedwater supply (replaces PG–61).
52.01–120 Safety valves and safety relief valves (modifies PG–67 through PG–72).
52.01–125 Fabrication (modifies PG–75 through PG–82).
52.01–130 Installation.
52.01–135 Inspection and tests (modifies PG–90 through PG–100).
52.01–140 Certification by stamping (modifies PG–105 through PG–113).
52.01–145 Manufacturers' data report forms (modifies PG–112, PG–113).

Subpart 52.05—Requirements for Boilers Fabricated by Welding

52.05–1 General (modifies PW–1 through PW–54).
52.05–5 Scope and responsibility (modifies PW–1).
52.05–10 Design (modifies PW–8 through PW–19).
52.05–15 Heat treatment (modifies PW–10).
52.05–20 Radiographic and ultrasonic examination (modifies PW–11 and PW–41.1).
52.05–25 Joint efficiency factors (reproduces PW–12).
52.05–30 Minimum requirements for attachment welds (modifies PW–16).
52.05–35 Welded-in staybolts (modifies PW–19).
52.05–40 Welded fabrication (modifies PW–26 through PW–43).
52.05–45 Circumferential joints in pipes, tubes and headers (modifies PW–41).
52.05–50 Joints in boiler appurtenances (replaces PW–42).
52.05–55 Inspection and tests of welded boilers (modifies PW–46 through PW–54).

Subpart 52.10—Requirements for Boilers Fabricated by Riveting

52.10–1 General (modifies PR–1 through PR–50).
52.10–3 Thickness of buttstraps (modifies PR–14).
52.10–5 Longitudinal riveted joints (replaces PR–16).
52.10–10 Circumferential joints (modifies PR–17).
52.10–15 Riveted fabrication (modifies PR–30 through PR–50).

Subpart 52.15—Requirements for Watertube Boilers

Sec.
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).
52.20–5 Shell joints (modifies PFT–10).
52.20–10 Combustion Chambers and furnaces (modifies PFT–13 through PFT–21).
52.20–15 Stayed surfaces (modifies PFT–22 through PFT–38).
52.20–20 Domes (modifies PFT–45).
52.20–25 Setting (modifies PFT–46).

Subpart 52.25—Other Boiler Types

52.25–1 General.
52.25–5 Miniature boilers (replaces PMB–1 through PMB–21).
52.25–10 Organic fluid vaporizer generators (modifies PVG–1 through PVG–12).

AUTHORITY: The provisions of this Part 52 issued under R.S. 4405, as amended, 4462, as amended, sec. 633, 63 Stat. 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 633, 49 U.S.C. 1655(b); 49 CFR 1.4 (a)(2), (f). R.S. 4417, as amended, 4417a, as amended, 4418, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 391, 391a, 392, 404–409, 411, 412, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 52.01—General Requirements

NOTE: See § 50.15–5 for general adoption of the ASME (American Society of Mechanical Engineers) Code. The adoption of section I of the ASME Code, for power boilers is subject to specific limitations or modifications as described in this part. Those requirements in section I of the ASME Code which are not referred to in this part are adopted without change. Table 52.01–1(a) sets forth a general reference to various paragraphs in section I of the ASME Code which are limited, modified, or replaced by regulations in this part.

§ 52.01–1 Adoption of section I of the ASME Code.

(a) Main power boilers and auxiliary boilers shall be designed, constructed, and tested in accordance with section I of the ASME (American Society of Mechanical Engineers) Code, as limited, modified, or replaced by specific requirements in this part. The provisions in the appendix to section I of the ASME Code are adopted and shall be followed when the requirements in section I make them mandatory. For general information Table 52.01–1(a) lists the various paragraphs in section I of the ASME Code which are limited, modified, or replaced by regulations in this part.

TABLE 52.01–1(a)—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF SECTION I OF THE ASME CODE

Paragraphs in section I, ASME code[1] and disposition	*Unit of this part*
PG–5 through PG–13 modified by	52.01–90
PG–16 through PG–31 modified by	52.01–95
PG–32 through PG–55 modified by	52.01–100
PG–42 replaced by	52.01–100(f)
PG–58 and PG–59 replaced by	52.01–105
PG–60 modified by	52.01–110
PG–61 replaced by	52.01–115 (56.50–30)
PG–63 modified by	52.01–110(a)
PG–64 modified by	52.01–110(b)
PG–65 modified by	52.01–110(c)
PG–67 through PG–72 modified by	52.01–120
PG–75 through PG–82 modified by	52.01–125
PG–90 through PG–100 modified by	52.01–135 (52.01–95(e))
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–105 and PG–106 modified by	52.01–140(a)
PG–107 through PG–109 replaced by	52.01–140(e)
PG–110 modified by	52.01–140(f)
PG–111 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–1 modified by	52.05–5
PW–8 modified by	52.05–10
PW–10 modified by	52.05–15
PW–11.1 modified by	52.05–20
PW–12 reproduced by	52.05–25
PW–16 modified by	52.05–30
PW–19 modified by	52.05–35
PW–26 through PW–43 modified by	52.05–40
PW–41 modified by	52.05–20, 52.05–45
PW–42 replaced by	52.05–50
PW–46 through PW–54 modified by	52.05–55
PR–1 through PR–50 modified by	52.10–1
PR–14 modified by	52.10–3
PR–16 replaced by	52.10–5
PR–17 modified by	52.10–10
PR–30 through PR–50 modified by	52.10–15
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–10 modified by	52.20–5
PFT–13 through PFT–21 modified by	52.20–10
PFT–22 through PFT–38 modified by	52.20–15
PFT–45 modified by	52.20–20
PFT–46 modified by	52.20–25
PMB–1 through PMB–21 replaced by	52.25–5
PVG–1 through PVG–12 modified by	52.25–10
A–19 through A–21 replaced by	52.01–50

[1] The references to specific provisions in the ASME Code 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.

(1) As stated in § 50.15–5 of this subchapter, section I of the ASME Code is adopted and shall be the governing requirements for main power boilers and auxiliary boilers unless specifically limited, modified or replaced by other regulations in this part.

(b) References to the ASME Code, such as paragraph PG–1, indicate:

P = Section I, Power Boilers ASME Code.
G = Subsection—General.
1 = Paragraph 1.

(c) When a section or paragraph of the regulations in this part relates to material in section I of the ASME Code, 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.

(d) ASME Power Boiler "Code Cases" sometimes contain "Limitation Notes". These notes are mandatory for boilers covered by the regulations in this part. Individual justifications may be made to the Commandant for removing the prohibition or requirement of a specific note in a specific application.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 52.01–3 Definitions of terms used in this part.

(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 all purposes, including emergency propulsion, for which steam may be required 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. In such boilers no part of the shell is in contact with the fire or products of combustion.

(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) *High temperature water boiler.* A high temperature water boiler is a boiler containing water at a temperature exceeding 250° F.

(7) *Packaged boiler.* A packaged boiler is a steam boiler equipped, and shipped complete with fuel burning equipment, mechanical draft equipment, feed water apparatus and all necessary controls for manual or automatic operation, all completely mounted on a common base and requiring only to be connected to fuel, water and electric supplies to be ready for use.

(8) *Fired steam boiler.* A pressure vessel in which steam is generated by the application of heat resulting from the combustion of fuel is classed as a fired steam boiler.

(9) *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) *Shell.* The shell is the structure forming the outer envelope of a boiler drum, or pressure vessel consisting of one or more plates properly joined (or of seamless construction) as specified in this part. This does not include tube sheets or heads.

(2) *Heads.* The heads are the ends of a boiler or pressure vessel. They may be flat or dished, stayed or unstayed.

(i) *Dished heads.* Dished heads are heads formed to a segment of a sphere

or to a hemispherical or elliptical section and may be attached to the shell so that the pressure will be either on the concave or on the convex side.

(ii) *Stayed heads.* Stayed heads are heads supported in whole or in part by stays, furnaces, flues, tubes, etc.

(3) *Water wall.* A water wall is a series of tubes or elements spaced along or integral with a wall of a furnace to protect the wall and provide additional heating surface.

(4) *Header.* A header is a hollow forging, pipe, or welded plate of cylindrical, square, or rectangular cross section, serving as a manifold to which tubes are connected.

(5) *Superheater.* A superheater is an appliance for the purpose of increasing the temperature of steam.

(6) *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.

(7) *Domes.* Domes are superstructures of shells, attached by riveting, bolting, or welding. They generally consist of a cylindrical shell with one end flanged for attachment to the main shell and the other end closed by a head which may be integral with, riveted, or welded to the shell.

(8) *Steam chimneys.* Steam chimneys are superstructures of steam boilers which are fitted with a lining inside of which the products of combustion pass to the smokestack. They may be constructed in the form of a dome integral with the boiler or as independent steam vessels connected by piping to the boiler.

(9) *Furnace.* A furnace is a firebox or a large flue in which the fuel is burned.

(i) *Corrugated furnace.* A corrugated furnace is a cylindrical shell wherein corrugations are formed circumferentially for additional strength and to provide for expansion. (See Figure 52.20–10.)

(ii) *Purves ribbed furnace.* A purves ribbed furnace is a cylindrical shell in which ribs or projections are formed circumferentially to provide additional strength. (See Figure 52.20–10(f).)

(iii) *Adamson ring furnace.* An Adamson ring furnace is a cylindrical shell made in short sections, the ends of the sections being flanged and riveted together through a reinforcing ring. (See Figure 52.20–10(g).)

(iv) *Plain furnace.* A plain furnace is a cylindrical shell usually made in sections joined by means of riveting or welding.

(10) *Combustion chamber.* A combustion chamber is that part of an internally fired boiler in which combustible gases may be burned after leaving the furnace.

(i) *Separate combustion chamber.* A separate combustion chamber is a combustion chamber which is connected to one furnace only.

(ii) *Common combustion chamber.* A common combustion chamber is a combustion chamber connected to two or more furnaces in a boiler.

(iii) *Crown or top plate.* A crown or top plate is the top of a combustion chamber and is usually supported by girder stays or by sling stays or braces.

(iv) *Curved bottom plate.* A curved bottom plate is the bottom of a separate combustion chamber formed to an arc of a circle and usually designed to be self-supporting.

(v) *Combustion chamber tube sheet.* A combustion chamber tube sheet is the plate forming the end of a combustion chamber in which the tubes are secured.

(vi) *Combustion chamber back sheet.* A combustion chamber back sheet is the plate opposite the tube sheet forming the back of the combustion chamber. It is usually stayed to the back head of the boiler by means of screw staybolts, or, in the case of double-ended boilers, to the back of the combustion chamber of the other end of the boiler.

(11) *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.

(12) *Tubes.* Tubes are cylindrical shells of comparatively small diameter constituting the main part of the heating surface of a boiler or superheater.

(i) *Seamless tube.* A seamless tube is a tube without any longitudinal joint.

(ii) *Electric-resistance-welded tube.* An electric-resistance-welded tube is a tube the longitudinal joint of which is made by the electric-resistance butt welding process.

(iii) *Stay tube.* A stay tube is a thick-walled tube, the end of which is usually thickened by upsetting to compensate for threading. Such tubes are used for staying tube sheets into which they are screwed and expanded.

(13) *Tube sheet.* A tube sheet is a portion of a boiler drum, or header perforated for the insertion of tubes.

(14) *Ligament.* The ligament is the section of metal between the holes in a tube sheet.

(i) *Longitudinal ligament.* A longitudinal ligament is the minimum section of metal between two tube holes on a line parallel with the axis of the drum.

(ii) *Circumferential ligament.* A circumferential ligament is the minimum section of metal between two tube holes on a line around the circumference of the drum.

(iii) *Diagonal ligament.* A diagonal ligament is the minimum section of metal between two tube holes in adjacent rows, measured diagonally from one row to the other.

(c) *Stays and supports.* (1) *Surfaces to be stayed.* Surfaces to be stayed or reinforced include flat plates, heads, or areas thereof, such as segments of heads, wrapper sheets, furnace plates, side sheets, combustion chamber tops, etc., which are not self-supporting; and curved plates, constituting the whole or parts of a cylinder subject to external pressure, which are not entirely self-supporting.

(2) *Through stay.* A through stay is a solid bar extended through both heads of a boiler and threaded at the ends for attachment by means of nuts. With this type of stay the ends are usually upset to compensate for the threading. (See Figure 52.01–3(a).)

(3) *Solid screw staybolt.* A solid screw staybolt is a threaded bar screwed through the plates, the ends being riveted over or fitted with nuts or welded collars. (See Figure 52.01–3(b).)

(4) *Welded collar.* A welded collar is a beveled ring formed around the end of a screw stay by means of arc- or gas-welding. It is used in lieu of a nut. (See Figure 52.01–3(1).)

(5) *Hollow screw staybolt.* A hollow screw staybolt is a hollow threaded bar screwed through the plate, the ends being riveted over or fitted with nuts or welded collars. (See Figure 52.01–3(c).)

(6) *Flexible staybolt.* A flexible staybolt is a bar made with ball-and-socket joint on one end, the cup of the socket being screwed into the outside sheet and covered with a removable cap, the plain end of the staybolt being threaded, screwed through the inside sheet and riveted over. (See Figure 52.01–3(d).)

(7) *Sling stay.* A sling stay is a flexible stay consisting of a solid bar having one or both ends forged for a pin connection to a crowfoot or other structural fitting secured to the stayed plate. (See Figure 52.01–3(e).)

(8) *Crowfoot.* A crowfoot is a forged fitting with palms or lugs secured to the head to form a proper connection with a sling stay. (See Figure 52.01–3(f).)

(9) *Crowfoot stay.* A crowfoot stay is a solid bar stay terminating in a forged fork with palms or lugs for attachment to the plate. (See Figure 52.01–3(g).)

(10) *Diagonal stay.* A diagonal stay is a bar or formed plate forged with palms or lugs for staying the head of the boiler to the shell diagonally. (See Figure 52.01–3(h).)

(11) *Gusset stay.* A gusset stay is a triangular plate used for the same purpose as a diagonal stay and attached to the head and the shell by angles, flanges, or other suitable means of attachment. (See Figure 52.01–3(i).)

(12) *Dog stay.* A dog stay is a staybolt, one end of which extends through a girder, dog, or bridge, and is secured by a nut, the other end being screwed through the plate which it is supporting and riveted over or fitted with a nut or welded collar. (See Figure 52.01–3(j).)

(13) *Stay tube.* A stay tube is a thick-walled tube, the end of which is usually thickened by upsetting to compensate for threading. Such tubes are used for staying tube sheets into which they are screwed and expanded.

(14) *Girder.* A girder is a bridge, built up of plates of structural shapes separated by distance pieces, a forging, or a formed plate, which spans an area requiring support, abutting thereon and supporting the girder stays or staybolts. (See Figure 52.01–3(k).)

(15) *Structural stiffeners.* Structural stiffeners are rolled shapes or flanged plates which are used to stiffen a surface which is not entirely self-supporting.

(16) *Reinforcement.* A reinforcement is a doubling plate, washer, structural shape, or other form for stiffening or strengthening a plate.

(d) *Pressure relief devices.* For boilers, pressure vessels, and pressure piping, a pressure relief device is designed to open to prevent a rise of internal fluid pressure in excess of a specified value due to exposure to emergency or abnormal conditions. It may also be designed to prevent excessive internal vacuum. It may be a pressure relief valve, a nonreclosing pressure relief device or a vacuum relief valve.

(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*) *Pressure loaded pilot actuated safety valve.* A pressure loaded pilot actuated safety valve is one which is held in a closed position by steam pressure and controlled in operation by a pilot actuator valve.

(*c*) *Spring loaded pilot actuated safety valve.* A spring loaded, pilot actuated safety valve is one in which a spring is used in the conventional way to hold the disk against the seat, but which has a piston attached to the spindle and enclosed within a cylinder, which when subjected to a limiting or set pressure, unbalances the spring load thereby opening the valve.

(*d*) *Spring loaded pilot valve.* A spring loaded pilot valve is a conventional safety valve designed to actuate another spring loaded safety valve through a pressure transmitting line led from the body of the pilot valve.

(ii) *Relief valve.* A relief valve is a pressure relief valve actuated by inlet static pressure which opens in proportion to the increase in pressure over the opening pressure.

(iii) *Safety relief valve.* A safety relief valve is a pressure relief valve characterized by rapid opening or pop action, or by opening in proportion to the increase in pressure over the opening pressure, depending on application.

(*a*) *Conventional safety relief valve.* A conventional safety relief valve has its spring housing vented to the discharge side of the valve. The performance characteristics (opening pressure, closing pressure, lift and relieving capacity) are directly affected by changes of the back pressure on the valve.

(*b*) *Balanced safety relief valve.* A balanced safety relief valve incorporates means of minimizing the effect of back pressure on the operational characteristics (opening pressure, closing pressure, lift and relieving capacity).

(*c*) *Internal spring safety relief valve.* An internal spring safety relief valve incorporates the spring and all or part of the operating mechanism within the pressure vessel.

(iv) *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 valve.

(v) *Power actuated relief valve.* A power actuated pressure relief valve is a pressure relief valve in which the major relieving device is combined with and controlled by a device requiring an external source of energy.

(vi) *Temperature actuated pressure relief valve.* A temperature actuated pressure relief valve is a pressure relief valve which is actuated by external or internal 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) *Breaking pin device.* A breaking pin device is a device actuated by inlet static pressure and designed to function by the breakage of a load carrying section of a pin which supports a pressure retaining member.

(iv) *Shear pin device.* A shear pin device is a device actuated by inlet static pressure and designed to function by the shearing of a load carrying pin which supports the pressure retaining member.

(v) *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.

(vi) *Frangible disk device.* A frangible disk device is the same as a rupture disk device.

(vii) *Bursting disk device.* A bursting disk device is the same as a rupture disk device.

(3) *Vacuum relief valve.* A vacuum relief valve is a valve designed to admit fluid to prevent an excessive internal vacuum.

(e) *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 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 from the auxiliary lines (including the whistle 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) *Feed valve.* A feed valve is a valve in the feed-water line which controls the boiler feed.

(6) *Blowoff valve.* A blowoff valve is a valve connected directly to the boiler for the purpose of blowing out water, scum or sediment.

(7) *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.

(8) *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.

(9) *Test cocks.* Tests cocks are small cocks on a boiler for indicating the water level.

(10) *Salinometer cocks.* Salinometer cocks are cocks attached to a boiler for the purpose of drawing off a sample of water for salinity tests.

(11) *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 and thus warn the engineer on watch.

(f) *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) *Expanding.* Expanding is the process of enlarging the end of a tube to make it fit tightly in the tube sheet.

(4) *Beading.* Beading is the process of turning over the protruding end of a tube after expanding to form a supporting collar for the tube sheet.

(5) *Bell-mouthing.* Bell-mouthing is the process of flaring the end of a tube beyond where it is expanded in the tube sheet.

(6) *Telltale hole.* A telltale hole is a small hole having a diameter not less than three-sixteenths inch drilled in the center of a solid stay, and extending to at least one-half inch beyond the inside surface of the sheet.

(7) *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.

(8) *Openings.* Openings are holes cut in shells or heads of boilers or boiler pressure parts for the purpose of connecting nozzles, domes, steam chimneys, or mountings.

(g) *Pressure.* The term pressure is an abbreviation of the more explicit expression "difference in pressure intensity." It is measured in terms such as pounds per square inch (p.s.i.).

(1) *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 (p.s.i.g.).

(2) *Absolute pressure.* Absolute pressure is the difference between the pres-

sure at the point being measured and that of a perfect vacuum. It is measured in units such as pounds per square inch absolute (p.s.i.a.).

(3) *Internal pressure.* Internal pressure refers to a situation where the pressure inside exceeds that outside the volume being described.

(4) *External pressure.* External pressure refers to a situation where the pressure outside exceeds that inside the volume being described.

(5) *Maximum allowable working pressure.* For a definition of maximum allowable working pressure, see § 54.10–5 of this subchapter.

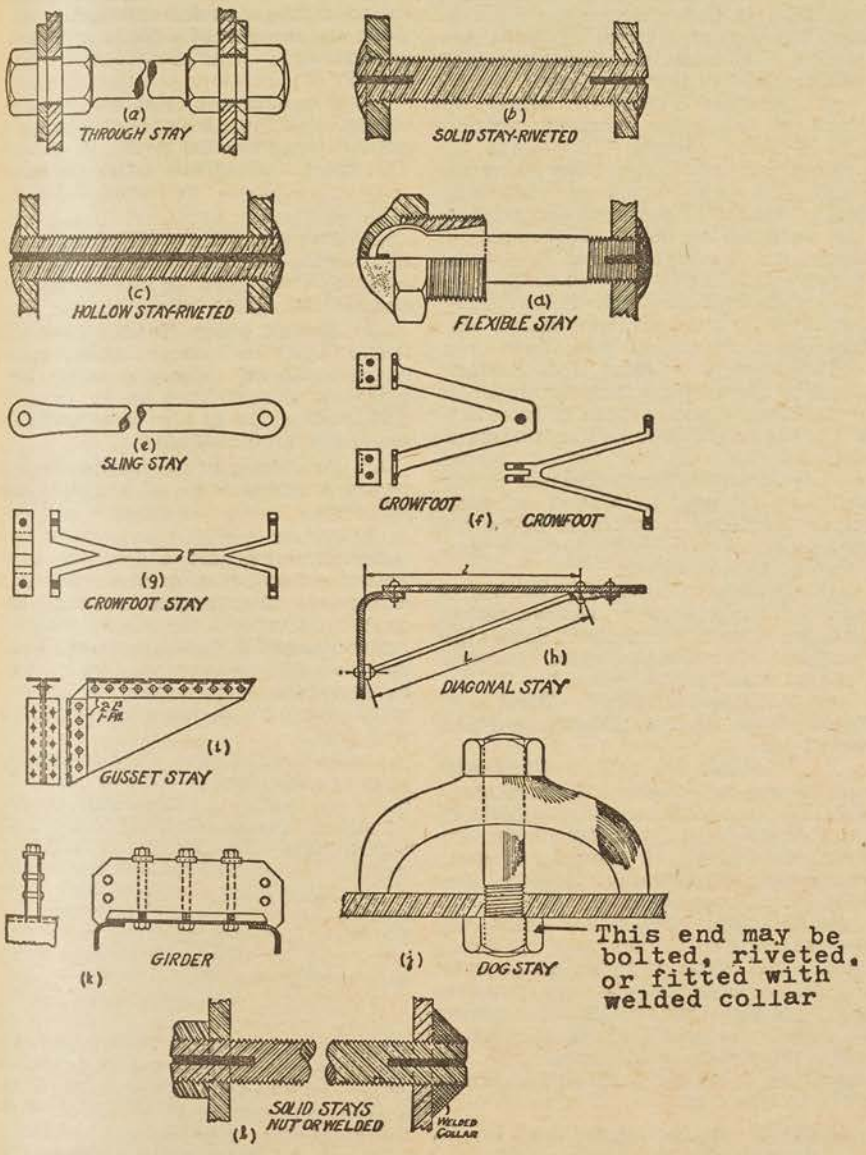


FIGURE 52.01–3—Acceptable Types of Boiler Stays.

§ 52.01–5 Plans.

(a) Manufacturers intending to fabricate boilers of riveted, welded, or seamless material to be installed on vessels shall submit detail plans as indicated in Subpart 50.20 of this subchapter.

§ 52.01–10 Automatic controls.

(a) Each automatically controlled main boiler shall meet special requirements for controls and safety shutdown as determined by the Commandant.

(b) Each automatically controlled auxiliary boiler shall meet the special requirements of Part 63 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 54.01–5(a) of this subchapter.

(b) Fired vessels in which steam is generated at pressures exceeding 30 pounds per square inch gage shall 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 shall be free from injurious defects and shall have a workmanlike finish. The construction work shall be executed in a workmanlike manner with proper tools or equipment and shall be free from defects which would impair strength or durability.

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

(a) All boilers, except watertube boilers and low-pressure heating boilers operating at pressures not in excess of 30 pounds per square inch, shall be fitted with fusible plugs from acceptable heats manufactured in accordance with Subpart 162.014 of Subchapter Q (Specifications) of this chapter.

(b) Vertical boilers shall be fitted with one fusible plug located in a tube not more than 2 inches below the lowest gage cock.

(c) Externally fired cylindrical boilers with flues shall have one plug fitted to the shell immediately below the fire line not less than 4 feet from the front end.

(d) Firebox, Scotch, and other types of shell boilers not specifically provided for, having a combustion chamber common to all furnaces, shall have one plug fitted at or near the center of the crown sheet of the combustion chamber.

(e) Double-ended boilers, having individual combustion chambers for each end, in which combustion chambers are common to all the furnaces in one end of the boiler, shall have one plug fitted at or near the center of the crown sheet of each combustion chamber.

(f) Boilers constructed with a separate combustion chamber for each individual furnace shall be fitted with a fusible plug in the center of the crown sheet of each combustion chamber.

(g) Boilers of types not provided for in this section shall be fitted with at least one fusible plug of such dimensions and located in a part of the boiler as will, in the judgment of the marine inspector, best meet the purposes for which it is intended.

(h) Fusible plugs shall be so fitted that the smaller end of the filling is in direct contact with the radiant heat of the fire, and shall be at least 1 inch higher on the water side than the plate or flue in which they are fitted, and in no case more than 1 inch below the lowest permissible water level.

(i) The lowest permissible water level shall be determined as follows:

(1) Vertical firetube boilers, one-half of the length of the tubes above the lower tube sheets.

(2) Vertical submerged tube boilers 1 inch above the upper tube sheet.

(3) Internally fired firetube boilers with combustion chambers integral with the boiler, 2 inches above the highest part of the combustion chamber.

(4) Horizontal-return tubular and dry back Scotch boilers, 2 inches above the top row of tubes.

(j) The lowest permissible water level for all water-tube boilers shall be determined at the time the plans of the boilers are submitted for approval.

(k) (1) Fusible plugs shall be cleaned and will be examined by the marine inspector at each inspection for certification, and oftener if necessary. 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 shall submit a written report to the Officer in Charge, Marine Inspection, who issued the certificate of inspection informing him of the renewal. This letter report shall 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 heat number of each plug.

(v) Reason for renewal.

(l) Fusible plugs shall not be permitted where the maximum steam temperature to which they are exposed exceeds 425° F.

§ 52.01–55 Increase in maximum allowable working pressure.

(a) When the maximum allowable working pressure of a boiler has been established, an increase in the pressure setting of its safety valves shall not be granted unless the boiler design meets the requirements of this subchapter in effect at the time the boiler was contracted for or built; but in no case will a pressure increase be authorized for boilers constructed prior to the effective date of the regulations dated November 19, 1952, if the minimum thickness found by measurement shows that the boiler will have a factor of safety of less than 4½. The piping system, machinery, and appurtenances shall meet the present requirements of this subchapter for the maximum allowable working pressure requested. An increase in pressure shall be granted only by the Commandant upon presentation of data or plans proving that the requested increase in pressure is justified.

(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 shall 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 shall be based on the results of this analysis.

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

(a) Materials subject to stress due to pressure shall conform to specifications as indicated in paragraph PG–5 through PG–13 of the ASME Code except as noted otherwise in this section.

(b) Material not fully identified with an ASME Code approved specification may be accepted as meeting Coast Guard requirements provided it satisfies the conditions indicated in paragraph PG–10 of the ASME Code.

(c) Miscellaneous pressure parts shall be as required by paragraph PG–11 except that welded pressure parts (other than the shell of a vessel), such as pipe fittings, shall meet the requirements of Subpart 56.15 of this subchapter.

(d) (Modifies PG–5.5.1.) When the maximum allowable working pressure (See PG–21) exceeds 15 pounds per square inch, cross pipes connecting the steam and water drums of water tube boilers, headers, cross boxes and all pressure parts of the boiler proper shall be made of a wrought or cast steel listed in Table PG–23.1 of the ASME Code.

(e) (Modifies PG–5.5.2.) Pipes used on boilers up to the first joint on all outlets, including steam lines, feed lines, blowoff lines and drains shall conform to one of the specifications for steel pipe or steel tubes that are listed in Table PG–23.1 of the ASME Code. Nonferrous materials are not permitted for this service but are permitted for instrument piping, and may be used in blowoff or drain service provided pressure is below 250 pounds per square inch gage and temperature is below 400° F.

(f) (Modifies PG–8.2.2.) The use of cast iron for mountings, fittings, valves, or cocks attached directly to boilers operating at pressures exceeding 15 pounds per square inch is prohibited.

(g) (Modifies PG–12.) Rivets of Specification SA–202 material are also acceptable.

(h) (Modifies PG–11.1.1.) The material, design, construction and workmanship of pumps shall be at least equivalent to the standards established by the American Bureau of Shipping or other recognized classification society. See Part 58 of this subchapter.

(i) (Modifies PG–5.4.) With the Commandant's permission, materials outside the limits of thickness given in the title or scope clause of any specification in section II of the ASME Code may be used if the material is in compliance with the other requirements of the specification and no similar limitation is given in this part.

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

(a) *Requirements.* Boilers required to be designed to this part shall meet the requirements of PG–16 through PG–31 of the ASME Code except as noted otherwise in this section.

(b) *Superheater.* (1) The design pressure of a superheater integral with the boiler shall not be less than the lowest setting of the drum safety valve, except that outlet connections shall be designed in accordance with Subpart 56.15 of this subchapter.

(2) Controls shall be provided to insure that the maximum temperature at the superheater outlet does not exceed the allowable temperature limit of the material used in the superheater outlet, in the steam piping, and in the associated turbo machinery under all normal operating conditions including boiler overload. Controls need not be provided if the operating superheater characteristic is demonstrated to be such that the temperature limits of the material will not be exceeded. Visible and audible alarms indicating excessive superheat shall be provided in any installation in which the superheater outlet temperature exceeds 850° F.

(3) Arrangement shall 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 shall 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 temperature not exceeding 525° F. Refer to § 56.30–30(b)(1) of this subchapter for applicable requirements.

(e) *Experimental determination of pressure rating. (Modifies PG–18 and PG–100.)*

(1) Where approval is requested for a boiler pressure part which, due to its irregular form, process of manufacture, or for any other reason, becomes a new or difficult subject for accurate mathematical analysis, the Commandant may require a full size specimen to be tested to determine a safe and fair pressure rating for such pressure vessel or pressure part.

(2) In lieu of the proof hydrostatic tests as prescribed in A–22 of the ASME Code appendix, the Commandant may permit the use of empirical formulas for determining the maximum allowable working pressure of boiler pressure parts of irregular form, or where the stresses cannot be accurately determined. The empirical formulas shall be based upon proof hydrostatic test data acceptable to the Commandant.

(f) *Stresses. (Modifies PG–22.)* The stresses due to hydrostatic head shall 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 shall 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.

(g) *Cylindrical components under internal pressure. (Modifies PG–27.)* The minimum required thickness and maximum allowable working pressure of boiler piping, tubes, drums and headers shall be as required by the formula in PG–27 of the ASME Code except that threaded boiler tubes are not permitted.

§ 52.01–100 Openings and compensation (modifies PG–32 through PG–41, PG–43 through PG–55, replaces PG–42).

(a) The rules for openings and compensation shall be as indicated in PG–32 through PG–55 of the ASME Code except as noted otherwise in this section.

(b) (Modifies PG–34.) Flanged-in manhole openings in a dished head shall be flanged to a minimum radius measured on the inside of the plate of not less than seven-eighths inch for plates up to and including 1⅛ inches in thickness, and for plates exceeding 1⅛ inches in thickness, the radius shall be increased proportionately.

(c) (Modifies PG–34.) The inner radius of the bend of any flanged opening in heads, except manholes or other access openings as specified in paragraph (b) of this section, shall, for furnace attachments, be not less than one and one-half times the thickness of the plate flanged.

(d) When handhole or other access openings are made, a margin of not less than one-fourth inch shall be left when punching operations are used, and not less than one-eighth inch shall be left when machine burning methods are employed. Such margins shall be machined or ground away to relieve the metal of any stresses which may be set up due to burning or punching operations.

(e) (Modifies PG–39.) Pipe and nozzle necks shall be attached to vessel walls as indicated in PG–39 except that threaded connections shall not be used under any of the following conditions:

(1) Pressures greater than 600 pounds per square inch gage;

(2) Nominal diameters greater than 2 inches; or

(3) Nominal diameters greater than three-fourths inch and pressures above 150 pounds per square inch gage.

(f) (Replaces PG–42.) Connections for pipe, piping fittings, and valves shall meet the appropriate requirements of Part 56 of this subchapter in lieu of PG–42 of the ASME Code.

(g) (Modifies PG–49.) The length of a staybolt shall not exceed 20 diameters of the staybolt.

(h) (Modifies PG–47.) The minimum thickness of nuts used in connection with screw stays shall be one-half of the nominal thread diameter of the stay, but in no case less than three-fourths inch. The stays shall be so placed in relation to the joints that the plates can be calked without removing the nuts.

(i) Handhole covers may be seal welded to provide tightness.

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

(a) *Piping system components.* All piping system components shall meet the appropriate requirements of Part 56 of this subchapter. These systems include steam (drum to superheater, desuperheated steam), feed water, drain, and blow-off piping. Parts of boilers fabricated from pipe material such as drums, shells, downcomers, risers, cross pipes, headers, and tubes shall meet the requirements of this part with the exception of the nondestructive testing of circumferentially welded butt joints. (See § 52.05–20.) The circumferential joint connecting the piping system to the boiler component shall be considered to be part of the piping system (Part 56 of this subchapter) for the purposes of design, inspection, and testing.

(b) *Feed connections.* (1) Feed water shall not be discharged into a boiler against surfaces exposed to hot gases or radiant heat of the fire or close to a riveted joint.

(2) Feed water nozzles of boilers designed for pressures of 400 pounds per square inch, or over, shall be fitted with sleeves or other suitable means employed to reduce the effects of metal temperature differentials.

(c) *Blowoff connections.* (1) Firetube and drum type boilers shall be fitted with a surface and a bottom blowoff valve or cock attached directly to the boiler or to a short distance piece. The surface blowoff valve shall be located within the permissible range of the water level, or fitted with a scum pan or pipe at this level. The bottom blowoff valve shall be attached to the lowest part of the boiler or fitted with an internal pipe leading to the lowest point inside the boiler. Watertube boilers designed for pressures of 350 pounds per square inch gage or over are not required to be fitted with a surface blowoff valve. 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 shall be protected by fire brick or other suitable heat-resisting material.

(d) *Dry pipes.* Internal dry pipes may be fitted to the steam drum outlet, provided such dry pipes have a diameter equal to the outlet and a wall thickness at least equal to standard commercial pipe thickness for their diameter. Openings in dry pipes shall be as near as practicable to the drum outlet and shall be slotted or drilled, the width of the slots to be not less than one-quarter inch, or the diameter of the holes to be not less than three-eighths inch. Where dry pipes are used, they shall be provided with drains at each end to prevent an accumulation of water.

§ 52.01–110 Water level indicators, water columns, gage glass connections, gage cocks, and pressure gages (modifies PG–60).

(a) *Boiler water level devices.* Boiler water level devices shall be as indicated in PG–60 of the ASME Code 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, shall have two independent means of indicating the water level in the boiler connected directly to the head or shell. One shall be a gage glass or multiport bicolor gage lighted by the emergency electrical system (See Subpart 112.15 of Subchapter J (Electrical Engineering) of this chapter) which will insure illumination of the gages under all normal and emergency conditions. The secondary indicator may consist of a gage glass, or other device approved by the Commandant. Where the allowable pressure exceeds 250 pounds per square inch, the gage glasses shall be of the flat type instead of the common tubular type.

(2) Gage glasses shall be in continuous operation while the boiler is steaming.

(3) Double-ended firetube boilers shall be equipped as specified in this paragraph and paragraph (e) of this section except that the required water level indicators shall be installed on each end of the boiler.

(4) Externally fired flue boilers, such as are used on central western river vessels, shall be equipped as specified in subparagraphs (1) through (3) of this paragraph 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 shall be close hauled to minimize the effect of ship motion on water level indication. When water columns are provided they shall be fitted directly to the heads or shells of boilers or drums by 1 inch minimum size pipes with shutoff valves attached directly to the boiler 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 or between the boiler and the shutoff valves required by PG–60.6 of the ASME Code for gage glasses, shall be locked or sealed open. Water column piping shall not be fitted inside the uptake, the smoke box, or the casing. Water columns shall be fitted with suitable drains. Cast iron fittings are not permitted.

(d) *Gage glass connections (modifies PG–60.3).* Gage glasses and gage cocks shall be connected directly to the head or shell of a boiler as indicated in paragraph (b) (1) of this section. When water columns are authorized, connections to the columns may be made provided a close hauled arrangement is utilized so that the effect of ship roll on the water level indication is minimized.

(e) *Gage cocks (modifies PG–60.4).*

(1) When the steam pressure does not exceed 250 pounds per square inch, three test cocks attached directly to the head or shell of a boiler may serve as the secondary water level indicator.

(2) See paragraph (d) of this section for restrictions on cock connections.

(f) *Pressure gages (modifies PG–60.6).* Each double-ended boiler shall be fitted with two steam gages, one on either end on the boiler.

(g) *Salinometer cocks.* In vessels operating in salt water, each boiler shall be equipped with a salinometer cock or valve which shall be fitted directly to the boiler in a convenient position. They shall not be attached to the water gage or water column.

§ 52.01–115 Feedwater supply (replaces PG–61).

Refer to § 56.50–30 of this subchapter for applicable requirements. The feedwater supply requirements in § 56.50–30 of this subchapter shall be followed in lieu of PG–61 of the ASME Code.

§ 52.01–120 Safety valves and safety relief valves (modifies PG–67 through PG–72).

(a) (1) Boiler safety valves and safety relief valves shall be as indicated in PG–67 through PG–72 of the ASME Code except as noted otherwise in this section.

(2) Each boiler and its superheater shall be provided with one or more approved safety valves meeting Subpart 162.001 of Subchapter Q (Specifications) of this chapter.

(3) On river steam vessels whose boilers are connected in batteries without means of isolating one boiler from another, each battery of boilers shall 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 shall not be less than the maximum generating capacity of the boiler which shall be determined and certified by the boiler manufacturer. This capacity shall be in compliance with PG–70 of the ASME Code.

(5) In the event the maximum steam generating capacity of the boiler is increased by any means, the relieving capacity of the safety valves shall be checked by an inspector, and, if determined to be necessary, valves of increased relieving capacity shall be installed.

(6) (Modifies PG–67.) Drum safety valves shall be set to relieve at a pressure not in excess of that allowed by the approved plans or 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–70(3) of the ASME Code shall be conducted in the presence of an Inspector to insure that the relieving capacity is sufficient at the lower pressure.

(7) On new installations, the safety valve diameter for power boilers, superheaters, or unfired steam generators shall be not less than 1½ inches nor more than 4 inches. Safety valves of 4½ inches diameter may be used for replacements on existing boilers or unfired steam generators. The foregoing diameters apply to the valve inlet.

(8) Lever or weighted safety valves now installed may be continued in use and may be repaired, but when renewals are necessary, lever or weighted safety valves shall not be used. All such replacements shall conform to the requirements of this section.

(9) Gags or clamps for holding the safety valve disk on its seat shall be carried on board the vessel at all times.

(b) (1) (Modifies PG–68.) Superheater safety valves shall be as indicated in PG–68 of the ASME Code except as noted otherwise in this paragraph.

(2) The setting of the superheater safety valve shall 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 shall be set at a pressure not less than that of the superheater safety valve setting plus 5 pounds minimum plus approximately the normal load pressure drop through the superheater and associated piping, including the controlled desuperheater if fitted. See also § 52.01–95(b)(1).

(3) Installations employing drum pilot actuated superheater safety valves will be specially considered by the Commandant. See also § 56.50–15(b) of this subchapter.

(c) (1) (Modifies PG–71.) Safety valves shall be installed as indicated in PG–71 of the ASME Code except as noted otherwise in this paragraph.

(2) The final setting of boiler safety valves shall be checked and adjusted under steam pressure and, if possible, while the boiler is on the line and the steam is at operating temperatures, in the presence of and to the satisfaction of a marine inspector who, upon acceptance, shall 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 the ASME Code shall be run as directly as possible from the body of each boiler safety valve, or the drain from each boiler safety valve may be led to an independent header common only to boiler safety valve drains. No valves of any type shall be installed in the leakoff from drains or drain headers and they shall be led to suitable locations to avoid hazard to personnel.

(d) (1) (Modifies PG–72.) The operation of safety valves shall be as indicated in PG–72 of the ASME Code except as noted in subparagraph (2) of this paragraph.

(2) The lifting device required by PG–72.4 of the ASME Code shall be fitted with suitable relieving gear so arranged that the controls may be operated from the fireroom or engineroom floor.

§ 52.01–125 Fabrication (modifies PG–75 through PG–82).

(a) *Requirements.* The fabrication of boilers and parts thereof shall be as indicated in PG–75 through PG–82 of the ASME Code except as noted otherwise in this section.

(b) *Cracked plates.* Plates which crack during cold forming operations as a result of localized stress raisers, such as sharp plate edges, minor localized surface imperfections, and fractures which subsequent microstructure examination shows to be caused by coarse grain size, may be repaired if authorized by the Commandant. Prior to such repairs being authorized, information as appropriate shall be furnished regarding:

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

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

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

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

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

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

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

(1) Method of excavating defective material and type of welding groove to be used;

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

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

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

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

§ 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 shall be submitted for approval to the Officer in Charge, Marine Inspection, in the district where the installation is being made.

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

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

(b) *Protection of adjacent structure.*—(1) Boilers shall 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 shall in no case be less than 18 inches at the lowest part.

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

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

(5) The distance between a boiler and a compartment containing fuel oil shall not be less than 24 inches at the back end of a boiler and 18 inches elsewhere, except that for a cylindrical part of a boiler or a knuckle in the casing of a water-tube boiler, these distances may

be reduced to 18 inches, provided all parts are readily accessible for inspection and repair.

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

(c) *Boiler uptakes.* (1) Where dampers are installed in the uptakes or funnels, the arrangement shall be such that it will not be possible to shut off the gas passages from the operating boilers.

(2) Each main power boiler and auxiliary boiler shall 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 shall be as indicated in PG–90 through PG–100 of the ASME Code except as noted otherwise in this section and in § 52.01–95(d).

(b) *Inspector (modifies PG–91).* The "Inspector" shall be the "Marine Inspector" as defined in § 50.10–15 of this subchapter.

(c) *Hydrostatic test (modifies PG–99).* Each new boiler shall be hydrostatically tested after installation to 1½ times the maximum allowable working pressure as indicated in PG–99 of the ASME Code. Before the boilers are insulated, accessible parts of the boiler shall be emptied, opened up and all interior surfaces shall be examined to ascertain that no defects have occurred due to the hydrostatic test.

(d) *Operating tests.* In addition to the hydrostatic tests prescribed in this section, automatically controlled auxiliary boilers shall be subjected to operating tests as specified in § 63.05–90 or § 63.10–90 of this subchapter as appropriate, or as directed by the Commandant for propulsion boilers. These tests are to be performed after final installation.

§ 52.01–140 Certification by stamping (modifies PG–105 through PG–113).

(a) The marine inspector (see § 50.10–15 of this subchapter) shall affix the Coast Guard symbol to main power boilers and to auxiliary boilers. Stamping with the ASME Code symbol stamps, as indicated in PG–105 through PG–113 of the ASME Code, is not required for main power boilers and auxiliary boilers and a manufacturer need not possess ASME Code symbol stamps (see § 50.15–5(c) of this subchapter).

(1) Those heating boilers which are built to section I of the ASME Code, as permitted by § 53.10–5 of this subchapter, do not require Coast Guard inspection or stamping, and shall receive full ASME stamping including the appropriate code symbol.

(b) Upon satisfactory completion of the tests and Coast Guard inspections, main power boilers and auxiliary boilers shall be stamped, on the front head or shell near the normal waterline and within 24 inches of the front of firetube boilers and on the drum head of watertube boilers, with the following:

(1) Manufacturer's name and serial number.

(2) Coast Guard number, see § 50.10–30 of this subchapter.

(3) Coast Guard symbol, which is affixed only by the marine inspector.

(4) Maximum allowable working pressure _____ at _____ °F.

(5) Boiler maximum output capacity in pounds per hour.

(c) The data shall be legibly stamped and shall not be obliterated during the life of the boiler. In the event that the portion of the boiler upon which the data is stamped is to be insulated or otherwise covered, a metal nameplate as described in PG–106.6 of the ASME Code shall be furnished and mounted. The Coast Guard Symbol on such plates may only be affixed by the marine inspector. The nameplate is to be maintained in a legible condition so that data may be easily read.

(d) (1) When only a pressure part of a boiler is supplied, the applicable data shall be recorded on the Manufacturers' Partial Data Form P–4. (See ASME Code.) The item shall be stamped as required by PG 106.7 of the ASME Code, except that the Coast Guard Symbol shall be substituted for the ASME Symbol and an ASME Serial Number need not be included.

(2) The Officer in Charge, Marine Inspection, who makes the final tests and inspection of the boiler as a whole shall assign the Coast Guard Number to the boiler in accordance with paragraph (b) of this section.

(e) PG–107 through PG–109 of the ASME Code do not apply. Field assembly of completed and stamped (less the Coast Guard Number) individual boiler components at a shipyard is permitted. Master data reports are required.

(f) Safety valves shall be stamped as indicated in PG–110 of the ASME Code as modified by Subpart 162.001 of Subchapter Q (Specifications) of this chapter.

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

(a) Manufacturers' Data Reports, both partial and master, as described in PG–112 and PG–113 of the ASME Code are required. These forms shall be modified as directed by the Officer in Charge, Marine Inspection, for main power boilers and auxiliary boilers which are examined by a marine inspector.

(b) All necessary forms shall be provided by the manufacturer.

Subpart 52.05—Requirements for Boilers Fabricated by Welding

§ 52.05–1 General (modifies PW–1).

(a) Boilers and component parts, including piping, that are fabricated by welding shall be as indicated in PW–1 through PW–54 of the ASME Code except as noted otherwise in this subpart.

§ 52.05–5 Scope and responsibility (modifies PW–1.2).

(a) Boilers and component parts thereof that are fabricated by welding shall be as indicated in PW–1 of the ASME Code except as noted otherwise in this section.

(b) The qualification of welding procedures and welders shall be as required by Part 57 of this subchapter.

§ 52.05–10 Design (modifies PW–8 through PW–19).

(a) The design of welded boilers and parts thereof shall be as indicated in PW–8 through PW–19 of the ASME Code except as noted otherwise in §§ 52.05–20, 52.05–25, 52.05–30, and 52.05–35.

§ 52.05–15 Heat treatment (modifies PW–10).

(a) Vessels and vessel parts shall be preheated and postweld heat treated in accordance with PW–38 and PW–39 of the ASME Code (reproduces PW–10). 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).

(a) Radiographic and ultrasonic examination of welded joints shall be as described in PW–11 of the ASME Code except that parts of boilers fabricated of pipe material, such as drums, shells, downcomers, risers, cross pipes, headers and tubes containing only circumferentially welded butt joints, shall be nondestructively examined as required by Table 56.95–10 of this subchapter even though they may be exempted by the size limitations specified in PW–11.1.2 and PW–41.1 of the ASME Code.

§ 52.05–25 Joint efficiency factors (reproduces PW–12).

(a) In applying the rules in PG–27 of the ASME Code a welded joint efficiency of 100 percent may be used provided all weld reinforcement on the longitudinal joints is removed substantially flush with the surface of the plate. Otherwise a joint efficiency not to exceed 90 percent shall be used.

§ 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 shall be as required by PW–16 of the ASME Code 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 the ASME Code and are welded from one side only, backing strips shall be used unless it can be determined visually or by acceptable nondestructive test methods that complete penetration has been obtained.

(c) When attachments as shown in Figure PW–16 (y) and (z) of the ASME Code are employed they shall be limited to 2-inch pipe size for pressure exceeding 150 pounds per square inch.

§ 52.05–35 Welded-in staybolts (modifies PW–19).

(a) Welded-in staybolts shall be as required by PW–19 of the ASME Code except as noted otherwise in this section.

(b) The palm end of the stay shall be hot formed to the radius of curvature of the shell.

(c) Welded collars may be used in lieu of nuts to attach screw staybolts to plates, provided the legs of the welds are of sufficient length to develop a strength of at least 25 percent of the staybolt, but in no case shall the legs of the welds be less than one-fourth inch in length.

(d) The welding, except where welded collars are used, shall be stress-relieved in accordance with PW–39 of the ASME Code.

§ 52.05–40 Welded fabrication (modifies PW–26 through PW–43).

(a) Boilers and parts thereof fabricated by welding shall be as required by PW–26 through PW–43 of the ASME Code except as noted otherwise in this section, and in §§ 52.05–45 and 52.05–50.

(b) Welder qualification shall be as required by Part 57 of this subchapter.

(c) Welding procedure qualification shall be as required by Part 57 of this subchapter.

(d) Welder qualification records shall be maintained as required by Part 57 of this subchapter.

(e) The transferral of welder qualification shall be as permitted by Part 57 of this subchapter.

§ 52.05–45 Circumferential joints in pipes, tubes and headers (modifies PW–41).

(a) Circumferential welded joints of pipes, tubes and headers shall be as required by PW–41 of the ASME Code except as noted otherwise in this section.

(b) (Replaces PW 41.1.) Circumferential welded joints in pipes, tubes, and headers of pipe material shall be nondestructively tested as required by the table in § 56.95–10 of this subchapter in lieu of the requirement of PW–41.1 (PW–41.1.1—PW–41.1.3).

(c) (Modifies PW–41.5.) Butt welded connections shall be provided whenever radiography is required by Table 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 the ASME Code may be provided. See also § 56.70–15(d)(3) of this subchapter.

§ 52.05–50 Joints in boiler appurtenances (replaces PW–42).

(a) Welded boiler appurtenances, such as valves, water columns and separate external desuperheaters, shall be as required by Part 56 of this subchapter in lieu of PW–42 of the ASME Code.

§ 52.05–55 Inspection and tests of welded boilers (modifies PW–46 through PW–54).

(a) Inspection and tests of power boilers, boiler parts, and boiler internal piping that are fabricated by welding shall be as required by PW–46 through PW–54 of the ASME Code except as noted otherwise in this section.

(b) These inspections and tests shall be made and used in conjunction with the general requirements for inspections and tests in § 52.01–135.

(c) All welders and welding procedures employed in construction shall be qualified as required by Part 57 of this subchapter.

(d) Production test plates shall be made when required by Subpart 57.06 of this subchapter.

Subpart 52.10—Requirements for Boilers Fabricated by Riveting

§ 52.10–1 General (modifies PR–1 through PR–50).

(a) Boilers and component parts thereof that are fabricated by riveting shall be as indicated in PR–1 through PR–50 of the ASME Code except as noted otherwise in this subpart.

§ 52.10–3 Thickness of buttstraps (modifies PR–14).

(a) Buttstrap thickness shall be as indicated in PR–14 of the ASME Code except that the thickness of inner buttstraps shall exceed the thickness of outer buttstraps by 0.125 inches. However, this total thickness of inner and outer buttstraps is not required to exceed the thickness of the shell plate.

§ 52.10–5 Longitudinal riveted joints (replaces PR–16).

(a) The main power boilers and auxiliary boilers having longitudinal riveted joints of shells or drums shall be as indicated in this section in lieu of the requirements in PR–16 of the ASME Code.

(b) The longitudinal joints of drums and shells of all boilers shall be of riveted double-buttstrap construction, at least double-riveted.

(c) Where the drums of watertube boilers are pierced through the longitudinal buttstrap joint for the purpose of inserting tubes to connect the headers to the drum, the combined thickness of both buttstraps shall be taken in computing the efficiency of the ligament between tube holes. This efficiency shall in no case be less than that required for the riveted joint.

(d) Boiler shell plates having longitudinal joints shall be rolled or formed by pressure, not blows, to the proper curvature.

(e) The maximum allowable pitch of rivets in longitudinal joints shall be such as to insure good calking.

§ 52.10–10 Circumferential joints (modifies PR–17).

(a) Riveted circumferential joints shall be as indicated in PR–17 of the ASME Code except as noted otherwise in this section.

(b) Circumferential end joints of shell plates over 5/8-inch thick and circumferential joints connecting courses of shells, the required thickness of which is over one-half inch, shall be at least double-riveted. Where the thickness of the shell plate exceeds 1 3/8 inches for single-ended boilers and 1 3/16 inches for double-ended boilers, the circumferential seams connecting shell courses shall be triple riveted.

§ 52.10–15 Riveted fabrication (modifies PR–30 through PR–50).

(a) The fabrication of riveted boilers and parts thereof shall be as indicated in PR–30 through PR–50 of the ASME Code except as noted otherwise in this section.

(b) The seal welding of rivet heads to secure tightness is prohibited.

(c) Plates and shapes shall be so closely fitted, metal to metal, as to require a minimum of calking to obtain tightness.

Subpart 52.15—Requirements for Watertube Boilers

§ 52.15–1 General (modifies PWT–1 through PWT–15).

(a) Watertube boilers and parts thereof shall be as indicated in PWT–1 through PWT–15 of the ASME Code except as noted otherwise in this subpart.

(b) Superheaters fitted in conjunction with watertube boilers may be considered as a part of the boiler, provided the pipes between the boiler and superheater and between superheaters are made of seamless steel material having a minimum thickness computed by the formula specified for piping in Part 56 of this subchapter. Fittings used in making such connections shall be of forged or cast steel.

§ 52.15–5 Tube connections (modifies PWT–9 and PWT–11).

(a) Tubes, pipe and nipples may be attached to sheets, heads, headers, and fittings as indicated in PWT–11 of the ASME Code except as noted otherwise in this section.

(b) (Replaces PWT–9.2 and PWT–11.3.) Threaded boiler tubes shall not be permitted as described by PWT–9.2 and PWT–11.3 of the ASME Code.

(c) (1) Boiler tubes may be welded to manifolds, headers, or drums without expanding or flaring provided the strength welds and testing comply with the provisions of this section.

(2) Economizer and waterwall tubes not exceeding 2 inches in size may be attached to headers by means of socket-welded joints, provided the depth of the socket is the maximum allowable but in no case less than three-eighths and the diameter is not greater than one-sixty-fourth inch above that of the tube. The throat dimension of the fillet weld shall be at least 1¼ times the tube wall thickness and the weld shall be deposited with a minimum of two layers.

(3) Boiler tubes not exceeding 2 inches in size, may be attached to headers or drums by any of the acceptable types of groove welds as shown in Figure 52.15–5. The welding grooves shall be of such depth and form as to insure full penetration of the weld metal. The depth of the groove shall be at least 1¼ times the thickness of the tube, but in no case less than one-eighth inch in any direction. The welding procedure shall meet the requirements of Part 57 of this subchapter.

(4) Postweld heat treatment and radiography are not required except that

welds joining materials other than P–1 or carbon-molybdenum (P–3) shall be examined by either the magnetic particle or the liquid penetrant method.

(d) In welded wall construction employing stub and welded wall panels which are field welded, approximately 10 percent of the field welds shall be checked using any acceptable nondestructive test method.

(e) Tubes may be lengthened or safeended by any of the methods described in PW–27 of the ASME Code.

(f) Nondestructive testing of the butt welded joints shall meet the requirements of Table 56.95–10 of this subchapter.

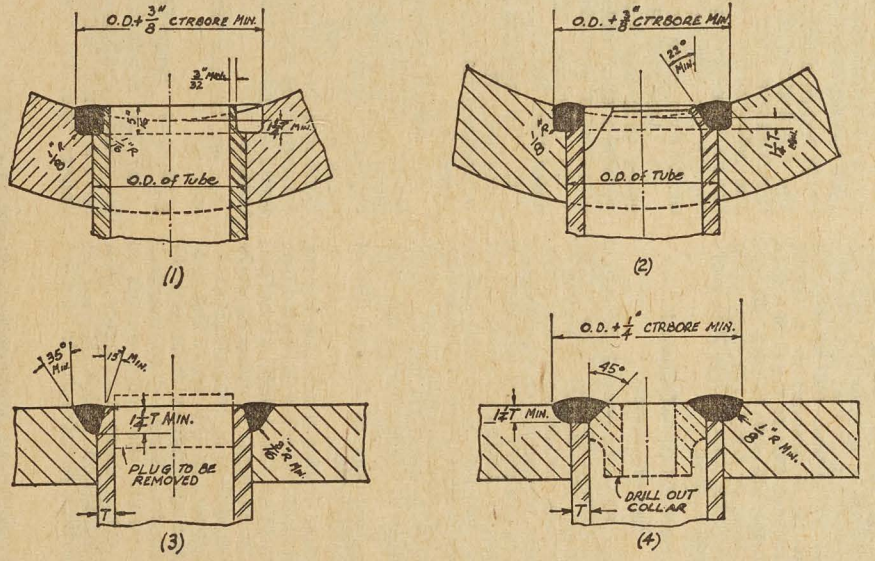


FIGURE 52.15–5—Acceptable types of welded attachments of boiler tubes to headers.

Subpart 52.20—Requirements for Firetube Boilers

§ 52.20–1 General (modifies PFT–1 through PFT–49).

(a) Firetube boilers and parts thereof shall be as indicated in PFT–1 through PFT–49 of the ASME Code except as noted otherwise in this subpart.

§ 52.20–5 Shell joints (modifies PFT–10).

(a) Shell joints shall be as indicated in PFT–10 of the ASME Code except as noted otherwise in this section.

(b) The strength of riveted circumferential head joints of externally fired firetube or flue boilers exposed to the fire or to the products of combustion and having 50 percent or more of the total longitudinal force supported by the effect of tubes or stays shall meet the criteria of PR–17.1 of the ASME Code rather than the reduction permitted by PR–17.2 of the ASME Code. Joints not exposed to the fire or to the products of combustion may be designed to the criteria of PR–17.2 of the ASME Code.

§ 52.20–10 Combustion chambers and furnaces (modifies PFT–13 through PFT–21).

(a) *General.* Combustion chambers and furnaces shall be as indicated in PFT–13 through PFT–21 of the ASME Code except as noted otherwise in this section.

(b) *Curved bottom plate without reinforcement.*—(1) The maximum allowable working pressure and minimum thickness of curved bottoms of separate combustion chambers without reinforcement shall be computed by the following formulas:

$$P=\frac{26\,(300T-1.03L)}{R}$$

$$T=\frac{\frac{PR}{26}+1.03L}{300}$$

(c) *Curved bottom plate with reinforcement.* (1) When the bottoms of combustion chambers are reinforced by structural stiffeners, such as angle or T bars, the minimum thickness of such bars shall be equal to 80 percent of the thickness of the plate reinforced, and the depth of web shall be equal to at least one-half the pitch of the stiffeners. The maximum allowable working pressure and minimum thickness shall be computed by the following formulas:

$$P=\frac{(480T)^2}{2RL}$$

$$T=\frac{\sqrt{2RLP}}{480}$$

(2) The strength of the fastening of the stiffeners to the wrapper plate shall be adequate to prevent separation.

(d) *Symbols.* The symbols to be used in connection with the formulas in paragraphs (b) and (c) of this section are:

P=Maximum allowable working pressure, in pounds per square inch.

T=Thickness of plate, in inches.

R=External radius to which plate is formed, in inches.

L=Length of plate between supports measured on a line parallel to the axis of the boiler, in inches.

(e) *Bottoms of common combustion chambers.* Curved bottoms of common combustion chambers shall be considered a flat surface and stayed in accordance with the requirements of PG–46 of the ASME Code.

(f) *Plates forming chamber and back connections.* When plates are flanged to form the combustion chamber and back connections, the minimum inner radius shall be not less than one and one-half times the thickness of the plate flanged.

(g) *Furnace corrugations.* The spacing and depth of furnace corrugations shall be in accordance with Figure 52.20–10.

(h) *Furnaces rolled in true circle.* New furnaces shall be rolled to practically a true circle. The maximum distortion permissible from the true circle shall not exceed one-fourth inch, and all new furnaces shall be measured by a marine inspector to ascertain that this tolerance has not been exceeded.

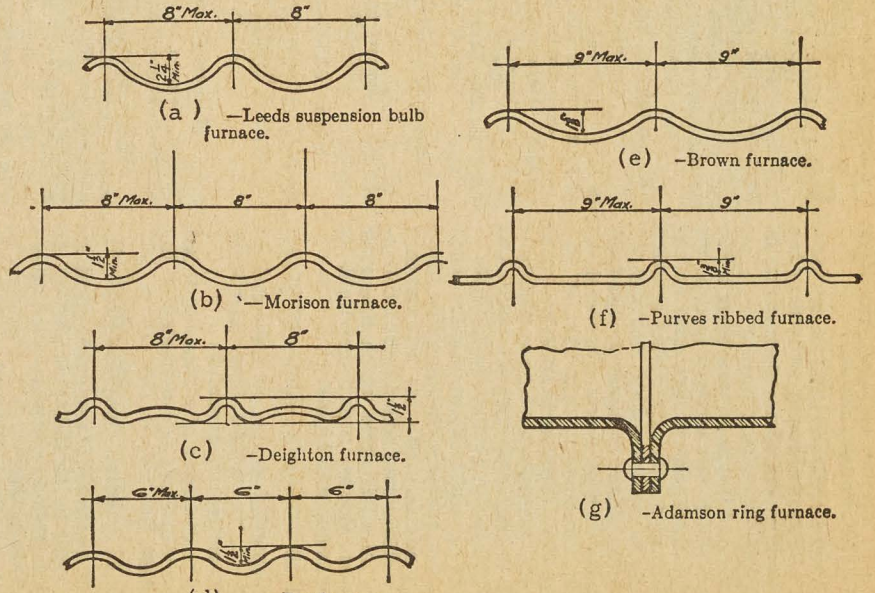


FIGURE 52.20–10—Furnaces.

§ 52.20–15 Stayed surfaces (modifies PFT–22 through PFT–38).

(a) Stayed surfaces shall be as indicated in PFT–22 through PFT–38 of the ASME Code except as noted otherwise in this section.

(b) Riveted heads are not permissible on stays which are screwed into plates having a thickness of less than seven-sixteenths inch. Such stays shall be fitted with nuts or welded collars. See § 52.05–35. The minimum thickness of nuts used in connection with screw stays shall be one half the nominal diameter of the stay, but in no case less than three-quarters inch. The stays shall be so placed in relation to the joints that the plates can be caulked without removing the nuts.

(c) Where stay tubes are used for supporting flat surfaces they shall be fitted with threads at both ends, screwed into the tube sheets and rolled tight with expanders, in addition to which they may be beaded. Making such tubes tight by caulking is not permissible.

§ 52.20–20 Domes (modifies PFT–45).

(a) Domes shall be as indicated in PFT–45 of the ASME Code except as noted otherwise in this section.

(b) The diameter of a dome shall not exceed one-half of the diameter of the boiler shell.

§ 52.20–25 Setting (modifies PFT–46).

(a) The method of supporting firetube boilers shall be as indicated in PFT–46 of the ASME Code except as noted otherwise in this section.

(b) The foundations shall meet the requirements of § 52.01–130.

Subpart 52.25—Other Boiler Types

§ 52.25–1 General.

(a) Requirements for fired boilers of various sizes and uses are referenced in Table 54.01–5(a) of this subchapter.

§ 52.25–5 Miniature boilers (replaces PMB–1 through PMB–21).

(a) The requirements in PMB–1 through PMB–21 of the ASME Code shall not apply to miniature boilers on board vessels. The applicable provisions in this part for the boiler type involved shall be followed.

§ 52.25–10 Organic fluid vaporizer generators (modifies PVG–1 through PVG–12).

(a) Organic fluid vaporizer generators and parts thereof shall meet the requirements of PVG–1 through PVG–12 except as noted otherwise in this section.

(b) The application and end use of organic fluid vaporizer generators shall be approved by the Commandant.

PART 53—HEATING BOILERS

Subpart 53.01—General Requirements

Sec.

53.01–1 Adoption of Section IV of the ASME Code.
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 and HG–401.5).
53.05–5 Discharge capacities and valve markings (replaces HG–402).

Subpart 53.10—Tests, Inspection, Stamping, and Reporting (Article 5)

53.10–1 General.
53.10–3 Tests and shop inspections (modifies HG–500 through HG–540).
53.10–5 Exemptions.
53.10–10 Certification by stamping (modifies HG–530).
53.10–15 Manufacturers' data report forms (modifies HG–520).

Subpart 53.12—Instruments, Fittings, and Controls

53.12–1 General (modifies HG–600 through HG–640).

Subpart 53.13—Welding and Brazing

53.13–1 Welding and brazing processes and qualifications (modifies HW–600 through HB–613 and HB–1500 through HB–1502).

Subpart 53.15—Plan Approval

53.15–1 Scope.
53.15–5 Exemptions.

AUTHORITY: The provisions of this Part 53 issued under R.S. 4405, as amended, 4462, as amended, sec. 633, 63 Stat. 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 633, 49 U.S.C. 1655(b); 49 CFR 1.4 (a)(2), (f). R.S. 4417, as amended, 4417a, as amended, 4418, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 391, 391a, 392, 404–409, 411, 412, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 53.01—General Requirements

NOTE: See § 50.15–5 for general adoption of the ASME (American Society of Mechanical Engineers) Code. The adoption of section IV of the ASME Code, for heating boilers, is subject to specific limitations or modifications as described in this part. Those requirements in section IV of the ASME Code which are not referred to in this part are adopted without change. Table 53.01–1(a) sets forth a general reference to various paragraphs in section IV of the ASME Code which are limited, modified or replaced by regulations in this part.

§ 53.01–1 Adoption of section IV of the ASME Code.

(a) Heating boilers shall be designed, constructed, and inspected in accordance with section IV of the ASME (American Society of Mechanical Engineers) Code, as limited, modified, or replaced by specific requirements in this part. The provisions in the appendices to section IV of the ASME Code are adopted and shall be followed when the requirements in section IV make them mandatory. For general information Table 53.01–1(a) lists the various paragraphs in section IV of the ASME Code which are limited, modified, or replaced by regulations in this part.

TABLE 53.01–1(a)—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF SECTION IV OF THE ASME CODE

Paragraphs in section IV ASME code and disposition[1]	*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(b)
HG–401 modified by	53.05–1
HG–401.5 modified by	53.05–2(c)
HG–402 replaced by	53.05–5
HG–500 through HG–540 modified by	53.10–3
HG–520 modified by	53.10–15
HG–530 modified by	53.10–10
HG–600 through HG–640 modified by	53.12–1
HW–600 through HW–613 modified by	53.13–1(a)
HB–1500 through HB–1502 modified by	53.13–1(b)

[1] The references to specific provisions in the ASME Code are coded. The first letter "H" refers to section IV. The letter following "H" refers to a part or subpart in section IV. The number following the letters refers to the paragraph so numbered in the text of the part or subpart in section IV.

(1) As stated in § 50.15–5 of this subchapter, section IV of the ASME Code is adopted and shall be the governing requirements for heating boilers unless specifically limited, modified, or replaced by other regulations in this part.

(b) References to the ASME Code, such as paragraph HG–307, indicate:

H=Section IV, Heating Boilers, ASME Code.
G=Part containing general requirements.
3=Article in part.
307=Paragraph within Article 3.

(c) When a paragraph or a section of the regulations in this part relates to material in section IV of the ASME Code, 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.

(d) ASME Heating Boiler "Code Cases" sometimes contain "Limitation Notes." These notes are mandatory for heating boilers covered by the regulations in this part. Individual justifications may be made to the Commandant for removing the prohibition or requirement of a specific note in a specific application.

(Sec. 552, 80 Stat. 383, as amended: 5 U.S.C. 552)

§ 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 shall be used in conjunction with section IV of the ASME Code. Table 54.01–5(a) 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, Heating Boilers, of the ASME Code shall be used except as noted otherwise in this part.

(c) Cast iron boilers for steam above 15 pounds per square inch pressure or for water above 30 pounds per square inch pressure or 250° F. shall not be accepted.

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

(a) *General.* The service restrictions and exceptions shall be as indicated in this section in lieu of the requirements in HG–101 of the ASME Code.

(b) *Service restrictions.* (1) Boilers of wrought materials shall be restricted to a maximum of 30 pounds per square inch gage pressure for steam and a maximum of 100 pounds per square inch gage pressure or 250° F. for hot water. If operating conditions exceed these limits, design and fabrication shall be in accordance with Part 52 of this subchapter.

(2) Boilers of cast iron materials shall be restricted to a maximum of 15 pounds per square inch gage pressure for steam and to a maximum of 30 pounds per square inch gage pressure or 250° F. for hot water. If either of these limits is exceeded, a cast iron boiler shall not be accepted.

(c) *Hot water supply boilers.* (1) Those electrically fired hot water supply boilers which have a capacity not greater than 120 gallons, a heat input not greater than 58.6 kilowatts (200,000 B.t.u. per hour), and are listed as approved under Underwriters' Laboratories Standard 174 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 shall not be exempted from the requirements of this part on the basis of size or heat input.

(d) *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 shall be as indicated in HG–400 and HG–401 except as noted otherwise in this section.

(b) Each steam boiler shall have at least one safety valve.

(c) Design and construction of valves shall comply with Subpart 162.012 of Subchapter Q (Specifications) of this chapter.

§ 53.05–2 Relief valve requirements for hot water boilers (modifies HG–400.2 and HG–401.5).

(a) The relief valve requirements for hot water boilers shall be as indicated in article 4 of section IV of the ASME Code except as noted otherwise in this section.

(b) (Modifies HG–400.2.) Each hot water boiler (heating and supply) shall have at least one safety-relief valve.

(c) (Modifies HG–401.5.) Design and construction of valves shall comply with Subpart 162.013 of Subchapter Q (Specifications) of this chapter.

§ 53.05–5 Discharge capacities and valve markings (replaces HG–402).

(a) The discharge capacities and valve markings shall be as indicated in this section in lieu of the requirements in HG–402 of the ASME Code.

(b) Marking of relief devices and flow-testing of valves for actual capacity shall conform to Subpart 162.012 or 162.013, as appropriate, of Subchapter Q (Specifications) of this chapter.

Subpart 53.10—Tests, Inspection, Stamping, and Reporting (Article 5)

§ 53.10–1 General.

(a) The tests, inspection, stamping, and reporting of heating boilers shall be as indicated in Article 5, Part HG of section IV of the ASME Code except as noted otherwise in this subpart.

§ 53.10–3 Tests and shop inspections (modifies HG–500 through HG–540).

(a) A marine inspector will make a shop inspection and witness the required pressure test on boilers regulated under this part except as noted in § 53.10–5. (See HG–510 and HG–410 of the ASME Code.)

(b) Automatically controlled boilers shall be subjected to such operating tests as prescribed in Part 63 of this subchapter regardless of the type of stamp they have and regardless of whether or not Coast Guard shop inspection of the bare boiler was made.

(c) All heating boilers, regardless of exemptions, shall have the operation of their pressure relieving devices checked after final installation.

§ 53.10–5 Exemptions.

(a) Heating boilers, which are constructed and stamped in accordance with section I of the ASME Code, need not have a Coast Guard shop inspection nor a Coast Guard stamping. (See §§ 52.01–135 and 52.01–140 of this subchapter.)

(b) Heating boilers, which are constructed and stamped in accordance with section IV of the ASME Code, need not have a Coast Guard shop inspection nor a Coast Guard stamping provided they are made of:

(1) Wrought materials and limited to use with steam not exceeding 15 pounds per square inch gage or with hot water at 100 pounds per square inch or below; or,

(2) Cast iron and limited to use with steam not exceeding 15 pounds per square inch gage or with hot water at 30 pounds per square inch gage or below.

§ 53.10–10 Certification by stamping (modifies HG–530).

(a) Stamping of heating boilers shall be as indicated in HG–530 of the ASME Code except as noted otherwise in this section.

(b) Heating boilers exempted by § 53.10–5, which are constructed in accordance with applicable provisions in section I or section IV of the ASME Code, shall receive the full ASME stamping, including the appropriate code symbol.

(c) Upon satisfactory completion of the tests and Coast Guard inspection, heating boilers not exempted by § 53.10–5 shall be stamped or marked in a place that is readily visible with the following:

(1) Manufacturer's name and serial number.

(2) Coast Guard number, see § 50.10–30 of this subchapter.

(3) Coast Guard symbol, which is affixed only by the marine inspector.

(4) _____ Maximum allowable working pressure—steam at _____ °F.

(5) _____ Maximum allowable working pressure—hot water at _____ °F.

(6) _____ Minimum safety valve or relief valve relieving capacity in pounds or B.t.u. per hour as determined according to HG–400.1(e) or HG–400.2(d) of the ASME Code.

§ 53.10–15 Manufacturers' data report forms (modifies HG–520).

(a) Manufacturers' Data Reports, both master and partial, as described in HG–520 of the ASME Code are required. These forms shall be modified as directed by the Officer in Charge, Marine Inspection for heating boilers not exempted by § 53.10–5 and which are examined by a marine inspector.

(b) All necessary forms shall be provided by the manufacturer.

Subpart 53.12—Instruments, Fittings, and Controls

§ 53.12–1 General (modifies HG–600 through HG–640).

(a) The instruments, fittings and controls for heating boilers shall be as indicated in HG–600 through HG–640 of section IV of the ASME Code 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 shall be followed.

Subpart 53.13—Welding and Brazing

§ 53.13–1 Welding and brazing processes and qualifications (modifies HW–600 through HW–613 and HB–1500 through HB–1502).

(a) Heating boilers and their appurtenances not exempted from Coast Guard inspection by § 53.10–5, fabricated by welding or brazing, shall be as required by HW–600 through HW–613 or HB–1500 through HB–1502 of the ASME Code and Part 57 of this subchapter.

(b) Heating boilers and their appurtenances exempted by § 53.10–5 and fab-

ricated by welding or brazing shall be as required by HW–600 through HW–613 or HB–1500 through HB–1502 of the ASME Code.

Subpart 53.15—Plan Approval

§ 53.15–1 Scope.

(a) Manufacturers intending to fabricate boilers to be installed on vessels shall have the plans and calculations for design and construction of heating boilers submitted for approval in accordance with Subpart 50.20 of this subchapter unless otherwise noted in this subpart.

(b) Plans for boiler controls are not covered in this subpart. See Part 63 of this subchapter for applicable requirements.

§ 53.15–5 Exemptions.

(a) (Refer to § 53.10–5.) Plans need not be submitted to the Coast Guard for approval for:

(1) Heating boilers which are constructed and stamped under section I of the ASME Code; and,

(2) Heating boilers which are constructed and stamped under section IV of the ASME Code.

PART 54—PRESSURE VESSELS

Subpart 54.01—General Requirements

Sec.
54.01–1 Adoption of division 1 of section VIII of the ASME Code.
54.01–2 Adoption of TEMA Standards for heat exchangers.
54.01–3 Adoption of other standards and specifications.
54.01–5 Scope (modifies U–1).
54.01–10 Steam generating pressure vessels (modifies U–1(e)).
54.01–15 Exemptions from shop inspection and plan approval (replaces U–1(d) and U–1(h)).
54.01–16 ASME pressure vessels for special services.
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).

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 temperature.
54.05–10 Certification of material toughness tests.
54.05–15 Weldment toughness tests—procedure qualification.
54.05–16 Production toughness testing.
54.05–17 Weld toughness test acceptance criteria.
54.05–20 Impact test properties for service temperatures of 0° F. to —70° F.
54.05–25 Impact test properties for service temperatures below —70° F.

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 (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).
54.10–17 Certification by stamping.
54.10–20 Marking and stamping (replaces UG–116 and UG–118).
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–134).
54.15–3 Definitions (modifies UA–60).
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).
54.20–3 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–29, UW–47, and UW–48).
54.20–10 Spot-examination of welded joints (replaces UW–52(c)(3)).

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 (replaces UCS–25).
54.25–7 Requirements for postweld heat treatment (modifies UCS–56).
54.25–8 Requirements for radiography (modifies UW–11(a) and UCS–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: The provisions of this Part 54 issued under R.S. 4405, as amended, 4462, as amended, sec. 633, 63 Stat. 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 633, 49 U.S.C. 1655(b); 49 CFR 1.4 (a)(2), (f). Interpret or apply R.S. 4417, as amended, 4417a, as amended, 4418, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 391, 391a, 392, 404–409, 411, 412, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 54.01—General Requirements

NOTE: (1) See § 50.15–5 for general adoption of the ASME (American Society of Mechanical Engineers) Code. The adoption of division 1 of section VIII of the ASME Code for pressure vessels is subject to specific limitations or modifications as described in this part. Those requirements in division 1 of section VIII of the ASME Code which are not referred to in this part are adopted without change. Table 54.01–1(a) sets forth a general reference to various paragraphs in division 1 of section VIII of the ASME Code which are limited, modified, or replaced by regulations in this part. Division 2 of section VIII of the ASME Code is not adopted.

(2) See § 50.15–20 for general adoption of selected standards issued by Tubular Exchanger Manufacturer's Association (TEMA) for heat exchangers which are limited, modified or replaced by regulations in this part.

§ 54.01–1 Adoption of division 1 of section VIII of the ASME Code.

(a) Pressure vessels shall be designed, constructed, and inspected in accordance with division 1 of section VIII of the ASME (American Society of Mechanical Engineers) Code, as limited, modified, or replaced by specific requirements in this part. The provisions in the appendices to division 1 of section VIII of the ASME Code are adopted and shall be followed when the requirements in section VIII make them mandatory. For general information Table 54.01–1(a) lists the various paragraphs in division 1 of section VIII of the ASME Code which are limited, modified, or replaced by regulations in this part. Other divisions of section VIII of the ASME Code have not been adopted.

TABLE 54.01–1(a)—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF DIVISION 1 OF SECTION VIII, ASME CODE

Paragraphs in section VIII, ASME Code[1] *and disposition*	*Unit of this part*
U–1 modified by	54.01–5 through 54.01–16
U–1(c) replaced by	54.01–5
U–1(d) replaced by	54.01–15
U–1(e) modified by	54.01–10
U–1(h) replaced 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–84 replaced by	54.05–1
UG–90 through UG–103 modified by	54.10–1
UG–90 and UG–91 replaced by	54.10–3
UG–92 through UG–103 modified by	54.10–3
UG–98 reproduced by	54.10–5
UG–99 modified by	54.10–10
UG–100 modified by	54.10–15
UG–115 through UG–120 modified by	54.10–1
UG–116 replaced by	54.10–20
UG–118 replaced by	54.10–20
UG–120 modified by	54.10–25

See footnote at end of table.

TABLE 54.01–1(a)—Continued

Paragraphs in section VIII, ASME Code[1] *and disposition*	*Unit of this part*
UG–125 through UG–134 modified by	54.15–1 through 54.15–15
UG–125 modified by	54.15–5
UG–126 modified by	54.15–10, 54.15–15
UG–127 modified by	54.15–13
UW–1 through UW–65 modified by	54.20–1
UW–9, UW–11(a), UW–13, UW–16 modified by	54.20–3
UW–11(a) modified by	54.25–8
UW–26, UW–29, UW–47, UW–48 modified by	54.20–5
UW–52(c)(3) replaced by	54.20–10
UCS–6 modified by	54.25–3
UCS–25 replaced by	54.25–5
UCS–56 modified by	54.25–7
UCS–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, UHT–23 modified by	54.25–20
UHT–82 modified by	54.25–20, 54.25–25
UA–60 modified by	54.15–3

[1] The references to specific provisions in the ASME Code are coded. The first letter "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.

(1) As stated in § 50.15–5 of this subchapter, division 1 of section VIII of the ASME Code is adopted and shall be the governing requirements for pressure vessels unless specifically limited, modified or replaced by other regulations in this part.

(b) References to the ASME Code, such as paragraph UG–125, indicate:

U=Division 1 of section VIII, Pressure Vessels, ASME Code.
G=Part containing general requirements.
125=Paragraph within part.

(c) When a paragraph or a section of the regulations in this part relates to material in division 1 of section VIII of the ASME Code, 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.

(d) ASME Pressure Vessel "Code Cases" sometimes contain "Limitation Notes." These notes are mandatory for pressure vessels covered by the regulations in this part. Individual justifications may be made to the Commandant for removing the prohibition or requirement of a specific note in a specific application.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 54.01–2 Adoption of TEMA Standards for heat exchangers.

(a) Heat exchangers (all portions other than the basic pressure vessel shell and heads) shall be designed, constructed and inspected in accordance with the TEMA (Tubular Exchanger Manufacturers Association) Standards for Class "B", "C", or "R" heat exchangers, as limited, modified, or replaced by specific requirements in this subchapter. The TEMA Standards require that the individual vessel shall comply with the requirements of division 1 of section VIII of the ASME Code for the pressure vessel shell portion, and may, in turn, be limited or replaced by regulations in this part.

(b) The TEMA Standards for heat exchangers cover tubes, shells and shell covers, baffle and support plates, floating heads, gaskets, tube sheets, channels and channel covers, nozzles and end flanges, and bolting. In event there is a conflict between a requirement in the TEMA Standards for heat exchangers and division 1 of section VIII of the ASME Code, then the provisions in the ASME Code shall govern and shall be followed. In event there is a difference of requirements between the TEMA Standards for heat exchangers and the regulations in this subchapter, the requirements in the regulations in this subchapter shall govern and shall be followed.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 54.01–3 Adoption of other standards and specifications.

(a) *General.* As stated in Subpart 50.15 of this subchapter, the standards and specifications specifically referred to in this part shall be the governing requirements for the subject matters covered unless specifically limited, modified or replaced by other regulations in this subchapter.

(b) *American Society of Testing Materials (ASTM).* The specifications of the American Society of Testing Materials referenced in this part are adopted and form a part of this subchapter.

(c) *Compressed Gas Association (CGA).* The standards of the Compressed Gas Association (see § 50.15–20(a) of this subchapter) referenced in this part are adopted and form a part of this subchapter.

(d) *Manufacturers' Standardization Society of the Valve and Fittings Industry (MSS).* The standards of the Manufacturers' Standardization Society (see § 50.15–20(a) of this subchapter) referenced in this part are adopted and form a part of this subchapter.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 54.01–5 Scope (modifies U–1).

(a) (Replaces U–1(d)(1).) The regulations in this part apply to pressure vessels. The requirements in this part shall be used in conjunction with division 1 of section VIII, Pressure Vessels, of the ASME Code. Table 54.01–5(a) gives a breakdown by parts in this subchapter of the regulations governing various types of pressure vessels and boilers.

TABLE 54.01–5(a)—REGULATION REFERENCE FOR BOILERS, PRESSURE VESSELS, AND THERMAL UNITS

Service	Pressure temperature boundaries	Part of this subchapter regulating mechanical design	Part of this subchapter regulating automatic control
Main (power) boiler	All	52	----------
Pressure vessel	All	54	NA
Fired auxiliary boiler (oil or electricity):			
(a) Steam	More than 30 p.s.i.g.	52	63
	Equal to or less than 30 p.s.i.g.	53	63
(b) Hot water heating	More than 100 p.s.i.g. or 250° F.	52	63
	Equal to or less than 100 p.s.i.g. and 250° F.	53	63
(c) Hot water supply	More than 100 p.s.i.g. or 250° F.	52	63
	Equal to or less than 100 p.s.i.g. and 250° F.	53	63
Other:			
(a) Fired thermal fluid heaters	All	52	63
(b) Unfired steam boiler [1]	More than 30 p.s.i.g. or 850° F [2]	52	NA
	Equal to or less than 30 p.s.i.g. and 850° F [2].	54	NA
(c) Evaporators and heat exchangers.	More than 15 p.s.i.g.[3]	54	NA
(d) Unfired hot water supply or heating boiler.	More than 15 p.s.i.g.[3]	54	NA

[1] Including exhaust gas types.
[2] Temperature of working fluid.
[3] Relief device is required even if designed for less than 15 p.s.i.g.

(b) Welded pressure vessels are divided into Classes I, I–L (low temperatures), II, II–L (low temperatures), and III, depending on service of vessel, contents carried in the pressure vessel, or pressures and/or temperatures of contents carried. Table 54.01–5(b) describes the classes of welded pressure vessels and requirements other than for special heat exchanger requirements which are noted in § 54.01–2.

TABLE 54.01-5(b)—WELDED PRESSURE VESSEL CLASSIFICATION

(Special heat exchanger requirements excluded, see § 54.01-2)

Class	Service contents	Class limits on pressure and temperature	Minimum joint requirements [1]	Minimum radiography requirements, section VIII, ASME Code	Post weld heat treatment required	Shop inspection required	Plan approval required
I	(a) Vapor or gas	Over 600 p.s.i. or 700° F.	(1) for categories A and B. All categories C and D shall be 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 ASME Code do not apply.	For carbon or low alloy steel, regardless of thickness, as per Table UCS-56, and for high alloy steel, regardless of thickness, as per Table UHA-32 of ASME Code.	Yes	Yes.
	(b) Liquid	Over 600 p.s.i. or 400° F.					
	(c) Dangerous substances. [2]	----------					
I-L (low temperature).	(a) Vapor or gas	Over 250 p.s.i. and service temperature below 0° F.	(1) for categories A and B. All categories C and D shall be 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 ASME Code do not apply.	For carbon or low alloy steel, regardless of thickness, as per Table UCS-56, and for high alloy steel, regardless of thickness, as per Table UHA-32 of ASME Code.	Yes	Yes.
	(b) Liquid	Over 250 p.s.i. and service temperature below 0° F.					
	(c) Dangerous substances. [2]	----------					
II	(a) Vapor or gas	30 through 600 p.s.i. or 275° through 700° F.	(1) or (2) for category A. (1), (2) or (3) for category B. Categories C and D as per UW-16 of ASME Code.	Spot, unless exempted by UW-11(c) of ASME Code.	As per section VIII of ASME Code.	Yes [4]	Yes. [4]
	(b) Liquid	200 through 600 p.s.i. or 250° through 400° F.					
	(c) Dangerous substances. [2]	----------					
II-L (low temperature).	(a) Vapor or gas	0 through 250 p.s.i. and service temperature below 0° F.	(1) for category A. (1) or (2) for category B. Category C: Full penetration extending through section at joint. Category D: Full penetration extending through thickness of vessel or nozzle.	Spot. Not exempted by UW-11(c) of ASME Code.	Same as for I-L except that mechanical relief may be substituted where permitted under Subpart 54.30.	Yes	Yes.
	(b) Liquid	0 through 250 p.s.i. and service temperature below 0° F.					
	(c) Dangerous substances. [2]	----------					
III	(a) Vapor or gas	Under 30 psi and 0° through 275° F.	As per section VIII of ASME Code.	Spot, unless exempted by UW-11(c) of ASME Code.	As per section VIII of ASME Code.	Yes [4]	Yes. [4]
	(b) Liquid	Under 200 psi and 0° through 250° F.					
	(c) Dangerous substances. [3]	----------					

[1] Welded joint categories are defined under UW-3 of the ASME Code. Joint types are described in Table UW-12 of the ASME Code, and numbered "(1)," "(2)," etc.

[2] Pressure vessels containing certain dangerous substances as described in Subchapter N (Dangerous Cargoes) of this chapter shall be of the Class required by Subchapter D (Tank Vessels) or Subchapter I (Cargo and Miscellaneous Vessels) of this chapter, or of the Class as determined by the Commandant where it is not otherwise specified.

[3] Class III pressure vessels shall not be used for the storage or stowage of dangerous substances regulated by Subchapter D (Tank Vessels), Subchapter I (Cargo and Miscellaneous Vessels), or Subchapter N (Dangerous Cargoes) of this chapter unless specifically authorized in one or more of such subchapters.

[4] Refer to §§ 54.01-15 and 54.10-1(a) for exemptions.

(c) (Modifies U-1(c).) It is intended that jurisdiction of this part over piping external to a pressure vessel shall terminate at the:

(1) First circumferential joint for welding end connections;

(2) Face of the first flange in bolted flanged connections; or,

(3) First threaded joint in that type connection.

(d) Pressure vessels containing dangerous articles, substances or combustible liquids which are required by law or regulation to be carried in containers fabricated as a pressure vessel shall comply with the applicable requirements for materials, construction, welding, inspection and marking as specified in this chapter irrespective of pressure, temperature or capacity. However, dangerous articles, substances or combustible liquids may be carried in containers constructed in accordance with the requirements of the Department of Transportation and where so permitted by Part 146 in Subchapter N (Dangerous Cargoes) of this chapter.

(e) In a multichambered pressure vessel, each chamber may be classed differently. Where an interface between two chambers exists, the pressure difference across it shall be, for purposes of design and testing, the greater of the following:

(1) Maximum allowable working pressure (gage) in the higher pressure chamber.

(2) Maximum allowable working pressure (absolute) in the higher pressure chamber minus the least operating pressure (absolute) in the vacuum chamber.

(f) The requirements for the design, fabrication, inspection and certification or stamping of pressure vessels, other than those covered by Parts 52, 53, and 55 of this subchapter, shall be as required in division 1 of section VIII of the ASME Code except as noted otherwise in this part.

§ 54.01-10 Steam generating pressure vessels (modifies U-1(e)).

(a) Pressure vessels in which steam is generated, such as waste heat boilers and steam generators in the secondary system of a nuclear plant, shall be classed as "Unfired Steam Boilers" except as required otherwise by paragraph (b) of this section. The unfired steam boilers shall be fitted with an efficient water level indicator, a pressure gage, and a blowdown valve. An approved safety valve shall be fitted as required by § 54.15-15. Unfired steam boilers, including exhaust gas types, shall be constructed in accordance with this part other than when the pressures are more than 30 pounds per square inch or the temperatures of the working fluid are more than 850° F. when such boilers shall 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 shall 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 shall 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 (replaces U-1(d) and U-1(h)).

(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 100 pounds per square inch gage, nor a temperature above 200° F., including those containing air, the compression of which serves only as a cushion. Air charging lines may be permanently attached provided the air pressure does not exceed 15 pounds per square inch gage.

(2) Hot water supply storage tanks heated by steam or any other indirect

means when none of the following limitations is exceeded:

(i) A heat input of 200,000 B.t.u. per hour;

(ii) A water temperature of 200° F.;

(iii) A nominal water-containing capacity of 120 gallons; or

(iv) A pressure of 100 pounds per square inch gage.

The exemption of any tank under this subparagraph requires that it shall 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 15 pounds per square inch gage with no limitation on size. (See UG–28(e) of the ASME Code.)

(ii) Cargo tanks of pressure vessel configuration are not included in the exemption in subdivision (i) of this subparagraph.

(4) Class III (See Table 54.01–5(b)) vessels which have qualified and been stamped U or UM under section VIII of ASME Code and which have an internal volume of less than 5 cubic feet.

(5) (i) Condensers and heat exchangers, regardless of size, where the design is such that the liquid phase is below 100 pounds per square inch gage and 200° F. and the vapor phase is below 15 pounds per square inch gage provided system overpressure conditions are considered.

(ii) Condensers and heat exchangers which meet all of the following criteria: Design temperatures and pressures above those in subdivision (i) of this subparagraph but not exceeding those for Class II pressure vessels (See Table 54.01–5 (b)); internal volume less than 5 cubic feet; built in accordance with section VIII of the ASME Code; and bearing the U or UM stamp.

§ 54.01–16 ASME pressure vessels for special services.

(a) Pressure vessels, other than those used for storage of compressed air, which do not fully comply with the requirements of this subchapter, may be accepted by the Officer in Charge, Marine Inspection, for installation on vessels subject to inspection if they are used exclusively in the handling and storage of petroleum and associated products; are installed aboard vessels engaged solely in offshore exploration, production, and drilling operations; and their design, fabrication and stamping comply with the requirements of division 1 of section VIII of the ASME Code for Pressure Vessels.

§ 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 shall submit detailed plans in accordance with Subpart 50.20 of this subchapter.

(b) The following information shall 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 Code, as modified by this part.

(6) A diagrammatic arrangement drawing of the assembled unit indicating location of internal and external components.

§ 54.01–25 Miscellaneous pressure components (modifies UG–11).

(a) Pressure components for pressure vessels shall be as required by UG–11 of the ASME Code except as noted otherwise in this section.

(b) All pressure components conforming to an accepted USASI (United States of America Standards Institute) Standard refered to in an adopted code, specification or standard or in this subchapter shall also be marked in accordance with MSS (Manufacturers' Standardization Society) Standard SP–25.

§ 54.01–30 Loadings (modifies UG–22).

(a) The loadings for pressure vessels shall be as required by UG–22 of the ASME Code 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 the ASME Code:

(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 shall be as required by UG–25 of the ASME Code except as noted otherwise in this section.

(b) The pressure portions of pressure vessels shall:

(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 using 80 percent of the allowable stress listed in section VIII of the ASME Code for calculating thickness.

(c) Telltale holes shall 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 is 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.

NOTE: No applied linings except as provided in Part UCL of the ASME Code shall be acceptable.

Subpart 54.03—Low Temperature Operation

§ 54.03–1 Scope.

(a) The pressure vessels for low temperature operation shall be as required by section VIII of the ASME Code 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 §§ 56.25–10, 56.25–15, and 56.25–20 of this subchapter 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).

(a) The toughness tests of materials used in pressure vessels shall be as required by this subpart in lieu of requirements in UG–84 of the ASME Code.

§ 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 shall apply:

(1) Additional requirements for ferritic steels with properties enhanced by heat treatment are in § 54.25–20. Code Case 1317 is not applicable.

(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 shall 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 (Tank Vessels) of this chapter.

§ 54.05–5 Toughness test specimens.

(a) *Charpy V-notch impact tests.* Where required, Charpy V-notch tests shall be conducted in accordance with ASTM Specification E–23, "Notched Bar Impact Testing of Metallic Materials", using the Type A specimen shown in Figure 4 of the specification. 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 shall not be used to qualify materials within the scope of this subpart. Each set of Charpy impact tests shall consist of three specimens. For materials ½-inch thick or less, the largest possible Charpy specimens for that thickness shall be cut centered at the material's mid-thickness. For materials thicker than ½-inch, full size Charpy specimens shall 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, longitudinally oriented Charpy impact specimens shall be used. When transverse specimens are used, the required energy values shall be not less than two-thirds times the values required for longitudinally oriented specimens. In all cases the notch shall be cut normal to the material's surface. Test specimens shall 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 shall be conducted for no-break performance in accordance with ASTM Specification E–208, "Conducting Drop-Weight Test to Determine Nil-Ductility Transition Temperature of Ferritic Steels". For material thicknesses between ½-inch and ⅝-inch, the ASTM E–208 specimen P–3, machined to ½-inch thickness, shall be used with a stop distance of 0.090-inch. In preparing weld specimens for drop-weight testing, weld reinforcement shall 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 or 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 shall 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 subparagraph (3) of this paragraph.

(2) When drop weight specimens are used, retests shall be permitted only within the limits prescribed in ASTM Specification E–208, except as outlined in subparagraph (3) of this paragraph.

(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 correlations 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 shall 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 temperature.

(a) Toughness tests shall be conducted at temperatures not warmer than 10° F. below the minimum service temperature, except that for service at or below —320° F., such tests may be conducted at the service temperature. Service temperature is defined in § 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 shall be taken as outlined in section 4(b) of ASTM A–300. Drop weight test specimens shall be taken from the end of the mill rolled plate nearer the top end of the ingot at the one-quarter width position. The length of the Charpy specimen shall, whenever possible, be taken parallel to the direction of the expected maximum stress. 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 subparagraph or subparagraph (2) of this paragraph, as well as the requirement for sampling in subparagraph (3) of this paragraph are met. The specimens shall 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 shall 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 shall be provided and one set of specimens shall be taken from each heat.

(4) One set of impact specimens shall 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 shall be cut from billets or blooms selected at random from each heat of material. Each test block shall 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 shall

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 shall be done in automatically controlled furnaces equipped with calibrated recording pyrometers, the certified records of which shall be made available to the inspector.

(3) One set of Charpy impact specimens or two drop-weight specimens, as applicable, shall be cut from each such test block and these specimens shall 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 or 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 shall be made as are required under the foregoing rule in subparagraph (3) of this paragraph to cover the weight of product and range of thickness found in the forgings represented. The major axis of the test specimens shall 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 shall be cut from the heaviest section, clear of fillets, of the shape being tested.

(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 shall 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 1½ 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 shall 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 shall be done in automatically controlled furnaces equipped with calibrated recording pyrometers, the certified records of which shall 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, toughness qualifications shall be determined by the Commandant based on material, chemical, and mechanical properties.

§ 54.05–15 Weldment toughness tests—procedure qualification.

(a) Plate for which Charpy V-notch impact testing is required in the parent material and for which V-notch minima are specified shall similarly have welding procedures qualified for toughness by Charpy V-notch testing. For these tests, the test plates shall 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 shall be the same as that used in production. The number of test specimens and the location of their notches shall be as shown in Figure 54.05–15(a) and as described in subparagraphs (1) through (5) of this paragraph.

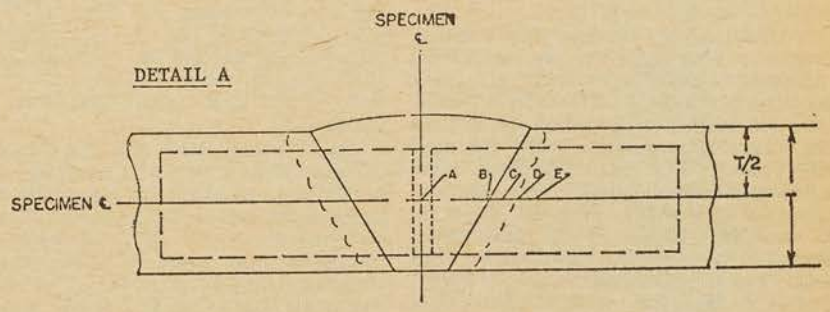
(1) Three specimens with the notch centered in the weld metal.

(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.

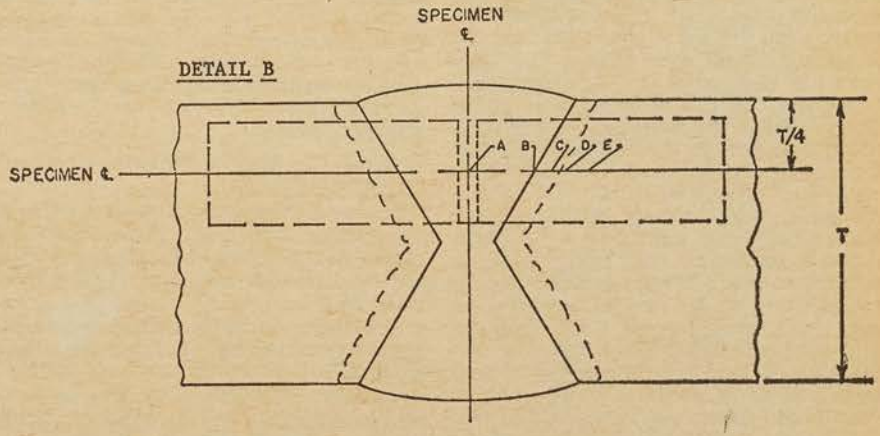
(4) Same as subparagraph (3) of this paragraph, but 3 mm. from the fusion line.

(5) Same as subparagraph (3) of this paragraph, but 5 mm. from the fusion line.



T = MATERIAL THICKNESS ½" OR LESS

A = ℄ OF WELD
B = FUSION LINE
C = HAZ, 1mm FROM FUSION LINE
D = HAZ, 3mm FROM FUSION LINE
E = HAZ, 5mm FROM FUSION LINE



T = MATERIAL THICKNESS GREATER THAN ½"

A = ℄ OF WELD
B = FUSION LINE
C = HAZ, 1mm FROM FUSION LINE
D = HAZ, 3mm FROM FUSION LINE
E = HAZ, 5mm FROM FUSION LINE

FIGURE 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, shall 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 shall 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, shall 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 shall 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 shall be the same as that of the vessel wall at the location of the production weld being sampled. The test plates shall 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 shall be taken from one of the heats of material used in the vessel, and both the electrodes and welding procedures shall 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, shall be taken transverse to the weld axis. For Charpy V-notch specimens, the notch shall 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 shall be prepared in the same manner as specified for procedure qualification testing, § 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 shall 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 shall 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 shall be given the same heat-treatment as the production material they represent. Test specimens representing other material than the weld toughness test plates shall 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 (Tank Vessels) of this chapter, production toughness test plates shall be prepared in accordance with paragraphs (a) and (d) of this section. One set of toughness test plates shall 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 shall be:

(1) For weld metal specimens, not less than the values required for the parent material.

(2) For heat affected zone specimens, not less than the values required for the parent material, when the specimens are longitudinally oriented.

(3) For heat affected zone specimens, not less than two-third times the values required for the parent material, when the specimens are transversely oriented.

(b) For drop-weight tests both specimens from each required set shall exhibit a no-break performance.

§ 54.05–20 Impact test properties for service temperatures of 0° F. to −70° F.

(a) *Test energy.* The impact energies of each set of longitudinal Charpy specimens shall be not less than the values shown in Table 54.05–20(a).

TABLE 54.05-20(a)—CHARPY V-NOTCH IMPACT REQUIREMENTS[1]

Size of specimen	Minimum impact value required for average of each set of 3 specimens, ft.-lbs.	Minimum impact value permitted on one specimen only of a set, ft.-lbs.
10 x 10 mm	30	20
10 x 7.5 mm	25	16.5
10 x 5 mm	20	13.5
10 x 2.5 mm	15	10

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

§ 54.05–25 Impact test properties for service temperatures below −70° F.

(a) Longitudinally oriented Charpy V-notch impact specimens of ASTM A–203 nickel steels shall exhibit energies not less than the values shown in Table 54.05–25(a). Requirements for 9 percent nickel steels are contained in § 54.25–20. Other nickel alloy steels, when specially approved by the Commandant, shall 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 and/or test criteria shall be specified by the Commandant.

TABLE 54.05-25(a)—CHARPY V-NOTCH IMPACT REQUIREMENT[1]

Size of specimen	Minimum impact value required for average of each set of 3 specimens, ft.-lbs.	Minimum impact value permitted on one specimen only of a set, ft.-lbs.
10 x 10 mm	25	16.7
10 x 7.5 mm	20.8	13.8
10 x 5 mm	16.7	11.3
10 x 2.5 mm	12.5	8.3

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

(b) Where required, austenitic stainless steels shall be tested using the drop-weight procedure and shall 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 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 and/or test criteria shall be specified by the Commandant.

Subpart 54.10—Inspection, Reports, and Stamping

§ 54.10–1 Scope (modifies UG–90 through UG–103 and UG–115 through UG–120).

(a) The inspection, tests, stamping, and reports for pressure vessels shall be as required by paragraphs UG–90 through UG–103 and UG–115 through UG–120 of the ASME Code except as noted otherwise in this subpart.

§ 54.10–3 Marine inspectors (replaces UG–90 and UG–91, and modifies UG–92 through UG–103).

(a) Only marine inspectors shall 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 shall be inspected by a marine inspector referring to procedures outlined in UG–92 through UG–103 of the ASME Code and §§ 50.30–10, 50.30–15, and 50.30–20 of this subchapter. However, the Officer in Charge, Marine Inspection, may accept shop inspection by authorized ASME Code Inspectors as defined in UG–91 of the ASME Code for Class III pressure vessels in cases where he is satisfied that any special Coast Guard requirements have been met. The marine inspector will then stamp the 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 operating 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 UA–60(a) of the ASME Code.)

TABLE 54.10–5—PICTORIAL INTER-RELATION AMONG VARIOUS PRESSURE LEVELS WITH REFERENCES TO SPECIFIC REQUIREMENTS [1]

Pressure differential, psi [2]	Test pressures [3]	Relief device pressure settings	Pressures upon which relief device flow capacity is based
Increasing ↑	Burst proof test (UG–101(m) of ASME Code).		
	Yield proof test (UG–101(j) of ASME Code).		
	Standard hydrostatic test (UG–99 of ASME Code).		
			Fire exposure, 120% MAWP.
	Pneumatic test (UG–100 of ASME Code).		
		Rupture disk burst (§ 54.15–13)	
			Normal, 110% MAWP.
	Maximum allowable working pressure (MAWP), UG–98 and UA–60(a) of ASME Code.	Maximum allowable working pressure (MAWP), UG–98 and UA–60(a) of ASME Code.	Maximum allowable working pressure (MAWP), UG–98 and UA–60(a) of ASME Code.
	Design pressure, UG–21, and UA–60(b) of ASME Code.	Design pressure, UG–21 and UA–60(b) of ASME Code.	Design pressure, UG–21 and UA–60(b) of ASME Code.
		Safety or relief valve setting (UG–133 of ASME Code).	
	Operating pressure (UA–60(f) of ASME Code).	Operating pressure (UA–60(f) of ASME Code).	Operating pressure (UA–60(f) of ASME Code).

[1] For basic pressure definitions see § 52.01–3(g) of this subchapter.
[2] For pressure differentials above 3,000 pounds per square inch (p.s.i.), special requirements may apply.
[3] For the basis for calculating test pressures, see UA–60(e) of the ASME Code.

(b) The maximum allowable working pressure for a vessel part is the maximum internal or external pressure, including the static head thereon, as determined by the rules and formulas in this Division (ASME Code), together with the effect of any combination of loadings listed in UG–22 of the ASME Code (see § 54.01–30) which are likely to occur, for the designated coincident operating temperature, excluding any metal thickness specified as corrosion allowance. (See UG–25 of the ASME Code.)

(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: Table 54.10–5 gives pictorially the interrelation among the various pressure levels pertinent to this part of the regulations. It includes reference to section VIII of the ASME Code for definitions and explanations.

§ 54.10–10 Standard hydrostatic test (modifies UG–99).

(a) All pressure vessels shall satisfactorily pass the hydrostatic test prescribed by this section, except those pressure vessels noted under § 54.10–15(a).

(b) The hydrostatic test pressure shall be at least one and one-half 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" shall be taken from Tables UCS 23, UNF 23, UHA 23, or UHT 23 of the ASME Code. The value of "S" at test temperature shall be that taken for the material of the tabulated value of temperature closest to the test temperature. The value of "S" at design temperature shall be as interpolated from the appropriate table. No ratio less than one shall be used. The stress resulting from the hydrostatic test shall 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 shall consider the combined stress during hydrostatic testing due to pressure and the support reactions. This stress shall not exceed 90 percent of the yield stress of the material at the test temperature. In addition, the adequacy of the supporting structure during hydrostatic testing should be considered in the design.

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

(d) Defects detected during the hydrostatic test or subsequent examination shall be completely removed and then inspected. Provided the marine inspector gives his approval, they may then be repaired.

(e) Vessels requiring stress relieving shall be stress relieved after any welding repairs have been made. (See UW–40 of the ASME Code.)

(f) After repairs have been made the vessel shall 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 his judgment the vessel is not suitable for service, he may permanently reject it.

§ 54.10–15 Pneumatic test (modifies UG–100).

(a) Pneumatic testing of welded pressure vessels shall be permitted only for those units which are so designed and/or supported that they cannot be safely filled with water, or 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 shall be submitted to the cognizant Officer in Charge, Marine Inspection, for approval.

(c) Except for enameled vessels, for which the pneumatic test pressure shall be at least equal to, but need not exceed, the maximum allowable working pressure to be marked on the vessel, the pneumatic test pressure shall be at least equal to 1.25 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 the ASME Code). In no case shall the pneumatic test pressure exceed 1.25 times the basis for calculated test pressure as defined in UA–60(e) of the ASME Code.

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

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

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

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

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

(f) After satisfactory completion of the pneumatic pressure test, the vessel may be stamped in accordance with § 54.10–20. A marine inspector shall observe the pressure vessel in a loaded condition at the first opportunity following the pneumatic test. The tank supports and saddles, connecting piping, and insulation if provided shall be examined to determine 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 shall be taken to protect personnel and adjacent property.

§ 54.10–17 Certification by stamping.

Pressure vessels exempted from Coast Guard shop inspection and stamping by § 54.01–15(a) (4) and (5)(ii) shall have the full ASME stamping, including the appropriate Code symbol, as indicated in UG–115 through UG–119 of the ASME Code.

§ 54.10–20 Marking and stamping (replaces UG–116 and UG–118).

(a) *Pressure vessels.* Upon satisfactory completion of tests and inspections, pressure vessels not exempted from Coast Guard shop inspection by § 54.01–15(a) shall be stamped or marked in a place that is readily visible with the following (items (5) through (7) may be omitted when not applicable):

(1) Manufacturer's name and serial number.

(2) Coast Guard number, see § 50.–10–30 of this subchapter.

(3) Coast Guard symbol, which is affixed only by the marine inspector.

(4) Maximum allowable working pressure _____ at _____ °F.

(5) Class if welded.

(6) Minimum service temperature allowed, if below 0° F.

(7) Water capacity in U.S. gallons, if a cargo carrying pressure vessel.

(b) *Multichambered pressure vessels.* 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 he shall stamp the combined structure 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.* The data shall be legibly stamped and shall 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 shall be reproduced on a metal nameplate. This plate shall be securely attached to the pressure vessel. The nameplate shall be maintained in a legible condition such that it may be easily read.

§ 54.10–25 Manufacturers' data report forms (modifies UG–120).

(a) Manufacturers' data reports, both partial and master, as described in UG–120 of the ASME Code are required. These forms shall be modified as directed by the Officer in Charge, Marine Inspection for those pressure vessels not exempted by § 54.01–15(a) and which are examined by a marine inspector.

(b) All necessary forms shall be provided by the manufacturer.

Subpart 54.15—Pressure-Relief Devices

§ 54.15–1 General (modifies UG–125 through UG–134).

(a) All pressure vessels built in accordance with applicable requirements in division 1 of section VIII of the ASME Code shall be provided with protective devices as indicated in UG–125 through UG–134 except as noted otherwise in this subpart.

(b) The markings shall be in accordance with this chapter for devices covered by § 54.15–10.

§ 54.15–3 Definitions (modifies UA–60).

(a) 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, irrespective of size or pressure, shall be provided with protective devices. The protective devices shall be in accordance with the requirements of UG–125 through UG–134 of the ASME Code except as modified in this subpart.

(b) An unfired steam boiler evaporator or heat exchanger (see § 54.01–10) shall be equipped with protective devices as required by § 54.15–15.

(c) All pressure vessels other than unfired steam boilers shall 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 shall be installed to protect against excessive pressure. Such supplemental pressure relieving devices shall 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 shall 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 shall 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 shall 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 shall be equipped with liquid relief valves unless otherwise protected against overpressure.

(i) The protective devices required under paragraph (a) of this section shall 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:

NOTE: In the case of nuclear power plants pressure-reducing valves and similar mechanical or electrical control instruments, except for pilot operated valves as permitted in UG–126(b) of the ASME Code are not considered as sufficiently positive in action to prevent excess pressures from being developed.

(j) Pressure-relieving devices shall 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 shall have at least the area of the pressure-relieving device inlet, and in all cases shall have sufficient area so as not to unduly restrict the flow to the pressure-relieving device. The opening in the vessel shall 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 shall 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 shall be designed to meet the protection and service requirements for which they are intended and shall 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 shall meet Subpart 162.001 in Subchapter Q (Specifications) of this chapter for service above 30 pounds per square inch gage pressure and Subpart 162.012 in Subchapter Q (Specifications) of this chapter for service below 30 pounds per square inch gage pressure. Safety relief valves used in liquefied compressed gas service shall meet Subpart 162.017 or 162.018 in Subchapter Q (Specifications) 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 shall 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 shall be equipped with a drain at the lowest point where liquid can collect (for installation, see UG–134 of section VIII of the ASME Code).

(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 shall 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 shall 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 shall be based on actual flow test data and the capacity shall 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 Compressed Gas Association Standard S–1.2.5.2.

(2) 110 percent of the valve set pressure for valves rated in accordance with UG–131 of section VIII of the ASME Code.

(3) 103 percent of the valve set pressure for steam in accordance with PG–69 of the ASME Code.

§ 54.15–13 Rupture disks (modifies UG–127).

(a) Paragraph UG–127 of the ASME Code 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 shall:

(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 shall 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 shall 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 shall 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 shall be fitted with a vent to prevent a buildup in pressure. In no case shall the vent be less than 1½ inches in diameter.

(b) Safety valves for use on pressure vessels in which steam or pressure is generated shall comply with the requirements of § 54.15–10.

(c) The relieving capacity of evaporator safety valves required by paragraph (a) of this section shall be at least equal to the capacity of the orifice fitted in the steam supply to the evaporator. The orifice capacity shall be determined in accordance with the formula in subparagraph (1) or (2) of this paragraph 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:

$$W=51.45AP$$

(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:

$$W=105.3\,A\sqrt{P_1(P-P_1)}$$

where:

W=The required orifice capacity, in pounds per hour.
A=Cross-sectional area of rounded entrance orifice, in square inches. The orifice shall be installed near the steam inlet of the coils or tubes and where no orifice is employed the area used in the formula shall be that of the inlet connection or manifold.
P=Set pressure of steam supply safety valve, in pounds per square inch, absolute.
P_1=Set pressure of evaporator shell safety valve, in pounds per square inch, absolute.

(d) The relieving capacity of safety valves on unfired steam boilers shall 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 shall 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 shall be at the normal operating level and the steam pressure shall be at the normal operating pressure, and while under this test the pressure shall 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, shall 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, shall have a liquid relief valve fitted to protect the shell against excess pressure.

(2) The discharge capacity of such relief valves shall 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 shall be not less than that determined by the following formula:

$$Q=29.81KD^2\sqrt{P_1-P_2}$$

where:

Q=Required relief valve discharge capacity, in gallons per minute, based on relief valve set pressure.
P_1=Pressure in the tube or coils, in pounds per square inch.
P_2=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 shall 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 (Specifications) of this chapter. Valves conforming to specification Subpart 162.017 shall 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 shall be in accordance with § 54.15–5.

(c) The rate of discharge to be provided for in consideration of heat input due to fire shall not be less than that determined by the following formula:

NOTE: Based on the information in Pamphlet S–1.2, Compressed Gas Association, New York, N.Y.

$$Q = FGA^{0.82}$$

$$G = \frac{633{,}000}{LC}\sqrt{\frac{ZT}{M}}$$

where:

Q=Minimum required rate of discharge in cubic feet per minute of air at standard conditions (60° F. and 14.7 p.s.i.a.).
G=Gas factor.
F=Fire exposure factor.
F=1.0—Pressure vessel type tanks.
F=0.5—Pressure vessel type tanks when insulated and approved by the Commandant. (Approval will be based on the use of an approved fire proofing material, the thermal conductance of the insulation, and its stability under fire exposure.)
F=0.5—Pressure vessel type tanks installed in a completely enclosed space below deck.[1]
F=0.2—Nonpressure vessel type independent tanks in holds.
F=0.1—Nonpressure vessel type independent tanks in inerted holds.
F=0.1—Membrane type tanks.
A=Area in square feet, as follows:

(1) For pressure vessel type tanks it is the total external surface area.

(i) *Cylindrical tanks.*

(*a*) Spherically dished or semi-ellipsoidal heads:

$$A = \pi D(U + 0.3D)$$

(*b*) Hemispherical heads:

$$A = \pi(DU)$$

(ii) *Spherical tanks.*

$$A = \pi D^2$$

(2) For nonpressure vessel type tanks it is the external surface area less the bottom surface area.

M=Molecular weight of the cargo.
T=Temperature in degrees R (460+degrees F.) at the relieving conditions (120 percent pressure at which safety relief valve is set).
D=Outside diameter of the tank in feet.
U=External overall length of the tank, in feet.
C=Constant based on relation of specific heats (see ASME Code section VIII, Appendix J, if not known, use C=315).
L=Latent heat of the material being vaporized at relieving conditions, in B.t.u. per pound.
Z=Compressibility factor of the gas at relieving conditions (if not known, use Z=1.0).

(d) In determining the total safety valve relieving capacity, the arrangement and location of the valves on the tank will be evaluated. The valves shall be placed so that a number of valves sufficient to provide the required relieving capacity shall 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 shall 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 shall be tested in the presence of a marine inspector before being placed in service except as noted otherwise in subparagraph (2) of this paragraph. The test shall 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 shall be furnished with the valve attested to by the manufacturer that the test requirements of subparagraph (1) of this paragraph 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 shall be as required by paragraphs UW–1 through UW–65 of section VIII of the ASME Code except as noted otherwise in this subchapter.

§ 54.20–3 Design (modifies UW–9, UW–11(a), UW–13, and UW–16).

(a) Fabrication by welding shall be in accordance with the provisions of this part and with Part 57 of this subchapter.

(b) Welding subject to UW–11(a) of the ASME Code shall be modified as described in § 54.25–8 for radiographic examination.

(c) A butt welded joint with one plate edge offset, Figure UW–13.1(k) of the ASME Code, may be used in the fabrication of Class II and Class III pressure vessels only, and then shall be subject to the limitations of Table UW–12 of the ASME Code.

(d) Attachment welds for nozzles and other connections shall be in accordance with UW–16 of the ASME Code. When nozzles or connections are made to pressure vessels, as shown in Figure UW–16.1 (a) and (c) of the ASME Code, and are welded from one side only, backing strips shall 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 shall be as specified under the column headed "minimum joint requirements" in Table 54.01–5(b) for various classes of pressure vessels.

§ 54.20–5 Welding qualification tests and production testing (modifies UW–26, UW–29, UW–47, and UW–48).

(a) *Performance and procedure qualification.* No production welding shall 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.

§ 54.20–10 Spot-examination of welded joints (replaces UW–52(c)(3)).

(a) In examination of spot-radiographs the following shall be used in lieu of UW–52(c)(3) of the ASME Code: "While porosity is not disqualifying, it should be noted when viewing the radiograph and gross porosity may be an indication of welding procedure difficulties."

Subpart 54.25—Construction With Carbon, Alloy, and Heat Treated Steels

§ 54.25–1 Scope.

(a) The carbon, alloy, and heat treated steels used in construction of pressure vessels and parts shall be as indicated in section VIII of the ASME Code except as noted otherwise in this subpart.

§ 54.25–3 Steel plates (modifies UCS–6).

(a) The steels listed in UCS–6(b) and UCS–6(c) of the ASME Code will be allowed only in Class III pressure vessels (see Table 54.01–5(b)).

§ 54.25–5 Corrosion allowance (replaces UCS–25).

(a) The corrosion allowance shall be as required in § 54.01–35 in lieu of requirements in UCS–25 of the ASME Code.

§ 54.25–7 Requirements for postweld heat treatment (modifies UCS–56).

(a) Postweld heat treatment is required for all Class I, I–L, and II–L vessels regardless of thickness. (Refer to Table 54.01–5(b) for applicable requirements.)

(b) Cargo tanks which are fabricated 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 shall be postweld heat treated regardless of thickness.

[1] In specific cases consideration will be given by the Commandant to fire exposure factors less than 0.5, based on a review of insulation, inerting, and surrounding hull structure.

§ 54.25–8 Requirements for radiography (modifies UW–11(a) and UCS–57).

(a) Full radiography is required for all Class I and Class I–L vessels regardless of thickness. (Refer to Table 54.01–5(b) for applicable requirements.)

(b) Class II–L vessels shall be spot radiographed. The exemption provided in UW–11(c) of the ASME Code does not apply. (Refer to Table 54.01–5(b) for applicable requirements.)

§ 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 in Subchapter D (Tank Vessels) 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) The service temperature is the minimum temperature of a product at which it may be contained, loaded and/or transported. However, the service temperature shall in no case be taken higher than given by the following formula:

$$t_s = t_w - 0.25\ (t_w - t_B)$$

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.

Under normal circumstances, only temperatures due to refrigerated service will be considered in determining the service temperature. Refrigerated service for purposes of this paragraph is defined as service where the temperature is controlled in the process rather than being caused 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) shall conform to a specification given in Table UCS–23 in the ASME Code and the following additional requirements:

NOTE: 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 —70° F., ferritic steels shall be made with fine grain practice and shall have an austenitic grain size of 5 or finer, and shall be normalized. Consideration will be given to other heat treatments. Refer to § 57.03–1(d) of this subchapter. Plate for pressure vessel applications shall conform to the requirements of ASTM A–20. It may be produced by the open hearth, basic oxygen or electric furnace process and shall conform to the requirements of Table 54.25–10(b)(1). (Other alloying elements may only be present in trace amounts.)

(ii) Mechanical properties shall be within the following limits:

Ultimate strength	—58,000 [1]–85,000 [1] p.s.i.
Yield strength	—Minimum 35,000 p.s.i. —Minimum 80 percent of ultimate.
Elongation [2]	—20 percent in 8 inches, or —24 percent in 2 inches, or —22 percent in 5.65 $\sqrt{A}$, where "A" is the test specimen cross sectional area.

[1] The specified tensile strength range of individual specifications shall not exceed 15,000 pounds per square inch.

[2] Longitudinal values as specified here; if transverse test is performed, 2 percent less elongation is permitted.

TABLE 54.25–10(b)(1)

Minimum service [1] temperature °F	Maximum C [1] percent	Manganese range [1] percent
—30	0.20	0.90–1.35
—50	.16	1.15–1.50
—70	.12	1.30–1.65

[1] 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.

Si range percent	*P and S maximum percent*
0.10–0.35	0.04

(2) For minimum service temperature below —70° F., but not below the designated minimum service temperature, ferritic steels shall be normalized, low carbon, fully kilned, fine grain, nickel alloy type, conforming to any one of the specifications in Table 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 shall be as shown in the applicable specification and shall be suitable to the design stress levels adopted. The service temperature shall not be colder than the minimum specified in Table 54.25–10(b)(2) for each steel.

TABLE 54.25–10(b)(2)

Steel	*Minimum service temperature*
A–203, 2¼ percent, Ni, normalized.	—80° F. for Grade A. —75° F. for Grade B.
A–203, 3½ percent, Ni, normalized.	—130° F. for Grade D. —110° F. for Grade E.
5 percent Ni, normalized.	Dependent on chemical and physical properties.

(3) The materials permitted under subparagraphs (1) and (2) of this paragraph shall be tested for toughness in accordance with and shall 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 (Tank Vessels) of this chapter shall 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 shall not be die-stamped on plate material less than one-fourth inch in thickness.

(c) *Design.* Pressure vessels shall meet the requirements for Class I–L or II–L construction. (Refer to Table 54.01–5(b) for applicable requirements.) The allowable stress values used in the design of low temperature pressure vessels shall not exceed those given in Table UCS–23 of the ASME Code for temperatures of 0° F. to 650° F. For materials not listed in this table, allowable stress values shall be determined in accordance with appendix P of section VIII of the ASME Code.

§ 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) of the ASME Code 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, shall 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 (Tank Vessels) 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. shall 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 the ASME Code. These materials and their weldments shall be tested for toughness according to the requirements of Subpart 54.05.

(c) The allowable stress values used in the design of low temperature pressure vessels shall not exceed those given in Table UHA–23 of the ASME Code for temperatures of —20° F. to 100° F.

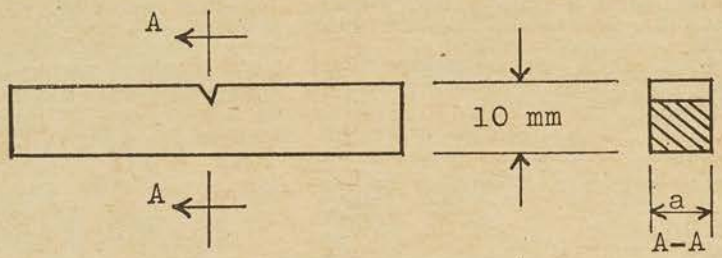
§ 54.25–20 Low temperature operation—ferritic steels with properties enhanced by heat treatment (modifies UHT–5(c), UHT–6, UHT–23, and UHT–82).

(a) For service temperatures below 0° F. but not below the designated minimum service temperature, steel conforming to the specifications of Table 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 (Tank Vessels) of this chapter. The ultimate and yield strengths shall be as shown in the applicable specification and shall be suitable for the design stress levels adopted. The service temperature shall not be colder than —320° F. Service temperature is defined in § 54.25–10(a)(2).

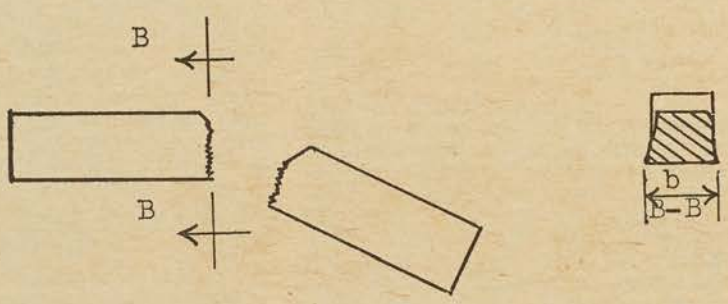
TABLE 54.25–20(a)

Steel	Minimum service temperature
A–333, 9 percent Ni, grade 8	−320° F.
A–334, 9 percent Ni, grade 8	−320° F.
A–353, 9 percent Ni, double normalized and tempered	−320° F.
A–522, 9 percent Ni, NNT, Q and T, forging	−320° F.
A–553, 9 percent Ni, quenched and tempered	−320° F.

(b) The materials permitted under paragraph (a) of this section shall be tested for toughness in accordance with the requirements of UHT–6 of the ASME Code except that tests shall be conducted at the temperature specified in § 54.05–6 in lieu of that in UHT–5(c) of the ASME Code. Lateral expansion in a broken Charpy V-notch specimen is illustrated in Figure 54.25–20(b) and shall be measured in accordance with the procedure outlined in ASTM A–370.



CHARPY V-NOTCH SPECIMEN



BROKEN SPECIMEN

LATERAL EXPANSION = (b-a)

FIGURE 54.25–20(b)—Illustration of lateral expansion in a broken Charpy V-notch specimen

(c) The qualification of welding procedures and welders and weld production testing for the steels of Table 54.25–20 (a) shall conform to the requirements of Part 57 of this subchapter and Subpart 54.05 except that the Charpy V-notch testing acceptance criteria shall be in accordance with UHT–6(a) (4) and (5) of the ASME Code.

(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 shall also be reported to the marine inspector or the Commandant, as applicable.

(e) The allowable stress values shall not exceed those given in Table UHT–23 of the ASME Code for temperatures of 150° F. and below.

§ 54.25–25 Welding of quenched and tempered steels (modifies UHT–82).

(a) The welding requirements in UHT–82 of the ASME Code shall be modified to require that the qualification of welding procedures and welders and weld production testing shall conform to the requirements of Part 57 of this subchapter. The requirements of § 57.03–1(d) of this subchapter are applicable to welded pressure vessels and nonpressure vessel type tanks of quenched and tempered steels other than 9 percent nickel.

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.

§ 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.

§ 54.30–5 Limitations and requirements.

(a) Class II–L pressure vessels which require stress relief (see Table 54.01-5 (b)) 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 the ASME Code 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 the ASME Code:

(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 the ASME Code and all categories C and D joints are full penetration welds. See UW–3 of the ASME Code 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 shall 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.

(c) The weld joint efficiencies as listed in Table UW–12 of the ASME Code shall apply except that a minimum of spot radiography will be required. UW–12(c) of the ASME Code which permits omitting all radiography does not apply. Spot examination shall follow UW–52 of the ASME Code 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 § 54.20–10 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:

$$\text{Percent strain} = \frac{65t}{R_f}\left(1 - \frac{R_f}{R_o}\right)$$

where:

t = Plate thickness.
R_f = Final radius.
R_o = Original radius (equals infinity for flat plate).

§ 54.30–10 Method of performing mechanical stress relief.

(a) The mechanical stress relief shall 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 1½ times the design pressure. (See UA–60(e) of the ASME Code.)

(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 shall not be less than 50° F. above service temperature.

(3) The stress relief shall 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 shall 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 shall not exceed 90 percent of the yield strength of the material at test temperature. The supporting structure shall 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 shall 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 55—NUCLEAR PRESSURE VESSELS

Subpart 55.01—General Requirements

Sec.
55.01–1 Adoption of Section III of the ASME Code.

Subpart 55.05—Plan Approval

55.05–1 General.

Subpart 55.10—Class A Vessels

55.10–1 General (modifies N–110 through N–914).
55.10–5 Design.
55.10–15 Marine inspector (replaces N–612).
55.10–20 Welding and fabrication.
55.10–25 Quenched and tempered steels.
55.10–30 Marking and stamping (modifies N–810 through N–830).
55.10–35 Manufacturers' data reports (modifies N–840).
55.10–40 Safety and relief valves (modifies N–911 and N–913).

Subpart 55.15—Class B Vessels

55.15–1 General (modifies N–1110 through N–1611.3).
55.15–5 Welding and fabrication.
55.15–10 Marking, stamping, and reports.

Subpart 55.20—Class C Vessels

55.20–1 General (modifies N–2110 through N–2115).
55.20–5 Welded joints.
55.20–10 Nondestructive testing.
55.20–15 Pressure relief devices.
55.20–20 Marking, stamping, and reports.

AUTHORITY: The provisions of this Part 55 issued under R.S. 4405, as amended, 4462, as amended, secs. 2, 633, 63 Stat. 496, 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 2, 633, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2), (f). R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4417a, as amended, 4418, as amended, 4421, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4453, as amended, 4472, as amended, 4488, as amended, 4491, as amended, sec. 2, 23 Stat. 118, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 391a, 392, 399, 404–409, 411, 412, 435, 170, 481, 489, 2, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 55.01—General Requirements

NOTE: See § 50.15–5 for general adoption of the ASME (American Society of Mechanical Engineers) Code. The adoption of section III of the ASME Code, for nuclear vessels, is subject to specific limitations or modifications as described in this part. Those requirements in section III of the ASME Code which are not referred to in this part are adopted without change. Table 55.01–1(a) sets forth a general reference to various paragraphs in section III of the ASME Code which are limited, modified or replaced by regulations in this part.

§ 55.01–1 Adoption of section III of the ASME Code.

(a) Nuclear pressure vessels shall be designed, constructed and inspected in accordance with section III of the ASME (American Society of Mechanical Engineers) Code, as limited, modified, or replaced by specific requirements in this part. The provisions in the appendices to section III of the ASME Code are adopted and shall be followed when the requirements in section III make them mandatory. For general information Table 55.01–1(a) lists the various paragraphs in section III of the ASME Code which are limited, modified, or replaced by regulations in this part.

TABLE 55.01–1—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF SECTION III OF THE ASME CODE

Paragraphs in section III, ASME Code,[1] and disposition	*Unit of this part*
N–110 through N–914 modified by	55.10–1
N–447 modified by	55.10–5(a)
N–522.1 modified by	55.10–20(a)
N–541 modified by	55.10–20(b)
N–612 replaced by	55.10–15
N–810 through N–830 modified by	55.10–30
N–832.2 modified by	55.10–30(d)
N–840 modified by	55.10–35
N–911 and N–913 modified by	55.10–40
N–1110 through N–1611.3 modified by	55.15–1
N–2110 through N–2115 modified by	55.20–1
N–2115 replaced by	55.20–20(a)

[1] The references to specific provisions in the ASME Code are coded. The first letter "N" refers to Section III. The letter and number following the letter refer to the paragraph so identified in the text of Section III.

(1) As stated in § 50.15–5 of this subchapter, section III of the ASME Code is adopted and shall be the governing requirements for nuclear pressure vessels unless specifically limited, modified, or replaced by other regulations in this part.

(b) References to the ASME Code, such as paragraph N–130, indicate:

N=Section III, Nuclear Vessels, ASME Code.
1=Article 1 containing general requirements.
130=Paragraph within Article 1.

(c) When a paragraph or a section of the regulations relates to material in section III of the ASME Code, 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 N-_____.) This indicates that the material in N-_____ is generally applicable but is being altered, amplified or augmented.

(2) (Replaces N-_____.) This indicates that N-_____ does not apply.

(3) (Reproduces N-_____.) This indicates that N-_____ is being identically reproduced for convenience, not for emphasis.

(d) ASME Nuclear Vessel "Code Cases" sometimes contain "Limitation Notes." These notes are mandatory for pressure vessels covered by the regulations in this part. Individual justifications may be made to the Commandant for removing the prohibition or requirement of a specific note in a specific application.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

Subpart 55.05—Plan Approval

§ 55.05–1 General.

(a) Manufacturers intending to fabricate nuclear pressure vessels to be installed on ships or barges shall submit detail plans and calculations which shall be fully descriptive of such pressure vessels. Submission shall be made in accordance with the provisions of Subpart 50.20 of this subchapter.

(b) Plans required for construction of Classes A and B nuclear vessels shall show the intended construction and safety features in sufficient detail to permit the Coast Guard to review and to reach conclusions upon the acceptability of the design. The plans shall include as a minimum:

(1) A preliminary Design Specification which lists the applicable design codes and standards; design criteria, bases, and requirements; materials specifications; quality control provisions, documentation to be provided, and cleaning, identification and packaging methods.

(2) Preliminary calculations which establish the tentative thicknesses of pressure containing parts.

(3) Methods to be followed in the detailed stress calculations.

(4) Joint design and methods of attachment of pressure containing parts.

(5) Diagrammatic arrangement drawing of the assembled vessel showing location of internal and external parts.

(c) When completed, the final Design Specification and Stress Report, required by N–141 and N–142, respectively, of the ASME Code, together with final arrangement drawings, shall be forwarded to the Commandant for review.

(d) The plans required for Class C vessels shall include the Design Specification required under paragraph (b)(1) of this section plus other documents required to fulfill the requirements of Subpart 55.20.

Subpart 55.10—Class A Vessels

§ 55.10–1 General (modifies N–110 through N–914).

(a) Class A vessels shall meet the requirements of articles 1 through 9 of section III of the ASME Code except as noted otherwise in this subpart.

§ 55.10–5 Design.

(a) *Additional loadings (modifies N–447).* The designer must consider loadings in addition to those listed in N–447 of the ASME Code, which are peculiar to the marine application. Loadings which must be determined for each application include but are not limited to:

(1) Loading imposed by vessel's attitude in roll, list, pitch, and trim.

(2) Dynamic forces due to ship motions.

(3) Loadings due to shielding.

(b) *Foundations and supports.* The designer shall determine the natural frequency of the nuclear pressure vessel in its mode of support, considering the engine and propeller shaft speed, and account for it in the design.

§ 55.10–15 Marine inspector (replaces N–612).

(a) The inspections will be conducted by marine inspectors in lieu of the inspectors required by N–612 of the ASME Code.

(b) The manufacturer's quality assurance program shall be acceptable to the Commandant (MMT). Appendix IX—200 to section III of the ASME Code will be used in reviewing this program.

§ 55.10–20 Welding and fabrication.

(a) *Weld procedure and performance qualification (modifies N–522.1).* Weld procedure and performance qualifications shall be as required by Part 57 of this subchapter and N–540 of the ASME Code.

(b) *Production tests (modifies N–541).* N–541 of the ASME Code is modified by adding the following requirements:

(1) Weld production test plates are required. These shall meet the requirements of Subpart 57.06 of this subchapter.

(2) In addition to the Charpy V-notch testing required for weld procedure qualification by N–541.2 (a), (b) of the ASME Code, Charpy V-notch production toughness tests of the weld metal and heat affected base metal are required at the same interval as described in § 57.06–1 of this subchapter for production test plates. The test specimens and testing shall follow the requirements of N–541.2 of the ASME Code.

§ 55.10–25 Quenched and tempered steels.

(a) The requirements of § 57.03–1(d) of this subchapter are applicable to welded vessels of quenched and tempered steels.

§ 55.10–30 Marking and stamping (modifies N–810 through N–830).

(a) The marine inspector (see § 50.10–15 of this subchapter) shall affix the Coast Guard symbol. Stamping with the ASME Code symbol stamps as indicated in N–810 through N–830 of the ASME Code is not required and a manufacturer need not possess ASME Code symbol stamps (see § 50.15–5(c) of this subchapter).

(b) In addition to the marking required by N–811 and figure N–822 (except Code N symbol) of the ASME Code, each completed nuclear vessel shall be stamped with:

(1) Coast Guard number, see § 50.10–30 of this subchapter.

(2) Coast Guard symbol, which is affixed only by the marine inspector.

(c) Those parts of nuclear vessels requiring inspection under this part which are furnished by other than the shop of the manufacturer responsible for the completed vessel shall be stamped with the Coast Guard symbol, the word "PART", the manufacturer's name and serial number, and the design pressure.

(d) (Modifies N–832.2) The manufacturer's quality assurance program shall be initially approved by the Commandant (MMT) and shall be periodically checked by the cognizant marine inspector which shall be in addition to or in lieu of the Society as specified in N–832.2 of the ASME Code. The manufacturer need not possess the contract specified by N–832.2 of the ASME Code.

(e) The required markings shall be affixed at the place of fabrication. The affixing of the Coast Guard symbol by the marine inspector, together with the certification required by § 55.10–35, shall confirm that all applicable requirements have been complied with.

§ 55.10–35 Manufacturers' data reports (modifies N–840).

(a) Manufacturers' Data Reports, both partial and master, as described in N–840 of the ASME Code are required. These forms shall be modified as directed by the Officer in Charge, Marine Inspection for those vessels which are examined by a marine inspector.

(b) All necessary forms shall be provided by the manufacturer.

§ 55.10–40 Safety and relief valves (modifies N–911 and N–913).

(a) All safety valves for Class A vessels shall comply with Subpart 162.001 of Subchapter Q (Specifications) of this chapter. The use of other than spring loaded safety valves must be approved by the Commandant and an overpressure Summary Technical Report Submitted.

(b) Relief valves shall comply with Subpart 54.15 of this subchapter.

Subpart 55.15—Class B Vessels

§ 55.15–1 General (modifies N–1110 through N–1611.3).

(a) Class B vessels shall meet the requirements of articles 11 through 16 of section III of the ASME Code except as noted otherwise in this subpart.

§ 55.15–5 Welding and fabrication.

(a) *Weld procedure.* Weld procedure and performance qualification shall follow that for Class A vessels in § 55.10–20 (a).

(b) *Production test.* Production tests are required meeting the requirements of Subpart 57.06 of this chapter.

(c) *Charpy V-notch testing.* When Charpy V-notch testing is required by N–1211 of the ASME Code such testing shall be required for both procedure qualification and for regular production welding as described in § 55.10–20(b)(2).

(d) *Quenched and tempered steels.* For vessels constructed of quenched and tempered steels refer to § 57.03–1(d) of this subchapter.

§ 55.15–10 Marking, stamping, and reports.

(a) (Modifies N–1500) N–1500 of the ASME Code is modified by the addition of the following:

(1) The requirements of §§ 55.10–30 and 55.10–35 shall be followed for marking, stamping, and manufacturers' data reports.

Subpart 55.20—Class C Vessels

§ 55.20–1 General (modifies N–2110 through N–2115).

(a) Class C vessels shall meet the requirements of article 21 of section III of the ASME Code except as noted otherwise in this subpart.

(b) (Modifies N–2111.) N–2111 of the ASME Code is modified to require that Class C vessels be designed to the Class I standards of Part 54 of this subchapter as modified by § 55.20–5.

§ 55.20–5 Welded joints.

(a) All welded joints of Category A shall be Type 1 of Table UW–12 of the ASME Code.

(b) All welded joints of Categories B and C shall be Type 1 or 2 of Table UW–12 of the ASME Code.

(c) All joints of Category D shall be full penetration welds extending through the entire thickness of the vessel wall or the nozzle wall except that those joints of 2 inches or less nominal pipe size may be of the acceptable types of Figure UW–16.1 of the ASME Code.

(d) Weld production testing need not meet the Class I requirements of Subpart 57.06 of this subchapter if the vessel's design pressure and temperature would place it in the Class II or Class III range (see Table 54.01–5(b) of this subchapter). Class C nuclear vessels which would otherwise fit the Class III category shall receive the production testing specified for a Class II vessel.

§ 55.20–10 Nondestructive testing.

(a) *Radiographic examination.* All welded joints of Categories A, B, and C and Category D joints which are butt welds where either of the joined members at the weld exceeds three-sixteenths inch in thickness shall be radiographically examined in accordance with the requirements of UW–51 of the ASME Code except that Categories C and D joints of 2 inches or less nominal pipe size need not be radiographed.

(b) *Liquid penetrant or magnetic particle examination.*—(1) All welded joints of Category D over 2-inch nominal pipe size which are not butt welds shall be examined by magnetic particle or liquid penetrant methods at the root of the weld after back chipping or after removal of backing rings and on the finished surfaces in accordance with the acceptance standards of N–626.3 or N–627.3 of the ASME Code.

(2) All other completed welds which are not radiographed shall be examined by the magnetic particle or liquid penetrant method on all accessible surfaces to the acceptance standards of N–626.3 or N–627.3 of the ASME Code.

§ 55.20–15 Pressure relief devices.

The requirements in Subpart 54.15 of this subchapter shall apply for pressure relief devices.

§ 55.20–20 Marking, stamping, and reports.

(a) (Replaces N–2115.) In lieu of the stamping required by N–2115 of the ASME Code, Class C vessels constructed in accordance with article 21 of the ASME Code as modified shall be marked and stamped as required by § 55.10–30.

(b) Manufacturers' data reports shall be made as required by § 55.10–35.

PART 56—PIPING SYSTEMS AND APPURTENANCES

Subpart 56.01—General

Sec.
56.01–1 Scope (replaces 100.1).
56.01–5 Adoption of USASI (United States of America Standards Institute) Code B31.1 for pressure and power piping, and other standards.
56.01–6 Adoption of other standards and specifications.
56.01–10 Plan approval.

Subpart 56.04—Piping Classification

56.04–1 Scope.
56.04–2 Piping classification according to service.
56.04–10 Other systems.
56.04–20 Nuclear piping.

Subpart 56.07—Design

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

Subpart 56.10—Components

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

Subpart 56.15—Fittings, Bends and Intersections

56.15–1 Fittings.

Subpart 56.20—Valves

56.20–1 General.
56.20–5 Marking (reproduces 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

Sec.
56.25–5 Flanges.
56.25–7 Blanks.
56.25–10 Flange facings.
56.25–15 Gaskets (reproduces 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 Screwed joints.
56.30–25 Flared, flareless and compression joints.
56.30–27 Caulked joints.
56.30–30 Brazed joints.
56.30–35 Sleeve coupled and other proprietary joints.
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).
56.35–5 Piping anchors at junction points (modifies 120.2.3).
56.35–10 Bellows expansion joints below 15 pounds per square inch (replaces 119.5.1).
56.35–15 Bellows expansion joints above 15 pounds per square inch (replaces 119.5.1).
56.35–35 Other joints providing flexibility (replaces 119.5.1).

Subpart 56.50—Design Requirements Pertaining to Specific Systems

56.50–1 General (replaces 122.6 through 122.10).
56.50–5 Systems conveying oil.
56.50–10 Special gaging 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 102.2.5 (d)).
56.50–45 Circulating pumps.
56.50–50 Bilge and ballast piping.
56.50–55 Bilge pumps.
56.50–60 Cargo oil systems and fuel oil systems for boilers and internal combustion engines; transfer systems, and general arrangement.
56.50–65 Boiler fuel oil service systems.
56.50–70 Gasoline fuel systems.
56.50–75 Diesel fuel systems.
56.50–80 Lubricating oil system.
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 Instrument, control and sampling piping (modifies 122.3).
56.50–100 Fluid power and control systems (hydraulic and pneumatic).
56.50–101 Refrigeration systems.
56.50–102 Liquefied petroleum gas for cooking and heating.
56.50–105 Low temperature piping.

Subpart 56.60—Materials

56.60–1 Acceptable materials and specifications (replaces 123).
56.60–2 Limitations on materials.
56.60–5 Steel.

Sec.
56.60–10 Cast iron and malleable iron.
56.60–15 Nodular iron.
56.60–20 Nonferrous materials.
56.60–25 Nonmetallic materials.

Subpart 56.65—Fabrication, Assembly and Erection

56.65–1 General (replaces 127 through 135.4).

Subpart 56.70—Welding

56.70–1 General.
56.70–5 Material.
56.70–10 Preparation (reproduces 127.3).
56.70–15 Procedure.
56.70–20 Qualification, general.

Subpart 56.75—Brazing

56.75–5 Filler metal.
56.75–10 Joint clearance (reproduces 128.2.2).
56.75–15 Heating (reproduces 128.2.3).
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.
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 (reproduces 131.1).
56.85–10 Preheating.
56.85–15 Postheat treatment.

Subpart 56.90—Assembly

56.90–1 General.
56.90–5 Bolting procedure.
56.90–10 Threaded piping (reproduces 135.4).

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 Test media.
56.97–30 Test preparation.
56.97–35 Test pressure.
56.97–40 Installation tests.

AUTHORITY: The provisions of this Part 56 issued under R.S. 4405, as amended, 4462, as amended, sec. 633, 63 Stat. 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 633, 49 U.S.C. 1655(b), 49 CFR 1.4 (a)(2), (f). R.S. 4417, as amended, 4417a, as amended, 4418, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 391, 391a, 392, 404–409, 411, 412, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 56.01—General

NOTE: See § 50.15–10 for general adoption of standards of the USASI (United States of American Standards Institute). The printing of portions of the "USA Standard Code for Pressure Piping, Power Piping," USAS–B31.1, is with the permission of the publisher, The American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017. The adoption of this standard USAS–B31.1 for pressure piping and power piping is subject to specific limitations or modifications as described in this part. Those requirements in USAS–B31.1 which are not referred to in this part are adopted without change. Table 56.01–5(a) sets forth a general reference to various paragraphs in USAS–B31.1 which are limited, modified, or replaced by regulations in this part.

§ 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 shall 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 systems which do not fully comply with the requirements of this subchapter may be accepted for installation on certain vessels subject to inspection provided:

(1) They are limited to handling petroleum and associated products for use in offshore drilling and production operations; and,

(2) The design, material and fabrication comply with the requirements of the American Petroleum Institute (API) for such piping.

§ 56.01–5 Adoption of USASI (United States of America Standards Institute) Code B31.1 for pressure and power piping, and other standards.

(a) Piping systems for ships and barges shall be designed, constructed and inspected in accordance with B31.1, the "Code for Pressure Piping, Power Piping," of the USASI (United States of America Standards Institute), as limited, modified, or replaced by specific requirements in this part. The provisions in the appendices to USAS–B31.1 are adopted and shall be followed when the requirements in USAS–B31.1 or the regulations in this part make them mandatory. For general information Table 56.01–5(a) lists the various paragraphs, etc., in USAS–B31.1 which are limited, modified, replaced, or reproduced by regulations in this part.

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

Section or paragraph in USAS–B31.1, and disposition	*Unit in this part*
100 through 104.7 modified by	56.07–10
100.1 replaced by	56.01–1
100.2 modified by	56.07–5
101.2 modified by	56.07–10 (a), (b)
101.5 replaced by	56.07–10(c)
102.2 modified by	56.07–10(d)
102.2.5(d) replaced by	56.50–40
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, 56.35–35
119.7 replaced by	56.35–1, 56.35–5
120.2.3 modified by	56.35–5
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 modified by	56.30–5(c)(3), 56.60–1
127 through 135.4 replaced by	56.65–1, 56.70–1 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 USAS–B31.1 Code (USA Standard Code for Pressure Piping, Power Piping), the relationship with this code will be shown immediately following the heading of the section or at the beginning of the paragraph as follows:

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

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

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

(c) As stated in § 50.15–10 of this subchapter, the standards and code cases of the USASI (United States of America Standards Institute) specifically referred to in this part shall be the governing requirements for the subject matters covered unless specifically limited, modified or replaced by other regulations in this subchapter. See § 56.60–1 (b) for the other adopted commercial standards applicable to piping systems, which also form a part of this subchapter.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 56.01–6 Adoption of other standards and specifications.

(a) *General.* As stated in Subpart 50.15 of this subchapter, the standards and specifications specifically referred to in this part shall be the governing

requirements for the subjects covered unless specifically limited, modified, or replaced by other regulations in this subchapter.

(b) *American Society of Mechanical Engineers.* The portions of the ASME (American Society of Mechanical Engineers) Code as referenced in this part are adopted and form a part of this subchapter.

(c) *American Society of Testing Materials.* (1) The ASTM specifications as referenced in this part are adopted and form a part of this subchapter.

(2) The following specifications of the American Society of Testing Materials have been specifically disapproved for certain purposes:

(i) ASTM A–53, ferrous pipe, shall not be used for flammable or combustible liquids in machinery spaces (see § 56.10–5(b)).

(ii) ASTM A–72, ferrous pipe, shall not be used for flammable or combustible liquids in machinery spaces (see § 56.10–5(b)).

(iii) Plate material listed in UCS–6 (b), section VIII, ASME Code (see § 56.30–10(b)(5)).

(d) *Manufacturers' Standardization Society (MSS).* See § 56.60–1(b) for other adopted commercial standards of the Manufacturers' Standardization Society applicable to piping systems.

(Sec. 552, 80 Stat. 383; 5 U.S.C. 552)

§ 56.01–10 Plan approval.

(a) Plans and specifications for new construction and major alterations showing the respective piping systems shall 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 valves and safety relief valves covered in Part 162 of Subchapter Q (Specifications) of this chapter, are not required to be specifically approved by the Commandant, but shall comply with the applicable requirements for materials, construction, markings, and testing. These materials and appliances shall 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 shall be submitted in accordance with paragraph (a) of this section.

(c) (1) Prior to installation aboard ship, diagrams of the following systems shall 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) Salt water tank cleaning piping.

(viii) Condenser circulating water piping.

(ix) Vent, sound and overflow piping.

(x) Plumbing, 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) High temperature hot water systems (pressurized heating systems).

(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.)

(xviii) Nuclear systems.

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

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

(ii) All nuclear piping systems.

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

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

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

(2) Pump rated capacity and pump shutoff head shall appear on piping diagrams. Pump characteristic curves shall 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 shall be submitted:

(i) Welding details for piping connections.

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

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

Subpart 56.04—Piping Classification

§ 56.04–1 Scope.

Piping shall be divided into seven classifications as shown in Table 56.04–1.

TABLE 56.04-1—PIPING CLASSIFICATIONS

Service	Class	Section in this part
Normal	I, II	56.04–2
Low temperature	I–L, II–L	56.50–105
Nuclear	I–N, II–N, III–N	56.04–20

§ 56.04–2 Piping classification according to service.

The designation of classes according to service is found in Table 56.04–2.

TABLE 56.04-2—PRESSURE PIPING CLASSIFICATION

Service	Class [1]	Pressure (p.s.i.g.)		Temp. (°F)
Class B and C poisons [2]	I	any	and	0 and above.
	I–L	any	and	below 0.
	II	not permitted.		
	II–L	not permitted.		
Gases and vapors [2]	I	above 150	or	above 650.
	I–L	above 150	and	below 0.
	II	150 and below	and	0 to 650.
	II–L	150 and below	and	below 0.
Liquefied flammable gases [2]	I	above 150	and	0 and above
	I–L	above 150	and	below 0.
	II	150 and below	and	0 and above
	II–L	150 and below	and	below 0.
Molten sulphur	I	above 225	or	above 330.
	II	225 and below	and	330 and below.
Cargo liquids Grades A through D [2]	I	above 225	or	above 150.
	I–L	above 225	and	below 0.
	II	225 and below	and	0 to 150.
	II–L	225 and below	and	below 0.
Cargo liquids Grade E	I	above 225	or	above 400.
	I–L	above 225	and	below 0.
	II	225 and below	and	0 to 400.
	II–L	225 and below	and	below 0.
Water	I	above 225	or	above 350.
	II	225 and below	and	350 and below.
Fuels (Bunker, diesel, gasoline, etc.)	I	above 150	or	above 150.
	II	150 and below	and	150 and below.
Lubricating oil	I	above 225	or	above 400.
	II	225 and below	and	400 and below.
Asphalt	I	above 225	or	above 400.
	II	225 and below	and	400 and below.
Heat transfer oil	I	above 225	or	above 400.
	II	225 and below	and	400 and below.
Hydraulic fluid	I	above 225	or	above 400.
	II	225 and below	and	400 and below.
Flammable or combustible dangerous cargoes.	Refer to specific requirements of Part 40 of this chapter.			
Other dangerous cargoes.	Refer to specific requirements of Part 98 of this chapter.			

[1] Where doubt exists as to proper classification, refer to the Commandant for resolution.
[2] Definitions are in Subpart 30.10 in Subchapter D (Tank Vessels) and in §§ 146.25–10 and 146.25–15 of Subchapter N (Dangerous Cargoes) of this chapter.

§ 56.04–10 Other systems.

Material used in other systems not requiring approval shall be acceptable to the marine inspector and shall meet normal commercial standards for the service intended.

§ 56.04–20 Nuclear piping.

(a) Nuclear piping is that piping designed to contain a fluid whose loss from the system could result in a radiation hazard either to the vessel personnel or to the general public.

(b) (Modifies B31 Case N–13.) Nuclear piping shall follow the requirements of the B31 Nuclear Code Cases except that paragraph 7 of Case N–13 is modified to permit only Charpy V-notch qualification, and the procedures of low temperature piping (§ 56.50–105) shall be applied for service below 0° F.

(c) Three classifications of piping are established: I–N, II–N, III–N. The specific requirements and classification criteria will be published at a later date. Prior to such action, submissions may be made to the Commandant for review and individual approval.

Subpart 56.07—Design

§ 56.07–5 Definitions (modifies 100.2).

(a) *Piping.* The definitions contained in 100.2 of USAS B31.1 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.

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

(c) *Schedule.* The word "Schedule" when used in this part refers to specific values as given in USA Standards B36.10 and B36.19.

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

(e) *Nonstandard fittings.* A "nonstandard fitting" is a component of a piping system which is not fabricated under the approved industry, ASTM, or USA standards for pipe, tubing, flanges, valves, pipe joining fittings, fluid conditioner fittings or special purpose fittings. Where such standards are not available or are not used, components are considered nonstandard and may be utilized if the requirements of § 56.15–1 are met.

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

(a) *Maximum allowable working pressure (modifies 101.2).* (1) The maximum allowable working pressure of a piping system shall not be greater than the internal design pressure defined in 104.1.2 of USAS–B31.1.

(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 shall 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 shall be safeguarded by appropriate relief devices. (See § 52.01–3 of this subchapter for definitions.) 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 shall not exceed the maximum allowable working pressure of the system. Its relieving capacity shall 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 shall be based on actual flow test data and the capacity shall be certified by the manufacturer at 120 percent of the set pressure of the valve.

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

(c) *Dynamic effects (replaces 101.5).* Where the effect of shipboard motions are taken into account, including the effects of impact or collision, weight, roll, sway, yaw, pitch and heave, and vibration, and additional nondestructive testing as specified by the Commandant is accomplished, the maximum allowable stress permitted will be that which may be found from Table 56.60–1 (a). Where these factors are not considered the maximum allowable stress shall be 80 percent of the tabulated value for all materials.

(d) *Pressure temperature ratings (modifies 102.2).* The material in 102.2 of USAS–B31.1 is applicable with the following exceptions:

(1) The details of components not having specific ratings as described in 102.2.2 shall be furnished to the Commandant for approval.

(2) Boiler blowoff piping shall be designed in accordance with § 56.50–40 in lieu of 102.2.5(d).

(e) *Pressure design (modifies 102.3, 104.1.2, and 104.4).* Materials for use in piping systems shall be selected from Table 56.60–1(a) or 56.60–2(a). Tabulated allowable stress values for these materials shall be taken as indicated in 102.3.1 of USAS–B31.1, Table 56.60–1(a) and 56.60–2(a). Allowable stress values as found in the ASME Code which are restricted in application by footnote or which are italicized shall not be used. Where multiple stresses are listed for a material, the lowest value of the listing shall be used unless otherwise approved by the Commandant. In all cases the temperature is understood to be the actual temperature of the component. Where it is desired to use a material not listed, permission must be obtained from the Commandant. The values of stress (S_c, S_h, SE) as used in equations appearing in 102.3.2, 104.1.2, and 104.4 of USAS–B31.1 are to be limited to 80 percent of the tabulated values if the dynamic effects are not considered and additional material inspection is not accomplished as per paragraph (c) of this section. Requirements for testing found in § 56.97–40(a) (2) and (4) 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 of USAS–B31.1 in 104.3 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.

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, shall meet material and standard requirements of Subpart 56.60 and shall meet the certification requirements of Part 50 of this subchapter.

(b) The requirements in this subpart and Subparts 56.15 through 56.25 shall be followed in lieu of those in 105 through 108 in USAS–B31.1; however, certain requirements are marked "reproduced."

§ 56.10–5 Pipe.

(a) *General.* Pipe and tubing shall be selected as described in Table 56.60–1(a).

(b) *Ferrous pipe.* ASTM Specifications A–53 and A–72 furnace welded pipe shall not be used for flammable or combustible liquids within machinery spaces. (See §§ 30.10–15 and 30.10–22 of Subchapter D (Tank Vessels) of this chapter.)

(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 pounds per square inch and for design temperatures to 406° F.

(2) Copper and brass pipe for air may be used in accordance with the allowable stresses found from Table 56.60–1(a).

(3) Copper tubing may be used for dead-end instrument service up to 1,000 pounds per square inch.

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

(5) Aluminum alloy pipe or tube may be used within the limitation stated in 123.2.7 of USAS–B31.1 and subparagraph (4) of this paragraph.

(d) *Nonmetallic pipe.* (1) Polyvinyl chloride pipe may be used for water, nonflammable chemicals and air service, provided the pressure is limited to 150 pounds per square inch gage and the temperature to 140° F. Other types of plastic pipe may be used in the above services provided that it is demonstrated that the pipe is suitable for the service conditions and is being used within the manufacturer's recommendations for pressure and temperature.

(2) Refer to § 56.60–25(a) for further details on limitations in the uses of nonmetallic pipe.

Subpart 56.15—Fittings, Bends and Intersections

§ 56.15–1 Fittings.

(a) Screwed, flanged, socket, butt welding, and brazed fittings, made in accordance with the applicable standards in Tables 56.60–1(a) and 56.60–1(b), 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. Design shall be for the maximum pressure to which they may be subjected, but in no case less than 50 pounds per square inch gage.

(b) Fittings not covered by the standards listed in Table 56.60–1(b) may be used if they conform to paragraphs (c), (d), and (e) of this section and are approved for use by the Commandant. (See the definitions in § 56.07–5 (d), (e).) All nonstandard fittings shall be pressure tested by the fabricator following the requirements of § 56.97–5.

(c) Nonstandard special purpose fittings shall meet the requirements of § 56.30–35 or § 56.35–10 as appropriate.

(d) Fabricators of nonstandard pipe joining fittings which are of nonwelded construction may obtain acceptance of their products by following § 50.25–25 of this subchapter. Those which are welded shall follow the procedures of § 50.25–20 of this subchapter. All nonstandard pipe joining fittings of welded construction rated for pressure above 15 pounds per square inch shall be of suitable materials as described in § 56.60–1, shall be marked in accordance with an industry standard (MSS Standard SP–25), and shall comply with the following requirements:

(1) Sizes 3 inches and below and fabricated by welding:

(i) The longitudinal joints of welded fittings may be fabricated by either gas or arc welding.

(ii) The first fitting of each size from the production line and at least one fitting from each lot of 100 or fraction thereof shall be flattened cold until the opposite walls meet without the weld(s) developing any cracks.

(iii) One fitting of each size from each lot of 100 or fraction thereof shall be subjected to a hydrostatic pressure test which shall be not less than that required for a seamless drawn pipe of the same size and thickness produced from equivalent strength material, as determined by the appropriate pipe material specification.

(iv) If this fitting fails to meet the prescribed test in subdivision (ii) or (iii) of this subparagraph the entire lot of fittings shall be rejected.

(v) Each fitting shall be pressure tested as prescribed by § 56.97–5.

(2) Sizes above 3 inches and fabricated by welding:

(i) The longitudinal joints of welded pipe fittings shall be fabricated by arc welding.

(ii) For pressures exceeding 150 pounds per square inch, each fitting shall be radiographically examined as specified in Section VIII of the ASME Boiler and Pressure Vessel Code.

(iii) For pressures not exceeding 150 pounds per square inch, the first fitting of each size from the production line and at least one fitting of each size in each lot of 20 or fraction thereof shall be examined by radiography to insure that the welds are of acceptable quality.

(iv) One fitting of each size in each lot of 100 or fraction thereof shall be subjected to a hydrostatic pressure test which shall be not less than that required for a seamless drawn pipe of the same size and thickness produced from equivalent strength material as determined by the appropriate pipe material specification.

(v) If this fitting fails to meet the prescribed test in subdivisions (iii) or (iv) of this subparagraph, the entire lot of fittings shall be rejected.

(vi) Each fitting shall be pressure tested as prescribed by § 56.97–5.

(3) Welded joint: Single welded butt joints without the use of backing strip may be employed in the fabrication of pipe fittings of welded construction provided the radiographs indicate that complete penetration is obtained.

(e) (1) Nonstandard fluid conditioner fittings whose internal volume is greater than 1.5 cubic feet or whose internal diameter exceeds 6 inches and which are rated for temperatures or pressures exceeding those specified as minimums for Class I piping systems shall be subject to the requirements for pressure vessels of the appropriate class as found in Part 54 of this subchapter except that stamping and shop inspection are not required. See also § 50.25–35 of this subchapter.

(2) All other nonstandard fluid conditioner fittings shall meet the material requirements of Subpart 56.60, the pressure testing requirements of § 56.97–5 and shall be designed to withstand a burst pressure of four times the rated pressure marked on the component. Acceptable manufacturers of this size and rating of nonstandard fluid conditioner fittings will be listed in CG–190, Equipment Lists. Fabricators will follow the procedure in § 50.25–10 of this subchapter for qualifying for listing. Nonstandard fluid conditioner fittings fabricated by welding will not be listed and fabricators will follow the procedure of § 50.25–20 of this subchapter for acceptance.

(3) Heat exchangers having headers, and tubes are not considered piping system components and shall meet the requirements of Part 54 of this subchapter regardless of size. In the case of brazed boiler steam air heaters, see also § 56.30–30(b)(1).

(f) The requirements in paragraph (e)(1) of this section shall also apply to those nonstandard fluid conditioner fittings rated above 15 pounds per square inch gage without regard to size if the service involves liquids or gases classed as dangerous (refer to Subchapter N (Dangerous Cargoes) of this chapter).

Subpart 56.20—Valves

§ 56.20–1 General.

(a) Valves complying with the standards and specifications listed in § 56.60–1 may be used within the specified pressure temperature rating.

(b) Valves not complying with paragraph (a) of this section, such as valves of welded construction, shall be specifically approved by the Commandant for the service intended. Materials for such valves shall be as designated in Table 56.60–1(a) or 56.60–2(a). Testing shall comply with § 56.97–5.

(c) Acceptable manufacturers of valves will be listed in CG–190, Equipment Lists. Fabricators of valves of nonwelded construction will follow the procedure in § 50.25–10 of this subchapter for qualifying for listing. Fabricators of valves of welded construction will not be listed but may have their products accepted by following the procedures in § 50.25–20 of this subchapter.

§ 56.20–5 Marking (reproduces 107.2).

(a) Each valve shall bear the manufacturer's name or trademark and reference symbol to indicate the service conditions for which the manufacturer guarantees the valve. The marking shall be in accordance with MSS–SP–25.

§ 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.

§ 56.20–9 Valve construction.

(a) Outside screw and yoke design shall be used for valves 3 inches and larger for pressures above 600 pounds per square inch. All valves shall close with a right-hand (clockwise) motion of the handwheels when facing the end of the valve stem. Valves shall be of the rising-stem type preferably with the stem threads external to the valve body. Where operating conditions will not per-

mit such installations, the use of a nonrising stem valve will be permitted, provided indicators are fitted to show clearly whether the valve is opened or closed except as provided for in § 56.50–1(g)(2).

(b) Valves of Class I piping systems (for restrictions in other classes refer to sections on nuclear and low temperature service), having diameters exceeding 2 inches shall have bolted, pressure seal, or breech lock bonnets and flanged or welding ends, except that socket type welding ends shall not be used where the diameter exceeds 2 inches. For diameters not exceeding 2 inches, screwed union bonnet or bolted bonnet, or bonnetless valves of a type which will positively prevent the stem from screwing out of the body may be employed. Cast iron valves with screwed-in or screwed-over bonnets are prohibited. Union bonnet type cast iron valves shall have the bonnet ring made of steel, bronze, or malleable iron.

(c) Valves shall be designed for the maximum pressure to which they may be subjected, but in no case shall the design pressure be less than 50 pounds per square inch. When butterfly or wafer type resilient seated valves are used for shell connections, the valve bodies shall be designed for the maximum pressure to which they may be subjected, but in no case shall the design pressure be less than 50 pounds per square inch. (Refer also to § 56.20–15(b)(2)(ii)). Large fabricated ballast manifolds connecting lines exceeding 8 inches nominal pipe size shall be designed for a pressure of not less than 25 pounds per square inch.

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

(e) Plug cocks shall be constructed with satisfactory and positive means of preventing the plug from becoming loosened or removed from the body when the plug is operated. Cocks having plug locking arrangements depending on cotter pins are prohibited.

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

(g) Materials forming a portion of the pressure barrier shall comply with the applicable provisions of this part.

§ 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 shall comply with the design, material and construction specified for valves in this part.

(b) Valves employing resilient material shall be divided into two categories, Category A and Category B.

(1) *Category A valves.* (i) Category A valves are those valves employing resilient material that would continue to provide effective closure of the line and would not allow appreciable leakage from the valve if the resilient material were damaged or destroyed.

(ii) Category A valves may be used in any piping system except as positive shutoff valves required by § 56.50–60(d) for systems subject to internal head pressure from tanks containing flammable, combustible, or hazardous materials, or as otherwise exempted in the regulations in this subchapter.

(2) *Category B valves.* (i) Category B valves are those valves employing resilient material that would not provide effective closure of the line or would permit appreciable leakage from the valve if the resilient material were damaged or destroyed.

(ii) Category B valves may be used in any piping system except in any location in a firemain system; in any location in the bilge system; as the positive closure for any opening in the shell of the vessel; in a position serving as the positive shutoff valve required by § 56.50–60(d) for systems subject to internal head pressure from tanks containing flammable, combustible, or hazardous materials; or as otherwise exempted in the regulations in this subchapter.

§ 56.20–20 Valve bypasses.

(a) Sizes of bypasses shall be in accordance with MSS–SP–45.

(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.

(c) Bypasses may be integral or attached.

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

§ 56.25–5 Flanges.

(a) Flanges shall conform to the design requirements of the applicable standards of Table 56.60–1(b) or UA–47 of section VIII of the ASME Code. Plate flanges shall meet the material requirements of § 56.60–1(a) and the requirements of § 56.30–10(c)(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 126.1 of USAS–B31.1, as listed in Table 56.60–1(b) and the requirements of this subpart. For flange facing gasket combinations other than those specified above, calculations shall be submitted indicating that the gaskets will not result in a higher bolt loading or flange moment than for the acceptable configurations.

(b) Acceptable manufacturers of flanges will be listed in CG–190, Equipment Lists. Fabricators of flanges will follow the procedure in § 50.25–10 of this subchapter for qualifying for listing.

§ 56.25–7 Blanks.

(a) Blanks shall conform to the design requirements of 104.5.3 of USAS–B31.1.

§ 56.25–10 Flange facings.

(a) Flange facings shall be in accordance with the applicable standards listed in Table 56.60–1(b) and MSS–SP–6.

(b) When bolting 150–pound standard steel flanges to flat face cast iron flanges, the steel flange shall be furnished with a flat face, and bolting shall be in accordance with § 56.25–20. Steel flanges of 300–pound raised face standard may be bolted to 250–pound raised face cast iron with bolting in accordance with § 56.25–20(b).

§ 56.25–15 Gaskets (reproduces 108.4).

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

(b) Only metallic or asbestos-metallic gaskets may be used on flat or raised face flanges if the expected normal operating pressure exceeds 720 pounds per square inch or the temperature exceeds 750° F. However, compressed sheet asbestos confined gaskets are not limited as to pressures provided the gasket material is suitable for the temperatures.

(c) The use of metal or metal-asbestos gaskets is not limited as to pressure provided the gasket materials are suitable for the maximum fluid temperatures.

§ 56.25–20 Bolting.

(a) *General.* (1) Bolts, nuts, and washers shall comply with applicable standards and specifications listed in Table 126.1 of USAS–B31.1. Refer to § 56.60–1 for use of other materials. Unless otherwise specified, bolting shall be in accordance with USAS–B16.5.

(2) Bolts shall extend completely through the nuts.

(3) See § 58.30–15(b) 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 expected normal operating pressure does not exceed 300 pounds per square inch for water or 250 pounds per square inch for steam and the expected normal operating temperature does not exceed 450° F. Carbon steel bolts shall have USA Standard (USAS–B18.2) heavy hexagon heads and shall have USA Standard heavy semifinished hexagonal nuts. All carbon steel bolts and stud bolts shall have USAS–B1.1 coarse threads, Class 2A; and their nuts, Class 2B threads. When 250-pound cast iron flanges are used or when 125-pound cast iron flanges are used with ring gaskets, bolting material shall be carbon steel conforming to ASTM Specification A–307, Grade B.

(c) Alloy steel stud bolts shall be threaded full length, or, if desired, may have reduced shanks of a diameter not less than that at the root of the threads. They shall have USA Standard (USAS–B18.2) heavy semifinished hexagonal nuts. Headed alloy bolts are not to be used.

(d) All alloy bolts or bolt studs and accompanying nuts are recommended to be threaded in accordance with USA Standard B1.1, Class 2A external threads, and Class 2B internal threads (8-thread series 8UN for 1 inch and larger).

(e) (Reproduces 108.5.6.) Washers, when used under nuts, shall be of forged or rolled steel.

Subpart 56.30—Selection and Limitations of Piping Joints

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

(a) The selection and limitation of piping joints shall be as required by this subpart in lieu of requirements in 110 through 118 of USAS–B31.1; however certain requirements are marked "reproduced" in this subpart.

§ 56.30–3 Piping joints (reproduces 110).

The type of piping joint used shall be suitable for the design conditions and shall 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 shall be removed and the inside of the joint ground smooth, or

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

(3) Consumable insert rings shall be used. Commonly used types of butt welding end preparations are shown in USAS–B16.25.

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

(c) *Socket welds.* (1) Socket welds shall conform to the requirements specified in USAS–B16.11, applicable standards listed in Table 126.1 and Figure 127.4.4C in USAS–B31.1. A gap of approximately one-sixteenth inch between the end of the pipe and the bottom of the socket shall be provided before welding. This may best be provided by bottoming the pipe and backing off slightly prior to tacking.

(2) Socket welds shall not be used where severe erosion or crevice corrosion is expected to occur. Restrictions on the use of socket welds appear in § 56.70–15(d)(3) for Class I service, and in the low temperature and nuclear piping sections and should be checked when designing for these systems. See § 56.70–15(d)(4) for Class II service.

(3) (Reproduces 111.3.3.) Drains and bypasses may be attached to a valve or fitting by socket welding in accordance with the dimensions specified in the applicable standards listed in Table 126.1 of USAS–B31.1.

(d) *Fillet welds.* Fillet welds shall have minimum dimensions as shown in Figures 127.4.4A, 127.4.4B, and 127.4.4C of USAS–B31.1. See also § 56.70–15(d)(3) and (4) for applications of fillet welds.

(e) *Seal welds.* Seal welds may be used but shall 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, I–N, and I–L piping for nominal diameters exceeding 2 inches, except as otherwise specified in this subchapter.

(b) Flanges shall be attached to pipe by any method shown by Figure 56.30–10(b) or by any additional means that may be approved by the Commandant. Pressure temperature ratings of the appropriate USA Standard shall not be exceeded.

(1) *Figure 56.30–10(b), Method 1.* Flanges with screwed threads may be used in accordance with the Table in 56.30–20.

(2) *Figure 56.30–10(b), Method 2.* 150-pound and 300-pound low-hubbed flanges with screwed threads plus the addition of a strength fillet weld of the size as shown may be used for Class I piping without diameter limitation for temperatures not exceeding 750° F. The pressure shall not exceed the USA Standards service pressure temperature rating.

(3) *Figure 56.30–10(b), Method 3.* USAS–B16.5 slip-on flanges exceeding 4 inches nominal pipe size may be used in Class I or Class II systems not to exceed the service pressure-temperature ratings for the 300-pound and lower classes within the temperature limitations of the material selected for use. USAS–B16.5 slip-on flanges not exceeding 4 inches nominal pipe size may be used in Class I, Class II, or Class II–L systems not to exceed the service pressure-temperature ratings of USAS–B16.5 within the temperature limitations of the material selected for use. In sizes of 3 inches or more when the class of flange is higher than 300 pounds, and whenever full radiography is required by Table 56.95–10 for the class, diameter, and wall thickness of pipe being joined, the use of slip-on flanges is not permitted and a butt weld type connection must be provided. See also Figure 127.4.4(B)(b) of B31.1 utilizing a face and backweld. This configuration may be preferable in those applications where it is desirable to eliminate void spaces. For Class II piping systems the size of the strength fillet may be limited to a maximum of 0.525 inch instead of 1.4T and the distance from the face of the flange to the end of the pipe may be a maximum of three-eighths inch. Restrictions on the use of slip-on flanges appear in the low temperature and nuclear piping sections.

(4) *Figure 56.30–10(b), Method 4.* USAS–B16.5 socket welding flanges may be used in Classes I, II, or II–L systems not exceeding 3 inches nominal pipe size for the 600-pound and lower classes, and 2½ inches for the 900-pound and 1,500-pound classes within the service pressure-temperature ratings of the standard. In the 3-inch size, whenever full radiography is required by Table 56.95–10 for the class, diameter, and wall thickness of pipe being joined, the use of socket welding flanges is not permitted and a butt weld type connection must be provided. For Class II piping, socket welding flanges may be used without diameter limitation, and the size of the fillet weld may be limited to a maximum of 0.525 inch instead of 1.4T. Restrictions on the use of socket welds appear in the low temperature and nuclear piping systems and should be checked when designing for these systems.

(5) *Figure 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 pounds per square inch and temperatures not exceeding 450° F. Plate material listed in UCS–6(b) of section VIII of the ASME Code shall not be used in this application except that material meeting ASTM Specification A–36 may be used. The fabricated flanges shall conform at least to the USA Standard 150-pound flange dimensions. The size of the strength fillet weld may be limited to a maximum of 0.525 inch instead of 1.4T and the distance from the face of the flange to the end of the pipe may be a maximum of three-eighths inch.

(6) *Figure 56.30–10(b), Method 6.* Steel plate flanges meeting the material and construction requirements listed in subparagraph (5) of this paragraph may be used for Class II piping for pressures not exceeding 150 pounds per square inch or temperatures not exceeding 650° F. The flange shall be attached to the pipe as shown by Figure 56.30–10(b), Method 6. The pressure shall not exceed the USA Standard Service pressure temperature rating. The size of the strength fillet weld may be limited to a maximum of 0.525 inch instead of 1.4T and the distance from the face of the flange to the end of the pipe may be a maximum of three-eighths inch.

(7) *Figure 56.30–10(b), Method 7.* Lap joint flanges (Van Stone) may be used for Class I and Class II piping. The Van Stone equipment shall be operated by competent personnel. The ends of the pipe shall be heated from 1,650° to 1,900° F. dependent on the size of the pipe prior to the flanging operation. The foregoing temperatures shall be carefully adhered to in order to prevent excess scaling of the pipe. The extra thickness of metal built up in the end of the pipe during the forming operation shall be machined to restore the pipe to its original diameter. The machined surface shall be free from surface defects and the back of the Van Stone lap shall be machined to a fine tool finish to furnish a line contact with the mating surface on the flange for the full circumference as close as possible to the fillet of the flange. The number of heats to be used in forming a flange shall be determined by the size of the pipe and not more than two pushups

per heat are permitted. The width of the lap flange shall be at least three times the thickness of the pipe wall and the end of the pipe shall be properly stress relieved after the flanging operation is completed. Manufacturers desiring to produce this type of joint shall demonstrate to a marine inspector that they have the proper equipment and personnel to produce an acceptable joint.

(8) *Figure 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 shall be welded as indicated by Figure 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 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 56.30–10(b), Method 9.

(10) *Figure 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 56.30–10(b), Method 10, shall be used to attach the hub to the pipe. This type of flange is limited to a maximum pressure of 300 pounds per square inch at temperatures not exceeding 500° F.

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

(12) *Figure 56.30–10(b), Method 12.* High-hub bronze flanges may be used for temperatures not exceeding 425° F. The hub of the flange shall be bored to a depth not less than that required for a threaded connection of the same diameter leaving a shoulder for the pipe to butt against. A preinserted ring of silver brazing alloy having a melting point not less than 1,000° F. and of sufficient quantity to fill the annular clearance between the flange and the pipe shall be inserted in the groove. The pipe shall then be inserted in the flange and sufficient heat applied externally to melt the brazing alloy until it completely fills the clearance between the hub and the flange of the pipe. A suitable flux shall be applied to the surfaces to be joined to produce a satisfactory joint.

(13) *Figure 56.30–10(b), Method 13.* The type of flange as described for Figure 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 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 width of the flange shall be not less than three times the pipe wall thickness. In addition, the pipe shall be securely brazed to the wall of the flange.

(15) *Figure 56.30–10(b), Method 15.* The flange of the type described and illustrated by Figure 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.

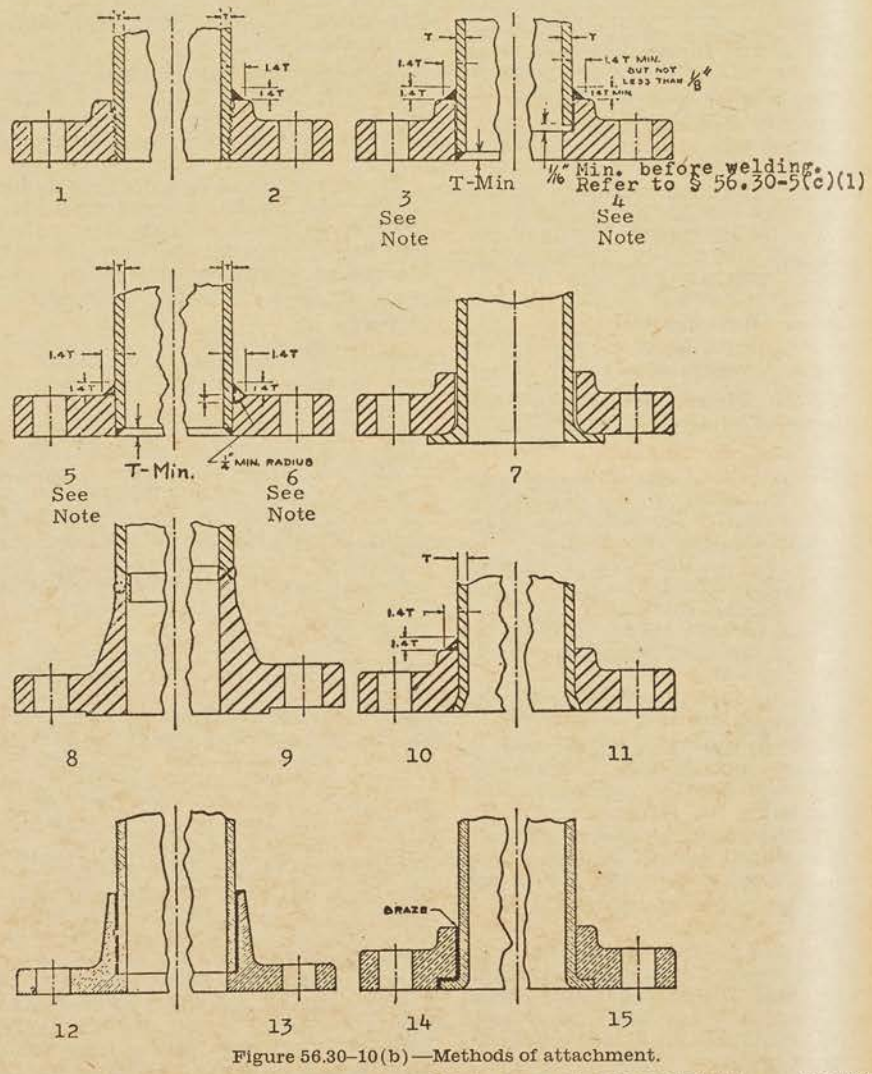


Figure 56.30–10(b)—Methods of attachment.

NOTE: T is nominal pipe wall thickness used. Refer to text in § 56.30–10(b) for modifications on Class II piping systems.

§ 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.

§ 56.30–20 Screwed joints.

(a) Screwed joints may be used within the limitations specified in Subpart 56.15 and within the other limitations specified in this section.

(b) (Reproduces 114.1.) All threads on piping components shall be taper pipe threads in accordance with the applicable standard listed in Table 126.1 of USAS–B31.1. 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) Screwed joints shall not be used where severe erosion, crevice corrosion, shock, or vibration is expected to occur, nor at temperatures over 925° F. Size limits shall be as in Table 56.30–20(c).

TABLE 56.30-20(c)—THREADED JOINTS [1]

Maximum nominal size, inches	Maximum pressure, p.s.i.g.
Above 2"	(Not permitted in Class I piping service.)
Above 1" up to 2"	600.
Above ¾" up to 1"	1,200.
¾" and below	1,500.

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

(d) Pipe with a wall thickness less than that of standard weight of USAS–B36.10 steel pipe shall not be threaded, regardless of service. For additional threading limitations for pipe used in steam service over 250 pounds per square inch or water service over 100 pounds per square inch and 200° F., see Part 104.1.2 (c)(1) of USAS–B31.1. Restrictions as to the use of screwed joints appear for low temperature and nuclear piping systems and should be checked when designing for these systems.

§ 56.30–25 Flared, flareless and compression joints.

(a) Flared, flareless and compression type tubing fittings may be used for tube sizes not exceeding 2-inch outside diameter within the limitations of applicable standards and specifications listed in Table 126.1 of USAS–B31.1 as modified by Tables 56.60–1(a) and 56.60–2(a) and as specified in this section.

(b) (Reproduces 115.1.) Fittings and their joints shall be compatible with the tubing with which they are to be used and shall conform to the range of wall thicknesses and method of assembly recommended by the manufacturer.

(c) (Reproduces 115.2.) Fittings shall be used at pressure-temperature ratings not exceeding the recommendations of the manufacturer. Service conditions, such as vibration and thermal cycling shall be considered in the application.

(d) Threads shall be either USA Standard taper pipe threads or Dryseal USA Standard taper pipe threads.

(e) In the absence of standards or specifications, the type of fitting selected shall be adequate and safe for the design conditions in accordance with the following requirements:

(1) The pressure design shall meet the requirements of 104.7 of USAS–B31.1.

(2) A suitable quantity of the type and size of fittings to be used shall be subjected to performance tests as approved by the Commandant to determine the safety of the joint under simulated service conditions. When vibration, fatigue, cyclic conditions, low temperature, thermal expansion, hydraulic shock, or assembly and disassembly are expected, the applicable conditions shall be incorporated in the test.

(f) Flareless fittings shall be of a design in which the gripping member or sleeve shall 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, or reducing the wall thickness. The gripping member shall also form a pressure seal against the fitting body.

(1) When using bite type fittings a spot check shall be made for adequate depth of bite and condition of tubing by disassembling and reassembling selected joints.

(2) Grip type fittings that are tightened in accordance with manufacturers' instructions need not be disassembled for checking. For flammable (§ 30.10–22 of this chapter) or combustible (§ 30.10–15 of this chapter) fluid service, flared fittings shall be used, except that both flared and flareless fittings of the nonbite type may be used when the tubing system is of steel, or nickel copper or copper nickel alloy. When using copper or copper-zinc alloys, flared fittings are required. See also §§ 56.50–70 and 56.50–75.

§ 56.30–27 Caulked joints.

(a) Caulked joint requirements in 118 of USAS–B31.1 do not apply to marine installations.

§ 56.30–30 Brazed joints.

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

(b) *Limitations.* (1) Brazed socket-type joints shall 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. When specifically approved by the Commandant, brazed construction may be used for service temperatures up to 525° F. in boiler steam air heaters provided the requirements of UB–12 of section VIII of the ASME Code are satisfied at the highest temperature desired.

(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 Sleeve coupled and other proprietary joints.

(a) Coupling type, mechanical gland type and other proprietary joints may be used in certain locations (see § 56.30–40(f) for limitations) where experience or tests have demonstrated that the joint is safe for the operating conditions, and where adequate provision is made to prevent separation of the joint. Use shall be authorized by the Commandant.

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

(a) This type of coupling is not suitable for use as a slip type expansion joint because the unit is designed to provide for angular deflection, and does not require the same degree of piping alignment as flanges and threaded couplings. This type of coupling although not designed for axial movement will provide a small amount (approximately ⅜-inch maximum) of such movement because of the elasticity present in the gaskets. To insure that the manufacturer's recommendation on the maximum axial displacement for each coupling is not exceeded, positive restraints affixed to ship's structure shall be included in each installation.

(b) Means should also be provided to prevent the coupling from "creeping" on the pipe and uncovering the joint. Centering rings, when included as part of the coupling, or angle clips welded to the pipe are considered adequate for this purpose. Couplings which have through bolts and a solid sleeve without a centering ring may have a certain number of these bolts elongated and connected to angle clips on one of the pipes. The number of such bolts should be one up to a 4-inch-diameter pipe, two on pipe 4 inches to 10 inches in diameter, and three on larger diameter pipe. Other positive means to prevent creep may be considered, such as machined grooves. Bite type devices are not considered to provide positive protection against creep.

(c) Couplings which employ a solid sleeve with welded attachments on both pipes will require the removal of one set of attachments before dismantling. Rewelding of the attachments may require gas freeing of the line.

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

(e) Fabricators of flexible couplings rated above 15 pounds per square inch gage may obtain acceptance of their products by following § 50.25–30 of this subchapter if not welded and § 50.25–20 of this subchapter if welded. Couplings rated below 15 pounds per square inch gage may be accepted if fabricators follow the procedures of § 50.25–10 of this subchapter if not welded and § 50.25–20 of this subchapter if welded.

(f) Flexible coupling installations shall not be used in cargo holds, deep tanks or in any other space which is not at all times readily accessible except that they may be used when the liquid being conveyed and the liquid in the space in which the joint is located are compatible. Where flexible couplings are not allowed joints shall be screwed, flanged and bolted, or welded.

(g) Damaged or deteriorated gaskets shall not be reinstalled.

(h) Each coupling shall 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., and for the primary piping of nuclear power systems shall be submitted for approval. Calcula-

tions shall be made in accordance with one of the recognized methods of stress analysis acceptable to the Commandant to determine the magnitude and direction of the forces and moments 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 shall be indicated in each run of pipe between anchor points.

(b) Special consideration will be given 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 additional nondestructive testing as specified by the Commandant, and where the calculations prescribed in 119.6.4 and 102.3.2 of USAS–B31.1 and § 56.07–10 are performed. The nondestructive testing procedures and method of stress analysis shall be approved by the Commandant prior to the submission of computations and drawings for approval.

§ 56.35–5 Piping anchors at junction points (modifies 120.2.3).

(a) Main junction points of piping subject to temperatures in excess of 450° F. which are not balance points shall be fitted with fixed anchors. If considered a balance point, the junction may be free to move in all directions or may be guided in selected directions. The chosen arrangement shall be included in the computations.

§ 56.35–10 Bellows expansion joints below 15 pounds per square inch (replaces 119.5.1).

(a) Fabricators of bellows type expansion joints rated for a pressure not exceeding 15 pounds per square inch may obtain acceptance of their products by following the procedures of § 50.25–10 of this subchapter if not welded and § 50.25–20 of this subchapter if welded.

§ 56.35–15 Bellows expansion joints above 15 pounds per square inch (replaces 119.5.1).

(a) *Acceptance.* Fabricators of bellows type expansion joints rated for pressures above 15 pounds per square inch gage may obtain acceptance of their products by following the procedures of § 50.25–30 of this subchapter if not welded and § 50.25–20 of this subchapter if welded.

(b) *Drawings and specifications.* Manufacturers desiring approval of a specific model or type of bellows type expansion joint for service above 15 pounds per square inch gage shall submit drawings in quadruplicate showing details of each joint, the material specifications, the total designed deflection, and the design and test pressure and temperature. In particular, details of the method(s) of affixing the flexible member (bellows) to the flanges or pipes is desired. If welding is employed, details of the procedure and materials employed shall be furnished.

(c) *Preapproval test.* The acceptability of bellows type expansion joints for service above 15 pounds per square inch gage is based upon a cyclic test of a prototype expansion joint indicating it will successfully withstand at least as many cycles, under the conditions of pressure, temperature, axial movement, rotational movement, and transverse movement, as will be encountered in an actual installation. The manufacturer shall submit a Certified Test Report for a prototype of the model or type joint under consideration detailing the test set up, the total number of corrugations, the deflection per corrugation, the internal test pressure and temperature, axial movement, rotational movement, transverse movement, the total cycles at failure, and the location of the failure.

(d) *Approval.* Upon receipt of the Certified Test Report described in paragraph (c) of this section, approval action will be taken. Approval will be granted for each model of expansion joint under consideration, with the approval specifically stating the model number, and nominal pipe size(s), by which the expansion joint may be readily identified. The approval will also state the maximum approved pressure, the corresponding maximum approved temperature, the maximum allowable deflection per corrugation, maximum axial movement, maximum rotational movement, maximum transverse movement, and whether of the self-equalizing or nonequalizing type.

(e) *Approval without submitting test data.* If approval of an entire line or a portion thereof is desired without submitting test data for each model and size, the following information is required:

(1) A detailed procedure for the design of the line of bellows-type expansion joints with total movement, movement per convolution, pressure, temperature, material, number of cycles to failure, and number of convolutions as variables.

(2) Sufficient test data to substantiate the design procedures along with details of the test procedure and mode of failure.

(3) A statement as to the statistical probability of survival of the bellows-type expansion joints under rated conditions. The design procedure shall contain the following provisions and information:

(i) A method of accounting for partial cycles such as those caused in a steam system when temperatures vary from the design maximum. A full cycle is considered to be from a cold plant to maximum temperature and back to a cold plant.

(ii) Listing of maximum total axial movement, maximum total lateral movement and maximum angular movement for each design as a function of size and number of convolutions.

(iii) Listing of maximum rated cold working pressure for each design as a function of size and number of convolutions.

(iv) A listing of unit axial force (pounds per inch), specific shear force (pounds per inch), and unit rotational moment (inch pounds per degree) at the bellows-flange joint for each design as a function of size and number of convolutions.

(v) Stress levels in the bellows if available. Representative drawings of all designs and sizes showing details of the bellows to flange weld shall also be submitted.

(f) *Expansion joints.* For expansion joints of nonmetallic materials see § 56.60–25(e) for specific requirements.

(g) *Testing expansion joints.* Expansion joints shall be tested in accordance with § 56.97–5.

§ 56.35–35 Other joints providing flexibility (replaces 119.5.1).

(a) The joint requirements in this section shall apply in lieu of those in 119.5.1 in USAS–B31.1.

(b) Joints of the ball, swivel and other types may be used if suitable for expected conditions of pressure, temperature, service, and cyclic life where permitted by the Commandant.

Subpart 56.50—Design Requirements Pertaining to Specific Systems

§ 56.50–1 General (replaces 122.6 through 122.10).

The piping requirements in this subpart shall apply in lieu of requirements in 122.6 through 122.10 of USAS–B31.1. Installation requirements 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 shall be maintained. Lead or other heat sensitive materials shall not be used in piping systems which make such bulkhead or deck penetrations where the deterioration of such systems in the event of fire would impair the integrity of the bulkheads or decks. (For plastic pipe installations, see § 56.60–25(a).) Where plate insert pads are used, bolted connections shall have threads tapped into the plate to a depth of not less than the diameter of the bolt. If welded, the pipe or flange shall be welded to both sides of the plating. Openings in structure through which pipes pass shall be reinforced where necessary. Flanges shall not be bolted to bulkheads so that the plate forms a part of the joint. 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 shall be fitted with screwdown valves operable from above the bulkhead deck and the valve shall be fitted inside the forepeak tank adjacent to the collision bulkhead. The pipe penetrating the collision bulkhead shall be welded to the bulkhead on both sides. On new installations or replacement in vessels of 150 gross tons and over, the valve body shall be of steel or ductile (nodular) cast iron.

(2) Passenger vessels shall not have the collision bulkhead pierced below the margin line by more than one pipe conveying liquids in the forepeak tank except that if the forepeak tank is divided to hold two different kinds of liquids, the collision bulkhead may be pierced below

the margin line by two pipes, provided there is no practical alternative to the fitting of the second pipe and further provided the safety of the vessel is maintained.

(c) Valves and cocks not forming part of a piping system are not permitted in watertight subdivision bulkheads.

(d) Piping shall not be run over or in the vicinity of switchboards or other electrical equipment if avoidable. When such leads are necessary, welded joints only shall be used and provision shall be made to prevent leakage from damaging the equipment.

(e) Stuffing boxes shall 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 shall be installed so that under no condition will the operation of safety or relief valves be impaired.

(g) (1) The use of power actuated valves in systems other than for cargo and fuel oil deep tanks as specified in § 56.50–60, is subject to special consideration by the Commandant. All power actuated valves required in an emergency to operate the vessel's machinery, to maintain its stability, and to operate the bilge and firemain systems shall also be provided with a manual means of operation.

(2) Remote valve controls which are not readily identifiable as to service shall be fitted with name plates. Remote valve controls shall always be accessible under service conditions and an indicator shall be fitted to show whether the valve is open or closed. However, valves installed in the cargo tanks of all vessels operated by reach rods are not required to be fitted with indicators. Valve control rods shall be adequately protected and only solid reach rods shall be used in tanks containing liquids, except that tank barges having plug cocks inside cargo tanks may have reach rods of extra heavy pipe with an annular space between the lubricant tube and the pipe wall sealed with a nonsoluble material to prevent penetration of the cargo.

(3) Where air operated remote control valves are installed, a self-indicating air cock and a pressure gage or other acceptable means shall be provided in the actuating line to the remote valve as close as possible to the control board to indicate whether the remote control valve is open or closed.

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

(i) Valves and cocks shall be located so as to be easily accessible and valves or cocks attached to the shell of the vessel or to sea chests located below the floorplating shall be operable from above the floorplates.

(j) When welded fabrication is employed, a sufficient number of detachable joints shall be provided to facilitate overhauling and maintenance of machinery and appurtenances. The joints shall be located so that adequate space is provided for welding, and the location of the welds shall be indicated on the plans.

(k) Piping, including valves, pipe fittings and flanges, conveying vapors, gases or liquids whose temperature exceeds 150° F., shall be suitably insulated where necessary to preclude injury to personnel.

(l) Where pipes are run through cargo spaces they shall be substantially encased to protect them from mechanical injury.

§ 56.50–5 Systems conveying oil.

(a) Pumps used to transfer oil shall have no discharge connections to firemains, boiler feed systems, or condensers unless approved positive means are provided to prevent oil from being accidentally discharged into any of the aforementioned systems.

(b) Oil piping shall not run through feed or potable tanks nor shall feed or potable water piping pass through oil tanks.

(c) Valves for fuel oil equalizing lines in machinery spaces shall comply with § 56.50–60. Where flooding equalizing cross-connections are required for stability considerations, the arrangement shall be approved by the Commandant.

(d) Piping conveying oil shall be run well away from hot surfaces wherever possible. Where such leads are unavoidable, welded joints only shall be used, or alternatively suitable shields shall be fitted in the way of flanged or mechanical pipe joints when welded joints are not practicable. Where piping, which conveys fuel oil or lube oil to equipment, passes within the proximity of equipment or lines having an open flame or having parts operating above 500° F., the piping must be of seamless steel. (Proximity shall include the distance covered by a jet from the line in question.) (See § 56.50–65.)

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

§ 56.50–10 Special gaging requirements.

(a) Where pressure reducing valves are employed (see 102.2.5(b) of USAS–B31.1) a pressure gage shall be provided on the low pressure side of the reducing station.

(b) Fuel oil service, fire, cargo and fuel oil transfer and boiler feed pumps shall be provided with a pressure gage on the discharge side of the pump. Additional information pertaining to fire pumps may be found in § 34.10–5 of Subchapter D (Tank Vessels), § 76.10–5 of Subchapter H (Passenger Vessels) and § 95.10–5 of Subchapter I (Cargo and Miscellaneous Vessels) 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 shall not be less than the lowest pressure setting of any drum safety valve. The value of allowable stress for the material shall not exceed that corresponding to the saturated steam temperature at drum pressure and shall be selected as described in § 56.07–10(e).

(b) Main superheater outlet piping systems, desuperheated piping systems, and other auxiliary superheated systems led directly from the boiler shall be designed for not less than the maximum pressure and temperature they may experience under normal operating conditions in service. This shall not be less than the pressure at which the superheater safety valve is set. The value of allowable stress for the material shall not exceed that corresponding to the steam temperature at the superheater outlet at normal rated operating conditions and shall be selected as described in § 56.07–10(e). In the case of a superheater safety valve which is drum pilot actuated, the design pressure of such piping systems shall not be less than the pressure setting of the actuator valve on the drum. Where it can be shown that the limitations set forth in 102.2.4 of USAS–B31.1 will not be exceeded, the design pressure of such piping systems may be reduced but shall not be less than the pressure setting of the actuator valve on the drum less the pressure drop through the superheater, including associated piping and a control desuperheater if fitted, at the normal rated operating condition. In both cases, the value of allowable stress shall be selected using a temperature not less than that of the steam at the superheater outlet at the normal rated operating conditions in accordance with § 56.07–10(e). Valves and fittings shall be selected for the above temperature and pressure from the accepted standards in Table 56.60–1(b), using the pressure-temperature rating in the standard.

(c) Steam stop valves in sizes exceeding 6 inches shall be fitted with bypasses for heating the line and equalizing the pressure before the valve is opened.

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

(e) Main and auxiliary steam stop valves shall be arranged to seat against boiler pressure.

(f) Where vessels are equipped with more than one boiler, the auxiliary steam piping shall be so arranged that steam for the whistle, steering gear, and electric-lighting plant may be supplied from any power boiler.

(g) Steam and exhaust pipes shall not be led through coal bunkers or dry cargo spaces unless approved by the Commandant.

(h) Steam piping with the exception of the steam heating system shall not be led through passageways, crew and passenger quarters, or public spaces unless the arrangement is approved by the Commandant. Steam pressure for space heating shall not exceed 45 pounds per square inch. High temperature hot water may be used for heating systems above this pressure, but not to exceed 375° F. Such systems should be designed as a complete unit and submitted for approval to the Commandant.

(i) (1) Where positive shutoff valves are fitted in exhaust lines of machinery,

and the exhaust side, including engine steam cylinders and chests, turbine casings, exhaust piping and shutoff valves is not designed for the maximum inlet pressure, a full capacity relief valve shall be fitted between the machinery exhaust and the shutoff valve. The relief valve shall be of sufficient capacity and set so as to prevent the equipment from being accidentally or otherwise subjected to a pressure in excess of its maximum allowable working pressure.

(2) A sentinel relief valve or other warning device fitted on the engine or turbine exhaust together with a back pressure trip device which will close the inlet valve when the exhaust side of the system is subjected to pressures exceeding the maximum allowable working pressure, may be substituted for the required relief valve.

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

§ 56.50–20 Pressure relief piping.

(a) *General.* There shall be no intervening stop valves between the vessel or piping system being protected and its protective device or devices.

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

(c) *Stop valves.* There shall be no intervening stop valve between the safety or relief valve and the point of discharge, except as specifically authorized by the Commandant in nuclear systems.

(d) *Reference.* See also § 50.07–10 (a) and (b) of this subchapter for specific requirements.

§ 56.50–25 Safety and relief valve escape piping.

(a) Escape piping from unfired steam generator, boiler, and superheater safety valves shall have an area of not less than that of the combined areas of the outlets of all valves discharging thereto and shall be led as near vertically as practicable to the atmosphere. Other arrangements may be permitted for nuclear systems when specifically authorized by the Commandant.

(b) Expansion joints or flexible pipe connections shall be fitted in escape piping. The piping shall be adequately supported and installed 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, shall be led below the floorplates or to a remote position to minimize the hazardous effect of the escaping steam.

(d) The effect of the escape piping on the operation of the relief device shall be considered. The back pressure in the escape piping from the main propulsion steam generator should not exceed 10 percent of the relief device setting unless a compensated relief device is used.

§ 56.50–30 Boiler feed piping.

(a) *General requirements.* (1) Steam vessels, and motor vessels fitted with steam driven electrical generators shall have at least two separate means of supplying feed water for the boilers. All feed pumps shall be fitted with the necessary connections for this purpose. The arrangement of feed pumps shall 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, shall 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), shall have a design pressure which exceeds the maximum allowable working pressure of the boiler by either 25 percent or 225 pounds per square inch whichever is less. The value of allowable stress for design purposes shall 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 shall have fresh water connections only. Care shall be taken to prevent the accidental contamination of feed water from salt water or oil systems.

(b) *Feed valves.* (1) Stop and stop-check valves shall be fitted in the main feed line and shall be attached as close as possible to the drum feed inlet nozzles or to the economizer feed inlet nozzles on boilers fitted with integral economizers.

(2) Where the installation will not permit the feed stop valve to be attached directly to the drum inlet nozzle on boilers not fitted with economizers, a distance piece may be installed between the stop valve and the inlet nozzle.

(3) Feed stop or stop-check valves may be located near the operating platform on boilers fitted with economizers provided the piping between the valves and the economizer, exclusive of the feed valves and the economizer inlet nozzles, is installed with a minimum of intervening flanged connections.

(4) Auxiliary feed lines shall be fitted with stop valves and stop-check valves. Boilers not having auxiliary feed water nozzles, or where independent auxiliary feed lines are not installed, shall have the auxiliary feed line to the drum or economizer connected to the main feed line as close as possible to the main feed stop valves; and the valves in the auxiliary feed line shall be fitted as close as possible to the junction point.

(5) Boilers fitted with economizers shall have a check valve fitted in the economizer discharge and located as close as possible to the drum feed inlet nozzle. When economizer bypasses are fitted, a stop-check valve shall be installed in lieu of the aforementioned check valve.

(6) A sentinel valve shall be fitted to an economizer when a valved bypass is installed.

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

(2) Feed water regulators designed with a built-in bypass for emergency use need not be fitted with an external bypass when installed in a feed system provided with an auxiliary feed line. All feed water regulators installed in a unit feed system shall be fitted with an external bypass. Feed water regulator bypasses shall be so arranged that the regular feed valves are in operation while the bypass is in use.

(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 shall be provided with pumps and piping as follows:

(1) Oceangoing and Great Lakes steam vessels, having a feed pump attached to the main propelling unit, shall be provided with at least one independently driven feed pump. Each of these pumps shall be used exclusively for feed purposes and shall 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, shall be provided for emergency use. This second pump may be used for other purposes.

(2) If two independently driven pumps are provided, each capable of supplying the boilers at their normal required operating capacity, and neither of which is used for other purposes, the third or emergency feed pump is not required. Where more than two independently driven feed pumps are provided, their aggregate capacity shall not be less than 200 percent of that demanded by the boilers at their required normal operating capacity.

(3) River or harbor steam vessels shall have at least two means for feeding the boilers; one of which shall 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 shall 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 shall have its own independently driven main feed pump capable of supplying the boiler at its normal operating capacity. In addition there shall be an auxiliary independently driven feed pump of the same capacity which 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 shall be provided for each boiler from its pumps. A separate auxiliary feed line is not required. The dis-

charge from each pump and the feed supply to each boiler shall be automatically controlled by the level of the water in that boiler. In addition to the automatic control, manual control shall be provided.

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

§ 56.50–35 Condensate pumps.

Two means shall be provided for discharging the condensate from the main condenser, one of which shall be mechanically independent of the main propelling machinery. If one of the independent feed pumps is fitted with a direct suction from the condenser and a discharge to the feed tank, it may be accepted as an independent condensate pump. On vessels operating on lakes (including Great Lakes), bays, sounds, or rivers, where provision is made to operate noncondensing, only one condensate unit will be required.

§ 56.50–40 Blowoff piping (replaces 102.2.5(d)).

(a) (1) The requirements for blowoff and drain piping in this section shall be followed in lieu of the requirements in 102.2.5(d) in USAS–B31.1.

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

(b) Blowoff piping external to the boiler shall 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 pounds per square inch, whichever is less. When the required blowoff piping design pressure exceeds 100 pounds per square inch gage, the wall thickness of the piping shall not be less than Schedule 80. The value of allowable stress for design purposes shall 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 shall be arranged so that the discharge is deflected downward.

(d) Valves such as the globe type so designed as to form pockets in which sediment may collect shall 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 shall be provided. The emergency means may consist of a connection from an independent power pump fitted between the main circulating pump and the condenser.

(b) Independent sea suctions shall 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.

(d) On vessels operating on lakes (including Great Lakes), bays, sounds, or rivers, where provision is made to operate noncondensing, only one circulating unit will be required.

§ 56.50–50 Bilge and ballast piping.

(a) (1) All vessels except unmanned barges shall be provided with a satisfactory bilge pumping plant capable of pumping from and draining any watertight compartment except for ballast, oil and water tanks which have acceptable means for filling and emptying independent of the bilge system. The bilge pumping system shall be capable of operation under all practicable conditions after a casualty whether the ship is upright or listed. For this purpose wing suctions will generally be necessary except in narrow compartments at the ends of the vessel where one suction may be sufficient. In compartments of unusual form, additional suctions may be required.

(2) Arrangements shall be made whereby water in the compartments will drain to the suction pipes. Efficient means shall be provided for draining water from all tank tops, other watertight flats and insulated holds. Peak tanks, chain lockers and decks over peak tanks may be drained by eductors, ejectors, or hand pumps. Where piping is led through the forepeak, see § 56.50–1(b).

(3) Where drainage from particular compartments is considered undesirable, the provisions for such drainage may be omitted, provided it can be shown by calculations that the safety of the vessel will not be impaired.

(b) Passenger vessels shall 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 (measured at right angles to the centerline at the level of the deepest subdivision loadline or deepest loadline where a subdivision loadline is not assigned) or is in a ductkeel, a nonreturn valve shall be fitted to the end of the pipe in the compartment which it serves.

(c) (1) Bilge suctions shall be led from manifolds. Such manifolds shall, insofar as practicable, be located in, or be capable of remote operation from, the same space as the bilge pump which normally takes suction on that manifold. In either case the manifolds shall be capable of being locally controlled from above the floorplates, and shall be easily accessible at all times. Except as otherwise permitted by paragraph (h) of this section for Great Lakes cargo vessels employing a common bilge and ballast system for the cargo spaces, bilge manifold valves controlling bilge suctions from various compartments shall be of the stop-check type.

(2) Passenger vessels engaged on international voyages shall have the manifolds and valves in the bilge pumping system so arranged that in the event of flooding, one of the bilge pumps can take suction from any compartment; and in addition, damage to a pump or its pipe connecting to the bilge main outboard of a line drawn at one-fifth of the beam of the vessel shall not render the bilge system inoperative.

(3) If a bilge system common to all pumps is installed on passenger vessels engaged on international voyages, the necessary valves for controlling the bilge suctions shall be operable from above the bulkhead deck. If, in addition to the main bilge pumping system, an emergency bilge pumping system is installed, it shall be independent of the main system and so arranged that a pump is capable of operating on any compartment under flooding conditions. In such cases, only the valves necessary for the operation of the emergency bilge system need be capable of being operated from above the bulkhead deck.

(d) The internal diameter of bilge suction pipes including strainers shall be determined by formulas (1) and (2), except that the nearest commercial size not more than one-fourth inch under the required diameter may be used. Bilge suction pipes shall be suitably faired to pump inlets.

(1) For suctions to each main bilge pump:

$$d=1+\sqrt{\frac{L\,(B+D)}{2500}} \qquad (1)$$

(2) For branch suctions to cargo and machinery spaces:

$$d=1+\sqrt{\frac{c\,(B+D)}{1500}} \qquad (2)$$

where:

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

NOTE 1: For tankers "L" may be reduced by the combined length of the cargo oil tanks.

NOTE 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.

(3) For vessels of 150 gross tons and over, no main suction piping shall be less than 2½ inches internal diameter. Branch piping need not be more than 4 inches and shall not be less than 2 inches in diameter except for drainage of small pockets or spaces in which case 1½-inch diameter may be used. For vessels less than 150 gross tons no bilge suction shall be less than 1½ inches internal diameter and no branch piping shall 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) of this paragraph are not mandatory, but in no case shall 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 shall be determined when the piping plans are submitted for

approval and shall be based upon the size of the compartments and the drainage arrangements.

(e) *Independent bilge suction.* One of the independent bilge pumps shall have a suction of a diameter not less than that given by Formula (2) in paragraph (d) of this section 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 shall 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 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 shall be located on each side of the compartment. If watertight bulkheads separate the engine and boiler rooms, a direct suction or suctions shall 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 shall be fitted with direct suction in its compartment.

(f) *Emergency bilge suctions.* In addition to the independent bilge suction(s) required by paragraph (e) of this section, an emergency bilge suction shall be provided in the machinery space for all self-propelled vessels except as described in the following subparagraphs. Emergency suctions shall be provided from pumps other than those required by § 56.50–55(a). Such suctions shall have nonreturn valves, and shall 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 shall not be less than two-thirds the diameter of the main sea injection. When it can be shown to the satisfaction of the Commandant that the main circulating pump is not suitable for emergency bilge service, a direct emergency bilge suction is to be led from the largest available independent power driven pump to the drainage level of the machinery space. The suction is to be of the same diameter as the main inlet of the pump used and the capacity of the pump shall exceed that of a required main bilge pump.

(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 except that a required bilge pump may not be used. The area of the suction pipe is to be equal to the full suction inlet of the pump. The discharge capacity of the pump selected shall exceed the capacity of the required main bilge 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, shall 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 shall 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 shall comply with the requirements of subparagraphs (1) and (2) of this paragraph.

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

(h) Pipes for draining cargo or machinery spaces shall be separate from pipes which are used for filling or emptying spaces where water or oil is carried. Bilge and ballast pumping systems shall be so arranged as to prevent oil or water from the sea or ballast spaces from passing into cargo or machinery spaces, or from passing from one compartment to another, whether from the sea, water ballast or oil tanks. The bilge and ballast mains shall be fitted with separate control valves at the pumps. The requirements of this paragraph do not apply to bilge and ballast systems on Great Lakes cargo vessels which may employ a common line for the bilge and ballast system for the cargo spaces.

(i) Ballast piping shall 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, shall be provided.

(j) When dry cargo is to be carried in deep tanks, arrangement shall be made for disconnecting or blanking-off the oil and ballast lines, and the bilge suctions shall be disconnected or blanked-off when oil or ballast is carried. Blind flanges or reversible pipe fittings may be employed for this purpose.

(k) Where bilge or ballast piping are led through deep tanks, means shall be provided to prevent the flooding of the compartments being served in the event of pipe leakage within the tanks. Such means may consist of an oiltight or watertight pipe tunnel, or the lines may be of Schedule 80 pipe thickness, fitted with expansion bends, and all joints within the tanks shall be welded. Where a pipe tunnel is installed, the watertight integrity of the bulkheads shall be maintained and if the tunnel is not of sufficient size to afford easy access, no valve or fitting shall be located therein. Bilge lines led through deep tanks without a pipe tunnel shall be fitted with nonreturn valves at the bilge suctions.

(l) When bilge pumps are utilized for other services, the piping shall 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, shall be of steel or other acceptable material.

(n) Oily water separators, if installed as a means of meeting the requirements of § 74.15–10 of Subchapter H (Passenger Vessels), § 93.13–10 of Subchapter I (Cargo and Miscellaneous Vessels), or § 35.01–40 of Subchapter D (Tank Vessels) of this chapter, shall be of sufficient capacity to provide acceptable separation under the least favorable anticipated service conditions. Vessels which require liquid ballast in oil tanks and which do not have an approved oily water separator shall have suitable hose connections to facilitate discharge to a sludge barge or shore facilities when in port.

§ 56.50–55 Bilge pumps.

(a) *Self-propelled vessels.* (1) All self-propelled vessels shall be provided with power pumps connected to the bilge main as required in Table 56.50–55 (a).

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

Vessel length, in feet	Passenger vessels [1]			Dry cargo vessel [2]		Tank vessels,
	International voyage [3]	Ocean, coastwise, and Great Lakes	All other waters	Ocean, coastwise, and Great Lakes	All other waters	All waters
180′ or more	3 [4]	3 [4]	2	3	2	2
Below 180′ and exceeding 65′	3 [4]	2 [5]	2 [5]	2 [5]	2 [5]	2
65′ or less	3	1	1	1	1	1

[1] Small passenger vessels under 100 gross tons refer to Subpart 182.25 of Subchapter T (Small Passenger Vessels of this chapter.

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

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

[4] When the criterion numeral exceeds 30, an additional independent power-driven bilge pump is required (See Part 73 Subchapter H (Passenger Vessels) of this chapter, for determination of criterion numeral.)

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

(2) On passenger vessels 300 feet or more in length engaged in international voyages, and on all other passenger vessels engaged in international voyages having a criterion numeral of 30 or more, one of the power bilge pumps shall be available at all times for use under emergency conditions in which a vessel may be flooded at sea. One of the following installations will be considered as complying with the requirements of this paragraph:

(i) One of the required bilge pumps is an emergency pump of a reliable submersible type, the source of power for which shall be located above the bulkhead deck; or,

(ii) The bilge pumps and their sources of power are located throughout the ship so that under any condition of flooding which the vessel is required to withstand, at least one pump will be available in an undamaged compartment.

(3) One of the required power bilge pumps may be attached to the propelling engine.

(4) The bilges forward of the cargo on tankships may be drained by a power or hand pumps, siphons, or eductors. If siphons or eductors are employed, they shall be permanently installed in each compartment.

(5) On Great Lakes cargo vessels which do not employ a common bilge and ballast main, the pumps used for bilge suction are not required to be connected to a bilge main.

(b) *Nonself-propelled vessels.* (1) Oceangoing sailing vessels and barges shall be provided with pumps connected to the bilge main as required in Table 56.50-55(b)(1).

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

Type of vessel	Waters navigated	Power pumps [1]	Hand pumps
Sailing	Ocean and coastwise.	Two	[2]
Manned barges	do	Two	[2]
Unmanned barges	All waters	[3]	[3]

[1] Where power is always available, independent power bilge pumps shall be installed as required and shall be connected to the bilge main.

[2] Efficient hand pumps connected to the bilge main may be substituted for the power pumps. Where there is no common bilge main, one hand pump will be required for each compartment.

[3] Suitable hand or power pumps or siphons, portable or fixed, carried either on board the barge or on the towing vessel shall be provided.

(2) The pumps and source of power for operation on oceangoing sailing vessels and barges shall be located above the bulkhead deck or at the highest convenient level which is always accessible.

(c) *Capacity of independent power bilge pump.* Each power bilge pump shall have a capacity of developing a suction velocity of not less than 400 feet per minute through the bilge suction pipe required by § 56.50-50 under ordinary conditions, except that for vessels of less than 65 feet in length not engaged on international voyages the pump shall have a minimum capacity of 25 gallons per minute and need not meet the velocity requirements of this paragraph.

(d) *Priming.* Suitable means shall 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 shall be distributed throughout these compartments. When the location of bilge pumps in separate watertight compartments is not possible, the Commandant will consider alternate arrangements of the bilge pumps.

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

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

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

§ 56.50-60 Cargo oil systems and fuel oil systems for boilers and internal combustion engines; transfer systems, and general arrangement.

(a) Oil-piping systems for the transfer or discharge of cargo or fuel oil shall be separate from other piping systems as far as practicable, and positive means shall be provided to prevent dangerous interconnection in service.

(b) When it is necessary to heat the oil to facilitate its transfer, heating coils shall be properly installed in the tanks. The drains from the heating coils as well as the steam drains from oil heaters in the service system shall be run to an open inspection tank or other suitable oil detector before being returned to the feed system.

(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 tanks to which they are connected and from which the oil can be distributed to the various tanks through the piping system. The end of filling pipes shall be fitted with a shutoff valve which shall be kept closed when not in use. Alternate arrangements where gravity systems for filling are employed will be given special consideration by the Commandant.

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

(1) Valves installed on the outside of the oil tanks shall be made of steel, nodular cast iron ASTM A-395 or A-445, or a ductile nonferrous alloy having a melting point above 1,700° F. and shall be arranged for local manual control at the valve and from a readily accessible and safe location outside of the compartment in which the valves are located.

(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 shall be located in the space where the system exits from the tank or adjacent tanks. Valves for local control outside the tanks shall be made of steel, nodular cast iron ASTM A-395 or A-445, or a ductile nonferrous alloy having a melting point above 1,700° F.

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

(i) The valve actuators shall be capable of closing the valve under all conditions except physical interruption of the power system (i.e., cable breakage, tubing rupture, etc.). This will require that all power actuated valves other than those opened against spring pressure shall be provided with an energy storage system which is protected from fire and collision as far as practicable. The storage system shall be used for no other purpose and shall have sufficient capacity to cycle all connected valves once (i.e., from the initial valve position to the opposite and return). The cross connection of this system to an alternate power supply will be given special consideration by the Commandant.

(ii) The valve shall 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 actuators shall not void the ability of the other actuator to close the valve.

(iv) The valve shall 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, shall be protected from casual use by means of covers, locking devices, or other suitable means. Instructions and warnings regarding the emergency system shall be conspicuously posted at the valve.

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

(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 shall be fitted with a cap or a plug to prevent leakage. Test cocks shall not be fitted to fuel or cargo oil tanks.

§ 56.50-65 Boiler fuel oil service systems.

(a) All discharge piping from the fuel oil service pumps to boiler burners shall be seamless steel with a thickness of at least Schedule 80. If required by § 56.07-10(e) or 104.1.2 of USAS-B31.1, the thickness shall be greater than Schedule

80. Short lengths of steel, or annealed copper nickel, nickel copper, or copper pipe and tubing may be used between the fuel oil boiler front header manifold and the atomizer head to provide flexibility. All material used shall meet the requirements of Subpart 56.60. The use of nonmetallic materials is prohibited. The thickness of the short lengths shall not be less than the larger of 0.035 inch or that required by § 56.07–10(e). Flexible metallic tubing may be considered for such application when approved by the Commandant. Tubing fittings shall be of 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 propulsion boiler(s) shall 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. At least two fuel oil heaters of approximately equal capacity shall be installed and so arranged that any heater may be overhauled while the other(s) is (are) in service. Suction and discharge strainers shall be of the duplex or other type capable of being cleaned without interrupting the oil supply and discharge strainers shall be located so as to preclude the possibility of spraying oil on the boiler casing or shall be provided with spray shields. Coamings, drip pans, etc., shall be fitted under fuel oil service pumps, heaters, etc., where necessary to prevent oil drainage to the bilge.

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

(3) Boilers burning fuel oils of low viscosity need not be equipped with fuel oil heaters, provided acceptable evidence is furnished to indicate that satisfactory combustion will be obtained without the use of heaters.

(c) Piping between service pumps and burners shall be located so as to be readily observable, and all bolted flange joints shall be provided with a wrap around deflector to deflect spray in case of a leak. The relief valve located at the pump and the relief valves fitted to the fuel oil heaters shall discharge back into the settling tank or the suction side of the pump. The return line from the burners shall be so arranged that the suction piping cannot be subjected to discharge pressure.

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

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

(f) Boiler header valves of the quick closing type shall 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) Fuel oil service pumps shall be equipped with controls to comply with § 58.01–25(a) of this subchapter.

§ 56.50–70 Gasoline fuel systems.

(a) *Material.* (1) Fuel supply piping to the engines shall 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) Tubing wall thicknesses shall not be less than the larger of that shown in Table 56.50–70(a), or as required by § 56.07–10(e) and 104.1.2 of USAS–B31.1.

(3) Tubing fittings shall 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 shall be cut square and flared by suitable tools. Tube ends shall be annealed before flaring. Pipe fittings shall be of nonferrous material. Pipe thread joints shall be made tight with a suitable compound.

(4) Valves for fuel lines shall 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 56.50–70(a)—TUBING WALL THICKNESS

Outside diameter of tubing, in inches	Thickness	
	B.W.G.	Inch
⅛, 3/16, ¼	#20	0.035
5/16, ⅜	#20	.035
7/16, ½	#19	.042

(b) *Installation.*—(1) All fuel pipes, pipe connections, and accessories shall be readily accessible. The piping shall run in sight wherever practicable, protected against mechanical injury, and effectively secured against excessive movement and vibration by the use of soft nonferrous metal liners or straps without sharp edges. Where passing through steel decks or bulkheads, fuel lines shall 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 shall be installed in the fuel supply line at or near the engine to prevent damage by vibration. If nonmetallic flexible hose is used it shall meet the requirements of § 56.60–25(c) for fuel service. Flexible hose connections should maintain metallic contact between the sections of the fuel supply lines; however, if such contact is not maintained, the fuel tank shall be grounded.

(3) Valves in fuel lines shall be installed to close against the flow.

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

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

(d) *Strainers.* A suitable twin strainer shall be fitted in the fuel supply line in the engine compartment. Strainers shall be of the type opening on top for cleaning screens. A drip pan shall be fitted under the strainer.

(e) *Outlets and drains.* Outlets in fuel lines for drawing gasoline for any purpose are prohibited. Valved openings in the bottom of fuel tanks are prohibited; however, openings fitted with threaded plug or cap may be used for cleaning purposes.

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

(g) *Filling and sounding pipes.* Filling and sounding pipes shall be so arranged that vapors or possible overflow when filling cannot escape to the inside of the vessel but will discharge overboard. Such pipes shall terminate on the weather deck clear of any coamings and shall be fitted with suitable shutoff valves or deck plugs. Filling and sounding pipes shall extend to within one-half of their diameter from the bottom of the tank or from the surface of the striking plate in case of a sounding pipe. A flame screen of noncorrodible wire mesh shall be fitted in the throat of the filling pipe. Sounding pipes shall be kept closed at all times except during sounding.

(h) *Vent pipes.* Each tank shall be fitted with a vent, the cross-sectional area of which shall not be less than that of the filling pipe. The vent pipes shall 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 shall terminate with U-bends and shall be fitted with flame screens or flame arresters. The flame screens shall 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 pumps.* Fuel pumps shall be equipped with controls to comply with § 58.01–25(a) of this subchapter.

§ 56.50–75 Diesel fuel systems.

(a) *Vessels greater than 100 gross tons.* (1) The diesel fuel system shall comply with §§ 56.50–60, 56.50–85, and 56.50–90. The fuel supply piping to engines shall 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 or unit pumps shall be equipped with controls to

comply with § 58.01–25(a) of this subchapter.

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

(3) Tubing connections and fittings shall 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 shall be cut square and flared by suitable tools. Tube ends shall be annealed before flaring.

(b) *Vessels of 100 gross tons and less and tank barges.* (1) *Materials.* Fuel supply piping shall be of copper, nickel copper or copper nickel having a minimum wall thickness of 0.035 inch except that piping of other materials such as seamless steel pipe or tubing which provides equivalent safety may be used.

(2) *Tubing connections and fittings.* Tubing connections shall comply with the provisions of § 56.50–75(a)(3).

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

(4) *Shutoff valves.* Shutoff valves shall 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 shall 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 on motorboats and motor vessels of less than 100 gross tons and tank barges shall terminate on an open deck and shall be fitted with suitable shutoff valves, deck plugs, or caps.

(7) *Vent pipes.* Each tank shall 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 system.

(a) The lubricating oil system shall be designed to function satisfactorily when the vessel has a permanent 15° list and a permanent 5° trim.

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

(c) Oil coolers on steam driven machinery shall 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 shall be met, but they do not apply to vessels in river and harbor service, nor to any vessel below 300 gross tons. Where the size and design of an engine is such that lubrication before starting is not necessary and an attached pump is normally used, the independent auxiliary pump is not required if a duplicate of the attached pump is carried as a spare. In meeting the requirements of paragraph (c) of this section in the case of internal combustion engines, two separate means are to be provided for circulating coolant on those engines on which oil coolers are fitted. 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. Where the design of an engine will not readily accommodate an independent pump connection, the independent auxiliary pump will not be required if a duplicate of the attached pump is carried as a spare. Oil filters shall be provided on all internal combustion engine installations. On main propulsion engines which are fitted with full-flow type filters, the arrangement shall 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 a single main propulsion engine.

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

(f) Diesel engine lubrication systems shall 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 shall be arranged to shut down automatically upon failure of the lubricating system.

(h) Piping subject to internal head pressure from lube oil in a storage tank shall be fitted with a positive shutoff valve of steel, nodular iron, or a ductile nonferrous alloy having a melting point above 1,700° F. located at the tank.

§ 56.50–85 Tank vent piping.

(a) This section applies to vents for spaces in which liquid is carried as fuel, ship stores, cargo or ballast.

(1) The structural arrangement in double bottom and other tanks shall be such as to permit the free passage of air and gases from all parts of the tanks to vent pipes. Tanks in nuclear systems shall be provided with means for preventing uncontrolled release of hazardous amounts of radioactive materials.

(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 shall be fitted with at least two vent pipes. The vents shall be located so as to provide venting of the tanks under any service condition.

(3) Vent pipes for fuel oil tanks shall, wherever possible, have a slope of no less than 30°. Header lines, where both ends are adequately drained to a tank, are excluded from this requirement.

(4) Vents of fresh water tanks shall extend above the weather deck unless they terminate within the machinery space, in which case they shall terminate well above the deep loadline. Vents from ballast and fuel oil tanks shall extend above the weather deck and the vents from oil tanks shall terminate not less than 3 feet from any opening into living quarters.

(5) Vents from fuel oil and other tanks extending above the freeboard or superstructure deck shall be of substantial construction. Except for barges in inland service and on Great Lakes vessels, the height from the deck to the opening at the inside of the return bend shall be at least 30 inches on the freeboard deck, and 18 inches on the superstructure deck. On Great Lakes vessels the height from the deck to the opening shall be, when practical, at least 24 inches on the freeboard deck, and 12 inches on the superstructure deck. Where height of vent pipes on Great Lakes vessels may interfere with the working of the vessel a lower height may be approved provided the vent cap is properly protected. Barges in inland service need provide a height of not less than 6 inches. A lesser amount may be approved if evidence is provided to the Commandant that a particular vent has proven satisfactory in service.

(6) Satisfactory means, permanently attached, shall 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 shall 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.

(ii) A hinged closure, either manual or automatic, normally open on the outlet of the return bend, which may be closed either by hand or by the force of a submerging wave.

(iii) Wooden plugs which may be inserted in the vent opening by hand during heavy weather and be removed when no longer needed.

(iv) Canvas hoods which may be installed over the vent opening and secured by line during heavy weather.

(v) Other suitable devices acceptable to the Commandant.

(7) Vent outlets from oil tanks shall 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 nor more than 1½ inches apart. The clear area through the mesh shall not be less than the internal unobstructed area of the required pipe.

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

(9) The diameter of each vent pipe shall not be less than 1½ inches for fresh water tanks, 2 inches for water ballast tanks and 2½ inches for fuel oil tanks.

(10) Where tanks may be filled by a pressure head exceeding that for which the tank is designed, the aggregate area of the vents in each tank shall be at least equal to the area of the filling line unless the tanks are protected by over-

flows, in which case the area of the overflow shall not be less than that of the filling line.

(11) Where deep tanks are intended for the occasional carriage of dry or liquid cargo, a "spectacle" or ring and blank flange may be fitted in the overflow pipe so arranged as not to interfere with venting when the tanks contain oil.

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

§ 56.50–90 Sounding devices.

(a) All tanks shall be provided with a suitable means of determining liquid level. In lieu of sounding pipes, tanks for the carriage of Grade E or lower liquids which are separate from the hull may be provided with a reliable liquid level indicating device. Where such devices are attached to a tank containing combustible liquids, they shall be of a heat resistant material adequately protected from mechanical damage and shall be provided at the tank connections with devices which will automatically close in the event of rupture of the gage or gage lines. Except for main cargo tanks on tank vessels, all integral hull tanks and compartments, which are not at all times accessible under service conditions shall be fitted with sounding pipes.

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

(c) The upper ends of sounding pipes terminating at the weather deck shall be closed by a screw cap or plug. Great Lakes dry cargo carriers may have the sounding pipes which service ballast water tanks terminate at least 4 inches above the deck if closure is provided by a tight fitting hinged cover making metal-to-metal contact with the hinge on the forward side. Positive means to secure these caps in the closed position shall be provided. No perforations or openings will be permitted throughout the length of a sounding pipe where fitted to oil tanks. Provision shall be made to prevent damage to the vessels' plating by the striking of the sounding rod.

§ 56.50–95 Overboard discharges and shell connections.

(a) (1) All inlets and discharges led through the vessel's side shall be fitted with efficient and accessible means for preventing the accidental admission of water into the vessel either through such pipes or in the event of fracture of such pipes.

(2) The number of scuppers, sanitary discharges, tank overflows, and other similar openings in the vessel's side shall 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 shall be taken as the freeboard deck.

(b) (1) Scuppers and discharge pipes originating at any level and penetrating the shell either more than 17½ inches (450 mm.) below the freeboard deck or less than 23½ inches (600 mm.) above the summer load waterline shall be provided with an automatic nonreturn valve at the shell. This valve, unless required by subparagraph (2) of this paragraph may be omitted if the piping is not less than Schedule 80 in wall thickness through 8 inches nominal pipe size, Schedule 60 for nominal pipe sizes above 8 inches and below 16 inches, and Schedule 40 for pipe sizes above 16 inches.

(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 (Load Lines) of this chapter, shall be fitted with efficient and accessible means for preventing water from passing inboard. Normally each separate discharge shall 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 shall be readily accessible and provided with an indicator showing whether the valve is open or closed. A suitable arrangement shall be made to insure the valve is not closed by unauthorized persons, and a notice shall be posted in a conspicuous place at the operating station to the effect that the valve shall 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 (Load Lines) of this chapter, they shall be led overboard. Refer to subparagraph (1) of this paragraph for any nonreturn valve requirement.

(c) Overflow pipes which discharge through the vessel's side shall be located as far above the deepest load line as practicable and shall be fitted with valves as required by paragraph (b) of this section. Two automatic nonreturn valves shall always 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 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 shall 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. Such controls shall be readily accessible and shall be provided with indication showing whether the valve is open or closed. However, sanitary pump discharges leading directly overboard or via a holding tank, shall satisfy paragraph (b) of this section. The location of the sanitary system openings within the vessel will determine whether paragraph (b) (2) or (3) of this section must be met.

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

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

(2) Seachests and other hull fittings shall be of substantial construction and as short as possible. They shall be located 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, shall be not less than that of Schedule 80 through 8 inches nominal pipe size, Schedule 60 for nominal pipe sizes above 8 inches and below 16 inches, and Schedule 40 for nominal pipe sizes above 16 inches.

(f) Valves required by this section and piping system components outboard of such required valves on new vessel installations or replacements in vessels of 150 gross tons and over shall be of a steel, bronze, or nodular cast iron specification listed in Table 56.60–1(a). Lead or other heat sensitive materials having a melting point of 1,700° F. or less shall not be used in such service, or in any other application where the deterioration of the piping system in the event of fire would give rise to danger of flooding. Brittle materials such as cast iron shall not be used in such service. Where non-metallic 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 shall 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 shall be fitted in the chute in an easily accessible position above the deepest load line. Means shall 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 boilerroom have the inboard openings below the deepest load line, they shall be fitted with efficient means for preventing the accidental admission of water. The thickness of pipe for ash-ejector discharge shall 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 shall be located outside the cargo tanks. These valves shall meet the material requirements of paragraph (f) of this section. The piping led through such tanks shall be fitted with expansion bends where required, and shall be of steel pipe having a wall thickness of not less than five-eighths inch, except that the use of suitable corrosion-resistant material of lesser thickness will be given special consideration by the Commandant. All pipe joints within the tanks shall be welded. Soil lines and sanitary drains which pass through cargo tanks shall be provided with nonreturn valves with positive means of closing or other suitable means for preventing the entrance of gases into living quarters.

§ 56.50–96 Keel cooler installations.

(a) Keel cooler installations shall meet the requirements of §§ 56.50–95 (d) (1) and (2), and (e) (3), 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 in such systems are above 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 is faired to the hull with a slope no greater than 4 to 1.

§ 56.50–97 Instrument, control and sampling piping (modifies 122.3).

(a) Instrument, control and sampling piping shall comply with 122.3 of USAS–B31.1 except that soldered type fittings may not be used.

§ 56.50–100 Fluid power and control systems (hydraulic and pneumatic).

(a) Requirements for fluid power and fluid control systems are in Subpart 58.30 of this subchapter.

§ 56.50–101 Refrigeration systems.

(a) Requirements for refrigeration systems are in Subpart 58.20 of this subchapter.

§ 56.50–102 Liquefied petroleum gas for cooking and heating.

(a) Requirements for liquefied petroleum gas systems for cooking and heating are in Subpart 58.16 of this subchapter.

§ 56.50–105 Low temperature piping.

(a) *Class I–L.* Piping systems designated to operate at temperatures below 0° F. and pressures above 150 pounds per square inch gage shall be of Class I–L. Exceptions to this rule may be found in the individual requirements for specific commodities in Subchapter D (Tank Vessels) and I (Cargo and Miscellaneous Vessels) of this chapter. The following requirements for Class I–L piping systems shall be satisfied:

(1) *Materials.* All materials used in low temperature piping systems shall be selected from among those specifications listed in Table 56.50–105 and shall 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 shall not be colder than that shown in Table 56.50–105; and,

(ii) The material shall be tested for low temperature toughness using the Charpy V-notch specimen of ASTM E–23, "Notched Bar Impact Testing of Metallic Materials", Type A, Figure 4. The toughness testing requirements of subpart 54.05 of this subchapter shall be satisfied for each particular product form. Charpy V-notch tests shall 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 shall not be less than that shown in Table 56.50–105. In the case of steels conforming to the specifications of Table 54.25–20(a) of this subchapter the minimum lateral expansion shall 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 shall be those obtained by multiplying the average energy shown in Table 56.50–105 by the applicable fraction shown in Table 56.50–105(a).

(iii) Steels equivalent to those listed in Table 56.50–105, but not produced according to a particular ASTM specification, may be used only with the prior consent of the Commandant. 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 covered in Table 56.50–105 may be specially considered by the Commandant for service at any low temperature.

(2) *Piping weldments.* Piping weldments shall 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 shall be postweld heat treated for stress relief in accordance with the procedures of Subpart 56.85. The only exceptions to this requirement are for materials which do not require postweld heat treatment as shown in Table 56.85–10. Relief from postweld heat treatment shall not be dependent upon pipe thickness or weld joint type.

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

(5) *Other requirements.* All other requirements contained in this part for Class I piping shall be applicable to Class I–L systems. Only seamless grade tubular products shall be used, pressure testing shall comply with Subpart 56.97 and nondestructive testing of welded joints shall comply with Table 56.95–10.

TABLE 56.50–105(a)—CHARPY V-NOTCH ENERGY MULTIPLYING FACTORS

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

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

(b) *Class II–L.* Piping systems designed to operate at temperatures below 0° F. and pressures not higher than 150 pounds per square inch gage shall be of Class II–L. Exceptions to this rule may be found in the individual requirements for specific commodities in Subchapter D (Tank Vessels) and I (Cargo and Miscellaneous Vessels) of this chapter. The following requirements for Class II–L piping systems shall be satisfied:

(1) Material requirements shall be the same as those of 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.

(2) Piping weldments shall 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 shall be postweld heat treated for stress relief in accordance with the procedures of Subpart 56.85. The only exceptions to this

requirement are for materials which do not require postweld heat treatment as shown in Table 56.85–10 and for socket weld joints and slip-on flange weld attachments. Otherwise, relief from postweld heat treatment shall not be dependent upon pipe thickness or weld joint type.

(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 shall not be used.

(5) Pressure testing shall comply with Subpart 56.97 and nondestructive testing of welded joints shall comply with Table 56.95–10.

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

TABLE 56.50–105—ACCEPTABLE MATERIALS AND TOUGHNESS TEST CRITERIA

Product form	ASTM specification	Grade	Minimum service temperature	Minimum average Charpy V-notch energy
Pipe	A–333 and A–334.	1	−30° F	20 ft. lb.
Tube (carbon and low alloy steels).		3	−150° F	25 ft. lb.
		4 (A–333 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).	A–312	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).	A–420	WPL 0	−30° F	20 ft. lb.
		WPL 3	−150° F	25 ft. lb.
		WPL 4	−100° F	25 ft. lb.
Forged or rolled flanges, forged fittings, valves and pressure parts (carbon and low alloy steels).	A–350 [1]	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).	A–182	Austenitic grades only (304, 304H, 304L, 310, 316, 316H, 316L, 321, 321H, 347, 347H, 348, 348H).	No limit	These products need be impact tested only when toughness tests are specified in Subpart 54.25 of this subchapter for plating of the same alloy designation. When such toughness tests are required, the minimum average energy is 25 ft. lb.
Forged flanges, fittings, and valves (9% nickel).	A–522	9% Ni	−320° F	Refer to § 54.25–20 of this subchapter.
Castings for valves and pressure parts (carbon and low alloy steels).	A–352 [1]	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).	A–351	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	A–320	L7, L9, L10, L43	−150° F	20 ft. lb.
		B8D, B8T, B8F, B8M	−325° F	No test required.
		B8, 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	A–194	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.

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

Subpart 56.60—Materials

§ 56.60–1 Acceptable materials and specifications (replaces 123).

(a) (1) The material requirements in this subpart shall be followed in lieu of those in 123 in USAS–B31.1.

(2) Materials used in piping systems shall be selected from the specifications which appear in Table 56.60–1(a) or Table 56.60–2(a), or they may be selected from the material specifications of section I, III, or VIII of the ASME Code if not prohibited by a regulation of this subchapter dealing with the particular section of the ASME Code. Table 56.60–1(a) contains only pipe, tubing, and fitting specifications. Other product forms appearing in Table 126.1 of USAS–B31.1 are not listed here. Determination of acceptability of plate, forging, bolting, nuts, and castings may be made by reference to the ASME Code as previously described. Additionally accepted materials for use as piping system components appear in Table 56.60–2(a). Other materials must receive the specific approval of the Commandant before being used.

(b) Acceptable commercial standards applicable to piping systems appear in Table 56.60–1(b).

TABLE 56.60–1(a)—ADOPTED SPECIFICATIONS AND STANDARDS (MODIFIES TABLE 126.1)

NOTE: This Table 56.60–1(a) identifies the acceptable pipe, tubing, and fitting specifications intended for piping system use and it modifies Table 126.1 in USAS–B31.1. Piping system applications will be considered if certification of physical testing is furnished. Without this certification, use is limited to applications within heat exchangers.

ASTM specification	Source of allowable stress values	Notes
Pipe, seamless:		
A106 Carbon steel	USAS–B31.1	
A335 Ferritic alloys	USAS–B31.1	
A376 Austenitic alloys	USAS–B31.1	(1).
Pipe, seamless and welded:		
A53 Types S, F, and E steel pipe	USAS–B31.1	(2, 3).
A312 Austenitic steel (welded with no filler metal)	USAS–B31.1	(1, 4).
A333 Low temperature steel pipe	Sec. VIII, ASME Code	(5).
Pipe, welded:		
A72 Welded wrought iron pipe	USAS–B31.1	(6).
A134 Fusion welded steel plate pipe	See footnote 7	(7).
A135 ERW pipe	USAS–B31.1	(3).
A139 Grade B only, fusion welded steel pipe	USAS–B31.1	(8).
A155 Electric fusion welded pipe, high temperature, ferritic and low alloy.	USAS–B31.1	(4, 9).
A358 Electric fusion welded pipe, high temperature, austenitic.	USAS–B31.1	(1, 4, 9).
Pipe, forged and bored:		
A369 Ferritic alloy	USAS–B31.1	
A430 Austenitic alloy	USAS–B31.1	(1).
Pipe, centrifugally cast:		
(None acceptable)	None applicable	
Tube, seamless:		
A83 Carbon steel boiler tubes	PG23.1, Sec. I, ASME Code	(10).
A179 Carbon steel heat exchanger and condenser tubes	UCS23, Sec. VIII, ASME Code	(11).
A192 Carbon steel boiler tubes	PG23.1, Sec. I, ASME Code	(10).
A199 Alloy steel condenser tubes	UCS23, Sec. VIII, ASME Code	
A210 Medium carbon boiler tubes	PG23.1, Sec. I, ASME Code	
A213 Ferritic and austenitic boiler tubes	PG23.1, Sec. I, ASME Code	(1).

See footnotes at end of table.

TABLE 56.60-1(a)—ADOPTED SPECIFICATIONS AND STANDARDS (MODIFIES TABLE 126.1)—Continued

ASTM specification		Source of allowable stress values	Notes
Tube, seamless and welded:			
A268	Seamless and ERW ferritic stainless tubing	PG23.1, Sec. I, ASME Code	(4).
A334	Seamless and austenitic welded (no added filler metal), low temperature tubing.	UCS23, Sec. VIII, ASME Code	(4, 5).
Tube, welded:			
A178	(Grades A and C only) ERW boiler tubes	PG23.1, Sec. I, ASME Code	(10 Grade A) (3).
A214	ERW heat exchanger and condenser tubes	UCS27, Sec. VIII, ASME Code	
A226	ERW boiler and superheater tubes	PG23.1, Sec. I, ASME Code	(4, 10).
A249	Welded austenitic boiler and heat exchanger tubes (no added filler metal).	PG23.1, Sec. I, ASME Code	(1, 4).
Wrought fittings (factory made):			
A234	Carbon and ferritic alloys	Conforms to applicable USA Standards (USAS–B16.9 and USAS–B16.11).	(12).
A403	Austenitic alloys	do	(12).
A420	Low temperature carbon and steel alloy	do	(12).
Castings,[13] iron:			
A47	Malleable iron	Conform to applicable USA Standards or refer to UCI–23 or UCN23, Sec. VIII, ASME Code.	(14).
A445	Nodular iron	do	(14).
A126	Gray iron	do	(14).
A197	Malleable iron	do	(14).
A395	Nodular iron	UCN23, Sec. VIII, ASME Code	(14).

NONFERROUS MATERIALS [15]

Pipe, seamless:			
B42	Copper	UNF23, Sec. VIII, ASME Code	(16).
B43	Red brass	do	
B241	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	Copper	See footnote 17	(16, 17, 18).
B75	Copper	UNF23, Sec. VIII, ASME Code	(16).
B88	Copper	See footnote 17	(16, 17).
B111	Copper and copper alloy	UNF23, Sec. VIII, ASME Code	
B210	Aluminum alloy, drawn	do	
B234	Aluminum alloy, drawn	do	
B280	Copper tube for refrigeration service	See footnote 17	(16, 17).
Welding fittings:			
B361	Wrought aluminum welding fittings	Shall meet ASA Standards	

[1] For austenitic materials where two sets of stresses appear, use the lower values.
[2] Type F (Furnace welded, using open hearth, basic oxygen, or electric furnace only) limited to Class II applications with a maximum service temperature of 450° F. Type E (ERW grade) limited to maximum service temperature of 650° F, or less.
[3] Electric resistance welded pipe or tubing of this specification may be used to a maximum design pressure of 350 pounds per square inch gage.
[4] Refer to limitations on use of welded grades given in introduction to Table 56.60-1(a) in paragraph (a) of this section.
[5] Use generally considered for Classes I–L and II–L applications. For Class I–L service only, the seamless grade is permitted. For other service refer to footnote 4 and to § 56.50-105.
[6] Furnace lap or furnace butt grades only. Limited to Class II applications only where the maximum service temperature is 450° F, or less.
[7] Limited to Grades 285A, 285B, and 285C only (straight and spiral seam). 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.

ASTM specification	Minimum tensile	Longitudinal joint efficiency	P No.	Allowable stresses (p.s.i.)
A134:				
Grade 285A	45,000	0.80	1	11,250×0, 8=9,000.
Grade 285B	50,000	0.80	1	12,500×0, 8=10,000.
Grade 285C	55,000	0.80	1	13,750×0, 8=11,000.

NOTE: When using 104.1.2 in USAS–B31.1 to compute wall thickness, the stress shown here shall 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).

[8] Limited to Class II applications where the maximum service temperature is 300° F or less for straight seam and 200° F or less for spiral seam.
[9] For Class I applications only, the Class I Grade of the specification may be used.
[10] The physical properties at room temperature as specified in ASTM A520 shall be certified as being met for the referenced specification or any grade thereof, where no physical testing is required when used in piping systems. Without this certification, use is limited to applications within heat exchangers.
[11] Use of this specification will be permitted for all piping system applications if the physical properties at room temperature specified for A83 in ASTM A520 are certified to as being met. Without this certification, use is limited to application within heat exchangers.
[12] Hydrostatic testing of these fittings is not required but all fittings shall be capable of withstanding without failure, leakage, or impairment of serviceability, a hydrostatic test of 1½ times the designated rating pressure.
[13] Other acceptable iron castings are in UCI–23 and UCN23 of section VIII of the ASME Code. (See also §§ 56.60-10 and 56.60-15.) Acceptable castings of materials other than cast iron may be found in section I or VIII of the ASME Code.
[14] Acceptable when complying with USA Standards. Nodular iron acceptable for temperatures not exceeding 650° F. For pressure temperature ratings refer to UCN3 of section VIII of the ASME Code. Other grades of cast iron acceptable for temperatures not exceeding 450° F. For pressure temperature limitations refer to UCI3 of section VIII of the ASME Code.
[15] For limitations in use refer to §§ 56.10-5(c) and 56.60-20.
[16] Copper pipe shall not be used for hot oil systems except for short flexible connections at burners. Copper pipe shall be annealed prior to installation in Class I piping systems. See also 105.2.2 of USAS–B31.1 and § 56.60-20.
[17] The stress values shall be taken from UNF23 of section VIII of the ASME Code for B75 annealed and light drawn temper as appropriate.
[18] B68 Shall be acceptable if provided with a mill hydrostatic or eddy current test.

TABLE 56.60-1(b)—ADOPTED STANDARDS APPLICABLE TO PIPING SYSTEMS (MODIFIES TABLE 126.1)

USA Standards (United States of America Standards Institute, 10 East 40th Street, New York, N.Y. 10017):

B1.1	Unified Screw Threads.
B2.1	Pipe Threads.
B2.2	Dryseal Pipe Threads.
B16.1	C.I. Flanges & Fittings—125 lb.
B16.2	C.I. Flanges & Fittings—250 lb.
B16.3	M.I. Scd. Fittings—150 & 300 lb.
B16.4	C.I. Scd. Fittings—125 & 250 lb.
B16.5	Steel Pipe Flanges and Flanged Fittings.
B16.9	Steel-Butt-Welding Fittings.
B16.10	Dimensions of Ferrous Valves.
B16.11	Steel S.W. Fittings.
B16.14	Ferrous-Threaded-Plugs-Bushings & Locknuts.
B16.15	Cast Bronze Scd. Fittings—125 & 250 lb.
B16.18	Cast Brass Solder-Joints.
B16.20	Ring Joint Gaskets—Steel Flanges.
B16.21	Non-metallic Gaskets for Flanges.
B16.22	Wrought Copper & Bronze Solder Joints Fittings.
B16.24	Brass or Bronze Flanges & Fittings—150 & 300 lb.
B16.25	Butt Welding Ends—Pipe, Valves, Flanges, & Fittings.
B18.2	Square and Hexagon Bolts and Nuts.
B36.10	Wrought-Steel & Iron Pipe.
B36.19	Stainless Steel Pipe.

MSS Standards (Manufacturers' Standardization Society of the Valve and Fittings Industry, 420 Lexington Avenue, New York, N.Y. 10017):

SP–6	Finishes-On Flanges, Valves & Fittings.
SP–9	Spot-Facing.
SP–25	Marking for Valves, Fittings, Flanges & Unions.
SP–37	Bronze Gate Valves—125 lb.[1]
SP–42	Cast Flanged Valves—150 lb.
SP–45	Bypass and Drain Connection.
SP–46	Assembly of Steel Raised Face Flanges to C.I. Brass, Bronze & S.S. Flanges.
SP–48	Steel Butt-Welding Fittings.
SP–49	Forged Steel Scd. Fittings 2,000, 3,000 & 6,000 lb.
SP–50	Forged Steel Plugs & Bushings.
SP–51	Cast Flanges & Fittings—150 lb.
SP–53	Magnetic Particle Inspection—Steel Castings.
SP–54	Radiographic Inspection—Steel Castings.
SP–55	Visual Inspection—Steel Castings.
SP–58	Pipe Hangers & Supports.
SP–59	Steel Butt-Welding Short Radius Elbows and Returns.
SP–61	Hydrostatic Testing Steel Valves.
SP–63	Wrought Welding Fittings.
SP–66	Pressure-Temperature Ratings for Steel Butt Welding End Valves.
SP–67	Butterfly Valves.[2]

§ 56.60–2 Limitations on materials.

(a) *Stresses.* Allowable stress shall be selected as designated by Table 56.60–1 (a). In all cases except those designed in accordance with § 56.07–10(c), the maximum allowable stress permitted shall be 80 percent of the tabulated value. A material shall not be used at design temperatures above those for which stress values are given. Italicized values of stress in referenced specifications shall not be used.

[1] In addition, adequacy of body shell thickness shall be satisfactory to the Commandant.
[2] In addition, see footnote 1 for bronze valves, and refer to § 56.60–10 for cast iron valves.

TABLE 56.60-2(a)—ADOPTED SPECIFICATIONS NOT LISTED IN THE ASME CODE

NOTE: This Table 56.60-2(a) is a listing of adopted bar stock and nonferrous forging and casting specifications not listed in the ASME Code. Particular attention should be given to the supplementary testing requirements and service limitations contained in the footnotes.

FERROUS MATERIALS [1]

ASTM specifications	Source of allowable stress	Notes
Bar stock:		
A107 (Grades 1010-1030).	See footnote 2	(2, 3)
A276 (Grades 304-A, 304L-A, 310-A, 316-A, 316L-A, 321-A, 347-A, and 348-A).	See footnote 4	(4)
A276 Grade 303	See footnote 5	(5, 6)

NONFERROUS MATERIALS

Bar stock:		
B16 (soft and half hard tempers).	See footnote 5	(5, 7)
B21 (alloys A, B, and C).	See footnote 8	(8)
B124:		
Alloy 2	See footnotes 5 and 9.	(5, 9)
Alloy 3	See footnote 8	(8, 10)
Alloy 7	See footnote 11	(11)
Alloy 11a	See footnote 12	(7, 12)
Alloy 11b	See footnote 13	(7, 13)
Alloy 13	See footnote 8	(8, 10)
Forgings:		
B283 (forging brass)	See footnotes 5 and 9.	(5, 9)
Castings:		
B26	See footnotes 5, 14, and 15.	(5, 14, 15, 16)
B85	See footnotes 5, 14, and 15.	(5, 14, 15, 16)

[1] For limitations in use refer to 105.2.1 of USAS-B31.1 and § 56.60-5.

[2] Allowable stresses shall be the same as those listed in UCS23 of section VIII of the ASME Code for SA-306 material of equivalent tensile strength.

[3] Physical testing shall be performed as for material manufactured to ASME Specification SA-306, except that the bend test shall not be required.

[4] Allowable stresses shall be the same as those listed in UCS23 of section VIII of the ASME Code for the corresponding SA-182 material.

[5] Limited to air and hydraulic service with a maximum design temperature of 150° F. The fluid being piped shall not be salt water or otherwise corrosive.

[6] This alloy shall not be welded.

[7] A mercurous nitrate test, in accordance with ASTM B154, shall be performed on a representative model of each finished product design.

[8] Allowable stresses shall be the same as those listed in UNF23 of section VIII of the ASME Code for SB-171, naval brass.

[9] A mercurous nitrate test, in accordance with ASTM B154, shall be performed on a representative model for each finished product design. Tension tests shall be performed to determine tensile strength, yield strength, and elongation. Minimum values shall be those listed in Table IV of ASTM B283.

[10] Physical testing, including mercurous nitrate test, shall be performed as for material manufactured to ASTM B21.

[11] Physical testing shall be performed as for material manufactured to ASTM B96. Allowable stresses shall be the same as those listed in UNF23 of section VIII of the ASME Code for SB-96 and shall be limited to a maximum allowable temperature of 212° F.

[12] Physical testing shall be performed as for material manufactured to ASTM B171, alloy D. Allowable stresses shall be the same as those listed in UNF23 of section VIII of the ASME Code for SB-171, aluminum bronze D.

[13] Physical testing shall be performed as for material manufactured to ASTM B171, alloy E. Allowable stresses shall be the same as those listed in UNF23 of Section VIII of the ASME Code for SB-171, aluminum bronze, alloy E.

[14] Tension tests shall be performed to determine tensile strength, yield strength, and elongation. Minimum values shall be those listed in Table III of ASTM B85.

[15] Those alloys with a maximum copper content of 0.6 percent or less shall be acceptable under this specification. Cast aluminum shall not be welded or brazed.

[16] Valves and fittings constructed of materials with an elongation less than 10 percent in a 2-inch specimen, and intended for pressure service in excess of 150 pounds per square inch, shall undergo the high impact shock test required in § 56.60-12.

(b) *Welded pipe and tubing.* 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:

(1) *Class II.* Use unlimited except as restricted by maximum temperature or pressure specified in Table 56.60-1(a).

(2) *Class I.*—(i) For those specifications in which a filler metal is used, the following applies to the material as furnished prior to any fabrication:

(*a*) For use in service above 800° F. full welding procedure qualifications by the Coast Guard is required. See Part 57 of this subchapter.

(*b*) Ultrasonic examination as required by Item S-6 in ASTM A-376 shall be certified as having been met in all applications except where 100 percent radiography is a requirement of the particular material specification.

(ii) For those specifications in which no filler metal is used in the welding process, the following applies:

(*a*) Ultrasonic examination as required by Item S-6 in ASTM A-376 shall be certified as having been met for service above 800° F.

(3) *Longitudinal joint.* Wherever possible, the longitudinal joint of a welded pipe shall not be pierced with holes for branch connections or other purposes.

NOTE: Refer to appropriate sections for nuclear and low temperature systems.

§ 56.60-5 Steel.

(a) (Reproduces 123.2.3(a).) Upon prolonged exposure to temperatures above 775° F., the carbide phase of plain carbon steel, plain nickel alloy steel, carbon-manganese alloy steel, manganese-vanadium alloy steel, and carbon-silicon steel may be converted to graphite.

(b) (Reproduces 123.2.3(b).) Upon prolonged exposure to temperatures above 875° F., the carbide phase of alloy steels, such as carbon-molybdenum, manganese - molybdenum - vanadium, manganese-chromium-vanadium and chromium-vanadium, may be converted to graphite.

(c) (Reproduces 123.2.3(c).) Upon prolonged exposure to temperatures above 975° F., the carbide phase of chromium-molybdenum steel (with chromium content under 0.60 percent) may be converted to graphite.

(d) The design temperature of a piping system employing one or more of the materials listed in paragraphs (a), (b), and (c) of this section shall not exceed the lowest graphitization temperature specified for materials used.

(e) Ferrous pipe used for salt water service should be protected against corrosion by hot-dip galvanizing or by the use of extra heavy schedule material.

§ 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 fittings conforming to the specifications of Table 56.60-1(a) may be used at pressures not exceeding the limits of the applicable standards of Table 56.60-1(b) at temperatures not exceeding 450° F. Valves of this material may be used in conformance with the standards for flanges and flanged fittings, USAS-B16.1 and B16.2 if such service does not exceed the rating as marked on the valve.

(b) Cast iron and malleable iron shall not be used for valves or fittings in lines carrying flammable or combustible fluids [1] 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 shall not be used for hull fittings, or in systems conducting lethal products.

(c) Malleable iron and cast iron valve and fittings designed and marked for Class 300 refrigeration service may be used for such service, provided the pressure limitation of 300 pounds per square inch is not exceeded. Malleable iron flanges of this class may also be used in sizes 4 inches and smaller (oval and square design).

(d) The use of cast iron in certain hydraulic fluid power systems is described in § 58.30-15(e) of this subchapter.

§ 56.60-15 Nodular iron.

(a) Nodular cast iron components made of material conforming to ASTM A445 and A395 may be used under the following conditions:

(1) Components whose dimensions conform to USAS-B16.1, B16.2, and B16.5 may be used at the adjusted ratings for nodular iron components given in Appendix E of USAS-B31.1.

(2) Welding shall not be used, either in fabrication of the components or in their assembly as a part of a piping system.

(3) Nodular iron castings shall be tested after machining to the hydrostatic shell test pressure specified in Appendix E of USAS-B31.1, and shall show no leaks.

(b) The use of cast iron in certain hydraulic fluid power systems is described in § 58.30-15(e) of this subchapter.

§ 56.60-20 Nonferrous materials.

(a) Nonferrous materials listed in this subpart may be used in piping systems under the following conditions (see also § 56.10-5(c)):

(1) The low melting points of aluminum and aluminum alloys must be recognized. These materials shall not be used to conduct flammable, combustible,

[1] For definitions of flammable or combustible fluids, see §§ 30.10-15 and 30.10-22 of Subchapter D (Tank Vessels) of this chapter.

or dangerous fluids,[2] or for vital systems unless authorized by the Commandant.

(2) 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.

(3) A suitable thread compound must be used in making up threaded joints in aluminum pipe to prevent seizing which might cause leakage and perhaps prevent disassembly. Pipe in the annealed temper should not be threaded.

(4) 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 56.60–2(a) for further guidance.

(b) The use of cast aluminum alloys in hydraulic fluid power systems is described in § 58.30–15(e) of this subchapter.

§ 56.60–25 Nonmetallic materials.

(a) *Plastic pipe–nonvital service.* Plastic pipe may be used for nonvital fresh and salt water service, subject to the following limitations:

(1) Penetrations of required watertight decks and bulkheads by any plastic pipe systems are prohibited, except when:

(i) Each such penetration is accomplished using an acceptable metallic spool piece, welded or otherwise attached to the bulkhead or deck by an accepted method; and

(ii) An acceptable metallic shutoff valve is installed adjacent to the spool piece. This valve shall be operable from above the bulkhead deck. If two valves are installed, one on either side of the bulkhead, the valves need not be operable from above the bulkhead deck provided immediate access to both is possible. Where both plastic and metallic pipes are used in a bulkhead penetrating system and where the two materials exist entirely on opposite sides of the bulkhead, the required shutoff valve shall be installed at the bulkhead in the metallic part of the system, and may be locally operated provided immediate access is possible.

(2) Penetrations of Classes "A" and "B" fire control bulkheads and decks by plastic pipe are prohibited without special precautions being taken to insure that the fire integrity of the divisions are not compromised. Methods of penetration shall be detailed on plan submission.

(3) The use of plastic pipe within concealed spaces in the accommodation and service areas is not permitted unless such piping is within ducts or trunks completely surrounded by "A" class divisions.

(4) Classes "A" and "B" divisions are defined in Subpart 32.57 of Subchapter D (Tank Vessels), Subpart 72.05 of Subchapter H (Passenger Vessels), and Subpart 92.05 of Subchapter I (Cargo and Miscellaneous Vessels) of this chapter. Concealed spaces are areas behind ceilings or linings or between double bulkheads.

(5) Plastic pipe may not be used outboard of the required metallic valve in any piping system penetrating the vessel's shell. (See § 56.90–95.) Where this shell valve and the plastic pipe are in the same unmanned space, the valve shall be operable from above the freeboard deck.

(6) The maximum pressure and temperature of the system shall not exceed 150 pounds per square inch and 140° F., respectively; or as may be specifically authorized by the Commandant.

(7) Materials used in the fabrication of plastic pipe shall be unplasticized rigid polyvinylchloride (PVC) conforming to the following requirements:

(i) The material specifications covering materials fabricated of rigid polyvinylchloride (PVC), shall comply with the following standard specifications issued by the American Society of Testing Materials, subject to the limitations noted in this subpart:

(ii) PVC pipe that is to be used for potable water shall bear the seal of approval or NSF mark of the National Sanitation Foundation Testing Laboratory, Incorporated, School of Public Health, University of Michigan, Ann Arbor, Mich. 48103.

(a) Pipe (PVC).

ASTM D1785 (Schedule 40, 80, 120).
ASTM D2241 (Standard Dimension Ratio).
Type I Grade 1 or 2.
Type II Grade 1.
Type IV Grade 1.

(b) Fittings (PVC).

ASTM D2464 (Schedule 80 threaded).
ASTM D2466 (Schedule 40 socket).
ASTM D2467 (Schedule 80 socket).
Type I Grade 1 or 2.
Type II Grade 1.

(8) In using PVC pipe, a schedule (for D1785) or Standard Dimension Ratio (for D2241) shall be chosen so that the maximum value of hoop stress in service shall not be more than 20 percent of the specified minimum burst strength as listed in the applicable specification.

(9) Pipe joints shall be of the slip sleeve, socket, or screwed type. Screwed joints may be used only on D1785 pipe having at least Schedule 80 wall thickness, or Class T, D2241 pipe.

(10) Materials such as glass reinforced resins, or other plastics may be authorized by the Commandant if full physical and chemical description is furnished. Flammability of the product shall not exceed the burning rate of the self-extinguishing type as determined by the standard test method ASTM D635.

(b) *Plastic pipe-vital service.* Plastic pipe may be used for vital fresh and salt water service, subject to the limitations for nonvital service in paragraph (a) of this section, and the following:

(1) Vital machines served by plastic pipe must be duplicated by equivalent machinery units served entirely by conventional metallic pipe, however when such machines are in separate watertight compartments, or they are located or insulated such that damage to both by a single localized fire is unlikely, both may be fitted with plastic pipe. The Marine inspector shall make the final determination as to the adequacy of the separation between duplicate machinery units installed in the same watertight compartment. In the latter two cases, failure of one plastic pipe system shall not affect the operation of the other. As an equivalent in cases where only a single machinery unit is installed, parallel, but independent, piping systems, one of plastic and the other of metallic materials, is acceptable. In installations where metallic piping is required to duplicate or parallel plastic piping, failure of the plastic pipe shall in no way interfere with the proper operation of the metallic pipe or the machinery it serves.

(c) *Nonmetallic flexible hose.* (1) The installation requirements for nonmetallic flexible hose shall be as specified in Table 56.60–25(c).

(2) Wire reinforced nonmetallic flexible hose shall be fabricated with an inner tube and a cover of synthetic rubber or other suitable material reinforced with wire or polyester braid.

(3) The innertube for nonmetallic flexible hose shall be of seamless construction, uniform gage and shall be compatible with the substances carried therein.

(4) Flexible hose assemblies shall be designed for a bursting pressure of not less than 4 times the maximum working pressure of system in which it is to be installed.

(5) Hose shall be complete with factory-assembled end fittings requiring no further adjustment of the fittings on the hose, except that reusable type fittings may be used provided they are of a type whose design is approved by the Commandant. A hydrostatic test of hose assemblies shall be conducted in accordance with Subpart 56.95.

(6) Nonmetallic flexible hose shall be marked with the manufacturer's name or trademark, type or catalog number and maximum allowable working pressure.

[2] For definitions of flammable or combustible fluids, see §§ 30.10–15 and 30.10–22 of Subchapter D (Tank Vessels) of this chapter. Dangerous fluids are those covered by regulations in Part 98 of Subchapter I (Cargo and Miscellaneous Vessels) of this chapter.

TABLE 56.60-25(c)—INSTALLATION REQUIREMENTS FOR NONMETALLIC FLEXIBLE HOSE

Type of service	Maximum service pressure (p.s.i.)	Type cover required	Required hose reinforcement	Where permitted
Vital fresh and salt water	150	Self-extinguishing [1]	Wire or polyester	[2, 3].
Nonvital fresh and salt water	150	do [1]	do	[4].
Nonvital water and pneumatic	50	do [1]	None	[4].
Do	150	do [1]	Fiber	[4].
Fuel and lube-oil		Fire-resistant [5]	Wire	For flexibility only.[6]
Fluid power systems		Self-extinguishing [1]	Wire or polyester	[7].

[1] The hose cover shall be judged self-extinguishing by test method ASTM D1692.
[2] May be used in duplicate installations in accordance with § 56.60-25(b) for plastic pipe or in reasonable lengths where flexibility is required at pressures not exceeding manufacturer's rating subject to the limitations of § 56.6025-(a) (1) through (6) for plastic pipe.
[3] Casualty control systems, such as firefighting and bilge systems, may utilize a flexible connection only if the pump is flexibly supported and the flexible connection is located directly at the pump.
[4] May be used subject to the limitations of § 56.60-25(a) (1) through (6) for plastic pipe.
[5] The hose shall be capable of withstanding free burning for 2½ minutes without failure under rated pressure (test details available from Commandant).
[6] May only be used in reasonable lengths for the purpose of flexibility at pressures not exceeding manufacturer's rating.
[7] See § 58.30-20 of this subchapter for installations permitted.

(d) Plastic valves, fittings, and flanges may be used in systems employing plastic pipe. Such valves, fittings, and flanges shall be designed, fabricated, tested, and installed so as to satisfy the intent of the requirements for plastic pipe contained in this section.

(e) Short nonmetallic expansion joints may be used in vital and nonvital machinery sea connections inboard of the skin valve. Such joints shall be reinforced with wire braid, polyester or fibrous materials. The cover materials shall be judged self-extinguishing by test method ASTM D1692. Design shall provide a burst pressure of not less than four times the maximum allowable working (rated) pressure. These joints shall not be used to correct for improper piping workmanship or misalignment. Refer also to § 56.35–10.

(f) If it is desired to use nonmetallic materials other than those specified in this section, a request furnishing the chemical and physical properties of the material shall be submitted to the Commandant for consideration.

Subpart 56.65—Fabrication, Assembly and Erection

§ 56.65–1 General (replaces 127 through 135.4).

(a) The requirements for fabrication, assembly and erection in Subparts 56.70 through 56.90 shall apply in lieu of 127 through 135.4 of USAS–B31.1. Those paragraphs reproduced are so noted.

Subpart 56.70—Welding

§ 56.70–1 General.

(a) The following applies essentially to the welding of ferrous materials. The welding of aluminum, copper, etc., requires different preparations and procedures, and should be referred to the Commandant.

§ 56.70–5 Material.

(a) *Filler metal.* All filler metal shall comply with the requirements of section IX, ASME Boiler and Pressure Vessel Code and § 57.02–4 of this subchapter.

(b) *Backing rings.* When metallic backing rings are used they shall be made from material of weldable quality compatible with the base metal, whether subsequently removed or not. When nonmetallic backing rings are used they shall be of material which does not deleteriously affect either base or weld metal, and shall be removed after welding is completed. Backing rings may be of the consumable insert type, removable ceramic type, or solid or split band type. A ferrous backing ring which becomes a permanent part of the weld shall not exceed 0.05 percent sulphur. If two abutting surfaces are to be welded to a third member used as a backing ring and one or two of the three members are ferritic and the other member or members are austenitic, the satisfactory use of such materials shall be determined by procedure qualification.

§ 56.70–10 Preparation (reproduces 127.3).

(a) *Butt welds. (Reproduces 127.3.1)* (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 USAS B16.25 or any other end preparation which meets the procedure qualification requirements are acceptable.

(iii) If piping component ends are bored, such boring shall 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 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 shall be clean and shall be free from paint, oil, rust, scale, or other material which is detrimental to welding.

(3) *Alignment.* The ends of piping components shall be aligned as accurately as is practicable within existing commercial tolerances on diameters, wall thicknesses, and out-of-roundness. Alignment shall be preserved during welding. Where ends are to be joined and the internal misalignment exceeds one-sixteenth inch, it is preferred that the component with the wall extending internally be internally trimmed (see Figure 127.3.1) so that adjoining internal surfaces are approximately flush. However, this trimming shall not result in a piping component wall thickness less than the minimum design thickness and the change in contour shall not be so abrupt as to cause a stress concentration. Inert gas metal arc welding may require more accurate alignment than specified above.

(4) *Spacing.* The root opening of the joint shall be as given in the procedure specification.

(b) *Fillet welds (reproduces 127.3.2).* Piping components which are to be joined in a manner which includes fillet welding shall be prepared in accordance with applicable provisions and requirements of § 56.70–10. For typical details see Figures 127.4.4 A, B, and C of USAS–B31.1.

§ 56.70–15 Procedure.

(a) *General.* (1) Qualification of the welding procedures to be used, and of the performance of welders and operators, is required, and shall comply with the requirements of Part 57 of this subchapter.

(2) No welding shall be done if there is direct impingement of rain, snow, sleet, or high wind on the piping component weldment.

(3) Sections of pipe shall be welded insofar as possible in the fabricating shop. Prior to welding Class I piping, low temperature piping, or nuclear piping the fabricator shall request a marine inspector to visit his plant to examine his fabricating equipment and to witness the qualification tests required by Part 57 of this subchapter. One test specimen shall be prepared for each process and welding position to be employed in the fabrication.

(b) *Girth butt welds* (1) *(reproduces 127.4.2(a)).* Girth butt welds 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 Classes I, I–L, and II–L piping systems shall 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 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 Classes I–L and II–L systems where double butt welds cannot be used. Appropriate welding procedure qualification tests shall be conducted as specified in Part 57 of this subchapter. 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. Classes I, I–L, and II–L piping are required to have the inside of the pipe machined for good fit up if the misalignment exceeds that specified in § 56.70–10 (a)(3). In the case of Class II piping the machining of the inside of the pipe may be omitted. For single welded joints, where possible, the inside of the joint shall 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 Table 56.95–10.

(3) For Class II piping, the type of joints shall 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 which become part of the finished weld, shall be made by a qualified welder. Tack welds made by an unqualified welder shall be removed. Tack welds which are not removed shall be made with an electrode which is the same as or equivalent to the electrode to be used for the first pass. Tack welds which have cracked shall be removed.

(5) (Reproduces 127.4.2(c).) When components of different outside diameters are welded together, there shall be a gradual transition in the weld between the two surfaces. If the differences in surfaces exceeds one-fourth inch, the outside surface of the component having the larger diameter shall be tapered at an angle not to exceed 30° with the axis of the pipe.

(6) (Reproduces 127.4.2(d).) The finished surface of the weld shall merge smoothly into the component surface at the weld toe. The thickness of weld reinforcement shall not exceed the following, considering the thickness of the thinner component being joined:

Component thickness	*Reinforcement thickness, maximum*
Up to ½ inch	1/16 inch
Over ½ to 1 inch	3/32 inch
Over 1 to 2 inches	⅛ inch
Over 2 inches	5/32 inch

(i) This reinforcement need not be removed except in the case where a joint is to be radiographed; then excessive ridges which interfere with proper interpretation of a radiograph shall be removed. The reinforcement shall be free of grooves, valleys, or other changes in contour along the edge or upon the surface of the weld if the marine inspector deems such to be objectionable.

(ii) For double welded joints, this limitation on reinforcement shall apply to each surface of the weld separately.

(7) The type and extent of examination required for girth butt welds is specified in Table 56.95–10.

(8) Sections of welds that are shown by radiography or other examination to have any of the following type of imperfections shall be judged unacceptable and shall 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 in extent than those specified as acceptable set forth in PW–51 of section I of the ASME Code.

(iii) Undercuts in the external surfaces of butt welds which are more than 1/32-inch deep.

(iv) Concavity on the root side of full penetration girth butt welds where the resulting weld thickness is less than the minimum pipe wall thickness required by this subchapter. Weld reinforcement up to a maximum of 1/32-inch thickness may be considered as pipe wall thickness in such cases.

(c) *Longitudinal butt welds.* Longitudinal butt welds in piping components not made in accordance with the standards and specifications listed in Table 126.1 of USAS–B31.1 and § 56.60–1 (a) and (b) must meet the requirements of paragraph 104.7 of USAS–B31.1 and may be examined nondestructively by an acceptable method. Imperfections shall not exceed the limits established for girth butt welds except that no undercutting shall be permitted in longitudinal butt welds. See also § 56.60–2(b).

(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 USAS–B31.1. Typical minimum fillet weld details for slip-on flanges and socket-welding components are shown in Figure 127.4.4B and Figure 127.4.4C of USAS–B31.1. (See subparagraph (3) of this paragraph on fillet size.)

(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 of nominal diameters not exceeding 3 inches and not subject to full radiography by Table 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 shall not exceed the outside diameter of the pipe or tube by more than 0.080 inch. Fit between socket and pipe shall conform to applicable standards for socket weld fittings. Depth of insertion of pipe or tube within the socket or sleeve shall not be less than three-eighths inch. The fillet weld shall have a throat dimension (see subparagraph (1) of this paragraph) of not less than the nominal thickness of the pipe or tube and shall be deposited in a minimum of two passes unless specifically approved otherwise in a special procedure qualification. Requirements for joints employing socket weld and slip-on flanges are covered 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. Applicable standards shall be followed on fit. The fillet welds utilized shall have a throat dimension (see subparagraph (1) of this paragraph) of not less than the nominal thickness of the pipe or tube and shall be deposited in a minimum of two passes unless specifically approved otherwise in a special procedure qualification. Requirements for joints employing socket weld and slip-on flanges are covered in § 56.30–10.

(e) *Seal welds (reproduces 127.4.5).* (1) Where seal welding of threaded joints is performed, threads shall be entirely covered by the seal weld. Seal welding shall be done by qualified welders.

(2) The limitations on cracks and undercutting set forth in 127.4.2(e) of USAS–B31.1 on girth welds are also applicable to seal welds.

(f) *Weld defect repairs (reproduces 127.4.7).* (1) All defects in welds requiring repair shall be removed by flame- or arc-gouging, grinding, chipping, or machining. Repair welds shall be made in accordance with the same procedure used for original welds, recognizing that the cavity to be repaired may differ in contour and dimensions from the original joint. The type, extent, and method of examination and limits of imperfections of repair welds shall be the same as for the original weld.

(2) Preheating may be required for flame-gouging on 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 (reproduces 127.4.8).* (1) Figure 127.4.8A, Figure 127.4.8B, and Figure 127.4.8C of USAS–B31.1 show typical details of branch connections with and without added reinforcement. However, no attempt has been made to show all acceptable types of construction and the fact that a certain type of construction is illustrated does not indicate that it is recommended over other types not illustrated. See also Figure 56.70–15(g) for additional pipe connections.

(2) Figure 127.4.8D of USAS–B31.1 shows basic types of weld attachments used in the fabrication of branch connections. The location and minimum size of these attachment welds shall conform to the requirements of this paragraph. Weld sizes shall be calculated in accordance with 104.3.1 of USAS–B31.1, but shall not be less than the sizes shown in Figure 127.4.8D of USAS–B31.1.

(3) The notations and symbols used in this paragraph and in Figure 127.4.8D of USAS–B31.1 are as follows:

t_n = nominal thickness of branch wall less corrosion allowance, inches.
t_c = the smaller of ¼ inch or 0.7t_n.
t_e = nominal thickness of reinforcing element (ring or saddle), inches (t_e = 0 if there is no added reinforcement).
t_{min} = the smaller of t_n or t_e.

(4) Branch connections (including specially made integrally reinforced branch connection fittings) which abut the outside surface of the run wall, or which 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. The full penetration groove welds shall be finished with cover fillet welds having a minimum throat dimension not less than t_c. The limitation as to imperfection of these groove welds shall be as set forth in 127.4.2(e) of USAS–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.

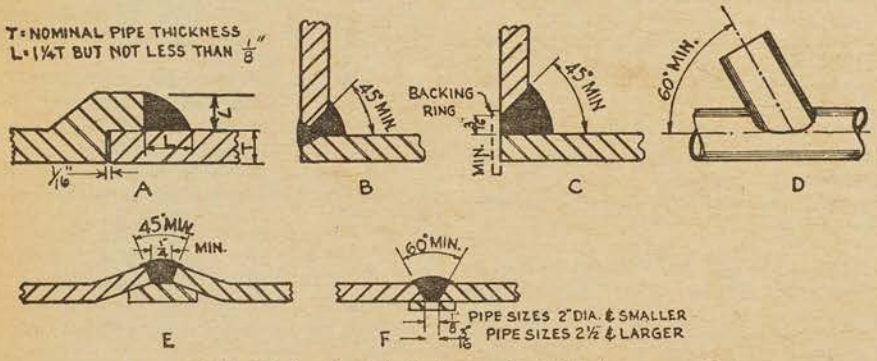


FIGURE 56.70–15(g).—Acceptable types of welded pipe connections.

(h) *Heat treatment.* Heat treatment for welds shall be in accordance with Subpart 56.85.

§ 56.70–20 Qualification, general.

(a) Qualification of the welding procedures to be used, and of the performance of welders and welding operators, is required, and shall comply with the requirements of the ASME Boiler and Pressure Vessel Code (section IX) except as modified by Part 57 of this subchapter.

(b) Each butt-welded joint of Class I or Class I–L piping shall be marked with the welder's identification symbol. Dies shall not be used to mark the pipe where the pressure exceeds 600 pounds per square inch or the temperature exceeds 750° F. or in Class I–L systems.

Subpart 56.75—Brazing

§ 56.75–5 Filler metal.

(a) The filler metal used in brazing shall 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 shall meet and flow freely within the desired temperature range and, in conjunction with a suitable flux or controlled atmosphere, shall wet and adhere to the surfaces to be joined.

(b) The brazing material used shall have a shearing strength of at least 10,000 pounds per square inch. The maximum allowable working pressure for brazing piping shall be determined by this part.

(c) (Reproduces 128.1.2.) Fluxes that are fluid and chemically active at the brazing temperature shall be used when necessary to prevent oxidation of the filler metal and the surfaces to be joined and to promote free flowing of the filler metal.

§ 56.75–10 Joint clearance (reproduces 128.2.2).

(a) The clearance between surfaces to be joined shall be no larger than is necessary to insure complete capillary distribution of the filler metal; between 0.002-inch minimum and 0.006-inch maximum.

§ 56.75–15 Heating (reproduces 128.2.3).

(a) The joint shall be brought to brazing temperature in as short a time as possible to minimize oxidation.

§ 56.75–20 Brazing qualification.

(a) The qualification of the brazing procedure, and of the performance of brazers and brazing operators, shall be in accordance with the requirements of part C, section IX of the ASME Code 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) (Reproduces 128.2.1.) The surfaces to be brazed shall be clean and free from grease, oxides, paint, scale, and dirt of any kind. Any suitable chemical or mechanical cleaning method may be used to provide a clean wettable surface for brazing.

(c) After the parts to be joined have been thoroughly cleaned the edges to be brazed shall 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 shall be cut or machined square and the edges shall 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 shall be not less than 90° where the wall thickness is three-sixteenths inch or greater. The annular clearance of socket joints shall be held to small clearances which experience indicates is satisfactory for the brazing alloy to be employed, method of heating, and material to be joined. The annular clearance shall be shown on drawings submitted for approval of socket joints.

(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 shall be not less than 60°.

(c) *Brazing, general.* (1) Heat shall be applied evenly and uniformly to all parts of the joint in order to prevent local overheating.

(2) The members to be joined shall 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 shall 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 shall 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.

Pipe may be bent by any hot or cold method and to any radius which 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 shall meet the design requirements of 102.4.5 and 104.2.1 of USAS–B31.1. This shall 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 shall be nondestructively examined by the use of ultrasonics or other acceptable method. Alternatively, the pipe may be drilled, gaged, and fitted with a screwed plug extending outside the pipe covering. The nondestructive method shall be employed where the design temperature exceeds 750° F. Prior to the use of nondestructive method of examination by the above procedure, it shall be demonstrated by the user, in the presence of a marine inspector on specimens similar to those to be examined, that consistent results, having an accuracy of plus or minus 3 percent, can be obtained.

§ 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, provided 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.

§ 56.80–15 Heat treatment of bends and formed components.

(a) (Reproduces 129.3.1.) Carbon steel piping which has been heated to at least 1,650° F. for bending or other forming operations shall require no subsequent heat treatment.

(b) Ferritic alloy steel piping which has been heated for bending or other forming operations shall receive a stress relieving treatment, a full anneal, or a normalize and temper treatment, as specified by the design specification before welding.

(c) (Reproduces 129.3.3.) Cold bending and forming of carbon steel having a wall thickness of three-fourth inch and heavier, and all ferritic alloy pipe in nominal pipe sizes of 4 inches and larger, or ½-inch wall thickness or heavier, shall require a stress relieving treatment.

(d) (Reproduces 129.3.4.) Cold bending of carbon and ferritic alloy steel pipe in sizes and wall thicknesses less than specified in 129.3.3 of USAS–B31.1 may be used without a postheat treatment.

(e) (Reproduces 129.3.5.) For other materials the treatment of bends and formed components shall be such as to insure pipe properties that are consistent with the original pipe specification.

(f) All scale shall be removed from heat treated pipe prior to installation.

Subpart 56.85—Heat Treatment of Welds

§ 56.85–5 Heating and cooling method (reproduces 131.1).

(a) Heat treatment may be accomplished by a suitable heating method which will provide the desired heating and cooling rates, the required metal temperature, metal temperature uniformity, and temperature control.

§ 56.85–10 Preheating.

(a) Preheating shall be in accordance with the qualified welding procedure. Recommended preheat temperatures are shown in Table 56.85–10. Preheat is required for Classes I, I–L, I–N, II–N, and II–L piping when the ambient temperature is below 50° F.

(b) (Reproduces 131.2.2.) When welding dissimilar metals having different preheat requirements, the preheat temperature shall be that established in the qualified welding procedure.

(c) (Reproduces 131.2.3.) The preheat temperature shall be checked by use of temperature-indicating crayons, thermocouples, pyrometers, or other suitable methods to assure that the required preheat temperature is obtained prior to and uniformly maintained during the welding operation.

(d) Compliance with Table 56.85–10 and its notes does not eliminate the requirements that all welding performed must be done in accordance with a Qualified Welding Procedure by qualified welders or welding operators. Notes (1) and (2) to Table 56.85–10 apply generally. Note (3) applies as indicated in column 4 of Table 56.85–10.

TABLE 56.85–10—PREHEAT AND POSTHEAT TREATMENT OF WELDS

P No.	Material group	Minimum or preheating range temperature (F)	Range or postheat treatment temperature (F) and notes 1 through 4
P–1	Carbon steel	60	1100–1200 (3c).
P–2	Wrought iron	60	Not required.
P–3	Alloy steels, Cr ¾% max.	300–600	1275–1350 (3b).
P–4	Alloy steels, Cr ¾% to 2%; total alloy 2¾% max.	400–700	1300–1400 (3b).
P–5	Alloy steels, total alloy 10% max.	400–700	1300–1425 (3b).
P–6	High-alloy steels, Martensitic.	60	1400–1500.
P–7	High-alloy steels, ferritic.	60	Not required (3f).
P–8	do	60	Not required (3g).
P–9	Nickel alloy steels	300–500	1100–1200.
P–10	Other alloy steels	As required for specific composition.	

NOTE 1: a. Heating rate for furnace, gas electric resistance, and other surface heating methods:

For thickness over 2 inches, heating rate shall be 600° F. per hour divided by one-half the thickness in inches. For thicknesses 2 inches and under, the heating rate shall be 600° F. per hour maximum.

b. Heating rate for induction heating:

For thicknesses less than 1½ inches at 60 cycles and 400 cycles the heating rate shall be 600° F. per hour maximum.

For thickness 1½ inches and over, heating rate at 60 cycles shall be 500° F. per hour maximum, and at 400 cycles shall be 400° F. per hour maximum.

NOTE 2: a. Holding time at temperature.

For thicknesses over 2 inches to holding time at temperature shall be 2 hours minimum. For thicknesses 2 inches and under, holding time at temperature shall be 1 hour per inch of thickness, but not less than 1 hour.

NOTE 3: Exclusions to Table 56.85–10.

a. Postheat treatment is not mandatory for socket welds.

b. Circumferential butt welds in chromium-molybdenum steels, P–3, P–4, and P–5, need not be postheat treated, provided that the specified chromium content does not exceed 3 percent, the outside pipe or tube diameter does not exceed 4 inches, and the wall thickness is less than one-half inch and the specified minimum carbon content is less than 0.25 percent for P–3 and less than 0.15 percent for P–4 and P–5 materials.

c. Postheat treatment is not mandatory for P–1 materials when thickness is less than three-fourths inch.

d. Postheat treatment is not mandatory for wrought iron, P–2 ferritic high alloy steels, P–7, and austenitic high alloy steels, P–8.

e. Seal welds of threaded joints for carbon steels, P–1, and alloy steels having a total alloy content of 2 percent maximum and a chromium content of ¾-percent maximum, P–3, need not be postheat treated.

f. Postheat treatments after welding may be necessary on some grades to improve ductility.

g. Annealing heat treatments may be necessary on some grades to improve resistance to corrosion in specific environments.

NOTE 4: Cooling rate.

Where local heating is done the weld shall be allowed to cool slowly from the postheat treatment temperature. A suggested method of retarding cooling is to wrap the weld with asbestos and allow to cool in still air. Where furnace heating is done the pipe sections shall be cooled in the furnace to 600° F. and may then be cooled further in still air.

§ 56.85–15 Postheat treatment.

(a) Postheat treatment according to Table 56.85–10 is required unless other heat treatment such as annealing or normalizing is used to restore mechanical properties. Where components having different thicknesses are welded together as is often the case when making branch connections, the preheat and postheat treatment requirements of Table 56.85–10 apply to the thicker of the components being joined. Postweld heat treatment is required for Classes I, I–L, I–N, II–L, and II–N systems. It is not required for Class II piping. Refer to § 56.50–105(a)(3) for exceptions in Classes I–L and II–L systems and to paragraph (b) of this section for Class I systems.

(b) All buttwelded joints in Class I piping shall be postweld heated as required by Table 56.85–10. The following exceptions are permitted:

(1) High pressure salt water piping systems used in tank cleaning operations; and,

(2) Gas supply piping of carbon or carbon molybdenum steel used in gas turbines.

(c) All complicated connections including manifolds shall be stress-relieved in a furnace as a whole as required by Table 56.85–10 before being taken aboard ship for installation.

(d) (Reproduces 131.3.2.) The postheat treatment method selected for parts of an assembly shall not adversely affect other components. Heating a fabricated assembly as a complete unit is usually desirable; however, the size or shape of the unit or the adverse effect of a desired heat treatment on one or more components where dissimilar materials are involved, may dictate alternative procedures such as heating a section of the assembly before the attachment of others, or local circumferential band heating of welded joints in accordance with paragraph (j) of this section.

(e) (Reproduces 131.3.3.) Postheat treatment of welded joints between dissimilar metals having different postheat requirements shall be that established in the qualified welding procedure.

(f) Postheat treatment temperatures shall be checked by the use of thermocouple pyrometers or other suitable methods other than by low melting point metallic alloys to assure that the requirements established by Table 56.85–10 or the qualified welding procedures are accomplished.

(g) (Reproduces 131.3.5.) If welding is interrupted before completion, or allowed to cool prior to postheat treatment, adequate heat treatment or controlled rate of cooling shall be effected to assure that no detrimental effect to the work shall result. Required preheat must be resumed before welding is continued.

(h) (Reproduces 131.3.5.) Welding on *1 Cr–½ Mo* to *3 Cr–1 Mo* materials may only be interrupted provided the following conditions have been met:

(1) A minimum of at least ⅜-inch thickness of weld deposit or 25 percent of welding groove is filled, whichever is the greater.

(2) The weld is allowed to cool slowly from welding temperature to room temperature. A suggested method of retarding cooling is to wrap the weld with asbestos and allow to cool in still air.

(i) (Reproduces 131.3.6.) For those materials listed under P–No. 1, when the wall thickness of the thicker of the two abutting ends, after end preparation, is less than three-fourths inch, the weld need not be postheat treated. In all cases, where the nominal wall thickness is less than three-fourths inch, postheat treatment is not required.

(j) (Reproduces 131.3.7.) (1) Local postheat treatment of butt welded joints shall be performed on a circumferential band of the pipe. The minimum width of this band, centered on the weld, shall be the width of the weld plus 2 inches.

(2) Local postheat treatment of welded branch connections shall be performed by heating a circumferential band of the pipe to which the branch is welded. The width of the heated band shall extend at least 1 inch beyond the weld joining the branch.

(3) In subparagraphs (1) and (2) of this paragraph the local postheat treatment shall require that the entire band be brought up to the uniform specified temperature over the complete circumference of the pipe section, with a gradual diminishing of the temperature outward from the edges of the band.

Subpart 56.90—Assembly

§ 56.90–1 General.

(a) The assembly of the various piping components, whether done in a shop or as field erection, shall be done so that the completely erected piping conforms with the requirements of the regulations in this subchapter and with the specified requirements of the engineering design.

§ 56.90–5 Bolting procedure.

(a) All flanged joints shall be fitted up so that the gasket contact faces bear uniformly on the gasket and then shall be made up with relatively uniform bolt stress. Bolt loading and gasket compression need only be verified by touch and visual observation.

(b) (Reproduces 135.2.2.) In bolting gasketed flanged joints, the gasket shall 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) (Reproduces 135.2.4.) All bolts shall be engaged so that there is visible evidence of complete threading through the nut or threaded attachment.

§ 56.90–10 Threaded piping (reproduces 135.4).

(a) Any compound or lubricant used in threaded joints shall be suitable for the service conditions and shall not react unfavorably with either the service fluid or the piping materials.

(b) Threaded joints which are to be seal welded shall be made up without any thread compound.

(c) Backing off to permit alignment of pipe threaded joints shall not be permitted.

Subpart 56.95—Inspection

§ 56.95–1 General (replaces 136).

(a) The provisions in this subpart shall apply to inspections in lieu of 136 of USAS–B31.1.

(b) Prior to initial operation, a piping installation shall be inspected to the extent necessary to assure compliance with the engineering design, and with the material, fabrication, assembly and test requirements of USAS–B31.1, as modified by this subchapter. This inspection is the responsibility of the owner and may be performed by employees of the owner or of an engineering organization employed by the owner, together with the marine inspector.

§ 56.95–5 Rights of access of marine inspectors.

Marine inspectors shall 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 shall 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 the nondestructive examinations required for the various groups of piping are set forth in Table 56.95–10. In addition a visual examination shall be made.

(b) *Visual examination.* Visual examination consists of observation by the marine inspector of whatever portions of a component or weld are exposed to such observation, either before, during, or after manufacture, fabrication, assembly or test. All welds, pipe and piping components shall be capable of complying with the limitations on imperfections specified in the product specification under which the pipe or component was purchased, 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[1] is required for welds in piping, each weld in the piping shall be completely radiographed. If a butt weld is examined by radiography, for either random or 100 percent radiography, the method used shall be as follows:

(i) X-ray or gamma ray method of radiography may be used. The selection of the method shall be dependent upon its adaptability to the work being radiographed. The procedure to be followed shall be as indicated in PW–51 of section I of the ASME Code.

(ii) If a piping component or a weld other than a butt weld is radiographed, the method used shall be in accordance with UW–51 of section VIII of the ASME Code.

(2) *Random radiography.* Where random radiography[1] is required, one or more welds may be completely or partially radiographed. Random radiography is considered to be a desirable means of spot checking welder performance, particularly in field welding where conditions such as position, ambient temperatures, and cleanliness are not as readily controlled as in shop welding. It is to be employed whenever a marine inspector questions a pipe weld not otherwise required to be tested. It is also used as specified in notes (7) and (8) of Table 56.95–10. The standards of accept-

[1] Where for some reason, such as joint configuration, radiography is not applicable, another approved examination may be utilized.

ance 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 shall be covered using extreme care and careful methods to be sure that a true representation of the actual conditions is obtained. The procedures to be used shall be submitted to the Commandant for approval.

(4) *Liquid penetrant.* Where liquid penetrant examination is required, the entire surface of the weld being examined shall be covered. The examination shall be performed in accordance with appendix VIII to section VIII of the ASME Code. The following standards of acceptance shall be met:

(i) All linear discontinuities and aligned penetrant indications revealed by the test shall 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 shall apply.

(5) *Magnetic particle.* Where magnetic particle testing is required, the entire surface of the weld being examined shall be covered. The testing shall be performed in accordance with appendix VI to section VIII of the ASME Code. The following standards of acceptance are required for welds. All linear discontinuities and aligned indications revealed by the test shall 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 subparagraph (1) of this paragraph shall be met.

TABLE 56.95-10—MANDATORY MINIMUM NONDESTRUCTIVE TESTS FOR WELDS

Class	Material	Nominal diameter [1]	Wall thickness [1]	Tests [2,3] RT [4]	MT [5]	PT [6]	Notes
I, I-L, II-L	Any material	<3"	≤⅜"	No	No	No	(7, 8)
I-N, II-N, III-N	do	All	All				(9)
I, I-L, II-L	P-1 materials or C-Mo P-3.	≥3"	≤⅜"	No [7]	Yes	No	(7, 8)
		<3"	>⅜"	Yes	No	No	
I, I-L, II-L	Materials other than P-1 or C-Mo P-3.	≥3"	≤⅜"	No [7, 10]	Yes	Yes	(7, 8, 10, 11)
I, I-L, II-L	Any material	≥3"	>⅜"	Yes	No	No	
II	do	≥18"	Any				(12)
		<18"	Any	No	No	No	

[1] The symbol < means less than the dimension stated. The symbol ≤ means equal to or less than the dimension stated. The symbol ≥ means equal to or greater than the dimension stated. The symbol > means greater than the dimension stated.

[2] Fabricators desiring to use ultrasonic testing in lieu of any of the required tests shall submit procedures to the Commandant and obtain approval for its use.

[3] The word "no" means not required. The word "yes" means required.

[4] "RT" means radiographic testing for 100 percent unless otherwise permitted.

[5] "MT" means magnetic particle testing for 100 percent unless otherwise permitted.

[6] "PT" means liquid penetrant testing for 100 percent unless otherwise permitted.

[7] Random radiography of at least 20 percent of joints required for Classes I-L and II-L systems, but ultrasonic testing may be utilized as an alternate inspection method if procedures are approved. Joints examined by radiographic testing or ultrasonic testing need not be tested by magnetic particle testing.

[8] Radiographic testing may be required for certain joining configurations (see § 56.70-15(b)(2)).

[9] Refer systems to the Commandant for approval. Nuclear systems may be subjected to 100 percent inspection.

[10] When nominal diameter exceeds 4 inches radiographic testing is required regardless of wall thickness. Under such conditions testing by magnetic particle testing or by liquid penetrant testing is not required.

[11] Use liquid penetrant testing for nonmagnetic materials.

[12] Any method of nondestructive testing may be used.

Subpart 56.97—Pressure Tests

§ 56.97-1 General (replaces 137).

(a) *Scope.* The requirements in this subpart shall apply to pressure tests of piping in lieu of 137 of USAS-B31.1. Those paragraphs reproduced are so noted.

(b) *Leak tightness.* It shall be mandatory that the design, fabrication, and erection of piping, constructed under the regulations in this subchapter demonstrate leak tightness. This requirement shall be met by a hydrostatic leak test prior to initial operation. Where a hydrostatic test is not practicable a pneumatic test, vacuum test or an initial service leak test, may be substituted if approved by the Commandant.

(1) Special valves, nonstandard fittings, manifolds, scuppers, seacocks and other appurtenances shall be tested as described in § 56.97-5.

(c) *Hydrostatic leak test.* When a hydrostatic leak test is conducted, it shall conform to the provisions of §§ 56.97-25, 56.97-30, 56.97-35, and 56.97-40, covering test media, test preparation, pressure, and specific systems.

(d) *Initial service leak test.* (1) An initial service leak test and inspection is acceptable when other types of tests are not practical or when leak tightness is conveniently demonstrable due to the nature of the service when authorized by the Commandant. One example is turbine extraction piping where shutoff valves are not available for isolating a line and where temporary closures are impractical. Others may be systems for service water, low pressure 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.

(2) The piping system shall 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 shall be deemed to have met the requirements of this section.

§ 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, scuppers, seacocks, and other appurtenances shall be individually hydrostatically tested to twice the rated pressure stamped thereon.

(b) Items for which an accepted standard appears in Table 56.60-1(b) 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 Test media.

(a) *Liquid tests (reproduces 137.2.1).* Water is generally used for a hydrostatic leak test, except where there may be damage due to freezing, or where the operating fluid or piping material might be adversely affected by the test water. A hydrocarbon oil, such as kerosene may be substituted for water, provided the flashpoint is over 120° F., and the freezing point is at least 250° F. lower than the minimum ambient temperature.

(b) *Pneumatic tests.* A pneumatic test may be applied as a preliminary to a liquid test to locate major leaks, or may be substituted for a liquid test in accordance with § 56.97-35(b) if authorized by the Commandant.

(c) *Vacuum tests.* A high vacuum test alone or in conjunction with a mass spectrometer leak test may be substituted for a hydrostatic leak test, if authorized by the Commandant.

§ 56.97-30 Test preparation.

(a) (Reproduces 137.3, first par.) Piping designed for vapor or gas shall be provided with additional temporary supports, if necessary, to support the weight of the test liquid.

(b) (Reproduces 137.3, second par.) Expansion joints shall be provided with temporary restraint, if required, for the additional pressure load under test, or shall be isolated from the test.

(c) Equipment which is not to be included in the test shall be either disconnected from the piping, or isolated by valves or blinds.

(d) (Reproduces 137.3, fourth par.) Flanged joints at which blinds are inserted to blank off other equipment during the test need not be tested.

(e) (Reproduces 137.3, fifth par.) A joint which has been tested and covered need not be reexposed on conducting a subsequent test.

(f) (Reproduces 137.3, sixth par.) If a pressure test is to be maintained for a period of time, and the test liquid in the system is subject to thermal expansion, precautions shall be taken to avoid excessive pressure.

(g) (Reproduces 137.3, seventh par.) When conducting tests at low metal temperatures, precautions shall be taken to avoid the possibility of brittle fractures.

§ 56.97–35 Test pressure.

(a) *Liquid tests.* (1) (Reproduces 137.4.1(a).) The test pressure for the piping shall not exceed the maximum test pressure of any vessels or components in the piping system.

(2) The hydrostatic leak pressure of a piping system shall be 1.5 times the maximum allowable working pressure unless a different pressure is indicated by § 56.97–40 or as limited by subparagraph (1) of this paragraph.

(3) (Reproduces 137.4.1(c).) The pressure test shall be maintained for sufficient time to inspect all joints, with a minimum time of 10 minutes.

(b) *Pneumatic tests.* (1) (Reproduces 137.4.2(a).) A preliminary test at a pressure not exceeding 25 pounds per square inch gage is recommended to locate major leaks.

(2) When conducting a pneumatic test, the test pressure may be the lesser of 100 pounds per square inch gage or 110 percent of the maximum allowable working pressure.

(3) In subparagraph (2) of this paragraph, the test pressure may exceed either 100 pounds per square inch gage or 110 percent of the maximum allowable working pressure, but the value of test pressure should not exceed that value which produces a hoop stress in the system of 50 percent of the specified minimum yield strength. Hoop stress for these purposes shall be determined by:

$$S=\frac{PD}{2t}$$

where:

"P" is the test pressure (p.s.i.g.).

"D" is the specified outside diameter (inches).

"t" is the specified wall thickness (inches).

(4) Pressure shall be applied in steps to one-half of the test pressure to allow the system to equalize strains, and to inspect the joints. Thereafter the test pressure shall be increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached. Then the pressure shall be reduced to a value of four-fifths of the required test pressure and held for a sufficient time to permit inspecting. The details of the method of determining leaks shall be submitted as a part of the test procedures.

§ 56.97–40 Installation tests.

(a) The following piping systems shall be hydrostatically leak tested in the presence of a marine inspector at a pressure of 1½ 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 shall be subjected to the same hydrostatic pressure to which the boiler is tested. The maximum allowable working pressures of boiler feedwater and blowoff piping shall be the design pressures specified in §§ 56.50–30(a)(3) and 56.50–40(b), respectively.

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

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

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

(5) Any Class I, I–L, II–L, I–N, II–N, or III–N piping not specifically listed in this paragraph.

(6) Cargo oil piping.

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

(8) Fuel oil transfer and filling piping.

(9) Class I compressed air piping.

(b) 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 shall be tested under working conditions as specified in the section on initial service leak test, § 56.97–1(b).

PART 57—WELDING AND BRAZING

Subpart 57.01—Scope

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57.01–1 Qualifications and production tests.

Subpart 57.02—General Requirements

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57.02–3 Fabricator's responsibility.
57.02–4 Filler metals.

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57.03–1 General requirements.

Subpart 57.04—Procedure Qualification Range

57.04–1 Test specimen requirements and definition of ranges (modifies Q–13, QN–13, and QB–13).

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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: The provisions of this Part 57 issued under R.S. 4405, as amended, 4462, as amended, sec. 633, 63 Stat. 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 633, 49 U.S.C. 1655(b); 49 CFR 1.4 (a)(2), (f). R.S. 4417, as amended, 4417a, as amended, 4418, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 391, 391a, 392, 404–409, 411, 412, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 57.01—Scope

§ 57.01–1 Qualifications and production tests.

(a) (Replaces Q–1(a), QN–1(a), QB–1(a).) The regulations in this part shall 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 Q–21(b), QN–21(b), QB–21(b).) Operators of fully automatic welding and brazing machines are specifically exempt from performance qualification tests.

Subpart 57.02—General Requirements

§ 57.02–1 Adoption of section IX of the ASME Code.

(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 shall be in accordance with section IX of the ASME (American Society of Mechanical Engineers) Code, as limited, modified, or replaced by specific requirements in this part. The provisions in the appendices to section IX of the ASME Code are adopted and shall be followed when the requirements in section IX make them mandatory. For general information Table 57.02–1(a) lists the various paragraphs in section IX of the ASME Code which are limited, modified, or replaced by regulations in this part.

TABLE 57.02–1(a)—LIMITATIONS AND MODIFICATIONS TO THE ADOPTION OF SECTION IX OF THE ASME CODE

Paragraphs in section IX, ASME code, and Disposition	*Unit of this part*
Q–1(a) replaced by	57.01–1(a)
Q–1(b) replaced by	57.02–3(a)
Q–1(c) replaced by	57.02–3(a)
Q–10(a) replaced by	57.03–1(a)
Q–13 modified by	57.04–1 and 57.03–1(b)
Q–21(b) modified by	57.01–1(b)
Table Q13.1 modified by	57.03–1(b)
Table Q13.2 modified by	57.03–1(b)
QN–1(a) replaced by	57.01–1
QN–1(b) replaced by	57.02–3(a)
QN–1(c) replaced by	57.03–1(a)
QN–10(a) replaced by	57.03–1(a)
QN–13 modified by	57.04–1 and 57.03–1(b)

TABLE 57.02-1(a)—LIMITATIONS AND MODIFICATIONS TO THE ADOPTION OF SECTION IX OF THE ASME CODE—Continued

QN-21(b) modified by	57.01-1(b)
QB-1(a) replaced by	57.01-1
QB-1(b) replaced by	57.02-3(a)
QB-1(c) replaced by	57.02-3(a)
QB-10(a) replaced by	57.03-1(a)
QB-13 modified by	57.04-1 and 57.03-1(b)
QB-19 modified by	57.01-1
QB-21(b) modified by	57.01-1(b)

(1) As stated in § 50.15-5 of this subchapter, section IX of the ASME Code is adopted and shall be the governing requirements for the qualification of all types of welders and brazers, the qualification of all types 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, nuclear vessels, heating boilers, pressure vessels, and piping unless specifically limited, modified or replaced by other regulations in this part.

(b) References to the ASME Code, such as paragraph QN-21, indicate:

Q=Section IX, Welding Qualifications, ASME Code.
N=Part B containing requirements for nonferrous materials.
21=Paragraph within part.

(c) When a paragraph or a section of the regulations in this part relates to material in section IX of the ASME Code, 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.

(d) ASME "Code Cases" applicable to welding or brazing sometimes contain "Limitation Notes." These notes are mandatory for welding and brazing covered by the regulations in this part. Individual justifications may be made to the Commandant for removing the prohibition or requirement of a specific note in a specific application.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 57.02-2 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, provided the fabricator's tests have been certified by an authorized Code inspector as defined in paragraphs PG-91, N-612, HG-515.2, or UG-91 of the ASME Code.

§ 57.02-3 Fabricator's responsibility.

(a) (Replaces Q-1 (b) and (c), QN-1 (b) and (c), and QB-1 (b) and (c).) Each manufacturer or contractor is responsible for the welding done by his organization and shall conduct the tests required in this part to qualify the welding procedures used and the performance of welders who apply these procedures. The manufacturer shall bear the expense of conducting the tests. Each manufacturer shall maintain a record of the test results obtained in welding procedure and welder performance qualifications. These required records, together with identification data, shall be maintained on the recommended forms illustrated in appendix II, to section IX, ASME Code, or on any other form acceptable to the Officer in Charge, Marine Inspection. Upon request, duplicate record forms shall be furnished to the marine inspector.

(b) Except as otherwise provided for in § 57.02-2, the fabricator shall 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.

§ 57.02-4 Filler metals.

(a) Filler metals approved by the American Bureau of Shipping shall be used in welded fabrication that is required to meet the provisions of this Part 57.

Subpart 57.03—Procedure Qualifications

§ 57.03-1 General requirements.

(a) *Approval procedure.* (Replaces Q-10(a), QN-10(a), and QB-10(a).) (1) Each manufacturer or contractor shall submit to the cognizant Officer in Charge, Marine Inspection, for approval, the results of the required physical tests, a macro-etch specimen, a sketch showing joint preparation and the procedure specification before using any welding or brazing process to which the rules of this subchapter are applicable. The macro-etch specimen may, in certain cases, be omitted if specifically authorized by the cognizant Officer in Charge, Marine Inspection. Suggested forms showing the information which is required in the procedure specification are listed in Appendix II to Section IX of the ASME Code.

(2) Procedure qualification may not be transferred from one plant to another plant of the same company or from one company to another.

(b) *Low temperature applications (modifies Q-13 and Tables Q13.1 and Q13.2).* Fabricators desiring to use any welding process for low temperature applications (i.e., below 0° F.) shall conduct a procedure qualification test in accordance with the requirements of paragraph (a) of this section and the following additional requirements:

(1) In addition to the material for the prescribed tests, shown in Tables Q13.1 and Q13.2 of the ASME Code, the test plate shall have sufficient material for toughness tests. The toughness tests shall be conducted and qualified in accordance with Subpart 54.05 of this subchapter.

(2) Low temperature procedure qualification thickness ranges shall be as indicated in Table 57.03-1(b).

TABLE 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	*3/8	3/4
3/4 to 3, inclusive	3/4	**t

* For thicknesses less than 3/8 inch, the thickness of the test plate or pipe is the minimum thickness qualified.
** Where "t" is the thickest material over 3/4 inch to be used in production.

(c) *Macro-etch specimens.* Macro-etch specimens submitted as part of the approval procedures required by this part shall not be flame or arc cut from the sample and the weld reinforcement shall not be machined or ground unless the production welds are to be machined or ground. Backing rings, if left in place in production, shall not be removed.

(d) *Quenched and tempered steels.* 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.

(e) *Electrodes.* Procedures using type E6012, E6013, E6014, E6024, E7014, and E7024 electrodes will be approved for a specific type, size and brand electrode only. If the electrode is changed, a new procedure qualification shall be conducted.

Subpart 57.04—Procedure Qualification Range

§ 57.04-1 Test specimen requirements and definition of ranges (modifies Q-13, QN-13, and QB-13).

The type and number of specimens that must be tested to qualify an automatic, semiautomatic, or manual procedure specification shall be in accordance with Q-13, QN-13, or QB-13 of the ASME Code as applicable, except as supplemented by § 57.03-1(a) (macro-etch specimen), § 57.03-1(b) (low temperature applications), and § 57.03-1(d) (quenched and tempered steels).

Subpart 57.05—Performance Qualifications

§ 57.05-1 General.

This subpart supplements the various paragraphs in section IX of the Code dealing with Performance Qualifications.

§ 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 an-

other 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.

§ 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 Figure 57.05–3 (a) or (b) shall be used when welding and brazing the test joint.

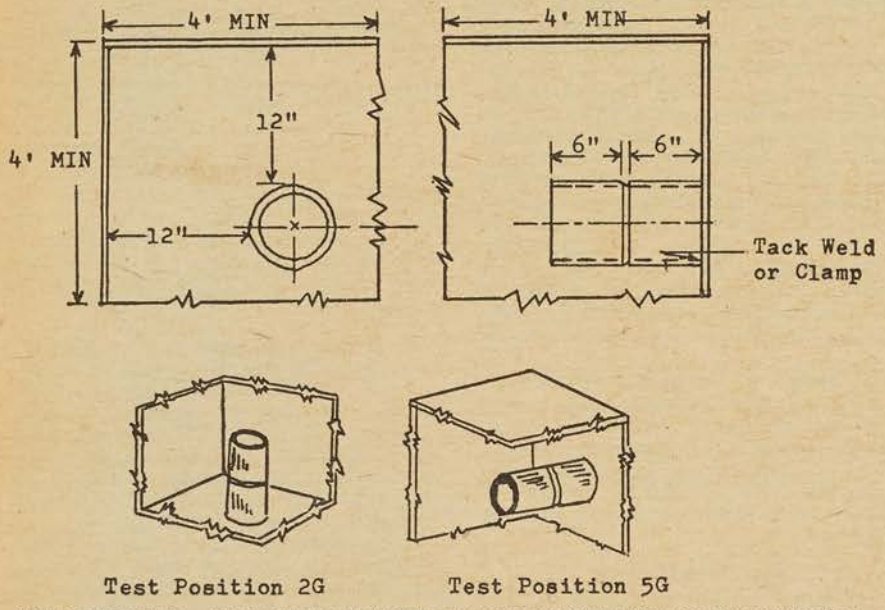


FIGURE 57.05–3(a).—Limited space restriction for pipe welding performance qualification.

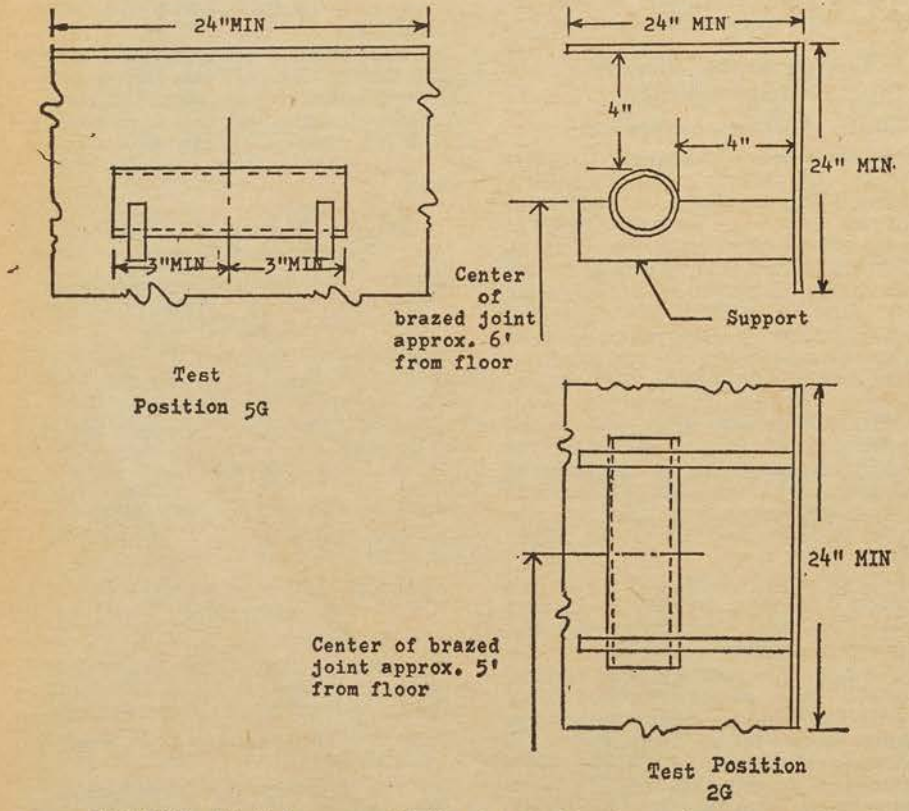


FIGURE 57.05–3(b).—Limited space restriction for pipe brazing performance qualification.

§ 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 shall demonstrate his ability to weld satisfactorily in accordance with procedures qualified in accordance with § 57.03–1(b). Manual welding shall 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 shall 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 and Class A nuclear vessels shall meet the test plate requirements for Class I pressure vessels. Class B nuclear vessels shall meet the test plate requirements for Class II–L pressure vessels. Class C nuclear vessels shall meet the test plate requirements for Class I or Class II pressure vessels, depending on their design pressure and temperature (see § 55.20–3(e) of this subchapter).

(c) Test plates are not required for heating boilers or Class III pressure vessels. Test plates are not required for main power boilers, pressure vessels, or nuclear vessels constructed of P–1, materials as listed in Table Q11.1 of the ASME Code whose welded joints are fully radiographed as required in Part 52, 54, or 55 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 shall be performed.

§ 57.06–2 Production test plate interval of testing.

(a) At least one set of production test plates shall 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 shall 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 shall 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 shall be prepared at the time of fabrication of the first vessel involving that increment.

(b) Production test plates for Class II–L pressure vessels shall be prepared as for Class 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 shall 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 shall be attached to the shell plate on one end of the longitudinal joint of each vessel as shown in Figure 57.06–3, 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 shall 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, shall 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 shall be welded for each vessel, using the circumferential joint process, procedure and technique, except that the provisions of § 57.06–2(a) shall also apply for Classes I and I–L vessels, and that the provisions of § 57.06–2 (b) and (c) shall also apply for Classes II and II–L vessels.

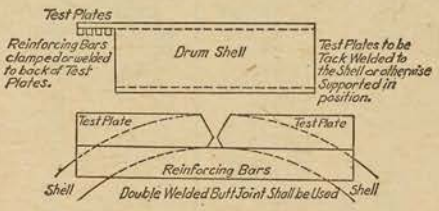


FIGURE 57.06–3.—(PW–53.2) Method of forming longitudinal test plates.

(e) Test plates shall 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 shall be made by the welder designated by the marine inspector. The test plates shall be of the same thickness as the material being welded and shall 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 shall 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 shall be tested. In addition boiler drums of thickness five-eighths inch or greater shall 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 and Classes A and B nuclear vessels as specified in § 57.06–5.

(b) The test plates shall be so supported that the warping due to welding shall 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 shall be straightened before being stress-relieved. The test plates shall be subjected to the same stress-relieving operation as required by this subchapter for the pressure vessel itself. At no time shall the test plates be heated to a temperature higher than that used for stress-relieving the vessel.

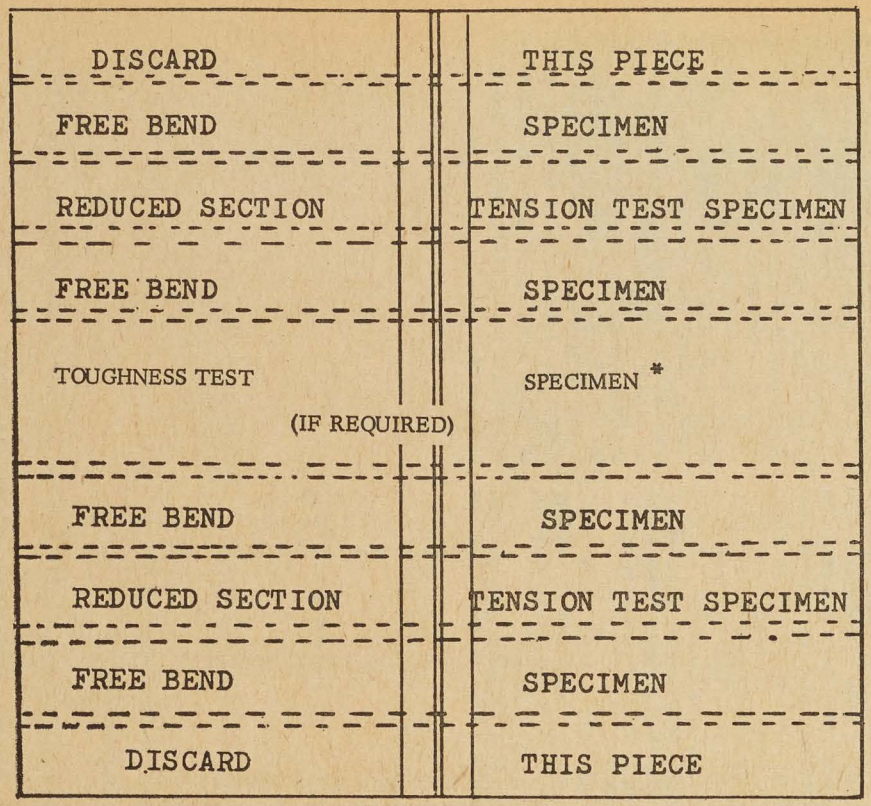
(d) The bend specimens shall be taken from opposite sides of the reduced-section tensile specimen in their respective test plates as shown in Figures 57.06–4 (d)(1) and 57.06–4(d)(2).

(e) In submitting the samples for test the manufacturer shall 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 shall not exceed the maximum permitted for construction.

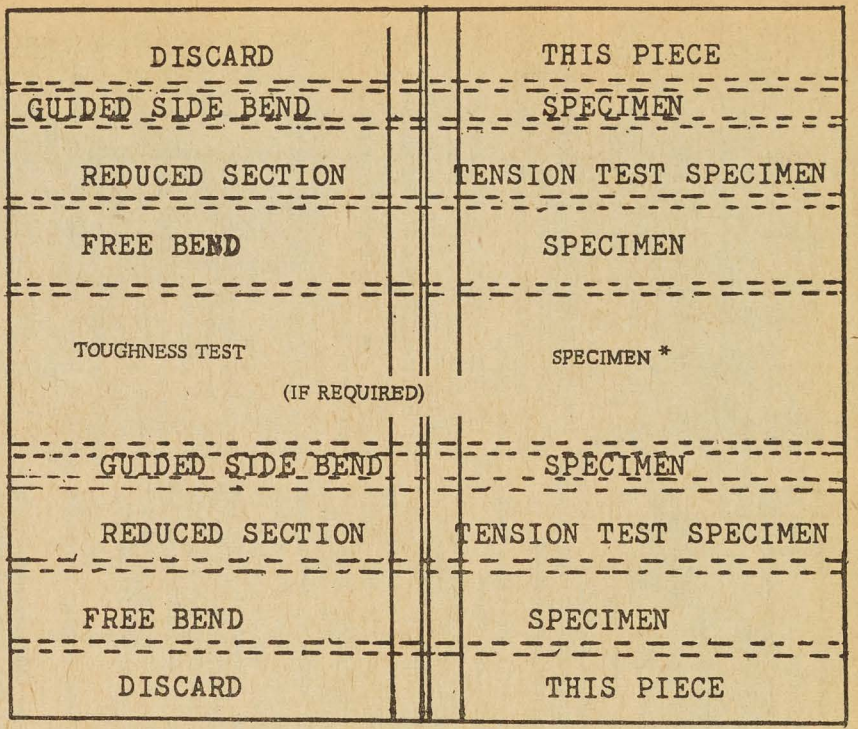
(1) The tension-test specimen of the joint shall be transverse to the welded joint and shall be of the full thickness of the plate after the weld reinforcement has been machined flush. The form and dimensions shall be as shown in Figure 57.06–4(f)(1)(i). When the capacity of the available testing machine 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 57.06–4 (f)(1)(ii) each of which shall meet the requirements. The tensile strength of the joint specimen when it breaks in the weld shall 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 shall have a tension-test specimen of the weld metal machined to form as shown in Figure 57.06–4(f)(2) taken entirely from the deposited metal. The all-weld tension test specimen shall have a tensile strength of not less than the minimum of the range of the plate which is welded and shall have a minimum elongation in 2 inches of not less than 20 percent.



*WHEN CHARPY V NOTCH IMPACT SPECIMENS ARE REQUIRED, THE TEST PLATES SHALL BE NO SMALLER THAN TWO FEET ON A SIDE

FIGURE 57.06-4(d)(1).—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

FIGURE 57.06-4(d)(2).—Workmanship test plates for material over three-fourths inch in thickness.

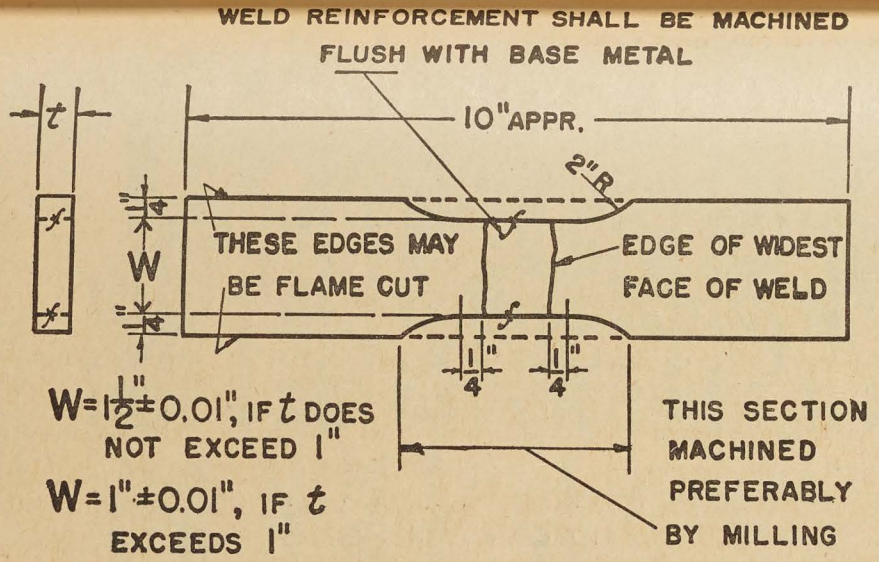
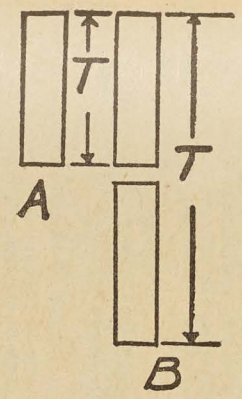
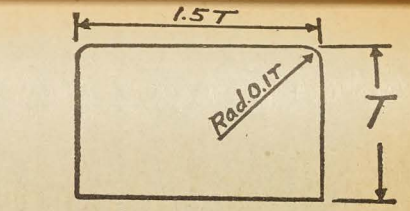


FIGURE 57.06-4(f)(1)(i).—(PW-53.1) Reduced-section test specimen for tension test of welded joint.



A= CROSS SECTION THRU TENSION SPECIMEN.

B= CROSS SECTION THRU TENSION SPECIMENS ON VERY THICK PLATE.



CROSS SECTION OF BEND TEST SPECIMEN

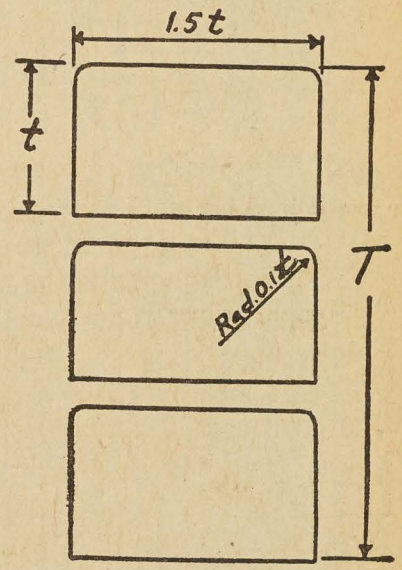


FIGURE 57.06-4(f)(1)(ii).—(PW-53.3) Cross section of bend-test specimens from very thick plate.

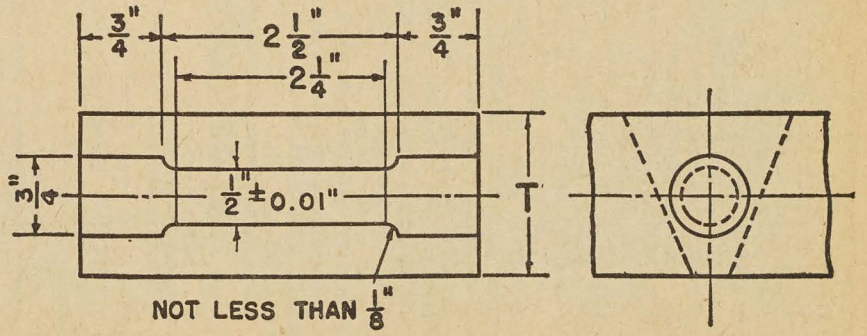
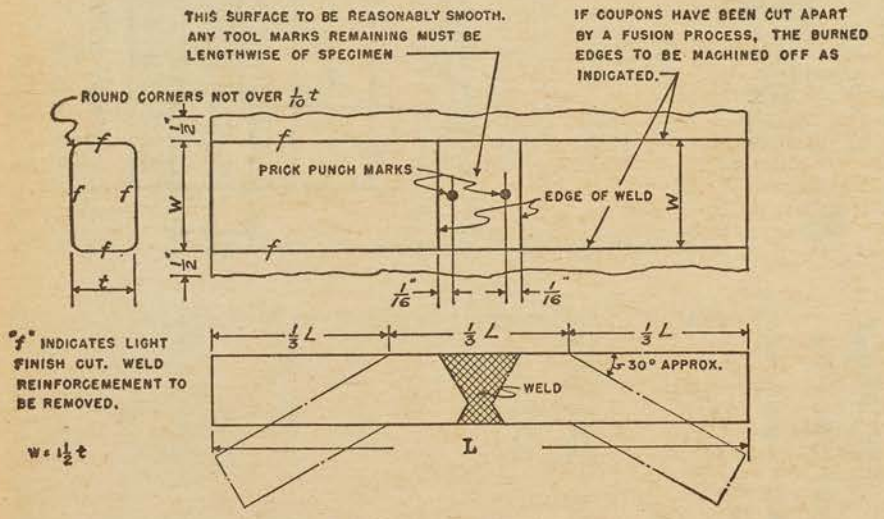


FIGURE 57.06-4(f)(2).—(PW-53.3) All weld metal tension-test specimen.

(g) The freebend specimens shall be of the form and dimensions shown in Figure 57.06–4(g). For plates of three-fourths inch or less in thickness one of the specimens shall be bent with the face of the weld in tension. Each freebend specimen shall 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 shall 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 57.06–4(f) (1) (ii), provided each such piece retains the proportion of 1½ to 1, width to thickness, each of which shall 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.

(h) The guided-bend specimen shall be bent with the side of the weld in tension. Its width shall be equal to the full thickness of the plate and its thickness, after machining, shall 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 Q–8, QN–8, Q–8.1, or QN–8.1 of the ASME Code. The specimen shall 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 shall be cut in two so that each portion does not exceed 2 inches in width. Each such portion shall be tested and shall meet the requirements.

(i) One retest shall 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 shall be chipped out, rewelded and new test plates provided.



L(Approximate Minimum) = 3in. + 3V
V = Width of the Surface of the Weld

The Length of the Bend Specimen is Immaterial provided the Bend occurs at the Weld. The Minimum Length indicated is only Suggestive and is Not Mandatory.

FIGURE 57.06–4(g).—(PW–53.3) Specimen for free-bend test.

§ 57.06–5 Production toughness testing.

(a) In addition to the test specimens required by § 57.06–4(a), production toughness test plates shall be prepared for Classes I–L and II–L pressure vessels in accordance with Subpart 54.05 of this subchapter, for Class A nuclear vessels in accordance with § 55.10–20(b) (2) of this subchapter, and for Class B nuclear vessels in accordance with § 55.15–5(c) of this supbchapter.

(b) For nonpressure vessel type cargo tanks and associated secondary barriers as defined in §38.05–4 of Subchapter D (Tank Vessels) of this chapter, production toughness test plates shall be prepared in accordance with Subpart 54.05 of this subchapter.

PART 58—MAIN AND AUXILIARY MACHINERY AND RELATED SYSTEMS

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AUTHORITY: The provisions of this Part 58 issued under R.S. 4405, as amended, 4462, as amended, sec. 633, 63 Stat. 545, sec 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 633, 49 U.S.C. 1655(b); 49 CFR 1.4 (a)(2), (f). R.S. 4417, as amended, 4417a, as amended, 4418, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 391, 391a, 392, 404–409, 411, 412, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 58.01—General Requirements

§ 58.01–1 Scope.

The regulations in this part contain requirements for the design and construction of main and auxiliary machinery installed on vessels.

§ 58.01–5 Applicable standards.

The applicable standards established by the American Bureau of Shipping, or other recognized classification society, may be used as the standard for the design, construction, and testing of main and auxiliary machinery, except as modified in this subchapter.

§ 58.01–10 Fuel for internal combustion engines on passenger vessels.

All internal combustion engines, whether used for main propulsion or auxiliaries, installed on passenger vessels exceeding 100 gross tons, or on passenger vessels engaged in international voyages, shall be driven by fuel having a flashpoint exceeding 110° F. (Pensky-Martens Closed Cup Method, ASTM–D93).

§ 58.01–15 Fuel oil for boilers.

Oil to be used as fuel to be burned under boilers on vessels subject to inspection by the Coast Guard shall have a flashpoint of not less than 150° F. (Pensky-Martens Closed Cup Method, ASTM–D93). Fuels having a lower flashpoint will be considered in those cases where the complete fuel system has been approved by the Commandant.

§ 58.01–20 Machinery guards.

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

§ 58.01–25 Means of stopping machinery.

Machinery driving forced and induced draft fans, fuel oil transfer pumps, fuel oil unit and service pumps and other similar fuel pumps shall be fitted with remote controls from a readily accessible position outside of the space concerned so that they may be stopped in the event of fire occurring in the compartment in which they are located. These controls shall be suitably protected against accidental operation or tampering and shall be suitably marked. All passenger ships on an international voyage, regardless of the date of construction, shall comply with the requirements of this paragraph. Refer to § 11.50–5(e) of Subchapter J (Electrical Engineering) of this chapter in the case of electrically driven units.

§ 58.01–30 Trial-trip observance.

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

Subpart 58.03—Adoption of Standards and Specifications

§ 58.03–1 General.

(a) In this part portions or the entire text of certain standards and specifications are referred to as the governing requirements for materials, equipment, tests, or procedures to be followed. As stated in Subpart 50.15 of this subchapter, these standards and specification requirements specifically referred to in this part shall be the governing requirements for the subject matters covered unless specifically limited, modified or replaced by other regulations in this part.

(b) As used in this part references to applicable standards, such as those established by the American Bureau of Shipping or other classification society and others, mean that the Coast Guard uses such standards as guide references with respect to the subjects covered, and under normal conditions accepts machinery, etc., meeting the requirements of such standards. Such standards are not adopted as the governing requirements and made a part of the regulations in this subchapter by reference.

(c) In this subpart are listed the organizations publishing standards and specifications which are adopted by reference.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 58.03–5 American Boat and Yacht Council, Inc. (ABYC).

(a) The standards of the American Boat and Yacht Council (see § 50.15–20 (a) of this chapter) referenced in this part are adopted and form a part of this subchapter.

§ 58.03–10 American Society for Testing and Materials (ASTM).

(a) The specifications of the American Society for Testing and Materials (see § 50.15–15 of this chapter) referenced in this part are adopted and form a part of this subchapter.

§ 58.03–15 Military specifications (MIL).

(a) The military specifications of the Department of Defense (see § 50.15–20 (a) of this chapter) referenced in this part are adopted (except those portions relating to shipment) and form a part of this subchapter.

§ 58.03–20 National Fire Protection Association (NFPA).

(a) The standards of the National Fire Protection Association (see § 50.15–20(a) of this subchapter) referenced in part are adopted and form a part of this subchapter.

§ 58.03–25 United States of America Standards Institute (USASI).

(a) The specifications of the United States of America Standards Institute (see § 50.15–10 of this chapter) referenced in this part are adopted and form a part of this subchapter.

§ 58.03–30 Yacht Safety Bureau (YSB).

(a) The standards of the Yacht Safety Bureau (see § 50.15–20 of this chapter) referenced in this part are adopted and form a part of this subchapter.

Subpart 58.05—Main Propulsion Machinery

§ 58.05–1 Material, design and construction.

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

(b) When main and auxiliary machinery is to be installed without classification society review, the builder shall submit in quadruplicate to the cognizant Officer in Charge, Marine Inspection, such drawings and particulars of the installation as are required by the American Bureau of Shipping rules for similar installations on classed vessels.

§ 58.05–5 Astern power.

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

Subpart 58.10—Internal Combustion Engine Installations

§ 58.10–5 Gasoline engine installations.

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

(b) *Carburetors.* (1) Drip collectors shall be fitted under all carburetors, except the 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 shall be covered with flame screens.

NOTE: 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 shall be equipped with an acceptable means of backfire flame control. Installations of backfire flame arresters or engine air and fuel induction systems bearing basic Approval No. 162.015 may be continued in use as long as they are serviceable and in good condition. New installations or replacements shall 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 constructed in accordance with the specification regulations contained in Subpart 162.041 of Subchapter Q (Specifications) of this chapter, and specifically approved by the Commandant. The flame arrester shall be suitably secured to the air intake with flametight 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 approved backfire flame arrester. A gasoline engine utilizing an air and fuel induction system, and operated without an approved backfire flame arrester, shall have such installation tested and labelled in accordance with the specifications contained in Subpart 162.042 of Subchapter Q (Specifications) of this chapter, and such system shall be specifically approved by the Commandant.

(iii) Any attachment to the carburetor or location of the engine air induction system by means of which flames caused by engine backfire will 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. All attachments shall be of metallic construction with flametight connections and firmly secured to withstand vibration, shock and engine backfire. Such installations do not require formal approval and labelling, but will be accepted by Coast Guard law enforcement officers on the basis of compliance with this subpart.

(iv) Where manufacturers wish to produce vessels having an integrated engine-vessel design, a premarket approval of an engine air induction system is available. Such an installation shall be tested and labelled in accordance with the specifications contained in Subpart 162.043 of Subchapter Q (Specifications) of this chapter, and such system shall be specifically approved by the Commandant.

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

(d) *Exhaust pipe.* (1) Exhaust pipe installations shall conform to the requirements of the American Boat and Yacht Council Standard P–1 "Safe Installation for Exhaust Systems" and National Fire Protection Association Standard NFPA 302, Part 1, section 23 and the following additional requirements:

(i) All exhaust installations with pressures in excess of 15 pounds per square inch gage 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."

§ 58.10–10 Diesel engine installations.

(a) The requirements of § 58.10–5 (a), (c), and (d) shall apply to diesel engine installations.

(b) On installations of engines of the semidiesel or hotbulb type, woodwork within 3 feet of starting torches shall be protected by at least ¼-inch asbestos board covered with sheet metal and a dead airspace of at least ¼-inch between the asbestos board and the wood.

§ 58.10–15 Gas turbine installations.

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

(b) *Materials.* The materials used for gas turbine installations shall 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, shall 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 pounds per square inch, such as in closed cycle systems, Class I shall be used. Where ducting other than pipe is employed, the drawings and design data shall be submitted to substantiate suitability and safety for the intended service.

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

(3) Gas turbine exhausts shall 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 shall be installed to prevent backflow of boiler exhaust gases through the turbine. Interconnected exhausts must be specifically approved by the Commandant.

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

(e) *Noise level.* The noise level in the vicinity of any part of the installation shall not exceed the levels prescribed in Table I of section 9400–2 of the Naval Ship Systems Command Specifications, U.S. Navy, or as otherwise designated by the Commandant. The assignment of noise level categories (see Table I of 9400–2) to affected spaces shall be submitted to the Commandant for approval.

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

(g) *Automatic shutdown.* (1) The control system shall be designed for automatic shutdown of the engine with actuation of audible and visible alarms at shutdown. The visible malfunction indicator shall indicate what condition caused the shutdown and remain visible until reset. Automatic shutdown shall 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 shall 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 shall be provided. Such device may be totally mechanical or may be electrical with a manually actuated switch.

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

(1) Combustion chamber.

(2) Regenerator or recuperator.

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

(i) *Fuel systems.* Gas turbine fuel systems shall meet the requirements of Part 56 of this subchapter.

(j) *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.

Subpart 58.16—Liquefied Petroleum Gases for Cooking and Heating

§ 58.16–1 Scope.

(a) Liquefied petroleum gas may be used for cooking and heating on all vessels subject to inspection by the Coast Guard, except passenger vessels, provided the installation complies with the requirements of this subpart.

(b) It is the intent of the regulations in this subpart to permit liquefied petro-

leum gas systems of the vapor withdrawal type only. Cylinders designed to admit liquid gas into any other part of the system are prohibited.

(c) All component parts of the system, except cylinders, appliances, and low pressure tubing, shall be designed to withstand a pressure of 500 pounds per square inch without rupture.

§ 58.16–5 Definition.

(a) 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 (ASTM–D323. Method of test for Vapor Pressure of Petroleum Products (Reid Method)) vapor pressure exceeding 40 pounds per square inch absolute at 100° F.

§ 58.16–10 Approvals.

(a) *Gas appliances.* (1) All gas-consuming appliances used for cooking and heating shall be of a type approved by the Commandant, and shall be tested, listed and labeled by an acceptable laboratory, such as:

(i) The American Gas Association Testing Laboratories.

(ii) The Yacht Safety Bureau, Inc.

(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 shall be furnished by the manufacturer.

(b) *Cylinders.* (1) Cylinders in which liquefied petroleum gas is stored and handled shall be constructed, tested, marked, maintained, and retested in accordance with the regulations of the Department of Transportation.

(2) All liquefied petroleum gas cylinders in service shall 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 shall 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 safety relief devices where required, shall be approved as to type, size, pressure setting, and location, by the Bureau of Explosives in conformance with the regulations of the Department of Transportation.

(d) *Valves, regulators, and vaporizers.* All component parts of the system, other than cylinders and low pressure distribution tubing between regulators and appliances, shall be tested and approved by and bear the label of the Underwriters Laboratories, Inc., or other recognized testing laboratory.

(e) *Plan approval.* Drawings in triplicate, showing the location and installation of all piping, gas-consuming appliances, cylinders, and other component parts of the system shall be submitted for approval.

§ 58.16–15 Valves and safety relief devices.

(a) Each cylinder shall have a manually operated screw-down shutoff valve fitted with a handwheel installed directly at the cylinder outlet.

(b) All cylinders shall be protected by one or more safety relief devices complying with the requirements of § 58.16–10(a). The safety relief device shall 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 shall have direct communication with the vapor space of the cylinder.

(d) In addition to the cylinder valve, a multiple cylinder system shall be provided with a two-way positive shutoff manifold valve of the manually operated type. The manifold valve shall 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 shall 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 shall be protected against excessive pressure by means of a suitable relief valve which shall be integral with the regulator. The relief valve shall 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 shall 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 shall 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 shall have a minimum wall thickness of 0.049 inch. All low-pressure tubing between the regulator and appliances shall have a minimum wall thickness of 0.032 inch.

(c) Tubing connecting fittings shall 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 shall be installed in a substantially constructed and firmly fixed metal enclosure located on or above the weather deck. The cylinder enclosure shall have access from the weather deck only. The enclosure shall 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 shall 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 shall be securely fastened and supported within the metal enclosure. The cylinders and high pressure equipment shall 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 shall be such that the cylinder valves can be readily operated and the pressure gage dial be easily visible. Where possible cylinders shall be mounted in an upright position.

(3) Stowage of unconnected spare cylinders, filled or empty, shall comply with the requirements for cylinders.

(4) All valves, manifolds and regulators shall be securely mounted in locations readily accessible for inspection, maintenance and testing, and shall be adequately protected.

(5) Discharge of the safety relief valves shall 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 shall be installed so as to provide minimum interior runs and adequate flexibility. The piping at the cylinder outlets shall be fitted with flexible metallic connections to minimize the effect of cylinder movement on the outlet piping.

(2) Distribution lines shall be protected from physical damage and be readily accessible for inspection. Lines shall 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 shall be protected by ferrules of nonabrasive material. The distribution lines shall be continuous length of tubes from the regulator to the shutoff valve at the appliance manifold.

(c) *Gas-consuming appliances.* All gas-consuming appliances shall be permanently and securely fastened in place.

(d) *Electrical.* No electrical connections shall be made within the cylinder housing.

§ 58.16–19 Tests.

(a) *Installation.* (1) After installation, the distribution tubing shall be tested prior to its connection to the regulator and appliance by an air pressure of not less than 5 pounds per square inch.

(2) After satisfactory completion of the tests prescribed in subparagraph (1) of this paragraph, the distribution tubing shall 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) shall be conducted at least once each month and at each regular annual or biennial inspection. The tests required at monthly intervals shall be conducted by a licensed 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 shall 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 shall be made available to the marine inspector upon request and shall 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 shall 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 shall 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 shall be located outside the compartment.

§ 58.16–25 Odorization.

(a) All liquefied petroleum gases shall 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.

§ 58.16–30 Operating instructions.

(a) Before opening a cylinder valve, the outlet of the cylinder shall be connected tightly to system; and in the case where only a single cylinder is used in the system, all appliance valves and pilots shall be shut off before the cylinder valve is opened.

(b) Before opening cylinder valve after connecting it to system, the cylinder shall be securely fastened in place.

(c) When cylinders are not in use their outlet valves shall be kept closed.

(d) Cylinders when exhausted shall have their outlet valves closed.

(e) Nothing shall be stored in the metal enclosure except liquefied petroleum gas cylinders and permanently fastened parts of the system.

(f) Valve protecting caps, if provided, shall 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 shall 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 multi-cylinder system.

(k) Report any presence of gas odor to _____
_____.

§ 58.16–35 Markings.

(a) The outside of the cylinder enclosure housing liquefied petroleum gas cylinders, valves and regulators shall be marked as follows:

Liquefied Petroleum Gas
Keep Open Fires Away.
Operating Instructions
Inside and In _____

(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 shall 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 American Bureau of Shipping or other recognized classification society. The minimum pressures for design of all components shall be those listed for piping in Table 501.2.4 of USASI–B31.5 (Refrigeration Piping). In no case shall pressure components be designed for a pressure less than that for which the safety devices of the system are set. Pressure vessels will be designed in accordance with Part 54 of this subchapter.

(b) For refrigeration systems other than those for reliquefaction of cargo, only those refrigerants listed in § 147.05–100 of Subchapter N (Dangerous Cargoes) of this chapter are allowed.

§ 58.20–10 Pressure relieving devices.

(a) Each pressure vessel containing refrigerants, which may be isolated, shall 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 shall 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 shall 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 shall 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 shall be located in a well-ventilated, isolated compartment, preferably on the deck, but in no case shall it be permissible to install such machines in the engineroom space unless the arrangement is such as to eliminate any hazard from gas escaping to the engineroom. 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 shall be fitted with a sprinkler system providing an effective water spray and having a remote control device located outside the compartment.

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

§ 58.20–20 Refrigeration piping.

(a) All piping materials shall be suitable for handling the primary refrigerant, brine, or fluid used, and shall be of such chemical and physical properties as to remain ductile at the lowest operating temperature.

(b) Piping systems shall be designed in accordance with USASI–B31.5. Piping used for cargo reliquefaction systems shall also comply with the applicable requirements found in low temperature piping, § 56.50–105 of this subchapter.

(c) A relief valve shall 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 shall 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 shall be leak tested after installation to their design pressures, hydrostatically or pneumatically.

(b) No pneumatic tests in refrigeration systems aboard ships shall 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 or 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 Apparatus

§ 58.25–1 Steering apparatus; existing installations.

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

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

§ 58.25–5 Steering apparatus; new installations.

(a) All new vessels subject to inspection by the Coast Guard, except towed barges, shall be provided with main and auxiliary steering apparatus in accordance with §§ 58.25–10 through 58.25–70.

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

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

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

§ 58.25–10 Rudder movement.

(a) The main steering gear shall be capable of putting the rudder over from 35° on one side to 35° on the other side with the vessel running ahead at the maximum continuous rated shaft r.p.m. (revolutions per minute). The timing shall be conducted from 35° on one side through 30° on the other side, and the average rate of the rudder shall be not less than 2⅓° per second.

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

§ 58.25–15 Plan approval.

(a) General arrangement plans of the main and auxiliary steering arrangements and piping systems shall be submitted for approval in accordance with Subpart 50.20 of this subchapter.

§ 58.25–20 Power-driven steering gear.

(a) The main steering gear shall be power driven for vessels over 250 feet in length or when the required upper rudder stock diameter is over 9 inches. However, power-driven main steering gear shall be required for any vessel where the hand steering gear is not considered capable of effectively complying with the requirements of § 58.25–10.

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

§ 58.25–25 Auxiliary means of steering.

(a) An auxiliary means of steering will not be required where the main gear is of the dual-power hydraulic type, having two independent pumps and connections and separate leads to the pump prime movers from the source of power, and each independent steering gear power unit has the required capacity for a main steering gear in order to meet the requirements of § 58.25–10(a). In such cases the attachment to the rudder stock shall be designed for strength in excess of that of the rudder stock.

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

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

§ 58.25–30 Steadying the rudder.

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

§ 58.25–35 Rudder stops.

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

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

§ 58.25–40 Buffers.

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

§ 58.25–45 Pilothouse steering gear controls.

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

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

§ 58.25–50 Alternative steering station steering gear controls.

(a) An alternative steering station shall be provided from which control of the main steering gear can be effected by mechanical, hydraulic, electrical, or other approved means. The alternative steering station shall be located on the after weather deck unless duplicate pilothouse control means are provided in accordance with § 58.25–55. The arrangement of the alternative steering control system and the steering gear components shall provide full followup control of the rudder unless a suitable rudder angle indicator is provided at the alternative steering station.

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

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

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

(e) Where it is not practicable to comply with the requirements of this section because of the arrangement of the vessel

or the type of steering gear installed, other types of steering gear control systems may be considered. Such systems shall provide steering gear control equivalent to that required by this section. Ease of maintenance, accessibility, and location and arrangement of components, as well as the type of control system, will be among the factors evaluated when determining equivalency.

§ 58.25–55 Duplicate pilothouse steering gear control systems.

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

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

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

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

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

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

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

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

§ 58.25–60 Arrangement of steering wheels.

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

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

§ 58.25–65 Special steering apparatus.

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

(b) When a lever type control is provided instead of a wheel type, it shall be installed and marked so that the lever movement clearly indicates the direction and amount of the rudder movement.

§ 58.25–70 Steering gear piping.

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

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

(c) Pressure piping shall meet the requirements of Subpart 58.30.

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 the following fluid power and control systems:

(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 system.

(5) Starting systems for internal combustion engines used for main propulsion, main or 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. In the case of hydropneumatic accumulators where it can be shown to the satisfaction of the Commandant that due to friction losses, constriction, or other design features, the hazard of explosive rupture does not exist downstream of a certain point in the hydraulic system, the requirements of this subpart will apply only to the accumulator and the system upstream of this point.

(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 subparagraph (2) of this paragraph.

(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 pounds per square inch.

(b) All other fluid power and control systems shall conform to good commercial practice. In addition, plans shall be submitted in accordance with § 58.30–40, all pneumatic cylinders shall meet the requirements of § 58.30–30, the hydraulic fluid used shall meet the requirements of § 58.30–10, and system testing shall meet § 58.30–35. The other requirements in this subpart apply only to the systems listed in paragraph (a) of this section.

§ 58.30–5 Design requirements.

(a) The pressure vessels, tubing, pipes, valves, flanges, fittings, and cylinders shall be designed for the maximum allowable working pressure of the system. The designer should consider the additional pressure due to hydraulic shock and should also consider the rate of pressure rise caused by hydraulic shock. Specific shock test requirements for components fabricated of cast material are contained in § 58.30–15(e).

(b) The system shall be so designed that proper functioning of any unit shall not be affected by the back pressure in the system. The design shall 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 pounds per square inch shall be designed with a surge tank or other acceptable means of pulsation dampening.

§ 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 shall have a flashpoint of not less than 200° F. for pressures below 150 pounds per square inch and 315° F. for pressures 150 pounds per

square inch and above, as determined by ASTM D92–57, Cleveland "Open Cup" test method.

(c) The chemical and physical properties of the hydraulic fluid shall be suitable for use with any materials in the system or components thereof.

(d) The hydraulic fluid shall 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 and US AS–B93.5 (Recommended Practice for the Use of Fire Resistant Fluids for Fluid Power Systems) shall 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 shall be selected from those specifications which appear in Table 56.60–1 (a) or Table 56.60–2 (a) of this subchapter; or they may be selected from the material specifications of sections I, III, and VIII of the ASME Code if not prohibited by the section of this subchapter dealing with the particular section of the ASME Code. Materials designated by other specifications shall be evaluated on the basis of physical and chemical properties. To assure these properties, the specifications shall specify and require such physical and chemical testing as considered necessary by the Commandant. All tubing and pipe materials shall be suitable for handling the hydraulic fluid used and shall be of such chemical and physical properties as to remain ductile at the lowest operating temperature.

(c) Bolting shall meet the requirements of § 56.25–20 of this subchapter except that regular hexagon bolts conforming to SAE J429, grades 2 through 8, or ASTM A–193 may be used in sizes not exceeding 1½ inches.

(d) The maximum allowable working pressure and minimum thickness shall be calculated as required by § 56.07–10(e) of this subchapter when the outside diameter to wall thickness ratio is greater than 6, except that the allowance for threading, grooving, and/or corrosion may be omitted when flare or flareless type tube fittings are used. Where the ratio is less than 6, the wall thickness may be established on the basis of an applicable thick-wall cylinder equation acceptable to the Commandant using 80 percent of the allowable stress values specified in Table 56.60–1(a) of this subchapter.

(e) All flared, flareless and compression type joints shall be in accordance with § 56.30–25 of this subchapter.

(f) Acceptable cast material as tabulated in § 56.60–1(a) and (b) of this subchapter may be used in the construction of valves and fittings designed for hydraulic systems. Prior to the use of such parts for pressure in excess of 150 pounds per square inch gage, each design shall be subjected to a shock test by a recognized testing laboratory and shall show no fracture when subjected to the impact test requirements of § 58.30–17. Materials complying with a ferrous specification having a minimum elongation of 15 percent in 2 inches or with cast aluminum alloy specifications having a minimum elongation of 10 percent in 2 inches need not be so tested.

(g) Fluid power motors and pumps installed on vessels subject to inspection shall be certified by the manufacturer as suitable for the intended use. Such suitability shall be demonstrated by operational tests conducted aboard the vessel which shall be witnessed by a marine inspector.

§ 58.30–17 Procedure for impact shock test of hydraulic cast iron and cast aluminum products.

(a) *Shock testing machine.* The machine for conducting these tests shall be as described in Military Specification MIL–S–901 for testing light equipment of approximately 250 pounds maximum weight.

(b) *Component mounting.* The component or components shall be mounted on a steel base plate manifold assembly; the latter shall be secured rigidly bolted to the anvil of the shock testing machine. Components of unlike designs may be mounted on the same base plate.

(c) *Test procedure.* (1) The manufacturer shall furnish sample stock valves, fittings, or other components of each design and size he desires to have tested. Three blows shall be applied to each of the principal axes of the item assembly being tested or a total of nine blows to each assembly employing the test apparatus described in paragraph (a) of this section. The three blows to be applied from the different directions shall be with heights of hammer drops of from 1, 3, and 5 feet each. While under test, the assembly shall be subjected to a hydrostatic pressure equal to the pressure rating marked on the valves to insure there is no leakage.

(2) A stock component of each design and size shall be subjected to a proof test of at least four times the pressure rating marked on the item prior to or after the shock test specified in subparagraph (1) of this paragraph.

(d) *Testing agency.* Tests shall be conducted by a testing laboratory acceptable to the Commandant. The testing laboratory shall furnish a written report to the Commandant, U.S. Coast Guard, stating that the tests were carried out as prescribed in this section and furnishing the results of the tests. All costs connected with the tests shall be borne by the manufacturer.

(e) *Acceptability of products.* The acceptability is contingent upon the valves passing the tests prescribed in this section without visual evidence of fracture, distortion or rupture of the cast iron body. Components which have been subjected to a hydrostatic proof test in excess of twice the pressure rating marked on the valve shall not be offered for sale.

§ 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 shall meet the requirements of Subpart 56.60 of this subchapter.

(c) Hose assemblies may be installed between two points of relative motion but shall not be subjected to torsional deflection (twisting) under any conditions of operation and shall 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 shall 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 shall be constructed under the provisions of Part 54 of this subchapter or as may be authorized by the Commandant.

(b) If the accumulator is of the gas and fluid type, suitable separators shall 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, shall 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 shall 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 shall be submitted to show compliance with this requirement.

(d) Piston rods, except steering gear rams, shall either be of corrosion resistant material or shall be of steel protected by a plating system acceptable to the Commandant.

(e) Materials selection shall 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 shall be tested as required by this section.

(b) Accumulators constructed as pressure vessels under the provisions of Part 54 of this subchapter shall be tested and retested as required by Parts 54 and 61 of this subchapter.

(c) Fluid power and control systems and piping assemblies shall 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 1½ times the maximum allowable pressure of the system. The required test pressure shall be maintained for a sufficient amount of time to check all components for strength and porosity and to permit an inspection to be made of all connections.

(2) Fluid power and control systems and associated hydraulic equipment components which have been tested in conformance with subparagraph (1) of this paragraph and so certified by the manufacturer, may be tested after installation as a complete assembly by stalling the driven unit in a safe and satisfactory manner and by blowing the relief valves. Otherwise, these systems shall be hydrostatically tested in the presence of a marine inspector at a pressure of 1½ 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 1½ times this value as prescribed in subparagraphs (1) and (2) of this paragraph 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 shall be tested in accordance with the requirements of subparagraphs (1) and (2) of this paragraph except that the accumulators may be isolated from the remainder of the system.

(d) Fluid power and control systems shall be purged with an inert gas or with the working fluid and all trapped air bled from the system prior to any shipboard testing. In no case shall air, oxygen, any flammable gas, or any flammable mixture of gases be used for testing fluid power systems.

(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 shall be submitted in accordance with Subpart 50.20 for each fluid power system installed on the vessel. Systems listed in § 58.30–1(a) shall meet the detail plan submittal requirements for piping systems found in § 56.01–10(d) of this subchapter. Diagrammatic plans shall be submitted for all other fluid power systems installed on the vessel indicating its location on the vessel, the purpose of the system, the fluid used, the velocity of fluid flow in the system, the maximum allowable working pressure, and a list of components identified by manufacturer and part number. Additional plans may be required for "fail-safe" equipment and for cargo hatch systems with alternate means of operation.

Subpart 58.50—Independent Internal Combustion Engine Fuel Tanks

§ 58.50–1 General requirements.

(a) The regulations in this subpart contain requirements for independent internal combustion engine fuel tanks.

(b) Passenger vessels exceeding 100 gross tons constructed prior to July 1, 1935, may carry gasoline as fuel not exceeding 40 gallons to supply the emergency electrical system. Passenger vessels exceeding 100 gross tons constructed on or after July 1, 1935, and all emergency systems converted on or after July 1, 1935, shall use fuel which has a flashpoint exceeding 110° F. (PMCC) for internal combustion engine units. Such vessels shall carry a sufficient quantity of fuel to supply the emergency electrical system. Refer to § 112.05–5 of Subchapter J (Electrical Engineering), of this chapter.

(c) An outage of 2 percent shall 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 shall be of cylindrical form.

(2) *Materials and construction.* The material used and the minimum thickness allowed shall be as indicated in Table 58.50–5(a) except that consideration will be given to other materials which provide equivalent safety as indicated in § 58.50–15.

(3) *Prohibited types.* Tanks with flanged-up top edges that may trap and hold moisture shall not be used.

(4) *Openings.* Openings for fill, vent and fuel pipes, and openings for fuel level gages where used, shall be on the topmost surface of tanks. Tanks shall 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 shall be welded or brazed.

(6) *Fittings.* Nozzles, flanges, or other fittings for pipe connections shall be welded or brazed to the tank. The tank openings in way of pipe connections shall be properly reinforced where necessary. Where fuel level gages are used, the flange to which gage fittings are attached shall be welded or brazed to the tank. No tubular gage glasses or trycocks shall be fitted to the tanks.

(7) *Baffle plates.* All tanks exceeding 30 inches in any horizontal dimension shall 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, shall be of the same material and not less than the minimum thickness required in the tank walls and shall be connected to the tank walls by welding or brazing. Limber holes at the bottom and air holes at the top of all baffles shall be provided.

TABLE 58.50–5(a)

Material	A.S.T.M. specification (latest edition)	Thickness in inches and gage numbers [1] vs. tank capacities for—		
		1- through 80-gallon tanks	More than 80- and not more than 150-gallon tanks	Over 150-gallon tanks [2]
Nickel-copper	B127, Hot rolled sheet or plate.	0.037 (USSG 20)[3]	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	B97, Alloys A, B, and C.	0.050 (AWG 16)	0.064 (AWG 14)	0.144 (AWG 7).
Steel or iron [4]		0.0747 (MfgStd 14)	0.1046 (MfgStd 12)	0.179 (MfgStd 7).

[1] Gages used are U.S. standard "USSG" for nickel-copper; "AWG" for copper, copper-nickel and copper-silicon; "MFR's STD" for steel.

[2] Tanks over 400 gallons shall 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.

[3] Nickel-copper not less than 0.031 inch (USSG 22) may be used for tanks up to 30-gallon capacity.

[4] Fuel tanks constructed of iron or steel, which is less than 3/16-inch thick shall be galvanized inside and outside by the hot dip process.

(b) *Installation.* (1) Gasoline fuel tanks used for propulsion shall be located in water-tight compartments separate from, but adjacent to the engineroom or machinery space. Fuel tanks for auxiliaries shall be located on or above the weather deck outside of the engine housing or compartment and as close to the engine as practicable. All tanks shall be so installed as to provide a free circulation of air around the tanks.

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

(3) Fuel tanks shall be so installed as to permit examination, testing, or removal for cleaning.

(4) Fuel tanks shall be adequately supported and braced to prevent movement. Portable fuel tanks are not permitted.

(5) All fuel tanks shall be electrically bonded to the common ground.

(c) *Testing.* (1) Prior to installation, tanks vented to atmosphere shall be tested to, and must withstand, a pressure of 5 pounds per square inch or 1½ times the maximum head to which they may be subjected in service, whichever is greater. A standpipe of 11½ feet in height attached to the tank may be filled with water to accomplish the 5 pounds per square inch 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 shall 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 shall 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 shall be as indicated in Table 58.50–10(a), except that consideration will be given to other materials which provide equivalent safety as indicated in § 58.50–15.

(3) Tanks with flanged-up top edges, that may trap and hold moisture, shall not be used.

(4) Openings for fill and vent pipes and openings for fuel level gages, where used, shall be on the topmost surface of tanks. Tanks shall have no openings in bottoms, sides, or ends 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.

(5) All tank joints shall be welded.

(6) Nozzles, flanges or other fittings for pipe connections shall be welded or brazed to the tank. The tank opening in way of pipe connections shall be properly reinforced where necessary. Where liquid level indicating devices are attached to the tank, they shall be of heat resistant materials adequately protected from mechanical damage and provided at the tank connections with devices which will automatically close in the event of rupture of the gage or gage lines.

(7) All tanks exceeding 30 inches in any horizontal dimension shall 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, shall be of the same material and not less than the minimum thickness required in the tank walls and shall 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 shall be provided.

(9) Iron or steel tanks shall not be galvanized on the interior. Galvanizing paint or other suitable coating shall be used to protect the outside of iron and steel tanks.

TABLE 58.50–10(a)

Material	A.S.T.M. specification (latest edition)	Thickness in inches and gage number [1] vs. tank capacities for—		
		1 through 80 gallon tanks	More than 80 and not more than 150 gallon tanks	Over 150 gallon tanks [2]
Nickel-copper	B127, Hot rolled sheet or plate.	0.037 (USSG 20)[3]	0.050 (USSG 18)	0.107 (USSG 12).
Steel or iron [4]		0.0747 (MfgStd 14)	0.1046 (MfgStd 12)	0.179 (MfgStd 7).

[1] Gages used are U.S. standard "USSG" for nickel-copper and "MfgStd" for steel or iron.
[2] Tanks over 400 gallons shall 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.
[3] Nickel-copper not less than 0.031 inch (USSG 22) may be used for tanks up to 30-gallon capacity.
[4] For diesel tanks the steel or iron shall not be galvanized on the interior.

(b) *Installation.* (1) Tanks containing fuel for emergency lighting units shall be located on an open deck or in an adequately ventilated metal compartment. No tank shall be located in a compartment where the temperature may exceed 150° F.

(2) When cylindrical tanks are installed, longitudinal seams shall be located as near the top of the tank as possible. Fuel tanks shall be located in, or as close as practicable, to the machinery space which is served.

(3) Fuel tanks shall be so installed as to permit examination, testing, or removal for cleaning.

(4) Fuel tanks shall be adequately supported and braced to prevent movement. Portable tanks are not permitted.

(5) All fuel tanks shall be electrically bonded to the common ground.

(c) *Tests.* (1) Prior to installation, tanks vented to the atmosphere shall be tested to and must withstand a pressure of 5 pounds per square inch or 1½ times the maximum head to which they may be subjected in service, whichever is greater. A standpipe of 11½ feet in height attached to the tank may be filled with water to accomplish the 5 pounds per square inch test. Permanent deformation of the tank will not be cause for rejection unless accompanied by leakage.

(2) All tanks not vented to atmosphere shall be constructed and tested in accordance with Part 54 of this subchapter.

§ 58.50–15 Alternate material for construction of independent fuel tanks.

(a) Materials other than those specifically listed in Table 58.50–5(a) and in Table 58.50–10(a) may be used for fuel tank construction only if the tank as constructed meets the testing requirements of Yacht Safety Bureau's STD E–3, paragraph E3–3. Testing may be accomplished by any acceptable laboratory, such as the Yacht Safety Bureau, or may be done by the fabricator if witnessed by a marine inspector.

PART 59—REPAIRS TO BOILERS, PRESSURE VESSELS AND APPURTENANCES

Subpart 59.01—General Requirements

Sec.
59.01–1 Scope.
59.01–3 Adoption of the ASME Code.
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: The provisions of this Part 59 issued under R.S. 4405, as amended, 4462, as amended, sec. 633, 63 Stat. 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 633, 49 U.S.C. 1655(b); 49 CFR 1.4 (a)(2), (f). R.S. 4417, as amended, 4417a, as amended, 4418, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 391, 391a, 392, 404–409, 411, 412, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

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.

§ 59.01–3 Adoption of the ASME Code.

(a) *General.* The portions of the ASME (American Society of Mechanical Engineers) Code listed in this part for various subjects are adopted and shall be the governing requirements except as limited, modified, or replaced by specific requirements in this subchapter.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 59.01–5 Repairs, replacements, or alterations.

(a) No repairs, replacements, or alterations, except emergency repairs, shall 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 shall be reported as soon as practicable to the Officer in Charge, Marine Inspection, at or nearest the first port where the vessel may call after such repairs are made.

(c) Plan approval shall 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 shall 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, etc., and the Mechanical Injury Section, paragraphs C4.401 through C4.427 of section VII of the ASME Code, shall 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 shall be made, except temporary emergency repairs without prior approval of the Officer in Charge, Marine Inspection. Emergency repairs shall be replaced with permanent repairs meeting the requirements of this subchapter when the vessel returns to a port in which an Officer in Charge, Marine Inspection, is located, except in the case of minor repairs which in the opinion of the Officer in Charge, Marine Inspection, do not materially affect the safety of the boiler or pressure vessel.

(c) Repair welding of power boilers, not meeting the requirements of Subpart 52.05 of this subchapter, is prohibited unless the stress is carried by such other type(s) of construction complying with the requirements of this subchapter, and where the adequacy of the boiler design is not solely dependent upon the strength of the welds.

(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 shall be referred to the Commandant and may be authorized by him, if in his opinion, it meets the intent of this subchapter.

§ 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 no exceed two staybolt pitches.

(d) Cracks in plain, circular or Adamson ring or similar type furnaces may be welded provided any one crack does not exceed 12 inches in length and after completion the weld is stress-relieved. 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 and is approved by the Commandant.

(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 if the repair is approved.

(h) All cracks permitted to be repaired under this subpart shall be excavated to sound metal by grinding, flame or arc gouging or chipping out the defective metal to form a clean welding groove. The first two methods of excavation are preferable. Either a V groove or U groove wherein complete penetration of the weld metal is secured may be used. After excavation is completed and prior to welding, the excavated area shall be examined by magnetic particle, dye penetrant, or other acceptable test method. When the reverse side of the weld is accessible the root of the weld shall be chipped or ground out to insure a clean surface of the originally deposited metal and the resultant groove welded to obtain a sound weld having complete penetration. When the weld cannot be back chipped because the reverse side is inaccessible, a backing strip or other approved means of assuring full penetration shall be employed.

(i) During welding of cracks a preheat shall be maintained by controlled temperatures. The degree of preheat shall be determined by the rules listed in accordance with the materials P-number groupings of PW–38, section I, appendix R, section VIII and Table Q. 11.1, section IX of the ASME Code. For thicknesses exceeding three-fourth inch, suitable U grooves should be employed. A welding sequence shall be used so as to equalize welding stresses.

(j) Postweld heat treatment of repaired cracks shall be performed in accordance with the rules specified in PW–39, section I and UW–40, section VIII of the ASME Code for boilers and pressure vessels respectively.

(k) Welded repairs of cracks shall be nondestructively tested in accordance with the rules specified in PW–40, section I, and UW–51, section VIII of the ASME Code for boilers and pressure vessels respectively.

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

(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 shall not be less than one-fourth of the diameter of the rivet hole, and the portion of the calking edge to be thus reinforced shall not exceed 30 inches in length in a circumferential direction.

(2) In all repairs to circumferential seams by welding, the rivets shall be removed over the portions to be welded

for a distance of at least 6 inches beyond the repaired portion.

(3) After repairs are made the rivet holes shall 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 shall be renewed in accordance with the provisions of § 52.20–15 of this subchapter, but where the staybolts are fitted with nuts, the nuts may be removed and after reinforcing has been applied, collars may be welded around the staybolts in lieu of the nuts. Such reinforced areas shall not exceed 400 square inches nor more than 30 inches in one direction. Two such areas in any one plate may be reinforced: Provided, that the distance between the reinforced surfaces is not less than 30 inches.

(e) When the corroded portion of a staybolted surface exceeds 400 square inches, it is permissible to 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 shall be fitted in accordance with the requirements of § 52.20–15 of this subchapter and where welding is performed through a line of staybolts, welded collars as required by Figure 52.01–3 of this subchapter shall 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 shall be excavated sufficiently by grinding, flame or arc gouging or chipping to ensure proper weld penetration. Rewelded seams shall be nondestructively tested in accordance with section VIII, ASME Code.

§ 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 shall be replaced. The seal welding of rivet heads to secure tightness is prohibited.

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

§ 59.10–20 Patches in shells and tube sheets.

(a) Unreinforced openings in the shells or drums of boilers or pressure vessels, the diameter of which does not exceed the maximum diameter of an unreinforced opening, in accordance with § 52.01–100 of this subchapter may be closed by the use of a patch or plate inside the drum or shell and sealed against leakage by welding. Such plates shall have a diameter of at least 2 inches larger than the diameter of the hole and shall have a thickness equal to the thickness of the plate to which it is attached. It is not permissible to insert such patches in the shell or head flush with the surrounding plate unless the requirements of this subchapter for Class I welded pressure vessels are met.

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

§ 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 shall be located entirely within staybolted areas and shall not pass through the outer row of stays.

§ 59.10–30 Seal welding.

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

§ 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 shall be cut between two rows of staybolts or on a line of staybolts where the thickness is approximately the same as the original construction. If welding is employed on a line of staybolts, the staybolts shall be fitted with a welded collar as required by Figure 52.01–3 of this subchapter.

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

(c) The edges of existing plates and new plates shall be beveled by chipping, flame cutting or grinding so as to form a suitable groove whereby complete penetration of the weld metal will be obtained. The edge preparation and preheat shall comply with the requirements of § 59.10–5(h).

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

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

Subpart 59.15—Miscellaneous Boiler Repairs

§ 59.15–1 Furnace repairs.

(a) Where corrugated or plain furnaces or flues are distorted by 1½ inches or more, they shall be repaired by either of the following methods:

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

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

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

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

(d) When it becomes necessary to rivet a patch to a furnace or other part of the heating surface, the riveted patch shall be placed on the 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 pumping back the distorted section to as nearly a true circle as possible and reinforcing the same by means of a ring, arc- or gas-welded to the distorted corrugation as shown in Figure 59.15–1, the welding to be done by welders and welding processors qualified in accordance with Part 57 of this subchapter using acceptable welding electrodes in accordance with § 57.02–4 of this subchapter.

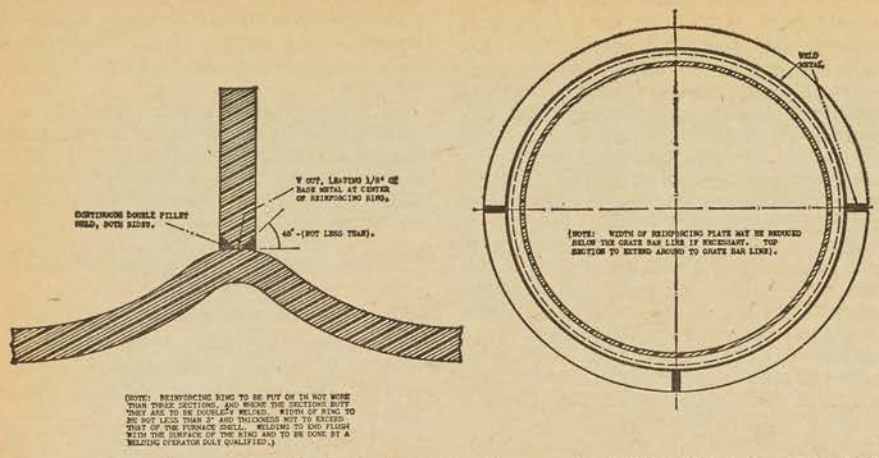


FIGURE 59.15–1.—Approved method of reinforcing furnaces by means of arc or gas welding.

§ 59.15–5 Stayed furnaces and combustion chambers.

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

(b) Where it is desired to rivet a patch to the wall of a stayed furnace or combustion chamber, the defective portion of the plate shall be cut away until solid material is reached, the patch shall be riveted on the 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 shall be the duty of the chief engineer in charge of the vessel to notify the Officer in Charge, Marine Inspection, for examination before raising steam on the boiler.

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

(c) Where the shell plate has blistered, bagged, or bulged to such an extent that there is an appreciable thinning of the plate, the Officer in Charge, Marine Inspection, shall require the defective portion to be cut away and the shell repaired by fitting a patch of steel plate conforming to the requirements of § 52.01–90 of this subchapter in place of the defective portion. Care shall 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 shall be performed in accordance with the material specification to which the casting was originally supplied.

PART 60—[RESERVED]

PART 61—PERIODIC TESTS AND INSPECTIONS

Subpart 61.01—General

Sec.
61.01–1 Scope.

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 Safety valves.

Subpart 61.10—Tests and Inspections of Pressure Vessels

61.10–1 Scope.
61.10–5 Periodic inspection.

Subpart 61.15—Periodic Tests of Piping Systems

61.15–1 Scope.
61.15–5 Steam piping.
61.15–10 Liquefied petroleum gas piping for heating and cooking.
61.15–15 Other piping.

Subpart 61.20—Periodic Tests of Machinery and Equipment

61.20–1 Steering gear.
61.20–3 Main and auxiliary machinery and associated equipment including fluid control systems.
61.20–5 Drydock examination.
61.20–15 Tailshaft survey.

Subpart 61.25—Periodic Tests and Inspections of Nuclear Reactor Power Plants

61.25–1 General standards and requirements.
61.25–5 Special preparations.

AUTHORITY: The provisions of this Part 61 issued under R.S. 4405, as amended, 4462, as amended, secs. 2, 633, 63 Stat. 496, 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 2, 633, 49 U.S.C. 1655(b); 49 CFR 1.4 (a)(2), (f). R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4417a, as amended, 4418, as amended, 4421, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4453, as amended, 4472, as amended, 4488, as amended, 4491, as amended, sec. 2, 23 Stat. 118, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391a, 392, 399, 404–409, 411, 412, 435, 170, 481, 489, 2, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 61.01—General

§ 61.01–1 Scope.

(a) Periodic tests and inspection shall be made of the main and auxiliarly machinery, boilers, nuclear pressure vessels, and other equipment as prescribed in this part.

(b) The inspections and tests shall insure that the equipment and associated structure are in satisfactory operating conditions and fit for the service for which they are intended.

Subpart 61.05—Tests and Inspections of Boilers

§ 61.05–1 Scope.

(a) The term "boiler" as used in this part shall include power boilers subject to Part 52 and heating boilers subject to Part 53 of this subchapter, including thermal fluid heaters.

§ 61.05–5 Preparation of boilers for inspection and test.

(a) It shall be the responsibility of the chief engineer to prepare the boilers for inspection.

(b) For internal inspection, manhole and handhold plates, and washout plugs shall be removed as required by the marine inspector and the furnace and combustion chambers shall be thoroughly cooled and cleaned. Portable obstructions shall be removed as necessary for proper access.

(c) In preparing the boilers for the hydrostatic test, they shall 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 shall be secured by means of gags or clamps.

§ 61.05–10 Boilers in service.

(a) Main boilers including superheaters, reheaters, economizers, auxiliary boilers, low pressure heating boilers, unfired steam boilers, and thermal fluid heaters shall be examined by a marine inspector at the inspection for certification and oftener if necessary, to determine that the complete unit is in a safe and satisfactory condition. Where hydrostatic tests are required, an inspection shall be made of all accessible parts while under pressure.

(b) Hydrostatic tests shall be applied to all boilers as provided in Table 61.05–10. The owner, master, or person in charge of the vessel shall give an advance notice to the appropriate Officer in Charge, Marine Inspection, so that a marine inspector may be scheduled to witness the tests and to make the required inspection.

(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, shall

be subjected to a hydrostatic test of 1½ times the maximum allowable working pressure. All other boilers shall be subjected to a hydrostatic test of 1¼ times the maximum allowable working pressure.

(d) In applying hydrostatic pressure to boilers, arrangements shall 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, he shall cause the boiler to be lifted to such position that it can be thoroughly examined, provided the examination cannot be made otherwise.

(f) The marine inspector may require any boiler to 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 shall 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 shall demonstrate to the marine inspector that results having an accuracy within plus or minus 5 percent are consistently obtainable when using specimens similar to those to be examined on the boiler.

(g) If the thickness is found to be less than the original thickness upon which the maximum allowable working pressure was based, it shall be recalculated. The thickness of the thinnest measured portion shall 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 61.05-10—HYDROSTATIC TESTS.

Boiler	Passenger vessels	Cargo, tank and miscellaneous vessels
Firetube	Annual	Annual.
Watertube	Annual	Quadrennial.
Fired thermal fluid heaters.[1]	Annual	Quadrennial.

[1] The fluid used in the thermal fluid heater may be used for the liquid medium for the hydrostatic test.

§ 61.05-15 Boiler mountings and attachments.

(a) All valves and boiler mountings and attachments shall be opened up and examined by the marine inspector after each 4 years of service.

(b) All boiler mounting studs or bolts shall be examined after each 8 years of service. Boiler mounting studs or bolts shall be removed for expansion on those mountings that are required to be removed.

(c) (1) Boiler mountings shall be removed from the boiler for examination after each 8 years of service where any of the following conditions exist:

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

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

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

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

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

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

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

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

§ 61.05-20 Safety valves.

(a) At each inspection for certification all boiler drum, superheater, and reheater safety valves are to be tested and resealed in the presence of the marine inspector.

Subpart 61.10—Tests and Inspections of Pressure Vessels

§ 61.10-1 Scope.

(a) All pressure vessels aboard ships are subject to periodic inspections.

(b) For the requirements for nuclear powerplant components, see Subpart 61.25.

§ 61.10-5 Periodic inspection.

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

(b) *Internal and external examination and tests.* Pressure vessels that required initial shop inspection and which are fitted with manholes or other inspection openings, so they can be satisfactorily examined internally, shall be opened biennially at the regular inspection for certification and thoroughly examined internally and externally. Such pressure vessels are not required to be hydrostatically tested unless defects are found which in the marine inspector's opinion may impair the safety of the pressure vessel. Where such defects are found a hydrostatic test shall be applied at a pressure equal to 1¼ times the maximum allowable working pressure.

(c) *Special purpose vessels.* Tubular heat exchangers, hydraulic accumulators, and those pressure vessels used in refrigeration service shall be examined under operating conditions at the regular inspection for certification.

(d) *Hydrostatic pressure tests.* All pressure vessels, other than those exempt by the provisions of this section, shall be subjected to a hydrostatic test 1¼ times the maximum allowable working pressure biennally at the regular inspection for certification.

(e) *Exemptions from hydrostatic tests.* The following pressure vessels will not normally be subjected to a hydrostatic test:

(1) Tubular heat exchangers.

(2) Pressure vessels used in refrigeration service.

(3) Hydraulic accumulators.

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

(5) Pressure vessels which were initially pneumatically tested in accordance with Part 54 of this subchapter.

(6) Pressure vessels exempted from initial shop inspection under § 54.01-15 of this subchapter.

(f) *Compressed gas or hazardous liquid pressure vessel tests.* Pressure vessels containing liquefied compressed gases or hazardous liquids shall be inspected and tested as required by the applicable regulations published in Subchapter D (Tank Vessels), Subchapter I (Cargo and Miscellaneous Vessels), or Subchapter N (Dangerous Cargoes) of this chapter.

(g) *Bulk storage tanks.* Bulk storage tanks containing refrigerated liquefied CO_2 gas for use on board vessels as a fire extinguishing agent shall be subjected to a hydrostatic test at the inspection for certification on the eighth year of the installation and at 8-year intervals thereafter. The hydrostatic test pressure shall be 1½ times the allowable pressure. At the conclusion of the hydrostatic test, the tank shall be drained and an internal examination made. Portions of the jacket and lagging on the underside of the tank shall be removed at the time of the hydrostatic test as deemed necessary by the marine inspector so as to determine the external condition of the tank.

(h) *Pneumatic tests.* (1) Pressure vessels which have been pneumatically tested during shop inspection shall be thoroughly examined internally and externally biennially at the regular inspection for certification except in those instances where the inspection interval is prescribed otherwise by the specific regulations applicable to the product carried in Subchapter D (Tank Vessels), Subchapter I (Cargo and Miscellaneous Vessels), or Subchapter N (Dangerous Cargoes) of this chapter. For those tanks

the design of which precludes a thorough internal or external examination, the thickness shall be determined by a nondestructive method acceptable to the Officer in Charge, Marine Inspection.

(2) Such pressure vessels in service are not required to be pneumatically tested unless repairs have been made to them, or unless defects are found which in the opinion of the marine inspector may impair the safety of the pressure vessel. If required, the pneumatic test shall be conducted in accordance with Part 54 of this subchapter.

(i) *Safety valves on pressure vessels.* The setting of safety valves or relief valves on all pressure vessels except cargo tanks, shall be checked by the marine inspector at each regular inspection for certification. Cargo tank safety or relief valves shall be checked at the interval required in Subchapter D (Tank Vessels) or I (Cargo and Miscellaneous Vessels) of this chapter, as appropriate.

Subpart 61.15—Periodic Tests of Piping Systems

§ 61.15–1 Scope.

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

(b) For requirements for nuclear power plant components, see Subpart 61.25.

§ 61.15–5 Steam piping.

(a) Main steam piping shall be subjected to a hydrostatic test equal to 1¼ times the maximum allowable working pressure at the same periods prescribed for boilers in § 61.05–10. The hydrostatic test shall be applied from the boiler drum to the throttle valve. If the covering of the piping is not removed, the test pressure shall be maintained on the piping for a period of ten minutes. If any evidence of moisture or leakage is detected, the covering shall be removed and the piping thoroughly examined.

(b) All steam piping subject to main boiler pressure shall be subjected to a hydrostatic test pressure of 1¼ times the maximum allowable working pressure of the boiler after each four years of service except as otherwise provided for in paragraph (a) of this section. If the covering of the piping is not removed, the test pressure shall be maintained on the piping for a period of ten minutes. If any evidence of moisture or leakage is detected, the covering shall be removed and the piping thoroughly examined. Piping under 3 inches nominal pipe size need not be hydrostatically tested.

(c) The setting of safety and relief valves installed in piping systems shall be checked by the marine inspector at each inspection for certification.

§ 61.15–10 Liquefied petroleum gas piping for heating and cooking.

(a) Leak tests as described in paragraph (b) of this section shall be conducted at least once each month and at each inspection for certification. The tests required at monthly intervals shall be conducted by a licensed 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 shall 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 shall be made available to the marine inspector upon request and shall 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 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 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.

§ 61.15–15 Other piping.

(a) All other piping systems shall be examined under working conditions as required by the marine inspector.

Subpart 61.20—Periodic Tests of Machinery and Equipment

§ 61.20–1 Steering gear.

(a) Steering gear shall be tested and inspected by the marine inspector at each inspection for certification and oftener if necessary.

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

§ 61.20–3 Main and auxiliary machinery and associated equipment, including fluid control systems.

(a) At each inspection for certification the marine inspector shall conduct such tests and inspections of the main propulsion and auxiliary machinery and of its associated equipment, including the fluid control systems, as he feels 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 shall be tested at each regular inspection for certification.

§ 61.20–5 Drydock examination.

(a) When any vessel is drydocked, examination shall be made of the propeller, stern bushing, sea connections, and fastenings if deemed necessary by the marine inspector.

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

§ 61.20–15 Tailshaft survey.

(a) The requirements in this section apply only to ocean and coastwise vessels.

(b) Tailshafts shall be drawn at least once in every 2 years except as follows:

(1) Vessels fitted with a single tailshaft fabricated of materials resistant to corrosion by sea water, or fitted with a continuous liner or with a sealing gland which effectively prevents sea water from contacting the steel shaft, shall be drawn at least once in every 3 years; or,

(2) Vessels fitted with multiple tailshafts which meet the requirements of subparagraph (1) of this paragraph shall be drawn at least once in every 4 years; or,

(3) Vessels fitted with a single tailshaft, which, in addition to meeting the requirements of subparagraph (1) of this paragraph, have a tailshaft and keyway specifically designed to reduce stress concentrations in accordance with the standards established by the American Bureau of Shipping, shall be drawn at least once in every 4 years: *Provided,* That on each drawing the tailshaft is, in addition to the visual examination, checked by an effective nondestructive testing method from the after edge of the liner to a point one third of the length of the cone from the large end.

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

(d) Where circumstances warrant it, the District Commander may extend the tailshaft drawing interval to the next regular drydocking period, but not to exceed 4 months. When it is shown that a vessel has had a long period of lay up, the Officer in Charge, Marine Inspection, may grant an extension equal to the time the vessel has been laid up, but in no case shall the extension exceed 1 year.

Subpart 61.25—Periodic Tests and Inspections of Nuclear Reactor Power Plants

§ 61.25–1 General standards and requirements.

(a) Tests and inspections of nuclear ships and power plants shall have the objective of insuring that the equipment and structure are in satisfactory condition, and that the ship and power plant can continue to operate with reasonable assurance that the health and safety of the public will not be endangered.

(b) Prior to the annual inspection for certification of a nuclear ship, it must be ascertained that its owner or operator possesses a valid operating license issued by the Atomic Energy Commission. In the case of a ship not yet possessing such a license, the Coast Guard must be

furnished evidence that the Atomic Energy Commission believes that the nuclear aspects of the plant may continue to be operated safely.

(c) A listing of inspection requirements for pressurized water reactors is available from the Commandant.

§ 61.25–5 Special preparations.

(a) When hydrostatic tests are required for a pressure vessel containing radioactive materials, the danger exists of spilling the contents and exposing personnel should the vessel leak or fail.

(b) Before any tests, the ship's health physics personnel shall determine that the level of radioactivity in the system to be tested is at a safe level. Annual hydrostatic tests of pressure vessels may be scheduled throughout the year if the waste disposal schedule makes that practice more feasible. This would be conducted in a manner similar to staggered boiler inspections on vessels having many boilers.

(c) Operating staff should refamiliarize themselves with the emergency methods of decay heat removal to be put into operation so that in the event of a failure of the primary system while under test, adequate decay heat removal may be obtained without delay.

(d) During these inspections, ship owners will provide the marine inspectors with the same radiation monitoring devices and dosage records as provided for the ship's crew working in the same spaces. Marine inspectors will follow the routine procedures as established by the ship or shipyard health physics staff.

PART 62 (RESERVED)

PART 63—CONTROL SYSTEMS FOR AUTOMATIC AUXILIARY HEATING EQUIPMENT

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63.15–35 Unspecified details.
63.15–40 Operating test.

AUTHORITY: The provisions of this Part 63 issued under R.S. 4405, as amended, 4462, as amended, sec. 633, 63 Stat. 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 633, 49 U.S.C. 1655(b); 49 CFR 1.4 (a)(2), (f). R.S. 4417, as amended, 4417a, as amended, 4418, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 391, 391a, 392, 404–409, 411, 412, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 63.01—Scope

§ 63.01–1 General.

(a) Vessels when equipped with automatic auxiliary heating equipment shall be provided with control systems meeting the applicable requirements in this part.

(b) The requirements for control systems for automatic steam boilers, hot water boilers, fluid heaters, and auxiliary heating units are in three independent subparts for convenience and clarity as follows:

(1) *Subpart 63.05, Large Automatic Auxiliary Heating Equipment.* This covers requirements for oil fired units with a fuel rate greater than 3 gallons of fuel per hour (approximately 400,000 B.t.u./hr.).

(2) *Subpart 63.10, Small Automatic Auxiliary Heating Equipment.* This covers requirements for oil fired units with a fuel rate of 3 gallons of fuel per hour (approximately 400,000 B.t.u./hr.) and below.

(3) *Subpart 63.15, Electric Storage Tank Hot Water Supply Boilers.* This covers requirements for units that heat water by means of electric heating elements rated at not more than 600 volts with storage tanks (pressure vessels) which are not open to the atmosphere.

§ 63.01–5 Adoption of standards and specifications.

(a) *General.* As stated in Subpart 50.15 of this subchapter, the standards and specifications specifically referred to in this part shall be the governing requirements for the subject matters covered unless specifically limited, modified or replaced by other regulations in this subchapter.

(b) *American Society for Testing and Materials (ASTM).* The specifications of the American Society for Testing and Materials referenced in this part are adopted and form a part of this subchapter.

(c) *National Bureau of Standards commercial standards (CS).* The commercial standards of the National Bureau of Standards (Commerce Department) referenced in this part are adopted and form a part of this subchapter.

(d) *National Fire Protection Association (NFPA).* The standards and codes of the National Fire Protection Association referenced in this part are adopted and form a part of this subchapter.

(e) *Underwriters' Laboratories, Inc. (UL).* The specifications of the Underwriters' Laboratories, Inc., referenced in this part are adopted and form a part of this subchapter.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

Subpart 63.05—Large Automatic Auxiliary Heating Equipment

§ 63.05–1 Scope.

(a) This subpart covers requirements for the control systems and accessories for automatic steam boilers, hot water boilers, fluid heaters, and similar oil fired units with a fuel rate greater than 3 gallons of fuel per hour (approximately 400,000 B.t.u./hr.).

§ 63.05–5 Plan approval.

(a) Plans shall be submitted for approval prior to the assembly or manufacture of the equipment. Refer to Subpart 50.20 of this subchapter for procedures to follow in submitting plans. Sufficient information shall be submitted to enable determination of compliance with the regulations in this chapter.

(b) The plans submitted shall include:

(1) Specifications or description of the equipment.

(2) General arrangement of the unit with all associated equipment and a parts list identifying each piece by name of manufacturer, drawing number and/or catalog number and material specification.

(c) Schematic diagram of the control system with a written description or a line sequence diagram giving the sequence of events.

(4) Wiring diagrams with bills of material.

(5) Enclosure drawings of cabinets and panels.

(6) Instruction booklets which are required by § 63.05–95.

§ 63.05–15 Construction.

(a) The construction of auxiliary boilers and heating boilers shall meet the applicable requirements as found in Table 54.01–5(a) of this subchapter.

(b) All electrical and mechanical control devices shall be of a type tested and

found satisfactory by a test laboratory acceptable to the Commandant, such as the Underwriters' Laboratories, Inc., Factory Mutual Laboratory, or a recognized inspection board, or shall be specifically approved by the Commandant.

(c) All devices and components shall be designed to perform satisfactorily in marine service. The heating unit and control equipment shall be designed to permit satisfactory operation with a momentary roll of 30° and with a permanent list of 15° and a permanent trim of 5° with the unit installed in the position specified by the manufacturer.

(d) All rotating or moving mechanical and exposed electrical parts shall be protected against accidental contact. All electrical devices shall be enclosed in dripproof or watertight enclosures.

§ 63.05–20 Controls.

(a) Each automatic auxiliary heating unit shall be fitted with the following control systems:

(1) Programing Control System.
(2) Operating Control System.
(3) Flame Safeguard Control System.
(4) Limit Control System.
(5) Combustion Control System.
(6) Fuel Supply Control System.
(7) Ignition System.

(b) Control systems (including relays, switches, and other auxiliary equipment used in conjunction therewith) shall be designed and utilized to prevent unsafe operation of the unit. The control equipment shall be so designed that as far as practicable any failure of this equipment will prevent continued operation and cause the fuel supply to be cut off.

(c) Electrical controls shall be provided to shut down the unit from a position outside the compartment in which it is located, so that fuel will not be supplied to the fuel burning equipment. The entire unit shall be disconnected from all sources of potential by means of one disconnect switch located adjacent to the heating unit.

(d) Mercury tube actuated controls are prohibited.

§ 63.05–25 Programing control system.

(a) The programing control system shall be connected to the combustion control system and the safety interlocks, as required, to provide safe operation upon starting, stopping, and cycling between temperature or pressure limits.

(b) The programing control shall cycle the unit in accordance with a predetermined sequence. The sequence of operation shall include the following:

(1) A prepurge period for a sufficient duration to assure a minimum of four changes of air in the combustion chamber and convecting spaces, but not less than 15 seconds.

(2) Ignition (spark coming on) shall occur only before or simultaneously with the opening of the fuel oil valve and shall remain energized during the trial for ignition period.

(3) A postpurge period of at least 15 seconds after the closing of the fuel valve.

(4) When controls are provided to modulate the air to fuel ratio, the modulating air control shall be opened sufficiently to provide the required prepurge.

(5) For high-low-off and modulating controls, ignition shall occur only when the controls are in the low-fire position.

§ 63.05–30 Operating control system.

(a) Each automatic heating unit shall be equipped with the appurtenances and controls necessary to automatically start, cycle, and stop the unit in response to the demand for heat.

(b) Steam boilers shall be provided with operating controls that will control the fuel supply to the burner so as to maintain the steam pressure within the designed operating range.

(c) Hot water boilers and fluid heaters shall be provided with operating controls that will control the fuel supply to the burner so that the temperature of the water or fluid is maintained within the designed operating range.

(d) Each drum type steam boiler shall be provided with a feed water control system that will automatically supply the required amount of feed water to maintain the proper level or, for boilers without a fixed water level, supply the proper amount to assure proper heat transfer. The system shall provide for filling the boiler when cold.

(e) Fluid heaters shall be provided with a circulating system that will provide a sufficient fluid circulation to ensure adequate heat transfer.

§ 63.05–35 Flame safeguard control system.

(a) The flame safeguard control shall consist of a flame sensing element and associated equipment connected to the programing control to provide for shut down of the unit in the event of ignition failure and flame failure during the firing cycle. The flame safeguard control shall be so designed that the failure of any component will cause a safety shut down and prevent automatic restarting.

(b) The flame safeguard control shall be capable of closing the fuel valves in not more than 4 seconds after a flame failure.

(c) The flame safeguard control shall provide a trial-for-ignition period of not more than 10 seconds during which fuel may be supplied to establish flame. If flame is not established within 10 seconds the fuel supply to the burners shall be immediately shut off automatically. Where a light oil pilot is used the flame safeguard control shall provide a trial-for-ignition period for the pilot of not more than 10 seconds. If flame is not established within 10 seconds the fuel supply to the pilot shall be immediatley shut off automatically.

(d) Whenever the flame safeguard control has operated because of failure of ignition, flame failure, or failure of any component, manual reset of the flame safeguard control shall be required for restart.

(e) Flame safeguard controls of the thermostatic type, such as stack switches and pyrostats operated by means of an open bimetallic helix, are prohibited.

§ 63.05–40 Limit control system.

(a) Limit controls consisting of various control actuators interlocked with the burner circuit to prevent start up, and to cause safety shut down when firing, if unsafe firing conditions exist, shall be provided as specified in this section.

(b) Drum type steam boilers with a fixed water level shall be provided with two low-water cutoffs. They shall prevent startup and shall shut down the burner if the water level is not at or above a minimum safe level. The cutoffs shall operate at different water levels and the lower shall operate when the water surface falls to a level no lower than that visible in the gauge glass.

(1) The upper low-water cutoff may be arranged to operate in conjunction with the operating water level control.

(2) The lower low-water cutoff shall have a connection to a drum nozzle of the boiler independent of the upper low-water cutoff and shall be so arranged that upon operation, both fuel control solenoid valves required by § 63.05–50(a) shall be deenergized. After the lower low-water cutoff functions, the resetting of a manual device shall be required before the boiler can be restarted.

(c) Steam boilers and hot water boilers without a fixed water level shall be provided with a cutout device or the equivalent, which will cut off the fuel supply to the burners in case of interruption of the feed water supply. This device shall be of the manual reset type.

(d) Fluid heaters shall be provided with a low fluid level cutout device or a low flow device to cut off the fuel supply to the burner in case of insufficient rate of fluid flow through the heating coils to ensure proper heat transfer. These devices shall be of the manual reset type.

(e) Fluid heaters shall be provided with a high temperature limit device installed in the fluid outlet that will cut off the fuel supply to the burner if the fluid temperature exceeds the designed maximum operating temperature. This device shall be of the manual reset type.

(f) A draft loss interlock switch shall be provided for units with forced draft. This switch shall prevent startup and shall shut down the burner when air flow is inadequate to support satisfactory combustion.

(g) An oil pressure interlock switch shall be provided to initiate a safety shutdown when the oil pressure to the burner falls below the value required for safe combustion.

(h) A fuel oil temperature limit interlock shall be provided for units designed to burn heavy oil. This interlock shall prevent the unit from being started and shall automatically shut off the fuel oil to the burners if the temperature of the fuel oil at the fuel oil heater outlet falls below the design temperature.

(i) Other interlocks shall be provided to prevent startup and/or cause shutdown of the unit as specified by the manufacturer.

§ 63.05–45 Combustion control system.

(a) A combustion control system shall be provided to insure a satisfactory fuel-to-air ratio under all designed operating conditions.

(1) When the burner is a fixed rate "on-off" type the combustion control system shall insure burner operation at the optimum firing rate by maintaining a fixed mechanical relationship between the area of the air damper opening and the rate of fuel flow to the burner. The air controls shall be manually adjustable in the event a change of the fuel-air ratio is required. For this system the programing control system shall cycle the burner on and off to meet the load demand.

(2) When the burner control is a "high-low-off" system, the combustion controls shall position the air and fuel supply openings for low fire and high fire in order to maintain the preset pressure or temperature as the load demand varies. The fuel control valve (or other suitable metering device) and the draft damper shall be power operated and shall be manually adjustable so as to maintain the proper fuel-air-ratio at both firing rates. A low-fire interlock to insure low-fire start shall be provided (see § 63.05–25(b)(5)).

(3) When the combustion control is a modulating type, the system shall provide a satisfactory fuel-air ratio throughout the range of firing rates. Power operated actuators shall be provided to position the fuel control system and the draft dampers. Means for manually adjusting the air-fuel ratio shall be provided for all firing rates permitted by the burner turn-down ratio. A low-fire interlock to insure low-fire start shall be provided (see § 63.05–25(b)(5)).

§ 63.05–50 Fuel supply control system.

(a) Two fuel control solenoid valves shall be provided in series in the fuel supply line to the burner. The valves shall be connected electrically in parallel so that both operate simultaneously.

(b) In addition to providing the fuel shutoff in case of ignition or flame failure, fuel shutoff shall occur in the event of low water, high steam pressure, high fluid temperature or low flow, inadequate or complete loss of draft, low voltage, low fuel pressure, or other abnormal condition.

§ 63.05–55 Ignition system.

(a) An automatic ignition system shall be provided. Ignition of the fuel oil may be accomplished by high voltage electric spark, high energy electric spark, or light oil pilot. Gas pilots are prohibited.

(b) High-tension transformers shall be rated at not less than 10,000 volts on the secondary side. The ignition transformer shall conform to requirements of Underwriters' Laboratories, Inc., UL 506, Standard for Specialty Transformers.

(c) Ignition cable shall conform to requirements of Underwriters' Laboratories, Inc., UL 814, Standard for Gas-Tube-Sign and Ignition Cable. The cable shall have a voltage rating equal to or greater than the rated secondary voltage of the ignition transformer.

§ 63.05–60 Detail requirements for operating water level controls and low-water cutoff controls.

(a) The requirements of this section apply to boilers having a definite liquid line. Boilers designed to operate with no definite water line will be given special consideration by the Commandant.

(b) Operating level controls and low-water cutoffs may be of the float type, electrode probe type, thermostatic expansion tube, or thermohydraulic type, or such other type acceptable to the Commandant. Float chamber type low-water cutoffs using stuffing boxes to transmit the motion of the float from the chamber to the external switches are prohibited.

(c) Water level controls shall be so located as to minimize the effect of vessel roll and pitch.

(d) Water level devices shall be so constructed that the water inlet valve cannot feed water into the boiler through the float chamber.

(e) The minimum size of pipes connecting a float chamber to a boiler shall be 1 inch. Shutoff valves fitted in connecting piping shall be either outside-screw-and-yoke or lever lifting type gate valves, or stopcocks having levers permanently fastened thereto and marked in line with the passageway, or of such other through construction as to prevent stoppage by deposits of sediment and also constructed to indicate by the position of the operating mechanism whether open or closed. Where stopcocks are used they shall be of a type having the plug held in place by a guard or gland.

(f) No outlet connection except for pressure controls, water columns, drains, or steam gages shall be placed on the float chamber or on the pipes connecting the float chamber to the boiler on which it is mounted.

(g) Float or electrode chambers shall be equipped with a suitable drain connection not less than ¾-inch pipe size.

(h) Float operated water control or cutoff devices shall be so constructed as not to be damaged in case of water levels above or below the intended operating and cutoff levels.

§ 63.05–65 Fuel pumps.

(a) Fuel pumps shall conform to requirements of Underwriters' Laboratories, Inc., UL 343, Standard for Pumps for Oil-Burning Appliances.

§ 63.05–70 Strainers.

(a) Duplex fuel oil strainers, single strainers of the self-cleaning type or single strainers fitted with a bypass shall be installed in the supply line to the fuel oil pump.

(b) The strainers shall conform to requirements for strainers in Underwriters' Laboratories, Inc., UL 296, Standard for Oil Burners and the requirements of Part 56 of this subchapter for fluid conditioner fittings.

§ 63.05–75 Fuel oil.

(a) The burner shall be so designed to burn one or more of the five grades of hydrocarbon oil, as defined by the National Bureau of Standards, Commerce Department, commercial standard, CS–12, Specification for Fuel Oil, or American Society for Testing Material standard ASTM–D396, Specifications for Fuel Oils. In either specification the term "light oil" refers to Grade Nos. 1, 2, and 4, and the term "heavy oil" refers to Grade Nos. 5 and 6.

(b) Where heavy fuel is used a thermostatically controlled electric oil heater shall be furnished.

§ 63.05–80 Alarms.

(a) For steam boilers, operation of the lower low-water cutoff shall cause an audible alarm to be automatically sounded. A visible indicator shall show that the shutdown was caused by low water.

(b) If shutdown is due to the flame safety system, an audible alarm shall be automatically sounded. A visible indicator shall show that shutdown was caused by the flame safety system.

(c) Means shall be provided to silence the audible alarm. The visible indicators shall be designed so that manual reset is required.

§ 63.05–85 Wiring of electrical components.

(a) All wiring shall be in accordance with Subchapter J (Electrical Engineering) of this chapter or Underwriters' Laboratories, Inc., Standard for Oil Burners, UL 296.

(b) Electric cable shall be of the type specified by § 111.60–1(d)(1) of Subchapter J (Electrical Engineering) of this chapter for damp or wet locations or National Electrical Code moisture resistant type or other type approved by the Commandant. Cable shall be rated for the maximum temperature that will be encountered after installation.

(c) All conductors shall be stranded and not smaller than No. 18 AWG.

(d) Wire sizes and overcurrent protection shall be in accordance with the applicable requirements of Subchapter J (Electrical Engineering) of this chapter or the National Electrical Code.

(e) Conduit or other suitable mechanical protection shall be provided where cable is liable to damage. All conduit runs shall be adequately drained.

§ 63.05–90 Inspection and tests.

(a) Each heating unit shall be carefully examined by a marine inspector to determine compliance with the regulations and approved drawings. This inspection shall be made while the unit is under construction in accordance with Part 52 or Part 53 of this subchapter as applicable.

(b) An operating test after installation shall be conducted to insure that all the control components have been properly installed and that all parts of the boiler, including controls and safety devices, are in satisfactory operating condition.

(1) *Flame safeguard.* The operation of the flame safeguard system shall be verified by causing flame and ignition failures. Operation of the audible alarm and visible indicator shall be verified. The

shutdown times shall be verified by stopwatch.

(2) *Limit controls.* Shutdown due to the operation of the limit controls shall be verified.

(i) *Water level controls.* Water level controls shall be tested by slowly lowering the water level in the boiler. The operating water level controls and the upper and lower low-water cutoff shall be tested individually. The operation of the audible alarm and visible indicator associated with the lower low-water cutoff shall be verified. The manual reset device shall be tested after operation of the lower low-water cutoff.

(ii) *Water flow controls.* Steam boilers and water heaters without water level controls shall have the feed water flow limit device tested by interrupting the feed water supply. Manual reset shall be required prior to restarting the unit.

(iii) *Fluid heater flow and level controls.* The level limits and flow controls shall be tested in the same manner as the boiler tests in subparagraph (2) and subdivision (ii) of this paragraph (b).

(iv) *Fluid heater high temperature.* The fluid temperature limit shall cut off the fuel to the burner when the fluid temperature at the heater outlet exceeds the designed maximum operating temperature. Manual reset shall be required prior to restarting the unit.

(v) *Draft limit control.* The draft loss interlock switch shall be tested by stopping the blower motor or blocking the draft opening. It shall be determined that this switch will operate to prevent startup and cause shutdown of the burner in case of inadequate air supply to the burner.

(vi) *Oil pressure limit control.* The lowering of the fuel oil pressure below the value required for safe combustion shall initiate a safety shutdown.

(vii) *Fuel oil temperature limit control.* (Units designed to burn heavy oil). The lowering of the fuel oil temperature below the designed temperature shall initiate a safety shutdown and prevent startup.

(viii) *Other interlocks.* Other interlocks provided shall be tested for proper operation as specified by the unit manufacturer.

(3) *Combustion controls.* The combustion control shall be stable and operate smoothly.

(4) *Programing controls.* Programing controls shall be verified as controlling and cycling the unit in the intended manner. Proper prepurge, ignition, postpurge, and modulation shall be verified. A stopwatch shall be used for verifying intervals of time.

(5) *Fuel supply controls.* The satisfactory operation of the two fuel control solenoid valves for all conditions of operation and shutdown shall be verified.

(6) *Low voltage test.* A low voltage test shall be conducted to satisfactorily demonstrate that the fuel supply to the burners will be automatically shut off before any boiler malfunction results from the reduced voltage.

(7) *Switches.* All switches shall be tested to verify proper operations.

§ 63.05–95 Instruction booklets.

(a) Prior to the issuance of final approval of the boiler(s) one (1) copy of the instruction booklet shall be submitted for approval. It shall provide a full description of the heating unit and all auxiliaries and complete instructions for installation and operation of the unit.

Subpart 63.10—Small Automatic Auxiliary Heating Equipment

§ 63.10–1 Scope.

(a) This subpart covers requirements for the control systems and accessories for small automatic steam boilers, hot water boilers, fluid heaters, and similar oil fired units with a fuel rate of 3 gallons of fuel per hour (approximately 400,000 B.t.u./hr.) or less.

§ 63.10–5 Plan approval.

(a) Plans shall be submitted for approval prior to the assembly or manufacture of the equipment. (Refer to Subpart 50.20 of this subchapter for procedures to follow in submitting plans.) Sufficient information shall be submitted to enable determination of compliance with the requirements of this and other parts of this chapter.

(b) The plans submitted shall include:

(1) Specifications or a description of the equipment.

(2) General arrangement of the unit with all associated equipment and a parts list identifying each piece by name of manufacturer, drawing number and/or catalog number, and material specification.

(3) Schematic diagram of the control system with a written description or a line sequence diagram giving the sequence of events.

(4) Wiring diagrams with bills of material.

(5) Enclosure drawings of cabinets and panels.

§ 63.10–15 Construction.

(a) The construction of auxiliary heating units shall meet the applicable requirements as found in Table 54.01–5 (a) of this subchapter.

(b) All electrical and mechanical control devices shall be of a type tested and approved by a test laboratory acceptable to the Commandant, such as the Underwriters' Laboratories, Inc., Factory Mutual Laboratory, or a recognized inspection board, or shall be specifically approved by the Commandant.

(c) All devices and components shall be designed to perform satisfactorily in marine service. The heating unit and control equipment shall be designed to permit satisfactory operation with a momentary roll of 30° and with a permanent list of 15° and a permanent trim of 5° with the unit installed in the position specified by the manufacturer.

(d) All electrical devices shall be enclosed in dripproof or watertight enclosures. All rotating or moving mechanical and exposed electrical parts shall be protected against accidental contact.

§ 63.10–20 Controls, general.

(a) The entire unit shall be disconnected from all sources of potential by means of one disconnect switch located near the heating unit.

(b) Mercury tube actuated controls are prohibited.

(c) A prepurge period of sufficient duration to assure at least four changes of air in the combustion chamber and stack, but not less than 15 seconds shall be provided. Ignition shall occur only before or simultaneously with the opening of the fuel oil valve.

(d) Each heating unit shall be provided with the following control system when applicable:

(1) Operating Control System.
(2) Flame Safeguard Control System.
(3) Limit Control System.
(4) Combustion Control System.
(5) Fuel Supply Control System.
(6) Ignition System.

§ 63.10–30 Operating control system.

(a) Each automatic heating unit shall be equipped with the appurtenances and controls necessary to automatically start, cycle, and stop the unit in response to the demand for heat.

(b) Steam boilers shall be provided with operating controls that will control the fuel supply to the burner so as to maintain the steam pressure within the designed operating range.

(c) Hot water boilers and fluid heaters shall be provided with operating controls that will control the fuel supply to the burner so that the temperature of the water or fluid is maintained within the designed operating range.

(d) Each drum type steam boiler shall be provided with a feed water control system that will automatically supply the required amount of feed water to maintain the proper level or, for boilers without a fixed water level, supply the proper amount to assure proper heat transfer. The system shall provide for filling the boiler when cold.

(e) Fluid heaters shall be provided with a circulating system that will provide a sufficient fluid circulation to ensure adequate heat transfer.

§ 63.10–35 Flame safeguard control system.

(a) The flame safeguard control shall consist of a flame or heat sensing element and associated equipment so arranged to provide for the shutoff of the fuel supply to the burner in the event of ignition failure and flame failure during the firing cycle.

(b) The flame safeguard control shall provide a trial-for-ignition period of not more than 90 seconds during which time fuel may be supplied to establish flame. If flame is not established within 90 seconds the fuel supply to the burners shall be shut off.

(c) After trial-for-ignition the flame safeguard control shall supervise the main flame. In case the flame fails during the firing cycle, the flame safeguard shall cause the fuel supply to the burners to be cut off within 90 seconds.

§ 63.10–40 Limit control systems.

(a) Boilers with a fixed water level shall be provided with a low-water cutout that will cut off the fuel supply to the burner if the water level drops to an unsafe level. This device shall be of the manual reset type.

(b) Steam boilers and hot water boilers without a fixed liquid level shall be provided with a cutout device, or the equivalent, which will cut off the fuel supply to the burners in case of interruption of the feed water supply. This device shall be of the manual reset type.

(c) Fluid heaters shall be provided with a low fluid level cutout device or a low flow device to cut off the fuel supply to the burner in case of insufficient fluid level or rate of fluid flow to insure proper heat transfer. These devices shall be of the manual reset type.

(d) Fluid heaters shall be provided with a high temperature limit device installed in the fluid outlet that will cut off the fuel supply to the burner if the fluid temperature exceeds the designed maximum operating temperature. This device shall be of the manual reset type.

(e) Other limits necessary to prevent unsafe operation shall be provided to prevent startup and to cause shutdown of the burner as specified by the manufacturer.

§ 63.10–45 Combustion control system.

(a) A combustion control system shall be provided to insure a satisfactory fuel-to-air ratio under all designed operating conditions. The combustion controls shall insure burner operation at the optimum firing rate by maintaining a fixed mechanical relationship between the area of the air opening and the rate of fuel flow to the burner. The air controls shall be manually adjustable.

(b) For other combustion arrangements such as "high-low-off" or the modulating type, the applicable requirements of § 63.05–45 shall be met.

§ 63.10–50 Fuel supply control system.

(a) Means shall be provided to supply fuel at the optimum pressure to the burner.

(b) A fuel control solenoid valve shall be provided in the fuel supply line to the burner. The valve shall cut off the fuel to the burner in case of ignition failure, flame failure, and low water, or in the case of fluid heaters high fluid temperature, low flow or low level.

§ 63.10–55 Ignition system.

(a) An automatic ignition system shall be provided. Ignition of the fuel oil may be accomplished by high voltage electric spark, high energy electric spark, or light oil pilot. Gas pilots are prohibited.

(b) High-tension transformers shall be rated at not less than 10,000 volts on the secondary side. The ignition transformer shall conform to requirements of Underwriters' Laboratories, Inc., UL 506, Standard for Specialty Transformers.

(c) Ignition cable shall conform to requirements of Underwriters' Laboratories, Inc., UL 814, Standard for Gas-Tube-Sign and Ignition Cable. The cable shall have a voltage rating equal to or greater than the rated secondary voltage of the ignition transformer.

§ 63.10–60 Detail requirements for operating water level controls and low-water cutoff controls.

(a) The requirements of this section apply to boilers having a definite liquid line. Boilers designed to operate with no definite water line will be given special consideration by the Commandant.

(b) Operating level controls and low-water cutoffs may be of the float type, electrode probe type, thermostatic expansion tube, or thermohydraulic type, or such other type acceptable to the Commandant. Float chamber type low-water cutoffs using stuffing boxes to transmit the motion of the float from the chamber to the external switches are prohibited.

(c) Water level controls shall be so located as to minimize the effect of vessel roll and pitch.

(d) Water level devices shall be so constructed that the water inlet valve cannot feed water into the boiler through the float chamber.

(e) The minimum size of pipes connecting a float chamber to a boiler shall be 1 inch. Shutoff valves fitted in connecting piping shall be either outside-screw-and-yoke or lever lifting type gate valves, or stopcocks having levers permanently fastened thereto and marked in line with the passageway, or of such other through construction as to prevent stoppage by deposits of sediment and also constructed to indicate by the position of the operating mechanism whether open or closed. Where stopcocks are used they shall be of a type having the plug held in place by a guard or gland.

(f) No outlet connection except for pressure controls, water columns, drains, or steam gauges shall be placed on the float chamber or on the pipes connecting the float chamber to the boiler on which it is mounted.

(g) Float or electrode chambers shall be equipped with a suitable drain connection not less than ¾-inch pipe size.

(h) Float operated water control or cutoff devices shall be so constructed as not to be damaged in case of water levels above or below the intended operating and cutoff levels.

§ 63.10–65 Fuel pumps.

(a) Fuel pumps shall conform to the requirements of Underwriters' Laboratories, Inc., UL 343, Standard for Pumps for Oil Burning Appliances.

§ 63.10–70 Strainers.

(a) Duplex fuel oil strainers, single strainers of the self-cleaning type or single strainers fitted with a bypass shall be installed in the supply line to the fuel oil pump.

(b) The strainers shall conform to requirements for strainers in Underwriters' Laboratories, Inc., UL 296, Standard for Oil Burners and the requirements of Part 56 of this subchapter for fluid conditioner fittings.

§ 63.10–75 Fuel oil.

(a) The burner shall be designed to burn one or more of the three light oil grades of hydrocarbon oil, as defined by the National Bureau of Standards, Commerce Department, commercial standard, CS–12, Specification for Fuel Oil, or American Society for Testing Materials standard ASTM–D396, Specifications for Fuel Oils. In either specification the term "light oil" refers to Grade Nos. 1, 2, and 4.

§ 63.10–80 Alarms.

(a) Operation of the low-water cutoff shall cause a visible indicator to show that the shutdown was caused by low water.

(b) If shutdown is due to the flame safety system, a visible indicator shall show that shutdown was caused by the flame safety system.

§ 63.10–85 Wiring of electrical components.

(a) All wiring shall be in accordance with Subchapter J (Electrical Engineering) of this chapter or Underwriters' Laboratories, Inc., Standard for Oil Burners, UL 296.

(b) Electric cable shall be of the type specified by § 111.60–1(d)(1) of Subchapter J, of this chapter, for damp or wet locations or National Electrical Code moisture resistant type or other type approved by the Commandant. Cable shall be rated for the maximum temperature that will be encountered after installation.

(c) All conductors shall be stranded and not smaller than No. 18 AWG.

(d) Wire sizes and overcurrent protection shall be in accordance with the applicable requirements of Subchapter J, of this chapter or the National Electrical Code.

(e) Conduit shall be provided where cable is liable to damage. All conduit runs shall be adequately drained.

§ 63.10–90 Inspection and tests.

(a) Each heating unit shall be carefully examined by a marine inspector to determine compliance with the regulations and approved drawings.

(b) An operating test after installation shall be conducted to insure that all the control components have been properly installed and that all parts of the boiler, including controls and safety devices, are in satisfactory operating condition.

(1) *Flame safeguard.* The operation of the flame safeguard system shall be verified by simulating flame and ignition failures. Operation of the audible alarm and visible indicator shall be verified. The shutdown times shall be verified by stopwatch.

(2) *Limit and miscellaneous controls.* Boiler shutdown due to the operation of boiler limit controls and miscellaneous control devices shall be verified.

(i) *Water level controls.* Water level controls shall be tested by slowly lowering the water level in the boiler. The operating water level controls and low-water cutoffs shall be tested individually. The operation of the visible indicator

associated with the low-water cutoff shall be verified.

(3) *Combustion controls.* The combustion controls shall provide smooth light-off and stable operation.

(4) *Fuel supply controls.* The satisfactory operation of the fuel control solenoid valves for all conditions of operation and shutdown shall be verified.

Subpart 63.15—Electric Storage Tank Hot Water Supply Boilers (Heaters)

§ 63.15–1 Scope.

(a) This subpart covers requirements for units that heat water by means of electric heating elements rated at not more than 600 volts with storage tanks (pressure vessels) which are not open to the atmosphere.

§ 63.15–5 Plan approval.

(a) Except for electric water supply boilers listed by Underwriters Laboratories as meeting UL 174, plans shall be submitted for approval prior to the assembly or manufacture of the equipment. (Refer to Subpart 50.20 of this subchapter for procedures to follow in submitting plans.) Sufficient information shall be submitted to enable determination of compliance with the regulations of this and other parts of this chapter.

(b) The plans submitted shall include:

(1) Specifications or a description of the equipment.

(2) General arrangement of the unit with all associated equipment and a parts list identifying each piece by name of manufacturer, drawing number and/or catalog number, and material specification.

(3) Schematic diagram of the control system.

(4) Wiring diagram with bill of material.

(5) Enclosure drawings of cabinets and panels.

§ 63.15–10 Construction.

(a) The storage tank shall be constructed in accordance with the applicable requirements of Part 52 or Part 53 of this subchapter as applicable. See § 53.01–10(b) of this subchapter for possible exception.

(b) Electric hot-water supply boilers shall be marked where plainly visible with the name of the manufacturer, the catalog number or the equivalent, the water capacity, and the electrical ratings of each heating element. If two or more heating elements are provided, the maximum wattage or current consumption shall be indicated.

(c) The hot-water outlet and cold-water inlet shall be marked so as to be easily identified.

§ 63.15–15 Heating elements.

(a) Heating elements shall be of a type that are insulated electrically from the water being heated. Heating elements shall be supported in a substantial and reliable manner and shall be protected against mechanical injury and contact with outside objects. A wrap-around element shall be so secured in place as to be prevented from loosening.

§ 63.15–20 Temperature regulating controls.

(a) Each heating element shall be so controlled by means of a suitable thermostat that the water will not attain a temperature of more than 90° C. (194° F.).

§ 63.15–25 Temperature limiting controls.

(a) Electric hot water supply boilers shall be provided with a temperature limiting device, in addition to and separate from the temperature regulating devices, that will prevent the water in the upper 25 percent of the tank from attaining a temperature higher than 99° C. (210° F.). This temperature limiting means:

(1) Shall be a manually reset device;

(2) Shall be trip-free from the operating means;

(3) Shall open all power supply conductors to the heater; and,

(4) Shall be readily accessible.

§ 63.15–30 Pressure relief device.

(a) A suitable pressure relief valve shall be provided which will operate to relieve the pressure in the water tank to prevent a pressure rise of more than 3 pounds per square inch above the maximum allowable working pressure with the heating elements operating at the maximum rating, continuously.

§ 63.15–35 Unspecified details.

(a) Unspecified details such as electric supply connections, wiring terminals, and wiring shall be in accordance with Underwriters' Laboratories, Inc., Standard UL–174—Electric Storage Tank Water Heaters.

§ 63.15–40 Operating test.

(a) For electric water heaters listed by Underwriters' Laboratories, Inc., the heating element, temperature regulating controls, and temperature limiting controls shall be considered as acceptable and no further testing will be required. The pressure relief valve shall be tested as required by Part 52 or by Part 53 of this subchapter as applicable.

(b) For heaters not listed by Underwriters' Laboratories, Inc., all operating, limit, and safety devices and controls shall be tested by the marine inspector. Such tests may be conducted at the factory or aboard the vessel after installation. The pressure relief valve shall be tested as required by Part 52 or Part 53 of this subchapter as applicable.

SUBCHAPTER G [RESERVED]

Subchapter G—Marine Engineering Installations Contracted for prior to July 1, 1935, consisting of Parts 66 to 69, inclusive, is deleted from Chapter I of Title 46 of the Code of Federal Regulations effective January 1, 1969. (See Part 50 in Subchapter F (Marine Engineering) for applicability of requirements to existing installations.) At the option of persons affected these requirements may be used until July 1, 1969.

(R.S. 4405, as amended, 4462, as amended; 46 U.S.C. 375, 416)

PART 66 [DELETED]

The provisions of Part 66—*General,* consisting of §§ 66.01–1 to 66.35–25, inclusive, are deleted effective January 1, 1969.

PART 67 [DELETED]

The provisions of Part 67—*Construction,* consisting of §§ 67.01–1 to 67.55–5, inclusive, are deleted effective January 1, 1969.

PART 68 [DELETED]

The provisions of Part 68—*Piping Systems,* consisting of §§ 68.01–1 to 68.05–40, inclusive, are deleted effective January 1, 1969.

PART 69 [DELETED]

The provisions of Part 69—*Installations, Tests, Inspections, and Repairs,* consisting of §§ 69.01–1 to 69.10–1, inclusive, are deleted effective January 1, 1969.

SUBCHAPTER H—PASSENGER VESSELS

PART 70—GENERAL PROVISIONS

Subpart 70.05—Application

1. Subpart 70.05 is amended by inserting a new § 70.05–12 reading as follows:

§ 70.05–12 Application to vessels concerning nuclear energy.

(a) Pertinent definitions are in § 70.10–30.

(b) Special provisions for "nuclear vessels" are in Part 79 of this subchapter.

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

(d) The regulations covering pressure containing portions of nuclear power systems are in Part 55 of Subchapter F (Marine Engineering) of this chapter. See § 56.04–20 of Subchapter F (Marine Engineering) of this chapter for nuclear piping. See Subpart 61.25 of Subchapter F (Marine Engineering) of this chapter for requirements regarding periodic tests and inspections of nuclear reactor power plants.

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2))

Subpart 70.10—Definition of Terms Used in This Subchapter

2. Section 70.10–30 is amended to read as follows:

§ 70.10–30 Nuclear energy, radioactive material, and nuclear vessel.

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

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

(c) The term "nuclear vessel" means any vessel in which power for propulsion, or for any other purpose, is derived from nuclear energy; or any vessel handling

or processing substantial amounts of radioactive material other than as cargo.

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2))

Subpart 70.20—General Marine Engineering Requirements

§ 70.20–5 [Deleted]

3. Section 70.20–5 *Nuclear vessels* is deleted.

(R.S. 4405, as amended, 4462, as amended; 46 U.S.C. 375, 416)

PART 71—INSPECTION AND CERTIFICATION

Subpart 71.01—Certificate of Inspection

1. Section 71.01–10 is revised to read as follows:

§ 71.01–10 Period of validity.

(a) Certificates of inspection will be issued for a period of 1 year, except for those vessels subject only to the Act of May 10, 1956 (46 U.S.C. 390–390g), when the certificates will be issued for a period of 3 years. Application may be made by the master, owner, or agent for inspection and issuance of a new certificate of inspection at any time within the period of validity of the current certificate. For nuclear vessels see also § 79.10–1 of this subchapter.

(b) Certificates of inspection may be revoked or suspended by the Coast Guard where such process is authorized by law. This may occur if the vessel does not meet the requirements of law or regulations in this chapter or if there is a failure to maintain the safety requirements requisite to the issuance of a certificate of inspection.

(R.S. 4472, as amended, sec. 2, 23 Stat. 118, as amended, secs. 2, 633, 63 Stat. 496, 545; 46 U.S.C. 170, 2, 14 U.S.C. 2, 633)

Subpart 71.20—Initial Inspection

2. Paragraph (b) of § 71.20–15 is amended to read as follows:

§ 71.20–15 Scope of inspections.

* * * * *

(b) For nuclear vessels, the inspections required by this section shall be made except insofar as they may be limited by the presence of radiation. In addition, the inspection shall include any special preoperational tests and inspections prescribed by the Atomic Energy Commission in its operating license, by the nuclear plant operating procedures, or by the vessel's Safety Assessment. See Part 79 of this subchapter.

(R.S. 4472, as amended, sec. 2, 23 Stat. 118, as amended, secs. 2, 633, 63 Stat. 496, 545; 46 U.S.C. 170, 2, 14 U.S.C. 2, 633)

Subpart 71.25—Annual Inspection

3. Paragraph (b) of § 71.25–10 is amended to read as follows:

§ 71.25–10 Scope of inspections.

* * * * *

(b) For nuclear vessels, the inspections required by this section shall be made except insofar as they may be limited by the presence of radiation. See also Subpart 79.10 of this subchapter.

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4418, as amended, 4421, as amended, 4426, as amended, 4433, as amended, 4453, as amended, 4488, as amended, 4490, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, sec. 5, 49 Stat. 1384, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 392, 399, 404, 411, 435, 481, 482, 489, 366, 395, 363, 369, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.)

PART 78—OPERATIONS

Subpart 78.17—Tests, Drills, and Inspections

§ 78.17–75 [Amended]

Paragraph (a) of § 78.17–75 *Requirements for fuel oil* is amended by changing the phrase from "flashpoint (closed cup test)" to "flashpoint (Pensky-Martens Closed Cup Method, ASTM–D93)."

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2))

Subchapter H of Chapter I is amended by adding a new Part 79 reading as follows:

PART 79—SPECIAL CONSTRUCTION, ARRANGEMENT, AND OTHER PROVISIONS FOR NUCLEAR VESSELS

Subpart 79.01—Application

Sec.
79.01–1 General.

Subpart 79.05—Design and Construction

79.05–1 Special requirements.
79.05–5 Subdivision and stability.
79.05–10 Location of nuclear system components.

Subpart 79.10—Inspection and Certification

79.10–1 Annual inspection and certification required.
79.10–5 Additional requirements.
79.10–15 International Convention certification.

Subpart 79.15—Other Special Provisions

79.15–1 Radiation.
79.15–3 Means for preventing uncontrolled release of radiation.
79.15–5 Atomic Energy Commission safety requirements.
79.15–10 Safety Assessment.

Subpart 79.20—Operations

79.20–1 Operating Manual.
79.20–5 Special operating procedures.

AUTHORITY: The provisions of this Part 79 issued under R.S. 4405, as amended, 4462, as amended, sec. 2, 23 Stat. 118, as amended, secs. 2, 633, 63 Stat. 496, 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 2, 14 U.S.C. 2, 633, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2), (f). R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4418, as amended, 4421, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4453, as amended, 4472, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, sec. 5, 49 Stat. 1384, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 392, 399, 404–409, 411, 412, 435, 170, 481, 489, 366, 395, 363, 369, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 79.01—Application

§ 79.01–1 General.

(a) The provisions of this part shall apply to all installations, systems, and components thereof, utilizing nuclear energy for propulsion or for any other purpose. They shall include vessels handling substantial quantities of radioactive materials other than cargo.

Subpart 79.05—Design and Construction

§ 79.05–1 Special requirements.

(a) The features described in this section shall be provided in nuclear vessels regardless of length or gross tonnage.

(b) A temporary and final source of emergency power, as required for oceangoing passenger vessels over 1,600 gross tons, shall be provided to insure an uninterrupted power supply to nuclear instrumentation, control, and safety systems. For applicable requirements see § 112.05–5(a) of Subchapter J (Electrical Engineering) of this chapter.

(c) Bilge system arrangements, as required for self-propelled oceangoing passenger vessels over 300 feet, shall be provided. For applicable requirements see §§ 56.50–50 and 56.50–55 of Subchapter F (Marine Engineering) of this chapter.

(d) In addition to the other requirements of Subpart 72.05 of this subchapter, the boundary bulkheads and decks separating the reactor compartment, other compartments containing vital primary system equipment, nuclear chemistry laboratories, and reactor control spaces from accommodations, galley, main pantries, and machinery spaces requiring fixed type extinguishing systems shall be of A–60 construction. For definition of Class A–60 construction, see Subpart 72.05 of this subchapter.

§ 79.05–5 Subdivision and stability.

(a) Watertight subdivision and damage stability requirements shall satisfy the requirements of Part 73 of this subchapter but in no case shall this be less than a two-compartment standard.

(b) A full double bottom shall be provided, regardless of the actual length of the vessel, as required by Subpart 73.25 of this subchapter for vessels over 249 feet in length.

(c) In assessing stability, direct calculations shall be utilized which take into account the form and proportions of the hull. The details of such calculations shall be in accordance with the provisions of Parts 73 and 74 of this subchapter except that subdivision and damage stability calculations will be based on the most severe permeability assumptions applicable to each compartment, having regard for its actual use.

§ 79.05–10 Location of nuclear system components.

(a) The location of the nuclear system components in the vessel and the manner in which they are supported shall be approved by the Commandant. In determining the location and the necessary structural support and protection required, the effects of grounding, collision, or other mishap resulting in holing of the vessel shall be considered.

(b) Reactor installations, including all potentially vulnerable primary system components, shall be placed as far inboard from the shell as practicable. Generally, the installation shall be situated inboard of a vertical surface perpendicular to the waterplane. The vertical surface shall be located at a minimum distance (measured at right angles to the centerline at the deepest loadline) inboard of the shell equal to one-fifth of the extreme breadth of the vessel. If the installation extends outboard of this vertical surface, special consideration shall be given to collision protection.

(c) Reactor installations shall be located a reasonable height above the ship's bottom, but in no case shall this height be less than the required double bottom height. Waste storage tanks and engineered safeguard systems may be permitted in the double bottom space if specifically approved by the Commandant. Consideration shall be given to collision-analysis statistics with regard to the longitudinal (fore and aft) location of the reactor installation.

Subpart 79.10—Inspection and Certification

§ 79.10–1 Annual inspection and certification required.

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

(b) Every nuclear vessel found to be in compliance with applicable requirements in this subchapter will be issued a certificate of inspection in accordance with Part 71 of this subchapter.

§ 79.10–5 Additional requirements.

(a) In addition to the requirements for inspection, test, overhaul and repair specified in this subchapter, nuclear vessels may be subject to such additional requirements as may be prescribed by the Commandant for inspection, test, overhaul and repair. For applicable requirements see Subpart 61.25 of Subchapter F (Marine Engineering) of this chapter.

(b) A prerequisite for annual recertification of the vessel will be a valid Atomic Energy Commission's facility operating license, or, if nonlicensed, a certificate from the Atomic Energy Commission stating that the nuclear installation complies with the requirements of the Commission.

§ 79.10–15 International convention certification.

(a) For applicable requirements governing Safety of Life at Sea Convention certificates see §§ 71.75–5, 71.75–10(c), and 71.75–20(c) of this subchapter.

Subpart 79.15—Other Special Provisions

§ 79.15–1 Radiation.

(a) The vessel shall be so designed, constructed and operated that no unreasonable hazard of radiation at sea or in port for crew, food, water supply, passengers, public, or waterways exists.

(b) The Atomic Energy Commission's Standards for Protection Against Radiation, set forth in 10 CFR Part 20, will be the radiation protection standards followed by the U.S. Coast Guard, except as otherwise provided for by law.

§ 79.15–3 Means for preventing uncontrolled release of radiation.

(a) The vessel's nuclear systems, including all components thereof, shall be provided with means for preventing the uncontrolled release of hazardous amounts of radioactive material to normally accessible spaces on the ship or to the ship's environment in the event of accident or malfunction of any such system.

§ 79.15–5 Atomic Energy Commission safety requirements.

(a) Before a Coast Guard certificate of inspection for a nuclear vessel will be issued, it must be shown that the nuclear system meets the safety requirements of the Atomic Energy Commission. After facility licensing, possession of a valid AEC license will attest to this fact. Prior to this licensing, a letter from the Commission to the Coast Guard with assurance that the system does meet the safety requirements of the Atomic Energy Commission is required.

§ 79.15–10 Safety Assessment.

(a) A Safety Assessment shall be prepared to permit evaluation of the nuclear power plant and safety of the ship, and to insure that there are no unreasonable radiation or other hazards, at sea or in port, to the crew, passengers or public, or to the waterways or food or water resources.

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

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

Subpart 79.20—Operations

§ 79.20–1 Operating Manual.

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

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

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

§ 79.20–5 Special operating procedures.

(a) In addition to the requirements specified in this chapter, all nuclear vessels may be subject to additional requirements governing fueling, startup, and operation.

SUBCHAPTER I—CARGO AND MISCELLANEOUS VESSELS

PART 90—GENERAL PROVISIONS

Subpart 90.05—Application

1. Subpart 90.05 is amended by inserting a new § 90.05–35 reading as follows:

§ 90.05–35 Application to vessels concerning nuclear energy.

(a) Pertinent definitions are in § 90.10–24.

(b) Special provisions for "nuclear vessels" are in Part 99 of this subchapter.

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

(d) The regulations covering pressure containing portions of nuclear power systems are in Part 55 of Subchapter F (Marine Engineering) of this chapter. See § 56.04–20 of Subchapter F (Marine Engineering) of this chapter for nuclear piping. See Subpart 61.25 of Subchapter F (Marine Engineering) of this chapter for requirements regarding periodic tests and inspections of nuclear reactor power plants.

Subpart 90.10—Definition of Terms Used in This Subchapter

2. Section 90.10–24 is amended to read as follows:

§ 90.10–24 Nuclear energy, radioactive material, and nuclear vessel.

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

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

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

Subpart 90.20—General Marine Engineering Requirements

§ 90.20–5 [Deleted]

3. Section 90.20–5 *Nuclear vessels* is deleted.

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2))

PART 91—INSPECTION AND CERTIFICATION

Subpart 91.01—Certificate of Inspection

1. Paragraph (a) of § 91.01–10 is amended to read as follows:

§ 91.01–10 Period of validity.

(a) Certificates of inspection will be issued for periods of either 1 or 2 years. For nuclear vessels it shall be for a period of 1 year; see also § 99.10–1 of this subchapter. Application may be made by the master, owner, or agent for inspection and issuance of a new certificate of inspection at any time during the period of validity of the current certificate. For nuclear vessels see Part 99 of this subchapter.

* * * * *

(R.S. 4472, as amended, sec. 2, 23 Stat. 118, as amended, secs. 2, 633, 63 Stat. 496, 545; 46 U.S.C. 170, 2, 14 U.S.C. 2, 633)

Subpart 91.20—Initial Inspection

2. Paragraph (c) of § 91.20–15 is amended to read as follows:

§ 91.20–15 Scope of inspection.

* * * * *

(c) For nuclear vessels, the inspections required by this section shall be made except insofar as they may be limited by the presence of radiation. In addition, the inspection shall include any special preoperational tests and inspections prescribed by the Atomic Energy Commission in its operating license, by the nuclear plant operating procedures, or by the vessel's Safety Assessment. See Part 99 of this subchapter.

(R.S. 4472, as amended, sec. 2, 23 Stat. 118, as amended, secs. 2, 633, 63 Stat. 496, 545; 46 U.S.C. 170, 2, 14 U.S.C. 2, 633)

Subpart 91.25—Inspection for Certification

3. Paragraph (b) of § 91.25–10 is amended to read as follows:

§ 91.25–10 Scope of inspection.

* * * * *

(b) For nuclear vessels, the inspections required by this section shall be made except insofar as they may be limited by the presence of radiation. See also Subpart 99.10 of this subchapter.

* * * * *

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4418, as amended, 4426, as amended, 4427, as amended, 4433, as amended, 4453, as amended, 4488, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 392, 404, 405, 411, 435, 481, 366, 395, 363, 367, 526p, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.)

PART 97—OPERATIONS

Subpart 97.15—Tests, Drills, and Inspections

§ 97.15–55 [Amended]

Paragraph (a) of § 97.15–55 *Requirements for fuel oil* is amended by changing the phrase from "flashpoint (closed cup test)" to "flashpoint (Pensky-Martens Closed Cup Method, ASTM–D93)."

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2))

PART 98—SPECIAL CONSTRUCTION, ARRANGEMENT, AND PROVISIONS FOR CERTAIN DANGEROUS CARGOES IN BULK

Subpart 98.01—Application

1. Section 98.01–5 is amended by adding a new paragraph (e) reading as follows:

§ 98.01–5 Effective date.

* * * * *

(e) The provisions regarding marine engineering in §§ 98.05–5(d), 98.05–50(b), 98.10–15(b), 98.15–15(b), 98.18–15(b), 98.20–10(a), 98.20–15(a), 98.20–40(a), 98.20–45 (a) and (c), 98.20–65(a), 98.25–10(a), 98.25–15(a), 98.25–40(a), and 98.25–55(a) shall be in effect on and after January 1, 1969, for new construction and major repairs or alterations. Those items and markings which are in use on vessels, previously approved by the Commandant but not complying with the latest 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.

Subpart 98.05—Elemental Phosphorus in Water in Bulk

2. Section 98.05–5(d) is amended to read as follows:

§ 98.05–5 Types of cargo tanks.

* * * * *

(d) Where a water displacement method of discharge is used, pressure-vessel type cargo tanks, designed and tested in accordance with Part 54 of Subchapter F (Marine Engineering) of this chapter shall be employed. Such tanks shall be designed for the maximum pressure to which they may be subjected when water pressure is used to discharge the cargo.

3. Section 98.05–50(b) is amended to read as follows:

§ 98.05–50 General requirements.

* * * * *

(b) Materials used in cargo piping systems shall meet the requirements of § 56.60–1 of Subchapter F (Marine Engineering) of this chapter. Cargo piping shall be of steel or wrought iron. Flanges and pipe fittings shall be of steel or malleable iron. Valves shall be of steel or bronze.

* * * * *

Subpart 98.10—Sulfuric Acid in Bulk

4. Section 98.10–15(b) is amended to read as follows:

§ 98.10–15 Pressure-vessel type cargo tanks.

* * * * *

(b) Pressure-vessel type cargo tanks shall be designed as Class II or Class III welded cylindrical pressure vessels, inspected and tested as required by Part 54 of Subchapter F (Marine Engineering) of this chapter.

* * * * *

Subpart 98.15—Hydrochloric Acid in Bulk

5. Section 98.15–15(b) is amended to read as follows:

§ 98.15–15 Pressure-vessel type cargo tanks.

* * * * *

(b) Pressure-vessel type cargo tanks shall be designed as Class II or Class III welded cylindrical pressure vessels, inspected and tested as required by Part 54 of Subchapter F (Marine Engineering) of this chapter.

* * * * *

Subpart 98.18—Phosphoric Acid in Bulk

6. Section 98.18–15(b) is amended to read as follows:

§ 98.18–15 Pressure-vessel type cargo tanks.

* * * * *

(b) Pressure-vessel type cargo tanks shall be designed as Class II or Class III welded cylindrical pressure vessels, inspected and tested as required by Part 54 of Subchapter F (Marine Engineering) of this chapter.

* * * * *

Subpart 98.20—Liquid Chlorine in Bulk

7. Section 98.20–10(a) is amended to read as follows:

§ 98.20–10 Design and construction of cargo tanks.

(a) The cargo tanks shall meet the requirements of Class I or I–L welded pressure vessels and shall be fabricated, inspected, and tested in accordance with the applicable requirements of Part 54 of Subchapter F (Marine Engineering) of this chapter.

* * * * *

8. Section 98.20–15(a) is amended to read as follows:

§ 98.20–15 Markings.

(a) Cargo tanks shall be marked in accordance with the requirements of

§ 54.10–20 of Subchapter F (Marine Engineering) of this chapter.

* * * * *

9. Section 98.20–40(a) is amended to read as follows:

§ 98.20–40 Cargo piping.

(a) Piping shall be of seamless steel meeting the requirements of § 56.60–1 of Subchapter F (Marine Engineering) of this chapter. The piping shall be of not less than Schedule 80 thickness.

* * * * *

10. Section 98.20–45 is amended by revoking paragraph (d), redesignating paragraphs (e) and (f) as paragraphs (d) and (e), respectively, and by amending paragraphs (a) and (c) so that this revised section reads as follows:

§ 98.20–45 Safety relief valves.

(a) Each tank shall be fitted with one or more approved safety relief valves, designed, constructed, and flow tested for capacity in conformance with Subpart 162.018 in Subchapter Q (Specifications) of this chapter.

(b) Each safety relief valve shall be set to pop at a pressure not in excess of the maximum allowable pressure of the tank and shall be vaportight at a pressure of not less than 80 percent of the maximum allowable pressure.

(c) The minimum rates of discharge of the safety relief valves shall be as given in § 54.15–25 of Subchapter F (Marine Engineering) of this chapter.

(d) Safety relief valve(s) shall be attached to the tank near the highest point of the vapor space. Shutoff valves shall not be installed between the tanks and the safety relief valve(s).

(e) Each safety relief valve shall be tested in the presence of a marine inspector before or after mounting prior to being placed in service. The test shall prove that the safety valve will start to discharge at a pressure not in excess of the maximum allowable pressure of the tank. (For periodic tests see § 98.20–75 (c).)

11. Section 98.20–65(a) is amended to read as follows:

§ 98.20–65 Cargo hose.

(a) Cargo hose fabricated of Schedule 80 seamless pipe meeting the requirements of § 56.60–1 of Subchapter F (Marine Engineering) of this chapter and not subject to deterioration by chlorine, having metallic flexible joints, or other types of flexible metallic hose acceptable to the Commandant, shall be fitted to the liquid or vapor lines during filling and discharging of the cargo tanks.

* * * * *

Subpart 98.25—Anhydrous Ammonia in Bulk

12. Section 98.25–10(a) is amended to read as follows:

§ 98.25–10 Design and construction of cargo tanks.

(a) The cargo tanks shall meet the requirements for Class I, I–L, II, or II–L welded pressure vessels and shall be fabricated, inspected, and tested in accordance with the applicable requirements of Part 54 of Subchapter F (Marine Engineering) of this chapter.

* * * * *

13. Section 98.25–15(a) is amended to read as follows:

§ 98.25–15 Markings.

(a) Cargo tanks shall be marked in accordance with the requirements of § 54.10–20 of Subchapter F (Marine Engineering) of this chapter.

* * * * *

14. Section 98.25–40(a) is amended to read as follows:

§ 98.25–40 Valves, fittings, and accessories.

(a) All valves, flanges, fittings and accessory equipment shall be of a type suitable for use with anhydrous ammonia and shall be made of steel, or malleable or nodular iron meeting the requirements of § 56.60–1 of Subchapter F (Marine Engineering) of this chapter. Valves shall be fitted with noncorrosive material suitable for ammonia service. Valves, flanges, and pipe fittings shall be of the square or round tongue and groove type or raised-face, United States of America Standard 300-pound standard minimum, fitted with suitable soft gasket material. Welded fittings shall be used wherever possible and the number of pipe joints shall be held to a minimum. Screwed joints are not permitted for pipe diameters exceeding 2 inches. Nonferrous materials, such as copper, copper alloys and aluminum alloys, shall not be used in the construction of valves, fittings or accessory equipment. Brazed joints are prohibited.

* * * * *

15. Section 98.25–55(a) is amended to read as follows:

§ 98.25–55 Cargo piping.

(a) Piping shall be of seamless steel meeting the requirements of § 56.60–1 of Subchapter F (Marine Engineering) of this chapter. The piping shall be of not less than Schedule 40 thickness. In case of piping on the discharge side of the liquid pumps or vapor compressors, the design shall be for a pressure of not less than the pump or compressor relief valve setting; or if the piping is not fitted with relief valves, the design pressure shall not be less than the total discharge head of the pump or compressor.

* * * * *

16. Section 98.25–60 is amended by revoking paragraphs (c) and (d), and by redesignating paragraphs (e) and (f) as paragraphs (c) and (d), respectively, so that this revised section reads as follows:

§ 98.25–60 Safety relief valves.

(a) Each tank shall be fitted with two or more approved safety relief valves, designed, constructed, and flow-tested for capacity in conformance with Subpart 162.018 of Subchapter Q (Specifications) of this chapter.

(b) Each safety relief valve shall start to discharge at a pressure not in excess of the design pressure of the tank.

(c) Safety relief valves shall be attached to the tank near the highest point of the vapor space. Shutoff valves shall not be installed between the tanks and the safety relief valves, except manifolds for mounting multiple safety relief valves may be fitted with acceptable interlocking three-way valves so arranged at all times as to permit at any position of the three-way valve, an unrestricted flow of vapors through at least one port. When two safety relief valves are mounted in parallel on both the upper outlets of the three-way valve, the arrangement shall be such as to permit at least one safety relief valve to be operative at all times.

(d) Each safety valve shall be tested in the presence of a marine inspector at the site of installation before or after mounting prior to being placed in service. The tests shall prove that the safety relief valve will start to discharge at a pressure not in excess of the maximum allowable pressure of the tank.

Subpart 98.30 [Revoked]

17. Subpart 98.30—*Nuclear Energy*, consisting of § 98.30–1, is revoked. (See Part 99 in this subchapter for applicable requirements.)

(R.S. 4405, as amended, 4462, as amended, 4472, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 170, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). R.S. 4417a, as amended, 4488, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 391a, 481, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.)

Subchapter I of Chapter I is amended by adding a new Part 99 reading as follows:

PART 99—SPECIAL CONSTRUCTION, ARRANGEMENT, AND OTHER PROVISIONS FOR NUCLEAR VESSELS

Subpart 99.01—Application

Sec.
99.01–1 General.

Subpart 99.05—Design and Construction

99.05–1 Special requirements.
99.05–5 Subdivision and stability.
99.05–10 Location of nuclear system components.

Subpart 99.10—Inspection and Certification

99.10–1 Annual inspection and certification required.
99.10–5 Additional requirements.
99.10–15 International Convention certification.

Subpart 99.15—Other Special Provisions

99.15–1 Radiation.
99.15–3 Means for preventing uncontrolled release of radiation.
99.15–5 Atomic Energy Commission safety requirements.
99.15–10 Safety Assessment.

Subpart 99.20—Operations

99.20–1 Operating Manual.
99.20–5 Special operating procedures.

AUTHORITY: The provisions of this Part 99 issued under R.S. 4405, as amended, 4462, as amended, sec. 2, 23 Stat. 118, as amended, secs. 2, 633, 63 Stat. 496, 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 2, 14 U.S.C.

2, 633, 49 U.S.C. 1655(b); 49 CFR 1.4 (a)(2), (f). R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4417a, as amended, 4418, as amended, 4421, as amended, 4426–4431, as amended, 4433, as amended, 4434, as amended, 4453, as amended, 4472, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 391a, 392, 399, 404–409, 411, 412, 435, 170, 481, 489, 366, 395, 363, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp., unless otherwise noted.

Subpart 99.01—Application

§ 99.01–1 General.

(a) The provisions of this part shall apply to all installations, systems, and components thereof, utilizing nuclear energy for propulsion or for any other purpose. They shall include vessels handling substantial quantities of radioactive materials other than cargo.

Subpart 99.05—Design and Construction

§ 99.05–1 Special requirements.

(a) The features described in this section shall be provided in nuclear vessels regardless of length or gross tonnage.

(b) A temporary and final source of emergency power, as required for oceangoing passenger vessels over 1,600 gross tons, shall be provided to insure an uninterrupted power supply to nuclear instrumentation, control, and safety systems. For applicable requirements see § 112.05–5(a) of Subchapter J (Electrical Engineering) of this chapter.

(c) Bilge system arrangements, as required for self-propelled oceangoing passenger vessels over 300 feet, shall be provided. For applicable requirements see §§ 56.50–50 and 56.50–55 of Subchapter F (Marine Engineering) of this chapter.

(d) The boundary bulkheads and decks separating the reactor compartment, other compartments containing vital primary system equipment, nuclear chemistry laboratories, and reactor control spaces from accommodations, galley, main pantries, and machinery spaces requiring fixed type extinguishing systems shall be of A–60 construction. For definition of Class A–60 construction, see Subpart 72.05 of Subchapter H (Passenger Vessels) of this chapter.

(e) The provisions of Subpart 92.07 of this subchapter shall apply to all vessels regardless of gross tonnage.

§ 99.05–5 Subdivision and stability.

(a) Watertight subdivision and damage stability requirements shall satisfy not less than a two-compartment standard. Whenever practicable they should be at least equivalent to that required for a conventionally powered oceangoing passenger vessel of similar size, capacity, and tonnage.

(b) A full double bottom shall be provided, regardless of the actual length of the vessel, as required by Subpart 73.25 of Subchapter H (Passenger Vessels) of this chapter for vessels over 249 feet in length.

(c) In assessing stability, direct calculations shall be utilized which take into account the form and proportions of the hull. The details of such calculations shall be in accordance with the provisions of Parts 73 and 74 of Subchapter H (Passenger Vessels) of this chapter except that subdivision and damage stability calculations will be based on the most severe permeability assumptions applicable to each compartment, having regard for its actual use.

§ 99.05–10 Location of nuclear system components.

(a) The location of the nuclear system components in the vessel and the manner in which they are supported shall be approved by the Commandant. In determining the location and the necessary structural support and protection required, the effects of grounding, collision or other mishap resulting in holing of the vessel shall be considered.

(b) Reactor installations, including all potentially vulnerable primary system components, shall be placed as far inboard from the shell as practicable. Generally, the installation shall be situated inboard of a vertical surface perpendicular to the waterplane. The vertical surface shall be located at a minimum distance (measured at right angles to the centerline at the deepest loadline) inboard of the shell equal to one-fifth of the extreme breadth of the vessel. If the installation extends outboard of this vertical surface, special consideration shall be given to collision protection.

(c) Reactor installations shall be located a reasonable height above the ship's bottom, but in no case shall this height be less than the required double bottom height. Waste storage tanks and engineered safeguard systems may be permitted in the double bottom space if specifically approved by the Commandant. Consideration shall be given to collision-analysis statistics with regard to the longitudinal (fore and aft) location of the reactor installation.

Subpart 99.10—Inspection and Certification

§ 99.10–1 Annual inspection and certification required.

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

(b) Every nuclear vessel found to be in compliance with applicable requirements in this subchapter will be issued a certificate of inspection in accordance with Part 91 of this subchapter.

§ 99.10–5 Additional requirements.

(a) In addition to the requirements for inspection, test, overhaul and repair specified in this subchapter, nuclear vessels may be subject to such additional requirements as may be prescribed by the Commandant for inspection, test, overhaul and repair. For applicable requirements see Subpart 61.25 of Subchapter F (Marine Engineering) of this chapter.

(b) A prerequisite for annual recertification of the vessel will be a valid Atomic Energy Commission's facility operating license, or if nonlicensed a certificate from the Atomic Energy Commission stating that the nuclear installation complies with the requirements of the Commission.

§ 99.10–15 International Convention certification.

(a) For applicable requirements governing Safety of Life at Sea Convention certificates see §§ 91.60–30, 91.60–35, and 91.60–40(e) of this subchapter.

Subpart 99.15—Other Special Provisions

§ 99.15–1 Radiation.

(a) The vessel shall be so designed, constructed, and operated that no unreasonable hazard of radiation at sea or in port for crew, food, water supply, passengers, public, or waterways exists.

(b) The Atomic Energy Commission's Standards for Protection Against Radiation, set forth in 10 CFR Part 20, will be the radiation protection standards followed by the U.S. Coast Guard, except as otherwise provided for by law.

§ 99.15–3 Means for preventing uncontrolled release of radiation.

(a) The vessel's nuclear systems, including all components thereof, shall be provided with means for preventing the uncontrolled release of hazardous amounts of radioactive material to normally accessible spaces on the ship or to the ship's environment in the event of accident or malfunction of any such system.

§ 99.15–5 Atomic Energy Commission safety requirements.

(a) Before a Coast Guard certificate of inspection for a nuclear vessel will be issued, it must be shown that the nuclear system meets the safety requirements of the Atomic Energy Commission. After facility licensing, possession of a valid AEC license will attest to this fact. Prior to this licensing, a letter from the Commission to the Coast Guard with assurance that the system does meet the safety requirements of the Atomic Energy Commission is required.

§ 99.15–10 Safety Assessment.

(a) A Safety Assessment shall be prepared to permit evaluation of the nuclear power plant and safety of the ship, and to ensure that there are no unreasonable radiation or other hazards, at sea or in port, to the crew, passengers or public, or to the waterways or food or water resources.

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

(c) The Safety Assessment will be used as a basis for establishing orderly negotiations between the United States and governments of countries which a nuclear vessel intends to visit to permit

entry of nuclear ships into ports of different countries.

Subpart 99.20—Operations

§ 99.20–1 Operating Manual.

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

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

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

§ 99.20–5 Special operating procedures.

(a) In addition to the requirements specified in this chapter, all nuclear vessels may be subject to additional requirements governing fueling, startup, and operation.

SUBCHAPTER J—ELECTRICAL ENGINEERING

PART 110—GENERAL PROVISIONS

Subpart 110.15—Definition of Terms Used in This Subchapter

Section 110.15–128 is amended to read as follows:

§ 110.15–128 Nuclear energy, radioactive material, and nuclear vessel.

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

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

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

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4417a, as amended, 4418, as amended, 4421, as amended, 4426, as amended, 4427, as amended, 4433, as amended, 4453, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, sec. 5, 49 Stat. 1384, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 391a, 392, 399, 404, 405, 411, 435, 481, 489, 366, 395, 363, 369, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.)

PART 111—ELECTRICAL SYSTEM; GENERAL REQUIREMENTS

Subpart 111.50—Distribution and Circuit Loads

Section 111.50–5(e) is amended to read as follows:

§ 111.50–5 Ship's service power circuits.

* * * * *

(e) *Remote shutdown requirements.* Machinery driving forced and induced draft fans, fuel oil transfer pumps, fuel oil unit and service pumps, and other similar fuel pumps, shall be fitted with remote controls from a readily accessible position outside of the space concerned so that they may be stopped in the event of fire occurring in the compartment in which they are located. These controls shall be suitably protected against accidental operation or tampering, and shall be suitably marked. All passenger ships on an international voyage, regardless of the date of construction, shall comply with the requirements of this paragraph. Refer to § 58.01–25(a) of Subchapter F (Marine Engineering) of this chapter.

* * * * *

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). R.S. 4399, as amended, 4400, as amended, 4417, as amended, 4417a, as amended, 4418, as amended, 4421, as amended, 4426, as amended, 4427, as amended, 4433, as amended, 4453, as amended, 4488, as amended, 4491, as amended, sec. 14, 29 Stat. 690, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, sec. 5, 49 Stat. 1384, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 361, 362, 391, 391a, 392, 399, 404, 405, 411, 435, 481, 489, 366, 395, 363, 369, 367, 526p, 1333, 390b, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.)

SUBCHAPTER Q—SPECIFICATIONS

PART 162—ENGINEERING EQUIPMENT

1. The authority citation for Part 162 is amended to read as follows:

AUTHORITY: The provisions of this Part 162 issued under R.S. 4405, as amended, 4462, as amended, secs. 2, 633, 63 Stat. 496, 545, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 14 U.S.C. 2, 633, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2), (f), unless otherwise noted.

2. Subpart 162.001, consisting of §§ 162.001–1 to 162.001–6, inclusive, is revised in its entirety to read as follows:

Subpart 162.001—Safety Valves (Steam Service in Excess of 30 Pounds Per Square Inch Gage)

Sec.

162.001–1 Applicable specifications, and referenced material.
162.001–2 Scope.
162.001–3 Materials.
162.001–4 Construction, adjustment and testing.
162.001–5 Marking.
162.001–6 Procedure for approval.

AUTHORITY NOTE: The provisions of this Subpart 162.001 issued under R.S. 4417a, as amended, 4418, as amended, 4426, as amended, 4433, as amended, 4488, as amended, 4491, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 391a, 392, 404, 411, 481, 489, 367, 1333, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.

§ 162.001–1 Applicable specifications, and referenced material.

(a) There are no other specifications applicable to this subpart except as noted in this subpart.

(b) The following referenced material from industry standards of the issue in effect on the date safety valves are manufactured shall form a part of the regulations of this subpart (see §§ 2.75–17 through 2.75–19 of Subchapter A (Procedures Applicable to the Public) and Subpart 50.15 of Subchapter F (Marine Engineering) of this chapter):

(1) ASME (American Society of Mechanical Engineers) Code (see § 50.15–5 of Subchapter F (Marine Engineering) of this chapter): The following paragraphs from section I of the ASME Code:

(i) PG–67 through PG–72, design, construction, adjustments, and tests, see § 162.001–4(a).

(ii) PG–71, drains, see § 162.001–4(f).

(iii) PG–110, markings, see § 162.001–5(a).

(iv) PG–69, tests, see § 162.001–6(c).

(c) A copy of this specification and the referenced material listed in this section shall be kept on file by the manufacturer, together with the approved plans, specifications and certificate of approval. It is the manufacturer's responsibility to have the latest issue, including addenda and changes, of the referenced material on hand when manufacturing equipment under this subpart.

(1) The ASME Code may be obtained from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 162.001–2 Scope.

(a) This specification covers requirements for the design, construction and testing of spring loaded safety valves intended for use on main boilers, class A nuclear vessels, unfired steam generators and auxiliary boilers designed for pressures in excess of 30 pounds per square inch and installed on merchant vessels subject to inspection by the Coast Guard. Other types of valves may be utilized where permitted by the applicable parts of Subchapter F of this chapter and shall meet the requirements of this subpart as appropriate.

§ 162.001–3 Materials.

(a) The materials used in the manufacture of safety valves shall conform to the applicable requirements of Subchapter F (Marine Engineering) of this chapter except as otherwise specified in this subpart.

(b) Safety valve bodies may be made of carbon or alloy forged or cast steel or cast bronze or of such other equivalent material as may be approved by the Commandant.

(c) Internal parts shall be made of materials possessing corrosion and heat resisting qualities suitable for the service conditions to which they will be subjected.

(d) Springs used in safety valves shall be of the best quality spring steel consistent with the design of the valve and the service requirement. Heat-resistant alloy-steel springs shall be used on valves intended for superheated steam service above 650° F.

(e) Bonnet or yoke material of spring loaded safety valves when subject to temperatures exceeding 900° F. shall be made of material having low thermal expansion properties, or a cooling spool shall be provided to reduce the temperature between the valve body and the bonnet assembly.

(f) Cast iron is prohibited in the construction of any part of the safety valve except in caps or lifting bars. When used for these parts the elongation shall be at least 5 percent in a 2-inch gauge length.

(g) Nonmetallic material is prohibited in the construction of safety valve pressure parts except for gaskets and packing.

§ 162.001–4 Construction, adjustment and testing.

(a) Safety valves shall be designed, constructed, adjusted and tested in accordance with PG–67 through PG–72 of the ASME Code section 1 except as indicated in this subpart and § 52.01–120 of Subchapter F (Marine Engineering) of this chapter.

(b) Safety valve inlet diameters shall be not less than 1½ inches nor more than 4 inches. Safety valves shall have bolted flanged inlets. Welding end inlets may be authorized by the Commandant.

(c) Springs shall be so constructed that the disc can lift from its seat to a height not less than 25 percent greater than the rated capacity lift of the valve before the coils are closed or before there is other interference. Whenever lift stops are used by the manufacturer for the purpose of preventing overlift they shall permit the full rated capacity lift plus a minimum tolerance of one sixty-fourth inch.

(d) Springs of safety valves shall be of the exposed spring type when the temperature of the steam exceeds 450° F. Exposed springs shall be enclosed in a ventilated metal housing preferably of the louver type or perforated with holes not exceeding three-sixteenths inch in diameter and sealed to prevent tampering.

(e) If the operating conditions of a valve are changed so as to require a new spring for a different pressure, the valve shall be adjusted by the manufacturer or his authorized representative who shall furnish and install a new nameplate as required under § 162.001–5.

(f) Safety valves from 1½ inch through 2 inch size shall be tapped for not less than ¼-inch size drain located below the level of the seat. Safety valves larger than 2 inch size shall be tapped in accordance with PG–71 of the ASME Code.

(g) (1) All safety valves for use on boilers, superheaters, class A nuclear vessels, and steam generators in the secondary side of nuclear power systems shall be supplied with gags or clamps for holding the disc on its seat when blowdown adjustments and hydrostatic tests are being made. Gagging a safety valve by means of a set screw through the cap or by screwing down the compression or adjusting screw to hold the valve on its seat is prohibited.

(2) Safety valves for use on unfired steam generators except for the secondary side of nuclear power systems, are not required to be fitted with gags or clamps.

(h) Safety valves shall be constructed so that shocks detrimental to the valve or boiler are not produced when lifting or closing.

(i) After the valve is set and adjusted, the tolerance in popping and reseating pressures shall not vary more than plus or minus 1 percent for saturated steam and 1½ percent for superheated steam service.

(j) The design of the huddling device shall be such that its adjustment will remain symmetrical with the axis of the valve and shall include a suitable stop for fixing such device after adjustment is made.

§ 162.001–5 Marking.

(a) Each safety valve shall be marked by the manufacturer in accordance with PG–110 of the ASME Code except that the ASME symbol may be omitted.

(b) The official Coast Guard approval number shall be marked on each valve in addition to the data required in § 162.001–5(a). The minimum wording for showing the approval number shall be "USCG 162.001/**" or "USCG 162.001–**".

§ 162.001–6 Procedure for approval.

(a) *General.* Safety valves intended for use as defined shall be approved by the Commandant (MMT), U.S. Coast Guard, Washington, D.C. 20591.

(b) *Plan submission.* Manufacturers desiring to secure approval of a new design or type of safety valve shall submit clear design drawings in triplicate with the material specifications of the component parts. In the event the design is changed, amended drawings shall be submitted to the Commandant for reapproval.

(c) *Preapproval tests.* Before approval is granted, manufacturers shall have flow tests conducted in accordance with PG–69 of the ASME Code. The manufacturer shall submit evidence that such tests have been conducted, in the form of certification of ASME Capacities by the National Board of Boiler & Pressure Vessel Inspectors, or by submitting a copy of flow test report ASME Form P–1, and a table of relieving capacities for each size of valve for which approval is required. Such data shall be forwarded to the Commandant with plan submission.

**Number to be assigned by the Commandant.

Subpart 162.012—Safety Valves (Steam Service Not in Excess of 30 Pounds Per Square Inch Gage)

3. The heading of Subpart 162.012 is amended to read "Safety Valves (Steam Service Not in Excess of 30 Pounds Per Square Inch Gage)", as set forth above.

4. The authority note for Subpart 162.012 is amended to read as follows:

AUTHORITY NOTE: The provisions of this Subpart 162.012 issued under R.S. 4417a, as amended, 4418, as amended, 4426, as amended, 4433, as amended, 4488, as amended, 4491, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 391a, 392, 404, 411, 481, 489, 367, 1333, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.

5. Section 162.012–1 is amended to read as follows:

§ 162.012–1 Applicable specifications, and referenced material.

(a) There are no other specifications applicable to this subpart except as noted in this subpart.

(b) The following referenced material from industry standards of the issue in effect on the date safety valves are manufactured shall form a part of the regulations of this subpart (see §§ 2.75–17 through 2.75–19 of Subchapter A (Procedures Applicable to the Public) and Subpart 50.15 of Subchapter F (Marine Engineering) of this chapter):

(1) ASME (American Society of Mechanical Engineers) Code (see § 50.15–5 of Subchapter F (Marine Engineering) of this chapter): The following paragraph from section IV of the ASME Code:

(i) HG–402, flow tests, see §§ 162.012–6(c) and 162.012–7(c).

(c) A copy of this specification and the referenced material listed in this section shall be kept on file by the manufacturer, together with the approved plans, specifications and certificate of approval. It is the manufacturer's responsibility to have the latest issue, including addenda and changes, of the referenced material on hand when manufacturing equipment under this subpart.

(1) The ASME Code may be obtained from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

6. Section 162.012–2 is amended to read as follows:

§ 162.012–2 Scope.

This specification covers requirements for the design, construction and testing of spring loaded safety valves intended for use on steam heating boilers and unfired steam generators designed for pressures not exceeding 30 pounds per square inch and installed on merchant vessels subject to inspection by the Coast Guard.

7. Section 162.012–5 is amended to read as follows:

§ 162.012–5 Marking.

(a) Each safety valve shall be plainly marked by the manufacturer in such a way that the markings will not be obliterated in service. The markings may be stamped or cast on the valve body or stamped or cast on a plate securely fastened to the body, and shall contain the following information:

(1) The name or identifying trademark of the manufacturer.

(2) Manufacturer's design or type number.

(3) Size _____ inches. (The pipe size of the valve inlet.)

(4) Set pressure _____ p.s.i.

(5) Rated capacity _____ pounds per hour.

(6) Coast Guard approval number. The minimum wording shall be "USCG 162.012/**" or "USCG 162.012–**".

8. Section 162.012–6 is amended to read as follows:

§ 162.012–6 Flow rating tests.

(a) The maximum rated capacity of safety valves shall be determined by actual steam flow at the following pressures:

(1) For set pressures not exceeding 15 pounds per square inch, at 5 pounds per square inch over the set pressure.

(2) For set pressures exceeding 15 pounds per square inch, at 3 percent over the set pressure.

(b) Tests shall be made to determine the lift, popping and blowdown pressures, and the capacity of at least three valves each of three representative sizes of each design and type.

(c) Flow tests shall be conducted in accordance with paragraph HG–402 of section IV of the ASME Code.

9. Section 162.012–7 is amended to read as follows:

§ 162.012–7 Procedure for approval.

(a) *General.* Safety valves intended for use on heating boilers and unfired steam generators installed on vessels subject to Coast Guard inspection shall be approved by the Commandant (MMT), U.S. Coast Guard, Washington, D.C. 20591.

(b) *Plan submittal.* Manufacturers desiring to secure approval of a new design or type of safety valve shall submit drawings in triplicate clearly showing the design, together with material specifications of the components. In the event the design is changed after receiving initial approval, amended drawings shall be submitted to the Commandant for reapproval.

(c) *Preapproval tests.* (1) Before approval is granted, manufacturers shall have flow tests conducted in accordance with § 162.012–6. The manufacturer shall submit evidence that such tests have been conducted in the form of Certification of ASME Capacities by the National Board of Boiler and Pressure Vessel Inspectors, or by submitting a copy of flow test report ASME Form H–1, and a table of relieving capacities for each size valve for which approval is required. Such data shall be forwarded to the Commandant with plan submission.

(2) Reports of conducted tests on designs of safety valves different from those previously approved shall be submitted by the manufacturer when requesting approval for different designs.

Subpart 162.013—Relief Valves (Hot Water Heating and Hot Water Supply Boilers)

10. The heading of Subpart 162.013 is amended to read "Relief Valves (Hot Water Heating and Hot Water Supply Boilers)", as set forth above.

11. The authority note for Subpart 162.013 is amended to read as follows:

AUTHORITY NOTE: The provisions of this Subpart 162.013 issued under R.S. 4417a, as amended, 4418, as amended, 4426, as amended, 4433, as amended, 4488, as amended, 4491, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 391a, 392, 404, 411, 481, 489, 367, 1333, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.

12. Section 162.013–1 is amended to read as follows:

§ 162.013–1 Applicable specifications, and referenced material.

(a) There are no other specifications applicable to this subpart except as noted in this subpart.

(b) The following referenced material from industry standards of the issue in effect on the date relief valves are manufactured shall form a part of the regulations of this subpart (see §§ 2.75–17 through 2.75–19 of Subchapter A (Procedures Applicable to the Public) and Subpart 50.15 of Subchapter F (Marine Engineering) of this chapter):

(1) ASME (American Society of Mechanical Engineers) Code (see § 50.15–5 of Subchapter F (Marine Engineering) of this chapter): The following paragraph from section IV of the ASME Code:

(i) HG–402, flow tests, see §§ 162.013–6(c) and 162.013–7(c).

(c) A copy of this specification and the referenced material listed in this section shall be kept on file by the manufacturer, together with the approved plans, specifications and certificate of approval. It is the manufacturer's responsibility to have the latest issue, including addenda and changes, of the referenced material on hand when manufacturing equipment under this subpart.

(1) The ASME Code may be obtained from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

13. Section 162.013–2 is amended to read as follows:

§ 162.013–2 Scope.

(a) This specification covers requirements for the design, construction and testing of relief valves on hot water heating and hot water supply boilers designed for pressure not exceeding 30 pounds per square inch and installed on merchant vessels subject to inspection by the Coast Guard.

14. Section 162.013–5 is amended to read as follows:

§ 162.013–5 Marking.

(a) Each relief valve shall be plainly marked in such a way that the markings will not be obliterated in service. The markings may be stamped or cast on the valve body or stamped or cast on a plate securely fastened to the body, and shall contain the following information:

(1) The name or identifying trademark of the manufacturer.

(2) Manufacturer's design or type number.

(3) Size _____ inches. (The nominal pipe size of the valve inlet.)

(4) Set pressure _____ p.s.i.

(5) Rated capacity _____ B.t.u. per hour.

(6) Coast Guard approval number. The minimum wording shall be "USCG 162.013/**" or "USCG 162.013–**".

15. Section 162.013–6 is amended to read as follows:

§ 162.013–6 Flow rating tests.

(a) The maximum rated capacity of relief valves shall be determined by actual steam flow at a pressure of 10 percent over the set pressure but not less than 3 pounds per square inch. The tests shall be made with steam, and in a manner closely approximating actual operating conditions of steam boilers. For determining the B.t.u. discharge capacity of relief valves for hot water boilers, the weight of steam in pounds per hour shall be multiplied by 1,000.

(b) For relief valves with metallic discs, tests shall be made to determine the popping and blowdown pressures, and capacity of at least three valves each of three representative sizes of each design or type.

(c) Flow tests shall be conducted in accordance with paragraph HG–402 of section IV of the ASME Code.

16. Section 162.013–7 is amended to read as follows:

§ 162.013–7 Procedure for approval.

(a) *General.* Relief valves for use on hot water heating and hot water supply boilers installed on vessels subject to Coast Guard inspection shall be approved by the Commandant (MMT), U.S. Coast Guard, Washington, D.C. 20591.

(b) *Plan submittal.* Manufacturers desiring to secure approval of a new design or type of relief valve shall submit drawings in triplicate clearly showing the design of same together with material specifications of the component

**Number to be assigned by the Commandant.

**Number to be assigned by the Commandant.

parts. In the event the design is changed, amended drawings shall be submitted to the Commandant for reapproval.

(c) *Preapproval tests.* (1) Before approval is granted, manufacturers of relief valves shall have flow tests conducted in accordance with § 162.013–6. The manufacturer shall submit evidence that such tests have been conducted in the form of certification of ASME Capacities by the National Board of Boiler and Pressure Vessel inspectors, or by submitting a copy of the flow test report, ASME form H–1 and a table of relieving capacities for each valve for which approval is requested. Such data shall be forwarded to the Commandant with plan submission.

(2) Reports of conducted tests on designs of relief valves different from those previously approved shall be submitted by the manufacturer when requesting approval for different designs.

Subpart 162.014—Fusible Plugs for Merchant Vessels

17. The authority note for Subpart 162.014 is amended to read as follows:

AUTHORITY NOTE: The provisions of this Subpart 162.014 issued under R.S. 4417a, as amended, 4418, as amended, 4426, as amended, 4433, as amended, 4488, as amended, 4491, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 3, 54 Stat. 347, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 391a, 392, 404, 411, 481, 489, 367, 1333, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.

18. Section 162.014–1 is amended to read as follows:

§ 162.014–1 Applicable specifications, and referenced material.

(a) *Specifications.* The following specifications, of the issue in effect on the date fusible plugs are manufactured, shall form a part of the regulations of this subpart (see §§ 2.75–17 through 2.75–19 of Subchapter A (Procedures Applicable to the Public) and Subpart 50.15 of Subchapter F (Marine Engineering) of this chapter:

(1) ASTM (American Society for Testing and Materials) standard specifications (see § 50.15–15 of Subchapter F (Marine Engineering) of this subchapter.)

B–61, Specification for steam or valve bronze castings.
B–143, Specification for tin-bronze and leaded tin-bronze sand castings.

(b) *Copies on file.* A copy of this specification and the referenced material listed in this section shall be kept on file by the manufacturer, together with copies of letters of acceptance issued by the Coast Guard for heats of fusible plugs meeting Coast Guard requirements.

(1) The ASTM specifications may be obtained from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19108.

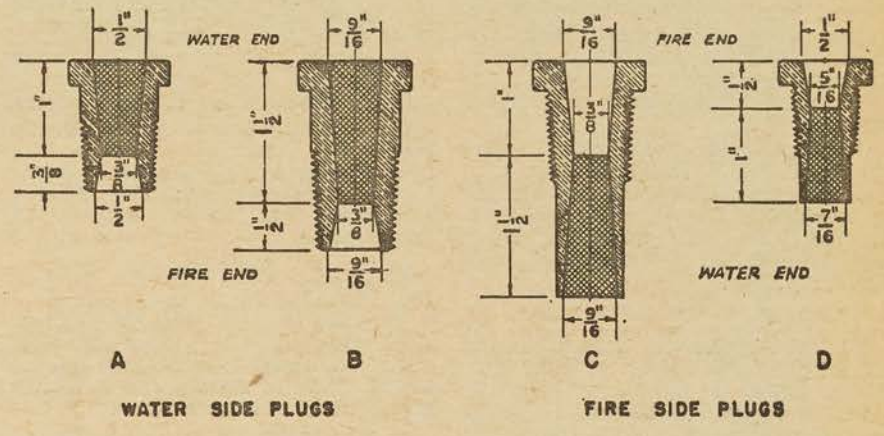
(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

19. Section 162.014–5(a) is amended to read as follows:

§ 162.014–5 Construction and workmanship.

(a) The casings of fusible plugs shall be machined to the dimensions not less than those shown in Figure 162.014–5, Sketch A for ⅜-inch (i.p.s.) water-side plugs, Sketch B for ½-inch (i.p.s.) and larger water-side plugs, Sketch C for ½-inch (i.p.s.) and larger fire-side plugs, and Sketch D for ⅜-inch (i.p.s.) fire-side plugs. All dimensions are minimum. The minimum length of the fusible filling shall be increased at least 1/16-inch for each 1/64-inch increase of the minimum diameter for the fusible filling.

* * * * *



NOTE (1) All threads are USA Standard taper pipe threads.
(2) All dimensions are minimum. The minimum length of the fusible filling shall be increased at least 1/16" for each 1/64" increase of the minimum diameter for the fusible filling.

FIGURE 162.014–5.—Acceptable fusible plugs

20. Section 162.014–8 is amended to read as follows:

§ 162.014–8 Procedure of acceptance of fusible plugs.

(a) *General.* A fusible plug manufacturer who desires to have his product accepted for marine use shall submit a request to the Commandant, U.S. Coast Guard Headquarters, Washington, D.C. 20591. The manufacturer will then be notified to send the required test samples (see § 162.014–6(b)) to an acceptable test laboratory for physical and chemical tests required by § 162.014–6. The test samples furnished shall bear the same number as the heat or lot it was selected from and shall be representative of the fusible plugs of such heat or lot.

(b) *Forwarding of letter of transmittal.* At the time the samples are sent to the test laboratory the manufacturer shall forward direct to the Commandant (MMT), U.S. Coast Guard Headquarters, Washington, D.C. 20591, a letter containing the following information and a copy of this letter shall also be forwarded to the test laboratory:

(1) Number of heat and lot.

(2) Size and type of fusible plugs manufactured from each heat.

(3) Number of fusible plugs manufactured from each heat.

(4) Number of samples of fusible plugs forwarded to test laboratory from each heat.

(5) Name of manfacturer or trademark stamped on casing of fusible plug.

(c) *Forwarding of test laboratory's report.* The original test laboratory's report of the physical test and chemical analysis of sample fusible plugs for each heat or lot shall be forwarded to the Commandant (MMT), U.S. Coast Guard Headquarters, Washington, D.C. 20591.

Subpart 162.017—Valves, Pressure-Vacuum Relief and Spill, for Tank Vessels

21. The heading for Subpart 162.017 is amended to read: "Valves, Pressure-Vacuum Relief and Spill, for Tank Vessels", as set forth above.

22. The authority note for Subpart 162.017 is amended to read as follows:

AUTHORITY NOTE: The provisions of this Subpart 162.017 issued under R.S. 4417a, as amended, 4491, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 391a, 489, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.

23. Section 162.017–3 is amended by revising paragraphs (f), (h), (i), and (o) and by adding paragraph (q), reading as follows:

§ 162.017–3 Materials, construction, and workmanship.

* * * * *

(f) Nonmetallic materials will not be permitted in the construction of the valves, except bushings used in way of moving parts and gaskets may be made of nonmetallic material resistant to attack by the product carried. Nonmetallic

diaphragms will be allowed where diaphragm failure will not result in unrestricted flow of cargo vapors to the atmosphere nor in an increase in the pressure or vacuum at which the valve normally releases.

* * * * *

(h) Valve discs shall be guided by a ribbed cage or other suitable means to prevent binding, and to insure proper seating. Where valve stems are guided by bushings suitably designed to prevent binding and to insure proper seating, the valves need not be fitted with ribbed cages.

(i) The disc shall close tight against the valve seat by metal to metal contact, however, resilient seating seals may be provided if the design is such that the disc closes tight against the seat in case the seals are destroyed or in case they carry away.

* * * * *

(o) Valve bodies may have screwed or flanged pipe connections, or such types of connections as may be approved by the Commandant. If flanged, the thickness and drilling shall comply with USA standards for 150-pound bronze flanged fittings.

* * * * *

(q) Relief pressure adjusting mechanisms shall be permanently secured by means of lockwires, locknuts, or other acceptable means.

24. Section 162.017–5 is amended to read as follows:

§ 162.017–5 Marking.

(a) Each valve shall be legibly marked with the style, type or other designation of the manufacturer, the size, pressure and vacuum setting and name or registered trademark of the manufacturer and Coast Guard approval number. The minimum wording for showing the approval number shall be "USCG/162.-017/**" or "USCG 162.017–**".

25. Section 162.017–6(a) is amended to read as follows:

§ 162.017–6 Procedure for approval.

(a) *General.* Pressure-vacuum relief and spill valves intended for use on tank vessels shall be approved for such use by the Commandant (MMT), U.S. Coast Guard, Washington, D.C. 20591.

* * * * *

Subpart 162.018—Safety Relief Valves, Liquefied Compressed Gas

26. The authority note for Subpart 162.018 is amended to read as follows:

AUTHORITY NOTE: The provisions of this Subpart 162.018 issued under R.S. 4417a, as amended, 4491, as amended, sec. 3, 68 Stat. 675; 46 U.S.C. 391a, 489, 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.

27. Section 162.018–1 is amended to read as follows:

§ 162.018–1 Applicable specifications, and referenced material.

(a) There are no other specifications applicable to this subpart except as noted in this subpart.

(b) The following referenced material from industry standards of the issue in effect on the date safety relief valves are manufactured shall form a part of the regulations of this subpart (see §§ 2.-75–17 through 2.75–19 of Subchapter A (Procedures Applicable to the Public) and Subpart 50.15 of Subchapter F (Marine Engineering) of this chapter):

(1) ASME (American Society of Mechanical Engineers) Code (see § 50.-15–5 of Subchapter F (Marine Engineering) of this chapter): The following paragraph from section VIII of the ASME Code:

(i) UG–131, flow rating of valves, see § 162.018–7(a).

(2) CGA (Compressed Gas Association) standard: The following standard of the Compressed Gas Association (see § 50.15–20(a) of Subchapter F (Marine Engineering) of this chapter):

(i) S–1.2.5.2, Flow test data for safety and relief valves for use on pressure vessels, see § 162.018–7(a).

(c) A copy of this specification and the referenced material listed in this section, if used, shall be kept on file by the manufacturer, together with the approved plans, specifications, and certificate of approval. It is the manufacturer's responsibility to have the latest issue, including addenda and changes, of the referenced material on hand when manufacturing equipment under this subpart.

(1) The ASME Code may be obtained from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

(2) The CGA standard may be obtained from the Compressed Gas Association, 500 Fifth Avenue, New York, N.Y. 10036.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

28. Section 162.018–3(b) is amended to read as follows:

§ 162.018–3 Materials.

* * * * *

(b) Nonmetallic materials shall not be used for any pressure containing parts of valves, except as may be approved for bonnet gaskets and valve seat seals. Materials melting below 1,700° F. shall not be used for liquefied flammable gas service. Flange gaskets shall be metal or spiral wound asbestos.

* * * * *

29. Section 162.018–6 is amended to read as follows:

§ 162.018–6 Marking.

(a) Each safety relief valve shall be plainly marked by the manufacturer with the required data in such a way that the marking will not be obliterated in service. The marking may be stamped on the valve or stamped or cast on a plate securely fastened to the valve. The marking shall include the following data:

(1) The name or identifying trademark of the manufacturer.

(2) Manufacturer's design or type number.

(3) Size _____ inches. (The pipe size of the valve inlet).

(4) Set pressure _____ p.s.i.

(5) Rated capacity _____ cubic feet per minute of the gas or vapor (at 60° F. and 14.7 p.s.i.a.).

(6) Coast Guard approval number. The minimum wording for showing approval shall be "USCG 162.018/**" or "USCG 162.018–**".

30. Section 162.018–7 is amended in its entirety to read as follows:

§ 162.018–7 Flow rating tests.

(a) Flow rating of valves shall be conducted in accordance with UG–131 of section VIII of the ASME Code, S–1.2.5.2 of the Compressed Gas Association Standards, or other procedure approved by the Commandant.

31. Section 162.018–8(a) is amended to read as follows:

§ 162.018–8 Procedure for approval.

(a) *General.* Safety relief valves for use on pressure vessels containing liquefied compressed gases shall be approved by the Commandant (MMT), U.S. Coast Guard, Washington, D.C. 20591.

* * * * *

Subpart 162.026 [Revoked]

32. Subpart 162.026—*Boilers, Auxiliary, Automatically Controlled, Packaged, for Merchant Vessels,* consisting of §§ 162.026–1 to 162.026–22, inclusive, is revoked.

SUBCHAPTER R—NAUTICAL SCHOOLS

PART 167—PUBLIC NAUTICAL SCHOOL SHIPS

Subpart 167.25—Marine Engineering

1. Subparagraph (a)(1) and paragraph (b) of § 167.25–1 are amended to read as follows:

§ 167.25–1 Boilers, pressure vessels, piping and appurtenances.

(a) * * *

(1) Marine engineering regulations in Parts 50 to 63, inclusive, of Subchapter F (Marine Engineering) of this chapter.

* * * * *

(b) The boilers, pressure vessels, and appurtenances shall be inspected initially under the provisions of Part 52 of Subchapter F (Marine Engineering) of this chapter. All alterations, replacements or repairs on nautical school ships shall conform to the applicable standards in paragraph (a) of this section insofar as practicable.

2. Section 167.25–5 is amended to read as follows:

§ 167.25–5 Inspection of boilers, pressure vessels, piping and appurtenances.

The inspection of boilers, pressure vessels, piping and appurtenances shall be

** Number to be assigned by the Commandant.

in accordance with the applicable regulations in Parts 50 to 63, inclusive, of Subchapter F (Marine Engineering) of this chapter, insofar as they relate to tests and inspection of cargo vessels.

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). R.S. 4417, as amended, 4418, as amended, 4426, as amended, 4433, as amended, 4450, as amended, 4453, as amended, 4488, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 3, 68 Stat. 675, sec. 8, 75 Stat. 403; 46 U.S.C. 391, 392, 404, 411, 239, 222, 481, 489, 363, 367, 390b, 50 U.S.C. 198, 33 U.S.C. 1007; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.)

SUBCHAPTER T—SMALL PASSENGER VESSELS (UNDER 100 GROSS TONS)

PART 175—GENERAL PROVISIONS

Subpart 175.27—Adoption of Standards and Specifications

Part 175 is amended by inserting a new Subpart 175.27, consisting of §§ 175.27-1, 175.27-5, and 175.27-20, reading as follows:

§ 175.27-1 General.

(a) In this subchapter portions or the entire text of certain industrial standards and specifications are referred to as the governing requirements for materials, equipment, tests, or procedures to be followed. These standards and specification requirements sepcifically referred to in this subchapter shall be the governing requirements for the subject matters covered unless specifically limited, modified, or replaced by other regulations in this subchapter.

(b) As used in this subchapter references to industry standards, such as those established by the American Bureau of Shipping, Lloyd's Register of Shipping or other recognized classification society, and others, mean that the Coast Guard uses such standards as a guide with respect to the subjects covered, and under normal conditions will accept machinery, etc., meeting the requirements of such standards. Such standards are not adopted as the governing requirements and made a part of the regulations in this subchapter by reference.

(c) In this subpart are listed the organizations publishing standards and specifications which are adopted by reference. The standards and specifications may be obtained direct from the organization issuing the standard or specification.

(Sec. 552, 80 Stat. 383, as amended; 5 U.S.C. 552)

§ 175.27-5 American Boat and Yacht Council, Inc. (ABYC).

(a) The materials as referenced in this subchapter from standards published by the American Boat and Yacht Council, Inc., in effect on the date equipment is manufactured, are adopted and shall form a part of the regulations in this subchapter. Copies of the referenced materials may be obtained from the American Boat and Yacht Council, Inc., 420 Lexington Avenue, New York, N.Y. 10017.

§ 175.27-20 Yacht Safety Bureau (YSB).

(a) The materials as referenced in this subchapter from standards published by the Yacht Safety Bureau, in effect on the date equipment is manufactured, are adopted and shall form a part of the regulations in this subchapter. Copies of the referenced materials may be obtained from the Yacht Safety Bureau, 336 Old Hook Road, Westwood, N.J. 07676.

(R.S. 4405, as amended, 4462, as amended, sec. 3, 70 Stat. 152, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 390b, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2))

PART 176—INSPECTION AND CERTIFICATION

Subpart 176.25—Materiel Inspections

1. Section 176.25-30 is amended by revoking paragraph (b)(5)(vii) and by revising paragraphs (b)(3), (4), and (5)(v) and (vi) to read as follows:

§ 176.25-30 Pressure vessels—S.

* * * * *

(b) * * *

(3) Pressure vessels which required initial Coast Guard shop inspection and stamping, and which are fitted with inspection openings shall be examined internally. Tubular heat exchangers, hydraulic accumulators and those pressure vessels used in refrigeration service need not be examined internally.

(4) All pressure vessels that require initial Coast Guard shop inspection and stamping other than those exempt by the provisions of this paragraph, shall be subjected to hydrostatic test of 1¼ times the maximum allowable working pressure.

(5) * * *

(v) Pressure vessels which were exempt from initial Coast Guard shop inspection and stamping.

(vi) Pressure vessels which received an initial pneumatic test in lieu of a hydrostatic test as permitted by § 54.10-15 of Subchapter F (Marine Engineering) of this chapter and which cannot be hydrostatically tested.

(vii) (Revoked.)

* * * * *

(R.S. 4405, as amended, 4462, as amended, sec. 3, 70 Stat. 152, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 390b, 49 U.S.C. 1655(b); 49 CFR 1.4(a). R.S. 4417, as amended, 4418, as amended, 4421, as amended, 4426, as amended, 4453, as amended, 4464, as amended; 46 U.S.C. 391, 392, 399, 404, 435, 451)

PART 182—MACHINERY INSTALLATION

Subpart 182.10—Auxiliary Machinery

§ 182.10-5 [Amended]

1. Subparagraph (d)(1) of § 182.10-5, *Installations*, is revoked.

Subpart 182.15—Machinery Using Gasoline as Fuel

2. Section 182.15-1 is amended to read as follows:

§ 182.15-1 Application.

(a) This subpart shall apply to all propulsion and auxiliary machinery installations of the internal combustion piston type which use gasoline or other fuel having a flashpoint of 110° F. (Pensky-Martens Closed Cup Method, ASTM-D93) or lower.

3. Section 182.15-15 is amended in its entirety to read as follows:

§ 182.15-15 Gasoline engine exhaust cooling.

(a) Except as otherwise provided in this paragraph, all engine exhaust pipes shall be water cooled.

(1) Dry pipe vertical exhausts are permissible if suitably insulated.

(2) 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.

(3) Exhaust pipes on air cooled engines need not be water cooled but suitable insulation may be required.

(b) The exhaust pipe cooling water system shall be in accordance with the following provisions:

(1) Water for cooling the exhaust pipe shall be obtained from the engine cooling water system or a separate engine driven pump.

(2) Water for cooling the exhaust pipe, other than a vertical exhaust, shall be injected into the exhaust system as near to the engine manifold as practicable. The water shall pass through the entire length of the exhaust pipe.

(3) That part of the exhaust system between the point of cooling water injection and the engine manifold shall be water-jacketed or effectively insulated.

(4) Vertical exhaust piping shall be water-jacketed between the engine manifold and the spark arrester.

(5) When the exhaust cooling system is separate from the engine cooling system, a suitable warning device shall be provided to indicate any failure of water flow in the exhaust cooling system. Such warning shall be visible or audible at the engine operating station.

(6) A suitable hull strainer shall be installed in the circulating water intake line for the exhaust cooling system.

(c) Engine exhaust cooling systems built in accordance with the requirements of American Boat and Yacht Council, Inc., Standard P-1, "Safe Installation of Exhaust Systems for Propulsion and Auxiliary Machinery" will be considered as meeting the requirements of this section. (See § 175.27-5 of this subchapter.)

4. Section 182.15-20 is amended by adding paragraphs (i) and (j), which read as follows:

§ 182.15-20 Gasoline engine exhaust pipe, installation.

* * * * *

(i) All exhaust installations with pressures in excess of 15 pounds per square

inch gage or employing runs passing through living or working spaces shall meet the material requirements of Part 56 of Subchapter F (Marine Engineering) of this chapter.

(j) Engine exhaust installations built in accordance with the requirements of American Boat and Yacht Council, Inc., Standard P–1, "Safe Installations of Exhaust Systems for Propulsion and Auxiliary Machinery" will be considered as meeting the requirements of this section. (See § 175.27–5 of this subchapter.)

5. Section 182.15–25 is amended by revising the text of subparagraphs (1) (but not Table 182.15–25(a)(1)), (4), (5), and (7) and by adding subparagraph (8) to paragraph (a), by adding a new subparagraph (5) to paragraph (b) and by revising paragraph (c) to read as follows:

§ 182.15–25 Gasoline fuel tanks.

(a) *Materials and construction.* (1) Fuel tanks shall be independent of the hull. The material used and the minimum thickness allowed shall be as indicated in Table 182.15–25(a)(1), except that consideration will be given to other materials which provide equivalent safety as indicated in subparagraph (8) of this paragraph. Fuel tanks having a capacity of more than 150 gallons shall be designed to withstand the maximum head to which they may be subjected in service but in no case shall the thickness be less than that specified in Table 182.15–25(a)(1).

* * * * *

(4) All tank joints shall be welded or brazed.

(5) Nozzles, flanges, or other fittings for pipe connections shall be welded or brazed to the tank. The tank openings in way of pipe connections shall be properly reinforced where necessary. Where fuel level gages are used the flange to which gage fittings are attached shall be welded or brazed to the tank. No tubular gage glasses or trycocks shall be fitted to the tanks.

* * * * *

(7) Baffle plates, where required, shall be of the same material and not less than the minimum thickness required in the tank walls and shall be connected to the tank walls by welding or brazing. Limber holes at the bottom and air holes at the top of all baffles shall be provided.

(8) Materials other than those listed in Table 182.15–25(a)(1) may be used for gasoline fuel tank construction only if the tank as constructed meets the testing requirements of Yacht Safety Bureau STD E–3, paragraph E3–3. (See § 175.27–20 of this subchapter.) Testing may be accomplished by any acceptable laboratory such as the Yacht Safety Bureau, or may be done by the fabricator if witnessed by a marine inspector.

(b) *Location and installation.* * * *

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

(c) *Tests.* (1) Prior to installation, tanks vented to the atmosphere shall be tested to, and must withstand, a pressure of 5 pounds per square inch or 1½ times the maximum head to which they may be subjected in service, whichever is greater. A standpipe of 11½ feet in height attached to the tank may be filled with water to accomplish the 5 pounds per square inch 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 shall 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 testing medium.

(3) All tanks not vented to the atmosphere shall be constructed and tested in accordance with § 182.10–5(d).

6. Section 182.15–40 is amended by revising paragraph (a) to read as follows:

§ 182.15–40 Gasoline fuel supply piping.

(a) *Materials and workmanship.* (1) Fuel lines shall be annealed tubing of copper, nickel-copper, or copper-nickel having a minimum wall thickness of 0.035 inch.

(2) Where flexibility is necessary or desired, a reasonable length of flexible hose may be used provided it is fitted with suitable connection fittings and has high resistance to saltwater, petroleum oils and vibration.

(3) Flexible hose shall be fabricated with an inner tube and a cover of synthetic rubber or other suitable material reinforced with wire braid. The cover for the hose shall be fire resistant, capable of withstanding fire burning gasoline for 2½ minutes. The details of fire tests designed to demonstrate this capability shall be submitted to the Commandant for approval.

(4) Tubing connections and fittings shall be of nonferrous drawn or forged metal 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. When making tube connections, the tubing shall be cut square and flared by suitable tools. Tube ends shall be annealed before flaring.

(5) Valves for fuel lines shall be of a suitable nonferrous type. Cocks are prohibited except for the solid bottom type with tapered plugs and union bonnets.

* * * * *

Subpart 182.20—Machinery Using Diesel Fuel

7. Section 182.20–1 is amended to read as follows:

§ 182.20–1 Application.

(a) This subpart shall apply to all propulsion and auxiliary machinery installations of the internal combustion piston type which use Diesel fuel or other fuel having a flashpoint (Pensky-Martens Closed Cup Method—ASTM–D93) of over 110° F.

8. Section 182.20–15 is revised in its entirety to read as follows:

§ 182.20–15 Diesel engine exhaust cooling.

(a) Installation shall be in accordance with § 182.15–15.

Section 182.20–20 is revised in its entirety to read as follows:

§ 182.20–20 Diesel engine exhaust pipe, installation.

(a) Installation of diesel engine exhaust pipe shall be in accordance with § 182.15–20.

10. Section 182.20–22(a) is amended to read as follows:

§ 182.20–22 Integral diesel fuel tanks.

(a) Fuel tanks may be built integral with the hull on steel, aluminum, and fiberglass reinforced plastic hull vessels.

* * * * *

11. Section 182.20–25 is amended by revising the text of subparagraphs (1) (but not Table 182.20–25(a)(1)) and (7) of paragraph (a); by adding subparagraph (9) to paragraph (a); by adding subparagraph (5) to paragraph (b); and by revising paragraph (c), reading as follows:

§ 182.20–25 Independent diesel fuel tanks.

(a) *Material and construction.* (1) The materials used and the minimum thickness allowed in the construction of independent fuel tanks shall be as indicated in Table 182.20–25(a)(1), except that consideration will be given to other materials which provide equivalent safety as indicated in subparagraph (9) of this paragraph. Fuel tanks having a capacity of more than 150 gallons shall be designed to withstand the maximum head to which they may be subjected in service but in no case should the thickness be less than that specified in Table 182.20–25(a)(1).

* * * * *

(7) Baffle plates, where required, shall be of the same material and not less than the minimum thickness required in the tank walls and shall be connected to the tank walls by welding or brazing. Limber holes at the bottom and air holes at the top of all baffles shall be provided.

* * * * *

(9) Materials other than those specifically listed in Table 182.20–25(a)(1) may be used only if the tank as constructed meets the testing requirements of Yacht Saftey Bureau STD E–3, paragraph E3–3. (See § 175.27–20 of this subchapter.) Testing may be accomplished by any acceptable laboratory such as the Yacht Safety Bureau, or may be done by the fabricator if witnessed by a marine inspector.

(b) *Location and installation.* * * *

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

(c) *Tests.* (1) Prior to installation, tanks vented to the atmosphere shall be tested to and must withstand a pressure of 5 pounds per square inch or 1½ times the maximum head to which they may be subjected in service, whichever is greater. A standpipe of 11½ feet in height attached to the tank may be filled with water to accomplish the 5 pounds per square inch 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 shall 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 the atmosphere shall be constructed and tested in accordance with § 182.10–5(d).

12. Section 182.20–40(a) is amended to read as follows:

§ 182.20–40 Diesel fuel supply piping.

(a) *Material and workmanship.* (1) Fuel supply piping shall be of copper, nickel copper, or copper nickel having a minimum wall thickness of 0.035 inch except that piping of other materials such as seamless steel pipe or tubing which provides equivalent safety may be used.

(2) Flexible hose may be used provided it is fitted with suitable connection fittings and has high resistance to saltwater, petroleum oils and vibration.

(i) Flexible hose runs shall be visible, easily accessible and shall not penetrate watertight bulkheads.

(ii) Flexible hose shall be fabricated with an inner tube and a cover of synthetic rubber or other suitable material reinforced with wire braid. The cover for the hose shall be fire resistant, capable of withstanding fire burning gasoline for 2½ minutes. The details of fire tests designed to demonstrate this capability shall be submitted to the Commandant for approval.

(3) Tubing connections and fittings shall be drawn or forged metal 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. When making flared tube connections the tubing shall be cut square and flared by suitable tools. Tube ends shall be annealed before flaring.

(4) Cocks are prohibited for use in fuel lines except those of the solid bottom type with tapered plugs and union bonnets.

* * * * *

(R.S. 4405, as amended, 4462, as amended, sec. 3, 70 Stat. 152, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 390b, 50 U.S.C. 198, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2))

SUBCHAPTER U—OCEANOGRAPHIC VESSELS

PART 188—GENERAL PROVISIONS

Subpart 188.05—Application

1. Subpart 188.05 is amended by inserting a new § 188.05–15, reading as follows:

§ 188.05–15 Application to vessels concerning nuclear energy.

(a) Pertinent definitions are in § 188.10–47.

(b) Special provisions for "nuclear vessels" are in Part 99 of Subchapter I (Cargo and Miscellaneous Vessels) of this chapter and shall be followed.

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

(d) The regulations covering pressure containing portions of nuclear power systems are in Part 55 of Subchapter F (Marine Engineering) of this chapter. See § 56.04–20 of Subchapter F (Marine Engineering) of this chapter for nuclear piping. See Subpart 61.25 of Subchapter F (Marine Engineering) of this chapter for requirements regarding periodic tests and inspections of nuclear reactor power plants.

Subpart 188.10—Definitions of Terms Used in This Subchapter

2. Section 188.10–47 is amended to read as follows:

§ 188.10–47 Nuclear energy, radioactive material, and nuclear vessel.

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

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

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

Subpart 188.20—General Marine Engineering Requirements

§ 188.20–5 [Deleted]

3. Section 188.20–5 *nuclear vessels* is deleted.

(R.S. 4405, as amended, 4462, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2))

PART 189—INSPECTION AND CERTIFICATION

Subpart 189.01—Certificate of Inspection

1. Paragraph (a) of § 189.01–10 is amended to read as follows:

§ 189.01–10 Period of validity.

(a) Certificates of inspection will be issued for periods of either 1 or 2 years. For nuclear vessels it shall be for a period of 1 year; see also § 99.10–1 of Subchapter I (Cargo and Miscellaneous Vessels) of this chapter. Application may be made by the master, owner, or agent for inspection and issuance of a new certificate of inspection at any time during the period of validity of the current certificate. For nuclear vessels see Part 99 of Subchapter I (Cargo and Miscellaneous Vessels) of this chapter.

* * * * *

(Sec. 2, 23 Stat. 118, as amended, secs. 2, 633, 63 Stat. 496, 545; 46 U.S.C. 2, 14 U.S.C. 2, 633)

Subpart 189.20—Initial Inspection

2. Paragraph (c) of § 189.20–15 is amended to read as follows:

§ 189.20–15 Scope of inspection.

* * * * *

(c) For nuclear vessels, the inspections required by this section shall be made except insofar as they may be limited by the presence of radiation. In addition, the inspection shall include any special preoperational tests and inspections prescribed by the Atomic Energy Commission in its operating license, by the nuclear plant operating procedures, or by the vessel's Safety Assessment. See Part 99 of Subchapter I (Cargo and Miscellaneous Vessels) of this chapter.

Subpart 189.25—Inspection for Certification

3. Paragraph (b) of § 189.25–10 is amended to read as follows:

§ 189.25–10 Scope of inspection.

* * * * *

(b) For nuclear vessels, the inspections required by this section shall be made except insofar as they may be limited by the presence of radiation. See also Subpart 99.10 of Subchapter I (Cargo and Miscellaneous Vessels) of this chapter.

* * * * *

(R.S. 4405, as amended, 4462, as amended, sec. 5, 79 Stat. 424, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 445, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(f). R.S. 4417, as amended, 4418, as amended, 4472, as amended, 4488, as amended, 4491, as amended, sec. 10, 35 Stat. 428, as amended, 41 Stat. 305, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 17, 54 Stat. 166, as amended, 46 U.S.C. 391, 392, 170, 481, 489, 395, 363, 367, 526p; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR 1965 Supp.)

Dated: December 10, 1968.

W. J. SMITH,
Admiral, U.S. Coast Guard,
Commandant.

Incorporation by reference provisions approved by the Director of the Federal Register on December 17, 1968.

[F.R. Doc. 68–15076; Filed, Dec. 17, 1968; 8:50 a.m.]