

§ 52.01-3

TABLE 52.01-1(A)—LIMITATIONS AND MODIFICATIONS IN THE ADOPTION OF SECTION I OF THE ASME CODE—Continued

Paragraphs in section I, ASME Code ¹ and disposition	Unit of this part
A-19 through A-21 modified by	52.01-50

¹The 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.

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

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

[CGFR 68-82, 33 FR 18815, Dec. 18, 1968, as amended by CGFR 69-127, 35 FR 9975, June 17, 1970; CGD 81-79, 50 FR 9431, Mar. 8, 1985. Re-designated and amended by CGD 88-032, 56 FR 35821, July 29, 1991]

§ 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.)

(10) *Hybrid boiler.* A hybrid boiler is a steam boiler whose design employs features from both watertube and firetube boilers.

(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.

(ii) *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 com-

bustion 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 thickwalled 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 extending 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) *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).)

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

(15) *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. A spring loaded, pilot actuated 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*. Test 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 part 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 pressure 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.

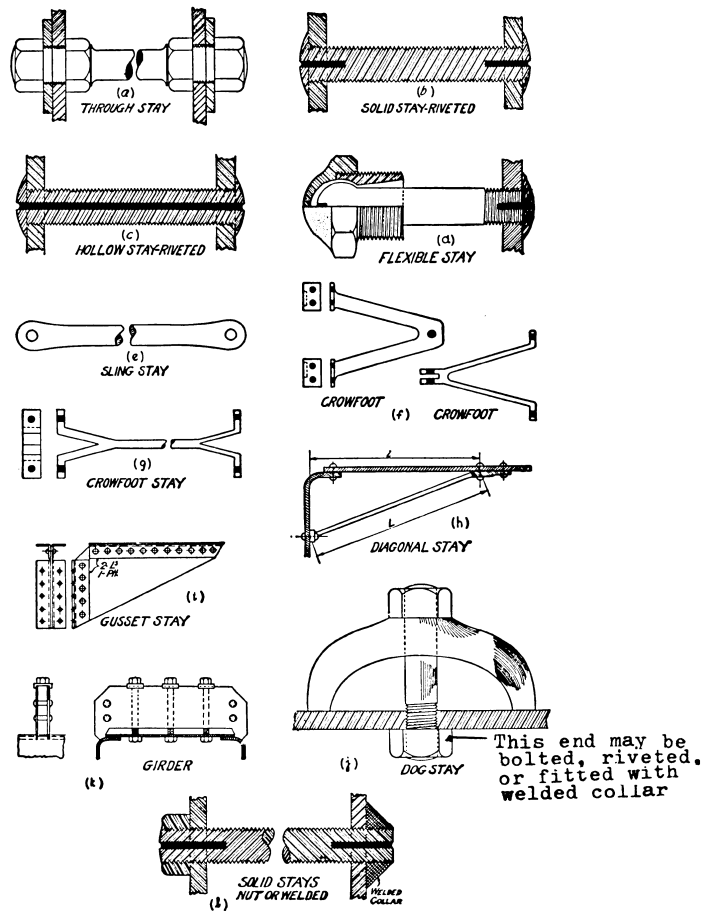


FIGURE 52.01-3—ACCEPTABLE TYPES OF BOILER STAYS

[CGFR 68-82, 33 FR 18815, Dec. 18, 1968, as amended by CGFR 69-127, 35 FR 9976, June 17, 1970; CGD 81-79, 50 FR 9431, Mar. 8, 1985; CGD 83-043, 60 FR 24772, May 10, 1995]

§ 52.01-5 Plans.

(a) Manufacturers intending to fabricate boilers to be installed on vessels shall submit detailed plans as required by subpart 50.20 of this subchapter. The plans, including design calculations, must be certified by a registered pro-

fessional engineer as meeting the design requirements in this part and in section I of the ASME Code.

(b) The following information must be included:

(1) Calculations for all pressure containment components including the maximum allowable working pressure and temperature, the hydrostatic or pneumatic test pressure, the maximum steam generating capacity and the intended safety valve settings.