

(3) The Assembler must document each use of a converted part.

(4) The Assembler must demonstrate to the Manufacturer the ability to perform each type of conversion. The Manufacturer shall document all authorizations granted to perform part conversions. The Manufacturer and Assembler shall maintain a file of such authorizations.

(5) For an Assembler to offer restricted lift valves, the Assembler must demonstrate to the satisfaction of the Manufacturer the ability to perform valve lift restrictions. The Manufacturer shall document all authorizations granted to restrict the lift of the valves, and shall maintain records of the lift restrictions made by the Assembler. The Assembler shall maintain a file of such authorizations.

(6) At least annually a review shall be performed by the Manufacturer of an Assembler's system and conversion capabilities. The Manufacturer shall document the results of these reviews. A copy of this documentation shall be kept on file by the Assembler. The review results shall be made available to a representative from an ASME designated organization. NOTE: Within the requirements of PG-73.4 and PG-73.5, a *manufacturer* is defined as a person or organization who is completely responsible for design, material selection, capacity certification, manufacture of all component parts, assembly, testing, sealing, and shipping of pressure relief valves certified under this Section.

An *assembler* is defined as a person or organization who purchases or receives from a manufacturer the necessary component parts or valves and assembles, adjusts, tests, seals, and ships pressure relief valves certified under this Section at a geographical location other than and using facilities other than those used by the manufacturer.

PG-73.5 Testing by Manufacturers or Assemblers

PG-73.5.1 Pressure Testing. Each pressure relief valve to which the Code Symbol Stamp is to be applied shall be subjected to the following tests by the Manufacturer or Assembler:

(a) The pressure-containing parts of each valve shall be hydrostatically tested at a pressure at least 1.5 times the design pressure of the parts. Parts meeting the following criteria shall be exempt from pressure testing:

(1) the applied stress under hydrostatic test conditions does not exceed 50% of the allowable stress; and

(2) the part is not cast or welded.

(b) Alternatively, testing may be performed pneumatically at a pressure 1.25 times the design pressure of the part. Pneumatic testing can be hazardous; it is therefore recommended that special precautions be taken when conducting a pneumatic test.

(c) Testing may be done in the component or assembled condition.

(d) When the valve is designed for discharging directly to atmosphere, the valve components downstream of the valve disk are exempt from pressure testing.

(e) Valve components downstream of the disk and fully contained within the body are exempt from pressure testing.

(f) These tests shall be conducted after all machining and welding operations on the parts have been completed.

(g) There shall be no sign of leakage.

PG-73.5.2 Every valve shall be tested with steam by the manufacturer or assembler to demonstrate its set point and pressure-containing integrity. The blowdown control elements of the pressure relief valve shall be set to the Manufacturer's specifications.

PG-73.5.2.1 Tests shall be conducted either on equipment that meets the requirements of PG-73.5.6, or on the boiler, by raising the pressure to demonstrate the set pressure.

PG-73.5.2.2 When the valve is beyond the production test equipment capabilities, an alternative test method presented in PG-73.5.2.2.1 or PG-73.5.2.2.2 may be used, provided all of the following conditions are met:

(a) testing the valve at full pressure may cause damage to the valve, or testing of the valve is impractical due to boiler system operational safety considerations

(b) the valve lift has been mechanically verified to meet or exceed the required lift

(c) the blow down control elements of the safety valve are set to the valve manufacturer's specification

(d) the valve design is compatible with the alternative test method selected

PG-73.5.2.2.1 The valve, with its lift temporarily restricted during the test, if required to prevent valve damage, shall be tested on steam to demonstrate set pressure.

PG-73.5.2.2.2 The valve may be fitted with a hydraulic or pneumatic lift assist device and tested on steam at a pressure less than the valve set pressure. The lift assist device and test procedure shall be calibrated to provide the set pressure setting within the tolerance of PG-72.2.

PG-73.5.3 Leak Test

(a) A seat tightness test shall be conducted at maximum expected operating pressure but at a pressure not exceeding the reseating pressure of the valve. When being tested, a valve exhibiting no sign of leakage shall be considered adequately tight.

(b) Closed bonnet pressure relief valves designed for discharge to a closed system shall be tested with a minimum of 30 psig (200 kPa) air or other gas in the secondary pressure zone. There shall be no sign of leakage.¹

PG-73.5.4 A manufacturer or assembler shall have a documented program for the application, calibration, and maintenance of test gages.

¹ The user may specify a higher test pressure commensurate with the back pressure anticipated in service.

PG-73.5. Testing time on steam valves shall be sufficient to assure that test results are repeatable and representative of field performance.

PG-73.5.6 Test fixtures and test drums, where applicable, shall be of adequate size and capacity to assure that the observed set pressure is consistent with the stamped set pressure within the tolerance required by PG-72.2.

PG-73.6 Design Requirements. At the time of submission of valves for capacity certification or testing in accordance with PG-69, the ASME designee has the authority to review design for conformity with the requirements of this Section and to reject or require modification of designs that do not conform, prior to capacity testing.

PG-73.7 Code Symbol "V" Stamp. Each pressure relief valve to which the Code "V" symbol (see Fig. PG-105.4) will be applied shall have been fabricated or assembled by a manufacturer or assembler holding a valid Certificate of Authorization (PG-105.2) and a capacity certified in accordance with the requirements of this Section. A Certified Individual (CI) shall provide oversight to assure that each use of the Code "V" symbol on a pressure relief valve is in accordance with the requirements of this Section, and that each use of the Code "V" symbol is documented on a Certificate of Conformance, Form P-8.

PG-73.7.1 Requirements for the Certified Individual (CI). The CI shall

- (a) be an employee of the manufacturer or assembler
- (b) be qualified and certified by the manufacturer or assembler. Qualifications shall include as a minimum
 - (1) knowledge of the requirements of this Section for the application of the Code "V" symbol
 - (2) knowledge of the manufacturer's or assembler's quality program
 - (3) training commensurate with the scope, complexity, or special nature of the activities to which oversight is to be provided
- (c) have a record, maintained and certified by the manufacturer or assembler, containing objective evidence of the qualifications of the CI and the training program provided

PG-73.7.2 Duties of the Certified Individual (CI). The CI shall

- (a) verify that each item to which the Code "V" symbol is applied has a current capacity certification and meets all applicable requirements of this Section
- (b) review documentation for each lot of items to be stamped to verify, for the lot, that requirements of this Section have been completed
- (c) sign the Certificate of Conformance, Form P-8, prior to release of control of the pressure relief valves

PG-73.7.3 Certificate of Conformance, Form P-8

(a) The Certificate of Conformance, Form P-8, shall be filled out by the manufacturer or assembler and signed by the Certified Individual. Multiple duplicate pressure

relief valves may be recorded as a single entry, provided the valves are identical and are produced in the same lot.

(b) The manufacturer's or assembler's written quality control program shall include requirements for completion of Certificates of Conformance, Form P-8, and retention, by the manufacturer or assembler, for a minimum of 5 years.

FABRICATION

PG-75 GENERAL

The fabrication of boilers and parts thereof shall conform to the general fabrication requirements in the following paragraphs and in addition to the specific requirements for fabrication in the Parts of this Section that pertain to the methods of construction used.

PG-76 CUTTING PLATES AND OTHER STOCK

PG-76.1 Plates may be cut by machining, punching, shearing, or cutting by the electric arc or gas process, providing enough metal is left at any unfinished edges to meet the requirements of PG-79.

PG-76.2 When end faces of nozzle or manhole necks are to remain unwelded in the completed vessel, these end faces shall not be cut by shearing unless at least 1/8 in. (3 mm) of additional metal is removed by any method that will produce a smooth finish.

PG-91 QUALIFICATION OF INSPECTORS

The inspection required by this Section shall be by an Inspector employed by an ASME accredited Authorized Inspection Agency,² that is, the inspection organization of a state or municipality of the United States, a Canadian province, or of an insurance company authorized to write boiler and pressure vessel insurance. These Inspectors shall have been qualified by written examination under the rules of any state of the United States or province of Canada which has adopted the Code.

PG-93 INSPECTION AND REPAIR OF FLAT PLATE IN CORNER JOINTS

PG-93.1 When flat plate greater than 1/2 in. (13 mm) thickness is welded to other pressure parts to form a corner joint, such as in flat heads [Fig. PG-31, illustrations (g), (i-1), and (i-2)], waterlegs of firebox boilers or combustion chambers of wetback boilers [Fig. A-8, illustrations (l), (m), (n), and (p)], and the exposed edges of the plate are closer to the edge of the weld than a distance equal to the thickness of the plate, the peripheral plate edges and any remaining edges and any remaining exposed surface of the weld joint preparation

² Whenever *Authorized Inspection Agency* or *AIA* is used in this Code, it shall mean an Authorized Inspection Agency accredited by ASME in accordance with the requirements in the latest edition of ASME QAI-1, Qualification for Authorized Inspection.

shall be examined after welding by either the magnetic particle or liquid penetrant method. When the plate is nonmagnetic, only the liquid penetrant method shall be used. The requirements of this paragraph shall not apply to those joints when 80% or more of the pressure load is carried by tubes, stays, or braces, or when the exposed edges of the plate are farther from the edge of the weld than a distance equal to the thickness of the plate.

PG-93.2 Laminations, cracks, or other imperfections found during the examination required by PG-93.1 that would affect the safety of the vessel shall be repaired in accordance with PG-78. The imperfection(s) may be pursued by any suitable method (grinding, chipping, etc.). The repaired area shall be subjected to the same examination that first revealed the imperfection.

PG-93.3 Methods and acceptance criteria for magnetic particle and liquid penetrant examination shall be in accordance with A-260 or A-270, respectively.

PG-99 HYDROSTATIC TEST

Hydrostatic testing of the completed boiler unit shall be conducted in accordance with the following requirements:

After a boiler has been completed (see PG-104), it shall be subjected to pressure tests using water at not less than ambient temperature, but in no case less than 70°F (20°C). Where required, test pressures are specified in this paragraph; whether minimum or maximum pressures, they apply to the highest point of the boiler system. When the boiler is completed in the Manufacturer's shop without boiler external piping, subsequent hydrostatic testing of the boiler external piping shall be the responsibility of any holder of a valid "S," "A," or "PP" stamp. The safety valves need not be included in the hydrostatic test. The tests shall be made in two stages in the following sequence:

PG-99.1 Hydrostatic pressure tests shall be applied by raising the pressure gradually to not less than 1 ½ times the maximum allowable working pressure as shown on the data report to be stamped on the boiler. No part of the boiler shall be subjected to a general membrane stress greater than 90% of its yield strength (0.2% offset) at test temperature. The primary membrane stress to which boiler components are subjected during hydrostatic test shall be taken into account when designing the components. Close visual inspection for leakage is not required during this stage.

PG-99.2 The hydrostatic test pressure may then be reduced to the maximum allowable working pressure, as shown on the Data Report, to be stamped on the boiler and maintained at this pressure while the boiler is carefully examined. The metal temperature shall not exceed 120°F (50°C) during the close examination.

PG-99.3 A completed forced-flow steam generator with no fixed steam and waterline, having pressure parts designed for different pressure levels along the path of water-steam flow, shall be subjected to a hydrostatic

pressure test by the above procedure (PG-99.1 and PG-99.2) based upon:

PG-99.3.1 For the first stage test (PG-99.1) a hydrostatic test pressure of not less than 1 ½ times the maximum allowable working pressure at the superheater outlet as shown in the master stamping (PG-106.3) but no less than 1 ¼ times the maximum allowable working pressure of any part of the boiler, excluding the boiler external piping.

PG-99.3.2 For the second stage test (PG-99.2) the hydrostatic test pressure may be reduced to not less than the maximum allowable working pressure at the superheater outlet.

PG-99.4 Test Gages

PG-99.4.1 An indicating gage, visible to the operator controlling the pressure applied, shall be connected to the pressure parts. Hydrostatic head on the gage shall be considered such that the required test pressure is achieved at the top of the boiler.

PG-99.4.2 Dial pressure gages used in testing shall preferably have dials graduated over their entire range of about double the intended maximum test pressure, but in no case shall the range be less than 1 ½ times that pressure. The spacing between graduations shall be such that the inspector and the operator controlling the test shall be able to determine when the required test pressure has been applied. Digital pressure gages having a wider range of pressure readings may be used provided the readings give the same or greater degree of accuracy as obtained with dial pressure gages.

PG-100 HYDROSTATIC DEFORMATION TEST

Where no rules are given and it is impossible to calculate with a reasonable degree of accuracy the strength of a boiler structure or any part thereof, a full-sized sample shall be built by the Manufacturer and tested in accordance with the Standard Practice for Making a Hydrostatic Test on a Boiler Pressure Part to Determine the Maximum Allowable Working Pressure, given in A-22 or in such other manner as the Committee may prescribe.

CERTIFICATION BY STAMPING AND DATA REPORTS

PG-101 HEATING SURFACE COMPUTATION

PG-101.1 For the stamping required by PG-106, the heating surface shall be computed as specified in PG-101.1.1 through PG-101.1.3.

PG-101.1.1 Heating surface, as part of a circulating system in contact on one side with water or wet steam being heated and on the other side with gas or refractory being cooled, shall be measured on the side receiving heat.

PG-101.1.2 Boiler heating surface and other equivalent surface outside the furnace shall be measured circumferentially plus any extended surface.

PG-101.1.3 Waterwall heating surface and other equivalent surface within the furnace shall be measured as the projected tube area (diameter x length) plus any extended surface on the furnace side. In computing the heating surface for this purpose, only the tubes, fireboxes, shells, tubesheets, and the projected area of headers need to be considered, except that for vertical firetube steam boilers only that portion of the tube surface up to the middle of the gage glass is to be computed.

PG-104 GENERAL

PG-104.1 The completed boiler unit includes all piping and piping components as defined in the Introduction.

The Manufacturer [see Note (1) below] of any complete boiler unit to be stamped with the Code symbol has the responsibility of assuring through proper Code certification that all work performed by him or others responsible to him complies with all requirements of the Code, including design, construction, materials, and workmanship. With the exception of field installed boiler external piping, when some portions of a complete boiler unit are supplied by, or Code work is performed by others not responsible to the Manufacturer, the Manufacturer has the duty of obtaining from these other organizations their proper Code certification, covering such portions of work.

When the Manufacturer furnishes a shop assembled boiler that is complete except for boiler external piping, and the boiler has been hydrostatically tested in the shop and properly stamped with the Manufacturer's "S" symbol, the subsequent installation in the field of the external piping within the scope of Section I is not by itself considered "field assembly of the boiler" [see Note (2) below].

No Manufacturer or assembler may accept Code responsibility for work that falls within the scope of the Code, that is performed by workmen employed by any other organization, except through proper Code certification. The responsibilities set forth herein relate only to Code compliance and are not to be construed as involving contractual relations or legal liabilities.

NOTES:

- (1) Boiler Manufacturer or Manufacturer as used in PG-104 or other paragraphs referenced to this Note may also be an Engineering Contractor organization with or without fabricating facilities, but having the capability of providing a design specification that establishes the pressure and temperature conditions for each component of a complete boiler unit and of assembling the fabricated parts in the field with authorization from the Society to use the Code symbol stamp "S" in accordance with the Code provisions in PG-105.3.
- (2) When boiler external piping within the scope of Section I is furnished by other than the boiler Manufacturer, the boiler Manufacturer is not responsible for the Code certification of such piping. The organizations that furnish and that install such external piping by welding shall furnish proper Code certification (PG-104.2) for such piping including Manufacturers' Data Report Form P-4A as required by PG-112.2.5 and PG-112.3.

PG-104.2 Proper Code certification refers to the furnishing of stamping and Data Reports as evidence to establish the following.

PG-104.2.1 The organization that performed that portion of the work held an appropriate Certificate of Authorization.

PG-104.2.2 By signing and furnishing the appropriate data report, that organization certified compliance with Code rules for that portion of the work.

PG-104.2.3 By proper use of the Code symbol stamp, that organization identified the portions of the work covered by its Data Report Form.

PG-104.2.4 By countersignature on the same Data Report a qualified Inspector confirmed that portion of the work complied with applicable Code rules.

PG-105 CODE SYMBOL STAMPS

PG-105.1 Authorization. Except as permitted in PG-105.5, no organization may assume responsibility for Code construction without having first received from the ASME a Certificate of Authorization to use one of the Code symbol stamps shown in Figs. PG-105.1 through PG-105.4. There are six such stamps, defined as follows:

- (a) S -- power boiler symbol stamp (see Fig. PG-105.1)
- (b) M -- miniature boiler symbol stamp (see Fig. PG-105.1)
- (c) E -- electric boiler symbol stamp (see Fig. PG-105.1)
- (d) A -- boiler assembly symbol stamp (see Fig. PG-105.2)
- (e) PP -- pressure piping symbol stamp (see Fig. PG-105.3)
- (f) V -- safety valve symbol stamp (see Fig. PG-105.4)

Stamps for applying the Code symbol shall be obtained from the Society. Each boiler, superheater, waterwall, economizer, or boiler part to which a Code symbol is to be applied shall be fabricated by a Manufacturer who is in possession of an appropriate Code symbol stamp. A Certificate of Authorization to use the Code symbol "S," "M," "E," "A," "PP," or "V" stamp will be granted by the Society pursuant to the provisions of these paragraphs.



FIG. PG-105.4 OFFICIAL SYMBOL FOR STAMP TO DENOTE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS' STANDARD FOR BOILER PRESSURE RELIEF VALVES

FIG. PG-105.1 OFFICIAL SYMBOLS FOR STAMPS TO DENOTE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS' STANDARD FOR BOILERS



FIG. PG-105.2 OFFICIAL SYMBOL FOR STAMP TO DENOTE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS' STANDARD FOR ASSEMBLY



FIG. PG-105.3 OFFICIAL SYMBOL FOR STAMP TO DENOTE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS' STANDARD FOR WELDED PIPING



PG-109 STAMPING OF PRESSURE PIPING

PG-109.1 Boiler external piping, as defined in the Introduction, may be fabricated by a manufacturer other than the Manufacturer of the boiler, provided that the manufacturer has been issued a Certificate of Authorization to use the "S" or "PP" symbol stamp. Boiler external piping may be installed by welding by a manufacturer or contractor other than the Manufacturer of the boiler, provided such an organization has been issued a Certificate of Authorization to use the "S," "PP," or "A" symbol stamp. When boiler external piping is installed by welding, the welding, including the qualification of welding procedures, welders, and welding operators, shall be done in accordance with the applicable rules of ASME B31.1. The welding shall be inspected by an Authorized Inspector at such stages of the work as he may elect. The organizations which fabricate or install such piping shall furnish proper code certification (PG-104.2) for it including a Manufacturer's Data Report Form P-4A as required by PG-112.2.5 and PG-112.3.

PG-109.2 Welded boiler external piping included within the scope of this Code, over NPS 2 (DN 50), shall be stamped with a Code symbol, together with the manufacturer's or contractor's name and serial number. Such stamping shall be on the pipe, valve or fitting adjacent to the welded joint farthest from the boiler. For piping operating at temperatures above 800° F (425° C) the symbol may be stamped on a nameplate that is irremovably attached by welding, provided such welding is postweld heat treated, or on a circular metal band at least ¼ in. (6 mm) thick. This band around the pipe shall be secured in such a manner as to prevent it from slipping off during handling and installation.

Welded piping NPS 2 (DN 50) or less included within the scope of this Code shall be marked with an identification acceptable to the Inspector and traceable to the required Data Report. Such marking shall be of a type that will remain visible until the piping has been installed.

PG-109.3 A manufacturer in possession of the pressure piping symbol stamp may

(a) design and fabricate welded piping. Such fabrications shall be stamped and reported on a Form P-4A, Manufacturer's Data Report for Fabricated Piping, as called for in PG-112.2.5.

(b) fabricate other parts of boilers, such as superheater, waterwall, or economizer headers, where complete design requirements are provided by others. Such parts shall be stamped or marked as required by PG-106.8 and reported on a Form P-4, Manufacturer's Partial Data Report, as called for in PG-112.2.4.

PG-109.4 Mechanically assembled boiler external piping which contains no pressure boundary welds does not require stamping, and as such may be assembled by a non-stamp holder. Note that the responsibility for documentation and hydrostatic testing of a mechanically assembled boiler external piping must be assumed by a holder of a valid "S," "A," or "PP" stamp (see PG-112.2.5).

PG-110 STAMPING OF BOILER PRESSURE RELIEF VALVES

Each pressure relief valve shall be plainly marked with the required data by the Manufacturer or Assembler (see PG-73.4.4) in such a way that the marking will not be obliterated in service. The marking shall be placed on the valve or on a nameplate securely fastened to the valve. The Code "V" symbol shall be stamped on the valve or nameplate by the Manufacturer or Assembler, as applicable. The other required data may be stamped, etched, impressed, or cast on the valve or nameplate. For units other than those included below, see PG-4. The marking shall include the following:

(a) the name (or an acceptable abbreviation) of the Manufacturer and Assembler, as applicable

(b) Manufacturer's design or type number

(c) NPS (DN) (the nominal pipe size of the valve inlet)

(d) set pressure ___ psi (MPa)

(e) Capacity

(1) capacity ___ lb/hr (kg/hr) (for saturated steam service in accordance with PG-69.2) or

(2) capacity ___ lb/hr (kg/hr) at ___ °F (°C) (for superheated steam service in accordance with PG-68.7 or supercritical steam service in accordance with PG-69.2.3) or

(3) capacity ___ gal/min (l/min) at 70°F (20°C) and lb/hr (kg/hr) steam for economizer service in accordance with PG-69.2

(f) year built, or alternatively, a coding may be marked on the valve such that the valve Manufacturer or

Assembler can identify the year the valve was assembled and tested

(g) ASME symbol as shown in Fig. PG-105.4

(h) The pilot of a pilot-operated pressure relief valve shall be plainly marked by the Manufacturer or Assembler showing the name of the Manufacturer, the Manufacturer's design or type number, the set pressure in pounds per square inch (MPa), and the year built, or alternatively, a coding that the Manufacturer can use to identify the year built.

PG-111 LOCATION OF STAMPINGS

The location of the required stampings shall be as listed below. These stampings shall be left uncovered or an easily removable marked cover may be provided over the stamping when a boiler is covered with insulation, or jacketed. No piping, boiler appliance, or other obstructions shall interfere with reading of the stamping.

PG-111.1 Horizontal-return tubular boilers – on the front head above the central rows of tubes.

PG-111.2 Horizontal-flue boilers – on the front head above the flues.

PG-111.3 Traction, portable, or stationary boilers of the locomotive type or Star watertube boilers – on the furnace end above the handhole. Or on traction boilers of the locomotive type – on the left wrapper sheet forward of the driving wheel.

PG-111.4 Vertical firetube and vertical submerged tube boilers – on the shell above the firedoor and handhole opening.

PG-111.5 Watertube Boilers

PG-111.5.1 Drum type – on a head of the steam outlet drum near and above the manhole.

PG-111.5.2 Forced-flow steam generator with no fixed steam and waterline – the master stamping (PG-106.3) shall be located on a major pressure part, located near the main operating floor where readily visible. The Data Report Form shall record the location of the master stamping.

PG-111.6 Scotch marine boilers – on either side of the shell near the normal water level line and as near as practical to the front tubesheet.

PG-111.7 Economic boilers – on the front head, above the center row of tubes.

PG-111.8 Miniature and electric boilers – on some conspicuous and accessible place on the boiler proper, or on a stamping plate at least 3/64 in. (1.2 mm) thick, permanently fastened (adhesives prohibited) to the boiler.

PG-111.9 On any of the above types where there is not sufficient space in the place designated, and for other types and new designs – in a conspicuous place on the boiler proper. The Data Report Form shall record the location of the required stamping.

PG-111.10 Superheaters – on superheater header near the outlet. Other headers shall carry identifying marks.

PG-111.11 Economizers – at a handy location on water inlet header or drums. Other headers shall carry identifying marks.

PG-111.12 Waterwalls – on one end of a lower header. Other headers shall carry identifying marks.

PG-111.13 When required by PG-106.6 and PG-106.7, the Manufacturer [see PG-104, Note (1)] shall furnish a nameplate or plates on which the appropriate Code Symbol and design data for the scope of his responsibility are permanently imprinted. The nameplate shall be securely attached to the front of the boiler, its setting or casing, at a place readily visible from the operating floor or platform.

PG-112 MANUFACTURERS' DATA REPORT FORMS

PG-112.1 Ten types of Manufacturers' Data Report Forms are shown in the Appendix under the heading "Data Report Forms and Guides" at the end of this Section. These forms shall be used by the Manufacturer [see PG-104, Note (1)] to record all the items of a complete boiler unit, in accordance with the provisions of PG-112.2. When the certification of the complete boiler unit is accomplished by more than one Data Report, the principal Data Report (P-2, P-2A, P-3, or P-3A) shall be designated as the Master Data Report (see PG-113).

For forced-flow steam generators with no fixed steam and waterline consisting of groups of pressure parts or components designed at several different pressure levels, a separate Manufacturers' Data Report shall clearly identify the pressure parts at each pressure level and show the maximum allowable working pressure. These several Data Reports shall be attached to a Master Data Report (PG-113) that shall clearly identify each component as part of the complete unit.

PG-112.2 Types of Data Report Forms. The types of Data Report Forms and the purposes for which they are to be used are specified in PG-112.2.1 through PG-112.2.8.

PG-112.2.1 Form P-2, Manufacturers' Data Report for All Types of Boilers Except Watertube and Electric, shall be used to record all types of boilers other than watertube boiler units and parts thereof, which are included under Form P-3.

PG-112.2.1.1 Form P-2A, Manufacturers' Data Report for All Types of Electric Boilers, shall be used to record all types of electric boilers.

PG-112.2.1.2 Form P-2B, Manufacturers' Data Report for Electric Superheaters and Reheaters, shall be used to record electric superheaters and reheaters installed external to the boiler setting.

PG-112.2.2 Form P-3, Manufacturers' Data Report for Watertube Boilers, Superheaters (except electric), Waterwalls, and Economizers, shall be used to record all of the items comprising a watertube boiler.

The Form P-3 shall also be used to record a superheater, waterwall, or economizer when the design

of such an item is certified by a manufacturer other than the boiler Manufacturer, or when such an item is to be added to an existing boiler. The item shall be stamped with the ASME "S" symbol and the additional information, as applicable, shown in PG-106.4.2.

Item 10 on Form P-3 shall be used to record other parts connected at the openings listed in Item 11 if such parts are fabricated of materials or by processes that require Code inspection. If such parts have not been connected prior to the hydrostatic test, a notation shall be made under Item 10 reading: "No parts connected to the openings listed in Item 11 except as noted."

PG-112.2.3 Form P-3A, Engineering-Contractor Data Report for a Complete Boiler Unit, shall be used when such an organization assumes the Manufacturer's Code responsibility as provided for by PG-104, Note (1). This form shall be used to certify Code responsibility for the design specification of the complete boiler unit, of which the components are individually certified by their individual manufacturers in accordance with the Code rules. This form also provides for field assembly certification.

PG-112.2.4 Form P-3A shall not be used by a Manufacturer to provide Code certification for only a portion of the complete boiler unit.

PG-112.2.5 Form P-4A, Manufacturers' Data Report for Fabricated Piping, shall be used to record all shop or field-welded piping that falls within the scope of this Section but is not furnished by the boiler Manufacturer. Form P-4B, Manufacturers' Data Report for Field Installed Mechanically Assembled Piping, shall be used to record all field installed mechanically assembled boiler external piping. Form P-4B shall be used only for piping that contains no joints brazed or welded by the field installer.

PART PFT REQUIREMENTS FOR FIRETUBE BOILERS

GENERAL

PFT-1 GENERAL

The rules in Part PFT are applicable to firetube boilers and parts thereof and shall be used in conjunction with the general requirements in Part PG as well as with the specific requirements in the applicable Parts of this Section that apply to the method of fabrication used.

MATERIALS

PFT-5 GENERAL

PFT-5.1 Materials used in the construction of pressure parts for firetube boilers shall conform to one of the specifications given in Section II and shall be limited to those for which allowable stress values are given in Tables 1A and 1B of Section II, Part D, or as otherwise specifically permitted in Parts PG and PFT.

PFT-5.2 Waterleg and doorframe rings of vertical firetube boilers and of locomotive and othertype boilers shall be of wrought iron or steel, or cast steel as

designated in the SA-216. The ogee or other flanged construction may be used as a substitute in any case.

DESIGN

PFT-8 GENERAL

The rules in the following paragraphs apply specifically to the design of firetube boilers and parts thereof and shall be used in conjunction with the general requirements for design in Part PG as well as with the specific requirements for design in the applicable Parts of this Section that apply to the method of fabrication used.

PFT-9 THICKNESS REQUIREMENTS

PFT-9.1 Shell and Dome. The thickness after forming shall be as determined in accordance with the rules in Part PG.

PFT-9.2 Tubesheet

PFT-9.2.1 The thickness shall be as determined in accordance with Part PG and Part PFT.

PFT-9.2.2 When butt welded to the shell of a firetube boiler, a formed tubesheet with a straight flange longer than 1 ½ times the tubesheet thickness shall have a straight flange thickness not less than that specified in the table in PFT-9.2.1, but in no case less than 0.75 times the thickness of the shell to which it is attached.

PFT-10 SHELL JOINTS

Longitudinal and circumferential welded joints of a shell or drum shall comply with the rules in Part PW.

PFT-11 ATTACHMENT OF HEADS AND TUBESHEETS

Flat heads and tubesheets of firetube boilers shall be attached by one of the following methods.

PFT-11.2 By flanging and butt welding in accordance with Parts PG and PW.

PFT-11.3 By attaching an outwardly or inwardly flanged tubesheet to the shell by fillet welding provided the following requirements are met.

PFT-11.3.1 The tubesheet is supported by tubes, or stays, or both.

PFT-11.3.2 The joint attaching an outwardly flanged tubesheet is wholly within the shell and forms no part thereof.

PFT-11.3.3 Inwardly flanged tubesheets are full fillet welded inside and outside.

PFT-11.3.4 The throat dimension of the full fillet weld is equal to not less than 0.7 of the thickness of the head.

PFT-11.3.5 The shell at the welds is not in contact with primary furnace gases.¹

PFT-11.3.6 The construction conforms in all other respects to the requirements of this Section, including welding and postweld heat treating, except that volumetric examination is not required.

PFT-11.3.7 This construction shall not be used on the rear head of a horizontal-return tubular boiler and

inwardly flanged tubesheets shall not be used on a boiler with an extended shell.

PFT-11.3.8 On inwardly flanged tubesheets, the length of flange shall conform to the requirements of PW-13 and the distance of the outside fillet weld to the point of tangency of the knuckle radius shall be not less than $\frac{1}{4}$ in. (6 mm).

PFT-11.4 By attaching an unflanged tubesheet to the shell by welding, provided the requirements of PFT-11.4.1 through PFT-11.4.7 are met.

PFT-11.4.1 The tubesheet is supported by tubes, or stays, or both.

PFT-11.4.2 The welded joint may be made through the tubesheet or shell thickness. When the weld joint is made through the shell, a minimum of 80% of the pressure load shall be carried by the tubes, stays, or both.

PFT-11.4.3 The weld is a full penetration weld equal at least to the full thickness of the base metal applied from either or both sides. When the full penetration weld is made through the shell, an external fillet weld with a minimum throat of $\frac{1}{4}$ in. (6mm) shall be provided, and no weld prep machining shall be performed on the flat tubesheet. The distance from the edge of the completed weld to the peripheral edge of the tubesheet shall not be less than the thickness of the tubesheet.

PFT-11.4.4 The shell or wrapper sheet, where exposed to primary furnace gases³ and not water cooled, does not extend more than $\frac{1}{8}$ in. (3 mm) beyond the outside face of the tubesheet.

PFT-11.4.5 The weld attaching a furnace or a lower tubesheet of a vertical firetube boiler to the furnace sheet is wholly within the furnace sheet and is ground flush with the upper or water side of the tubesheet.

PFT-11.4.6 The construction conforms in all other aspects to the requirements of this Section including welding, and postweld heat treatment, except that volumetric examination is not required.

PFT-11.4.7 This construction shall not be used on the rear head of a horizontal-return tubular boiler.

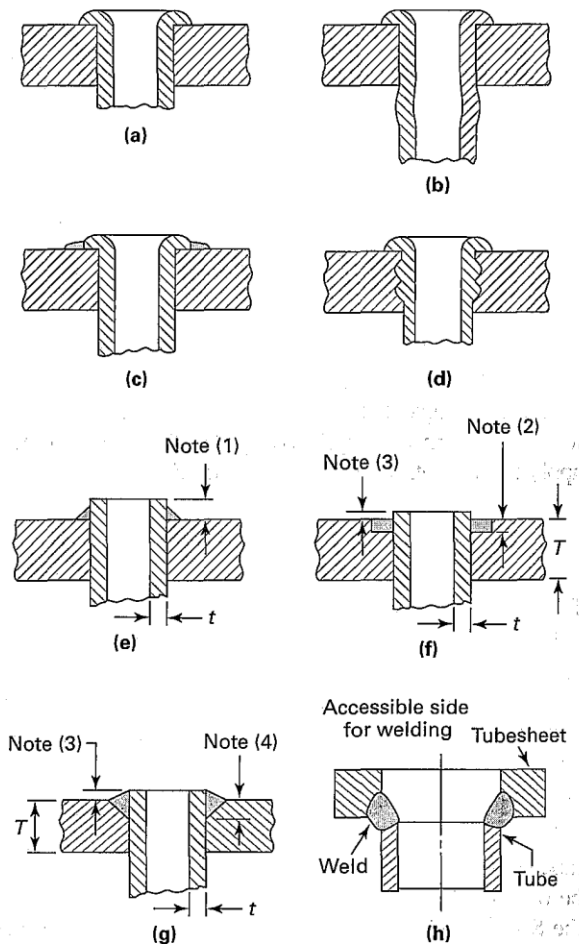
PFT-12 TUBES

PFT-12.1 Allowable Working Pressure

PFT-12.1.1 The maximum allowable working pressure of tubes or flues of firetube boilers shall be as given in PFT-50 and PFT-51.

PFT-12.1.2 The maximum allowable working pressure for copper tubes or nipples subjected to internal or external pressure shall not exceed 250 psi (1.7 MPa). The maximum temperature shall not exceed 406° F (208° C).

FIG. PFT-12.1 SOME ACCEPTABLE FORMS OF TUBE ATTACHMENT ON FIRETUBE BOILERS



NOTES:

- (1) Not less than t or $\frac{1}{8}$ in. (3 mm), whichever is the greater, nor more than $2t$ or $\frac{1}{4}$ in. (6 mm), whichever is the lesser.
- (2) Not less than t or $\frac{1}{8}$ in. (3 mm), whichever is the greater, nor more than $7/3$ (see PFT-12.2.1.2).
- (3) Not more than t .
- (4) Not less than t or $\frac{1}{8}$ in. (3 mm), whichever is the greater, nor more than $7/3$ (see PFT-12.2.1.2).

The maximum allowable working pressure for copper clad tubes subjected to external pressure shall be determined by the formula in PFT-51, in which t may be increased by one-half the thickness of the cladding.

PFT-12.2 Attachment of Tubes

PFT-12.2.1 Figure PFT-12.1 illustrates some of the acceptable types of tube attachments. Such connections shall be

- (a) expanded and beaded as in illustrations (a), (b), and (d)
- (b) expanded and beaded and seal welded as in illustration (c)
- (c) expanded and seal welded as in illustration (e)
- (d) welded, as in illustrations (f) and (g)

³ Primary furnace gases are those in a zone where the design temperature of those gases exceeds 850° F (455° C).

Tube ends attached by expanding and welding are subject to the provisions specified in PFT-12.2.1.1 through PFT-12.2.1.3.

PFT-12.2.1.1 Where no bevel or recess is employed, the tube shall extend beyond the tubesheet not less than a distance equal to the tube thickness or 1/8 in. (3 mm), whichever is the greater, nor more than twice the tube thickness or 1/4 in. (6 mm), whichever is the lesser [see Fig. PFT-12.1, illustration (e)].

PFT-12.2.1.2 The tubesheet hole may be beveled or recessed. The depth of any bevel or recess shall not be less than the tube thickness or 1/8 in. (3 mm), whichever is greater, nor more than one-third of the tubesheet thickness, except that when tube thicknesses are equal to or greater than 0.150 in. (4 mm), the bevel or recess may exceed $T/3$. Where the hole is beveled or recessed, the projection of the tube beyond the tubesheet shall not exceed a distance equal to the tube wall thickness [see Fig. PFT-12.1, illustrations (f) and (g)].

PFT-12.2.1.3 On types of welded attachment shown in Fig. PFT-12.1, illustrations (c) and (e), the tubes shall be expanded before and after welding. On types shown in illustrations (f) and (g), the tubes may be expanded.

PFT-12.2.2 Expanding of tubes by the Prosser method may be employed in combination with any beaded or seal welded attachment method [see Fig. PFT-12.1, illustration (b)].

PFT-12.2.3 After seal welding as shown by Fig. PFT-12.1, illustrations (c) and (e), a single hydrostatic test of the boiler shall suffice.

PFT-12.2.4 The inner surface of the tube hole in any form of attachment may be grooved or chamfered.

PFT-12.2.5 The sharp edges of tube holes shall be taken off on both sides of the plate with a file or other tool.

DOORS AND OPENINGS

PFT-40 WELDED DOOR OPENINGS

Arc or gas welding may be used in the fabrication of door holes provided the sheets are stayed around the opening in accordance with the requirements of PFT-27.6 and PFT-27.7.

No calculations need be made to determine the availability of compensation for door openings spanning between the plates of waterlegs. The required thickness of circular access openings shall be determined in accordance with PFT-51. The required thickness of door openings of other than circular shape shall be calculated using eq. (1) of PG-46, using 2.1 or 2.2 for the value of C , depending on the plate thickness, and a value of p equal to the waterleg inside width. Volumetric examination of the joining welds is not required.

PFT-41 OPENINGS IN WRAPPER SHEETS

Openings located in the curved portion of the wrapper sheet of a locomotive type boiler shall be designed in accordance with the rules in PG-32.

PFT-42 FIRESIDE ACCESS OPENINGS

The minimum size of an access or fire door opening, in which the minimum furnace dimension is 24 in. (600 mm), shall be not less than 12 in. x 16 in. (300 mm x 400 mm) or equivalent area, 11 in. (280 mm) to be the least dimension in any case. A circular opening shall be not less than 15 in. (380 mm) in diameter.

For furnace dimensions less than 24 in. (600 mm), the opening should be 2 3/4 in. x 3 1/2 in. (70 mm x 89 mm) or larger where possible. In cases where the size or shape of the boiler prohibits an opening of that size, two openings with a minimum size of 1 in. (25 mm) may be used, preferably opposite each other, to permit inspection and cleaning of the furnace. If the burner is removable so as to permit inspection and cleaning through the burner opening, a separate access opening need not be provided.

The bonnet or smoke hood of a vertical flue or tubular boiler shall be provided with an access opening at least 6 in. x 8 in. (150 mm x 200 mm) for the purpose of inspection and cleaning the top head of the boiler.

PFT-43 REQUIREMENTS FOR INSPECTION OPENINGS

All firetube boilers shall have sufficient inspection openings, handholes, or washout plugs with a minimum of four openings to permit inspection of the waterside of the tubesheets, furnaces, and tubes and to permit flushing of loose scale and sediment from the boiler. Except where space restrictions would prohibit entry to the boiler, a manhole shall be provided in the upper portion of the shell. All openings shall meet the requirements of PG-32 through PG-44. Where washout plugs are used, the minimum size shall be NPS 1 1/2 (DN 40), except for boilers 16 in. (400 mm) or less in inside diameter, the minimum size shall be NPS 1 (DN 25).

PFT-44 OPENING BETWEEN BOILER AND SAFETY VALVE

The opening or connection between the boiler and the safety valve shall have at least the area of the valve inlet.

After the boiler Manufacturer provides for the opening required by the Code, a bushing may be inserted in the opening in the shell to suit a pressure relief valve that will have the capacity to relieve all the steam that can be generated in the boiler and which will meet the Code requirements. The minimum size of the connection and opening for the pressure relief valve shall be not less than NPS 1/2 (DN 15).

No valve of any description shall be placed between the required pressure relief valve or valves and the boiler, or on the discharge pipe between the pressure relief valve and the atmosphere. When a discharge pipe is used, the cross-sectional area shall be not less than the full area of the valve outlet or of the total of the areas of the valve outlets discharging therein and shall be as short and straight as possible and so arranged as to avoid undue stresses on the valve or valves.

DOMES

PFT-45 REQUIREMENTS FOR DOMES

PFT-45.1 The longitudinal joint of a dome may be butt welded or the dome may be made without a seam of one piece of steel pressed into shape. The dome flange may be double full fillet lap-welded to the shell if all welding complies fully with the requirements for welding in Part PW. Volumetric examination of the fillet welds may be omitted. The opening shall be reinforced in accordance with PG-32 through PG-44.

PFT-45.3 When a dome is located on the barrel of a locomotive-type boiler or on the shell of a horizontal-return tubular boiler, the outside diameter of the dome shall not exceed six-tenths the inside diameter of the shell or barrel of the boiler unless the portion of the barrel or shell under the dome (the neutral sheet) is stayed to the head or shell of the dome by stays which conform in spacing and size to the requirements given in PG-46 and Table 1A of Section II, Part D. With such stayed construction the outside diameter of a dome located on the barrel or shell of a boiler is limited to eight-tenths of the barrel or shell inside diameter.

PFT-45.4 All domes shall be so arranged that any water can drain back into the boiler.

PFT-45.5 Flanges of domes shall be formed with a corner radius, measured on the inside, of at least twice the thickness of the plate for plates 1 in. (25 mm) in thickness or less, and at least three times the thickness of the plate for plates over 1 in. (25 mm) in thickness.

PFT-45.6 Domes and manhole frames attached to shells or heads of boilers shall be designed in accordance with PG-32 through PG-44.

PART PEB REQUIREMENTS FOR ELECTRIC BOILERS

GENERAL

PEB-1 GENERAL

The rules in Part PEB are applicable to electric boilers and parts thereof and shall be used in conjunction with the general requirements in Part PG as well as with the special requirements in the applicable Parts of this Section that apply to the method of fabrication used.

PEB-2 SCOPE

PEB-2.1 This part contains special rules for construction of electric boilers, both of the electrode and immersion resistance element type. This Part does not include electric boilers where the heat is applied externally to the boiler pressure vessel by electric resistance heating elements, induction coils, or other electrical means. These types of electric boilers shall be constructed in accordance with other applicable Parts of this Section.

PEB-2.2 Electric boilers and parts thereof that do not exceed the diameter, volume, or pressure limits of PMB-2 may be constructed using the applicable paragraphs of Part PMB in conjunction with this Part.

PEB-2.3 An electrode type boiler is defined as an electric boiler in which heat is generated by the passage of an electric current using water as the conductor.

PEB-2.4 An immersion resistance element type boiler is defined as an electric boiler in which heat is generated by the passage of an electric current through a resistance heating element directly immersed in water, or enclosed in a pipe immersed in water.

PEB-2.5 Electric boilers may be field assembled provided the boiler is manufactured and assembled in compliance with the provisions and requirements of Part PEB and other applicable Parts of this Section.

PEB-3 OPTIONAL REQUIREMENTS FOR THE BOILER PRESSURE VESSEL

The boiler pressure vessel may be constructed in compliance with the ASME Pressure Vessel Code Section VIII, Division 1, rules for unfired steam boilers [UW-2(c)] subject to the conditions specified in PEB-3.1 through PEB-3.4.

PEB-3.1 The Manufacturer who certifies and stamps the completed boiler shall specify to the “U” stamp holder all additional requirements of Part PEB, which are not requirements of Section VIII, Division 1, and shall ensure that these requirements are satisfied.

PEB-3.2 These additional requirements are:

PEB-3.2.1 The materials of construction shall comply with the requirements of PEB-5.1 and PEB-5.3.

PEB-3.2.2 Inspection openings shall comply with the requirements of PEB-10.

PEB-3.3 The boiler pressure vessel shall be stamped with the ASME Code “U” symbol and the letters “UB,” and be documented with the ASME U-1 or U-1A Data Report.

PEB-3.4 The master Data Report P-2A for the Electric Boiler shall indicate “Boiler pressure vessel constructed to Section VIII, Division 1 as permitted by Part PEB.”

MATERIALS

PEB-5 GENERAL

PEB-5.1 Unless specifically permitted elsewhere in this section, materials used in the construction of pressure parts for electric boilers shall conform to one of the specifications in Section II and shall be limited to those permitted by PG-6, PG-7, PG-8, and PG-9 for which allowable stress values are given in Tables 1A and 1B of Section II, Part D. Miscellaneous pressure parts shall conform to the requirements of PG-11.

PEB-5.2 Seamless or welded shells, plates, or heads of electric boilers shall not be less than 3/16 in. (5 mm) in thickness.

PEB-5.3 Electric boilers of the immersion element type may be fabricated of austenitic stainless steel type 304, 304L, 316, 316L, and 347 of any material specification listed in PG-6 and PG-9, provided that a precautionary statement indicating that the boiler shall be operated using only deionized water, having a maximum conductance of 1 microSiemen per cm (1 μ S/cm) [minimum specific resistivity of 1 megohm per cm (1 M Ω /cm)], is clearly marked on the boiler in a visible location.

DESIGN

PEB-8 GENERAL

PEB-8.1 The rules in the following paragraphs apply specifically to the design of electric boilers and parts thereof. They shall be used in conjunction with the general requirements for design in Part PG, any applicable requirements in Part PMB for miniature boilers, and with the specific requirements for design in applicable Parts of this Section that apply to the method of fabrication used.

PEB-8.2 Responsibility of design of electric boilers to be marked with the "E" symbol shall be that of the holder of the "E" stamp.

PEB-9 WELDING

Electric boilers may be constructed by fusion welding in accordance with all the requirements of this Section except that postweld heat treatment, volumetric examination of the welded joints, and the nondestructive examinations described in PG-93.1 are not required when the limitations in PMB-2.1 are not exceeded.

PEB-10 INSPECTION OPENINGS

PEB-10.1 Electric boilers of a design employing a removable cover, or removable internal electric heating elements that will permit access for inspection, and cleaning and having an internal volume (exclusive of casing and insulation) of not more than 5 ft³ (0.14 m³) need not be fitted with washout or inspection openings.

PEB-10.2 Electric boilers of more than 5 ft³ (0.14 m³) not provided with a manhole, shall have an inspection opening or handhole located in the lower portion of the shell or head. The inspection opening shall not be smaller than NPS 3 (DN 80). In addition, electric boilers of the resistance heating element type designed for steam service shall have an inspection opening or handhole at or near the normal waterline.

PEB-11 FEEDWATER SUPPLY

PEB-11.1 The feedwater source to electric boilers shall be capable of meeting the applicable requirements of PG-61. Feedwater connections to an electric boiler shall not be smaller than NPS ½ (DN 15), except as permitted by PMB-11.

PEB-11.2 Electric boilers that do not exceed the diameter, volume, or pressure limits of PMB-2, may have the feedwater delivered through the blowoff opening if desired.

PEB-12 BLOWOFF

PEB-12.1 The blowoff piping for each electric boiler pressure vessel having a normal water content not exceeding 100 gal (380 L) is required to extend through only one valve.

PEB-12.2 The minimum size of blowoff pipes and fittings shall be NPS 1 (DN 25), except that for boilers of 200 kW input or less the minimum size of pipe and fittings may be NPS ¾ (DN 20). Electric boilers that do not exceed the diameter, volume, or pressure limits of PMB-2 may have blowoff connections in accordance with PMB-12.

PEB-13 WATER LEVEL INDICATORS

PEB-13.1 Electric boilers of the electrode type shall have at least one gage glass. The gage glass shall be located as to indicate the water levels both at startup and under maximum steam load conditions as established by the Manufacturer.

PEB-13.2 Electric boilers of the resistance element type shall have at least one gage glass. The lowest visible water level in the gage glass shall be at least 1 in. (25 mm) above the lowest permissible water level as determined by the Manufacturer. Each electric boiler of this type shall also be equipped with an automatic low-water cutoff on each boiler pressure vessel so located as to automatically cut off the power supply to the heating elements before the surface of the water falls below the visible level in the gage glass.

PEB-13.3 Tubular gage glasses on electric boilers shall be equipped with protective rods or shields.

PEB-14 PRESSURE GAGES

Pressure gages shall meet the requirements of PG-60.6.

PEB-15 PRESSURE RELIEF VALVES

PEB-15.1 Each electric boiler shall have at least one pressure relief valve. Electric boilers with a power input more than 1,100 kW shall have two or more pressure relief valves.

PEB-15.2 The minimum pressure relief valve relieving capacity for electric boilers shall be 3 ½ lb/hr/kW (1.6 kg/hr/kW) input. The pressure setting shall not be higher than the MAWP stamped on the completed boiler (see PEB-18.3.2).

PEB-15.3 Pressure relief valves shall be mounted in accordance with PG-71.2 with the spindle vertical. Electric boilers that do not exceed the diameter, volume, or pressure limits of PMB-2, may have a pressure relief valve(s) installed in other than the vertical position, provided that

- (a) the valve design is satisfactory for such position
- (b) the valve is not larger than NPS ¾ (DN 20)
- (c) the maximum angle of deviation from vertical does not exceed 30 deg
- (d) the nozzle location is such that no material that could interfere with the operation of the valve can accumulate at the valve inlet
- (e) the discharge opening of the valve body and discharge piping is oriented so that drainage is adequate

PEB-16 AUTOMATIC DEVICES

Electric boilers shall be provided with pressure and/or temperature controls and an automatic low-water fuel cutoff. No low-water cutoff is required for electrode type boilers.

PEB-17 HYDROSTATIC TEST

PEB-17.1 Each electric boiler pressure vessel shall be hydrostatically tested at completion of fabrication in accordance with PG-99 or PMB-21, as applicable.

PEB-17.2 In addition to the above, after assembly of the boiler pressure vessel and the mechanically assembled boiler external piping and trim, the completed electric boiler shall be given a final hydrostatic test at a

pressure not less than 1 ½ times the MAWP of the pressure vessel. Miniature electric boilers that are trimmed to operate at less than the MAWP of the pressure vessel shall be given a hydrostatic test at a pressure not less than the safety valve setting.

PEB-17.3 When the electric boiler is to be marked with the “E” symbol, the symbol shall be applied after completion of the hydrostatic test of PEB-17.2.

PEB-18 INSPECTION AND STAMPING OF BOILERS

PEB-18.1 Inspection of electric boilers shall be as required by PG-90.1 and PG-90.3. Witness by the Authorized Inspector of the hydrotest required in PEB-17.2 for the completed boiler may be omitted for electric boilers that meet all the following limitations:

- (a) 800 kW maximum per vessel
- (b) 600 V maximum
- (c) mechanically assembled boiler external piping (BEP) only

When the Authorized Inspector does not perform a final inspection of the completed boiler, the Manufacturer or Assembler shall make an equivalent examination. The equivalent examination shall be in accordance with a quality control procedure meeting the requirements of PEB-18.2 and PEB-18.5.

PEB-18.1.1 Electric boilers exceeding the size limitations specified in PEB-18.1, and having only mechanically assembled external piping (BEP) and trim, shall have a final inspection by the Authorized Inspector, who shall also witness the hydrostatic test called for in PEB-17.2.

PEB-18.1.2 For electric boilers having welded or brazed boiler external piping (BEP) or trim, the inspection requirements of PG-90.1 and the hydrostatic test requirements of PG-99 apply.

PEB-18.2 Each electric boiler Manufacturer shall comply with the applicable requirements of PG-104 and PG-105.

PEB-18.2.1 An electric boiler Manufacturer or Assembler applying for or renewing the “E” stamp shall have its facilities and organizations subject to a joint review by its Authorized Inspection Agency and the legal jurisdiction involved (see last paragraph of PG-105.4).

PEB-18.2.2 A Manufacturer or Assembler holding an “E” stamp and assembling units where the final shop inspection is not mandatory (see PEB-18.1), shall be subject to periodic review by its Authorized Inspection Agency. The review shall be conducted on a quarterly basis or more frequently if deemed necessary by the Authorized Inspection Agency. The frequency of this review may be reduced subject to written agreement between the Manufacturer or Assembler and its inspection agency and the written approval of the appropriate legal jurisdiction. However, in no case shall the review be less than once every 6 months.

PEB-18.3 The stamping of electric boilers shall conform to the requirements of PG-106. Completed

electric boilers shall be marked with the “S” or “M” symbol by the Manufacturer of the boiler pressure vessel except when the boiler pressure vessel is constructed under the provisions of PEB-3 (see PEB-18.4). When the trim, fixtures and fittings (such as valves), threaded boiler external piping, and appurtenances are connected to an electric boiler by a Manufacturer or Assembler not authorized to apply the “S” or “M” stamp, the boiler assembler shall apply an “E” stamp to the completed assembly. “E” stamp holders are limited to the use of assembly methods that do not require welding or brazing.

PEB-18.3.1 The stamping of the boiler pressure vessel shall be located as called for in PG-111.8 and need not indicate the kW input or the maximum designed steaming capacity.

PEB-18.3.2 The stamping of the complete electric boiler shall be on a separate metallic plate and shall be in accordance with PG-106.4. The MAWP shall be that established by the completed boiler assembler holding the “S,” “M,” or “E” stamp, but in no case higher than the MAWP stamped on the boiler shell. The MAWP shall be listed on Part II of Form P-2A, Manufacturers’ Data Report for All Types of Electric Boilers. This plate shall be located on the assembly so that it is readily visible from the operating floor.

PEB-18.3.3 The stamping required by PEB-18.3.2 need not be done in the presence of the Authorized Inspector for electric boilers that do not receive final inspection by the Authorized Inspector (see PEB-18.1).

PEB-18.4 For boiler pressure vessels constructed under the provisions of PEB-3, the inspection and stamping requirements of Section VIII, Division 1, UG-116(c) for special service pressure vessels (UB), shall be followed.

PEB-18.5 Those Manufacturers and Assemblers providing an equivalent examination of completed electric boilers when final inspection is not witnessed by the Authorized Inspector (see PEB-18.1), shall provide oversight by a Certified Individual (CI).

PEB-18.5.1 A Certified Individual (CI) shall be an employee of the Manufacturer or Assembler and shall be qualified and certified by the Manufacturer or Assembler. Qualifications shall include as a minimum

- (a) knowledge of the requirements of this Section for the application of Code symbols
- (b) knowledge of the Manufacturer’s quality program
- (c) training commensurate with the scope, complexity, or special nature of the activities to which oversight is to be provided

The Manufacturer or Assembler shall maintain a record containing objective evidence of the Certified Individual’s qualifications, training and certification.

PEB-18.5.2 The duties of a Certified Individual (CI) shall be to assure that each use of the Code symbol as permitted in PEB-18.3.3 is in accordance with the requirements of this Section and is documented on the Certificate of Conformance on Form P-2A,

Manufacturers' Data Report for All Types of Electric Boilers. The CI shall also

(a) verify that each electric boiler, to which a Code symbol is applied, meets all applicable requirements of this Section

(b) sign the Certificate of Conformance, Form P-2A, prior to release of control of the boiler

PEB-19 MANUFACTURERS' DATA REPORT FOR ELECTRIC BOILERS

PEB-19.1 This form consists of two parts. Part I is to be completed by the Manufacturer of the boiler pressure vessel who is the holder of the "S" or "M" stamp and his inspection agency. Part II is to be completed by the Manufacturer or Assembler responsible for the completed electric boiler who shall be authorized to use any of the "S," "M," or "E" stamps.

PEB-19.2 When the boiler pressure vessel is constructed by a "U" stamp holder and certified on a U-1 or U-1A Data Report, Part 1 shall be completed by the "S," "M," or "E" stamp holder to the extent indicated in Guide A-351.1.