

TITLE: PROPOSED BOILER INSPECTOR GUIDELINES AND STANDARD

A. Definitions

- (1) "Steam Boiler" shall mean any closed vessel wherein steam or other vapor is or is intended to be generated above atmospheric pressure by the application of fire, by the product of combustion, by electrical means, or by other heat source.
- (2) "Power Boiler" shall mean a steam boiler with a working pressure exceeding 1.055-kg/cm² gauge (15 psig).
- (3) "Miniature Boiler" shall mean a power boiler, which does not exceed any of the following limits.
 - a. 40.5 cm (16 in.) inside diameter of shell;
 - b. 106.5 cm (42 in.) overall length of the shell;
 - c. 1.85 m² (20 ft²) water heating surface, or;
 - d. 7.03 kg/cm² (100 psig) maximum allowable working pressure.
- (4) "Low Pressure Heating Boiler" shall mean a steam boiler used exclusively for operation at a pressure not exceeding 1.055 kg/cm² (15 psig) or a temperature not exceeding 121 deg. C (250 deg. F).
- (5) "Hot Water Boiler" a vessel completely filled with water and is intended to be heated above atmospheric pressure by the application of fire or such products of combustion, by electrical means, or other heat source.
- (6) "Working Pressure" shall mean gauge pressure above atmospheric pressure in kg./cm²(psig).
- (7) "Boiler Horsepower" in the absence of Manufacturer's Data, Boiler Horsepower shall mean the equivalent of 0.95 sq. m. (10 sq. ft.) of heating surface for vertical tube boilers and the equivalent of 0.46 sq. m. (5 sq. ft.) of heating surface for other types.

B. General Provisions

- (1) No boiler shall be installed and/or operated in the Philippines without the permit issued for the purpose by the Secretary of Labor or his/her authorized representative.
- (2) Application for installation of a new boiler shall be filed with the Bureau or in the Regional Office with available professional mechanical engineer (PME) for processing and verification accompanied by the manufacturer's data sheets, working drawings, foundation design computation, installation and location plans, all in five (5) copies (with print).
- (3) Application to locally fabricate boilers shall be filed in five (5) copies with the Bureau or in the Regional Office concerned, accompanied by design drawings, computations and specifications.
- (4) Major repair work on pressure parts of boilers shall be done after the details of the repair and the design plan shall have been processed and cleared by the Bureau or Regional Office. After repairs, the boiler shall not be operated or used without the permit issued by authorize person.
- (5) Any removal and/or change of location or ownership of a steam boiler shall be reported to the Bureau or Regional Office concerned by the old and new owners not later than thirty
(30) days after the sale or transfer. Such boilers shall not be operated or used without the required permit.
- (6) All portable pressure vessels with operating permit issued by the Secretary or his/her authorized representative shall be honored in the Philippines during the period covering the permit.
- (7) The minimum personnel requirement in the operation of boilers shall be in accordance with Section 36, Article IV of R.A. 8495, otherwise known as "The Philippine Mechanical Engineering Act of 1998".

B.1 Standards Requirements

For purposes of fabrication, as well as inspection, checking, test and other consideration prior to the approval/clearance of any of the fabrication and installation application and plans and use of any boiler, the following in accordance with the latest revision, are hereby adapted:

- (1) ASME Boiler and Pressure Vessel Code;
- (2) ASME Code for Pressure Piping;
- (3) API Code for Petroleum Gases and Liquids;

(4) ISO Code; and

(5) The Philippine Society of Mechanical Engineers (PSME) Code.

B.2 Inspection of Boilers

(1) The Regional Office concerned through its authorized technical safety inspectors shall conduct inspection, both internally and externally on all boiler parts and appliances on the following phases of work:

- a. During construction or fabrication if manufactured in the Philippines and hydrostatically tested at 1.5 times the design pressure after completion of work;
- b. Before being placed into service after completion of installation and hydrostatically tested at 1.5 times the design pressure;
- c. Before being placed into service after completion of reconstruction or repair and hydrostatically tested 1.2 times the maximum working or operating pressure; and
- d. Periodically at intervals of not exceeding twelve (12) months.

The Regional Office concerned shall serve Notice of Inspection for the annual inspection of boiler to the owner/user thirty (30) days before the expiration of the permit to operate the boiler and at exact date of scheduled inspection, the owner/user shall have the boiler drained, cooled, opened-up and thoroughly cleaned for the conduct of internal and external inspection on all boiler parts and appliances. Hydrostatic pump shall always be made ready just in case the boiler is to be subjected to a hydrostatic test.

(2) The result of internal and external conduct of inspection on all boiler parts and appliances, may upon the discretionary power/privilege of the technical safety inspection authority, decide whether or not to subject the boiler to a hydrostatic test.

(3) Boiler subjected to hydrostatic test shall be:

- a. with a test pressure equal to 1.2 times the maximum working or operating pressure. The minimum temperature of the water used shall not be less than 210C (700F) and a maximum temperature not to exceed 710C (1600F.)
- b. under proper control, to reach the required test pressure gradually and in no case shall this test pressure be exceeded by more than six percent (6%).

(4) During hydrostatic test, the safety valves shall be removed, and the valves disc held down by means of testing clamps and not by screwing down the compression screw upon the spring. 5) In lieu of hydrostatic test, radiographic, ultrasonic, thickness gauging magnetic particle, liquid penetrant and/or other, equivalent non-destructive test shall be performed on the boiler head, shell and tubes, including operational test on boiler instruments and appliances.

All test shall be performed in the presence of the inspection authority. The test results shall be certified true and correct, and sealed by a professional mechanical engineer (PME) and signed by the owner/user as well.

(6) Boilers found unsafe shall not be operated until the boiler defect/s is/are corrected and their fittings are in good condition to ensure safe operation.

B.3 Age Limit of Lap-Riveted Boilers

The age limit of a horizontal return tubular boiler having a longitudinal lap joint and carrying over 3.5 kg/cm. 2g. (50 psig.) pressure shall be twenty-five (25) years. No riveted joint boiler shall be discontinued from service solely on account of age. However, within a period of five (5) years after the effectivity of this Standards, a joint lap-riveted boiler maybe used provided that the lap-joints are thoroughly investigated particularly for cracks in the lap-joints, the boiler tested hydrostatically to 1.2 times its working pressure and the general condition of the shell, tubes, sheets, joints, rivets and other parts warrant further use of the boiler, as found by the safety engineer in the presence of the owner's/establishment's plant mechanical engineer provided however that the total service age of the boiler is not more than twenty five (25) years.

B.4 Construction of Steam Boilers

(1) Steam boilers are to be constructed in accordance with the procedures/process of the standards requirements provided under rule 1162.01

(2) Steam boilers, their fittings and attachments shall be:

- a. designed to adopt to the condition of their use; and
- b. constructed of sufficient strength to sustain internal pressure to which they are normally subjected.

B.5 Boiler Records

- (1) Every boiler shall be accompanied by a certificate showing all the technical specifications used by the manufacturers including all the design standards and dimensions and the maker's nameplate affixed on the boiler.
- (2) All second hand or rehabilitated boilers shall be accompanied by detailed working drawings and certificates executed by a Professional Mechanical Engineer calculating the ultimate tensile stress which shall not exceed 3,873 kg./cm.² and (55,000 psi), the joint efficiency of not more than 90% for radio graphed and heat-treated butt fusion weld, and a factor of safety of not less than five(5).
- (3) The certificates shall also contain the results of all the control test conducted during the manufacture of the material and the construction of the boiler.
- (4) The certificates shall be kept on file by the owner, ready and available to present during the course of inspection.
- (5) Every boiler owner/user shall keep a boiler maintenance register which shall show the dates of all the tests, internal and external inspections, replacements and repairs.

C. Power Boilers

C. 01 Boiler Rooms

- (1) Clearance around the boiler to the boiler room wall or any equipment shall be at least 100 cm. (3.28 ft.). Boiler room shall have two independent doors for easy access.
 - a. in separate buildings of fire-resistant materials used for no other purpose and situated not less than 3 m. (10 ft.) away from buildings not forming part of the factory, or
 - b. in structure of fire-resistant materials if situated in the same factory buildings or in close proximity to other factory buildings.
- (2) Where power boiler room adjoins workrooms in which flammable or explosive substances are manufactured, used, handled, or liberated, there shall be no exits or other wall openings in the intervening walls.
- (3) Power boiler rooms, blow-offs, ash pits or high pressure steam line tunnels and other places where there is danger or workers being trapped in the event of explosion or rupture of steam lines, shall be provided with not less than (2) adequate exits which shall be kept clear of any obstructions.
- (4) Rails, walls, runways and stairs of iron or steel construction with non-slip surface shall be provided for convenient and safe access to overhead valves, water columns, feed water regulators and other fittings.
- (5) Runways located on top or alongside a battery of power boilers shall be provided with not less than two (2) means of descent.
- (6) Power boiler rooms shall be of sufficient height to permit installation and operation of all valves and safety devices with a minimum clearance of 90 cm. (3 ft.) above the highest valve fittings or levers.
- (7) Pits in power boiler rooms shall be covered or guarded by standard railings and toeboards.
- (8) Where power boilers are supported by structural steel work, the support shall be located or insulated that the heat from the furnace cannot impair the strength of the steel.
- (9) Power boiler settings shall be provided with suitably packed openings or sleeves of sufficient size to permit the expansion and contraction of the pipes.
- (10) Wet-bottom stationary boiler shall have a space of not less than 30 cm. (12 in.) between the bottom of the boiler and the floor line to provide access for maintenance or inspection.
- (11) Clearance around the boiler to the boiler room wall or any equipment shall be at least 90 cm. (3 ft.). Boiler room shall have two independent doors for easy access.

C.02 Factors of Safety

The working pressure shall be reduced to maintain a factor of safety of not less than five (5) of such other factor as may have been specified/fixed in the specification, to which the boiler was made by increasing the factor of safety by ten percent (10%) or more as determined by the enforcing authority under the following conditions:

- a. the inspection shows signs of deterioration affecting the integrity of the boiler/s unless repair is/are undertaken: and
- b. after twenty five (25) years of service

C.03 Access and Inspection

Power boiler or parts thereof shall be equipped with suitable manholes or other openings for inspection, examination and cleaning.

(1) Hand-hole openings in heads or shells of power boilers shall not be less than 70mm. x 90 mm. (2 3/4 in 3 1/2 in).

(2) Each power boiler shall be equipped with at least one (1) safety valve if the heating surface is 46.5 sq.m. (500 sq.ft.) or less and two (2) or more if the heating surface is over. The safety valves shall be:

- a.) place as close as possible to the boiler;
- b.) connected to the boiler independent of any other steam connection; and
- c.) place between the boiler and the discharge point when installed in the pipeline.

(3) The safety valve or valves on power boilers shall be of sufficient capacity to discharge all the steam generated by the boiler without allowing the pressure to rise to more than:

- a.) six percent (6%) above the maximum allowable working pressure; or
- b.) six percent (6%) above the highest pressure to which any valve is set.

(4) Seats and discs of safety valve for power boilers shall be of suitable corrosion-resistant materials and the seat shall be secured on the valve body to avoid the possibility of the seat lifting off.

(5) Safety valves for power boilers shall be constructed, tested and maintained in the following manner:

- a. the failure of any part will not obstruct the free and full discharge of steam from the valves;
- b. no shock injurious to the valves or to the boiler shall result from its operations; and
- c. the valve can be turned on its seat.

(6) Safety valves for power boilers shall be:

- a.) capable of being adjusted and set to operate without chattering.
- b.) sealed or otherwise protected to prevent tampering by any unauthorized person;
- c.) provided with a special means for lifting the valve for testing purposes; and
- d.) located to enable the boiler attendant to hear readily the discharge.

(7) Safety valves discharge outlets for power boiler shall be located or piped out away from running boards and platforms, preferably not less than 3 meters. (10 ft.) above the platforms.

(8) When the discharge pipes are used on safety valves for power boilers, they shall be:

- a.) not less in cross-sectional area than the full area of the valve outlets, and
- b.) fitted with open drains to prevent water lagging in the upper part of the valves or in the pipes.

9) When mufflers are used on safety valves for power boilers, they shall:

a.) have sufficient outlet area to prevent back pressure from interfering with the proper operation and discharge capacity of the valves and

b.) be constructed to avoid any possibility of obstruction of the steam passage due to deposits.

10.) Superheaters arranged in a manner that they can be isolated from power boilers shall be located near the steam outlet. However, valve or valves may be located anywhere in the lengths of the outlet heater if there is a uniform flow of steam through the superheater Tubes and heater.

(11) Economizers used on power boilers shall be equipped with at least one (1) safety valve provided with seats and discs of corrosion resistant materials, if there is an isolating valve between the drum and economizer.

(12) Miniature boilers shall be equipped with sealed safety valves connected directly to the boiler. Miniature boilers with no extraction of steam (closed system), may in addition to safety valves, be provided with a rupture disc relieving device.

C.04 Stop Valves

- (1) Steam discharge outlets on boilers, except safety valves, shall be equipped with stop valves located at an accessible point in the steam delivery line and as near the boiler as practicable.
- (2) Quick and convenient means of manipulating the principal stop valves on power boilers shall be provided
 - a. by extending the valve spindles so that the valve wheels may be operated:
 - i. from the floors of the boiler rooms by means of chains, gears or other mechanical devices, or
 - ii. from outside the boiler rooms in case of emergency.
 - b. by installing remote control stations for electrically operated valves in a protected space where they may be operated without danger.
- (3) When two or more power boilers are connected to a common steam main, the steam connection from each boiler equipped with a manually opened valve shall be fitted with two stop valves having between them an ample free-flow drain. The discharge shall be visible to the operator while manipulating the valves.
- (4) When stop valves on power boilers are located where water may accumulate, ample drain shall be provided.

C.05 Water Column Pipes

- (1) Pipes connecting water columns to power boilers shall not be less than 25 mm. (1 in.) pipe size, and as short and direct as possible.
- (2) Horizontal return to water columns shall be taken from the top of the shell in the upper part of the head and the water connections from a point not less than 15 cm. (6 in.) below the lowest center line of the shell.
- (3) On the fire box type of power boilers, the water connections shall be taken from a point not less than 25 cm. (10 in.) below the lowest water line or as near thereto as possible, and in no case less than 45 cm. (18 in.) above the mud ring.
- (4) Whenever practicable, water connection from power boilers to water column shall be provided with a cross at each right angle turn, to facilitate cleaning.
- (5) Water columns on power boilers shall be fitted with drain cocks or drain valves with suitable connections to a safe point of disposal.
- (6) No outlet connection allowing the escape of an appreciable amount of steam or water shall be placed on pipes connecting water column to medium and high pressure boilers, except for damper regulators or feed water regulators, drain, steam gauges or apparatus of similar form.

C.06 Steam Gauges

- (1) Each power boiler shall be equipped with steam pressure gauge, placed as follows:
 - a. free from vibrations;
 - b. conveniently adjusted; and
 - c. afford a clear and unobstructed view to the attendant from the usual operating position, in front or at the side.
- (2) Steam gauges, in satisfactory working condition for power boilers, shall be connected to the steam space or to the water column on its steam connection by siphons or equivalent devices, which shall be:
 - a. of sufficient capacity to keep the gauge tube filled with water; and
 - b. arranged that the gauge cannot be shut-off from the boiler, except:
 - i. by a cock placed near the gauge and provided with the level handle fitted parallel to the pipe when the cock is open, or
 - ii. by a cock or shut-off valve of 35 kg/cm²g (500 psig.) rating or over.
- (3) Steam gauges connection for power boilers shall be as short as practicable.

(4) Dials of steam gauges for power boilers shall:

- a. be of a size and marked that the graduations of the pointer can be clearly determined by a person with normal vision from a distance equal to one and one half (1 1/2) times the width of the boiler front;
- b. be graduated to not less than 1 1/2 times the pressure at which the safety valve is set, preferably to about double such pressure. The graduation shall be so arranged that the pointer will be at nearly vertical position when indicating the working pressure; and
- c. have the working pressure indicated in red on the dial.

(5) All steam gauges in any power boiler room shall be of the same type, size and graduation.

(6) Each power boiler shall be provided with a valve connection near the regular connection of the steam gauges for the exclusive purpose of attaching gauge set.

C.07: Water Gauge Glasses

(1) Each power boiler, except once-through boilers with no fixed steam and water-lines, shall be equipped with at least one (1) water gauge glass which shall be:

- a. located within the range of vision of the boiler attendant;
- b. fitted at top and bottom with quick closing valves easily closed from the floor in case the glass breaks;
- c. connected to the water column or directly to the boiler by piping of not less than 12mm. (15/32in.) diameter;
- d. equipped with a valve drain piped to a safe point of disposal; and
- e. provided with a wire glass or other suitable guard for the protection of workers from flying glass or escaping hot water in case of breakage, and such guard shall not obstruct free observation of water level.

(2) Water gauge glasses on power boilers shall be located in such a way that when the visible water level is at its lowest reading in the glass, the reading should not be less than:

- a. 75 mm (3 in.) of water over the highest point of the tubes, flues or crown sheets in horizontal fire tube power boilers; or
- b. 50 mm. (2 in.) of water above the lowest permissible level in water tube power boilers.

(3) Miniature boilers operating on the closed system, where there is insufficient space for the usual water gauge glass, may be provided with water level indicators of the glass bull's eye type

C.08 Gauge Cocks

(1)

- a. Subject to the provisions of the succeeding sub-paragraphs, each power boiler shall be equipped with three or more gauge cocks located within the range of the visible length of the water glass;
- b. When the boiler is equipped with water gauge independently connected to the boiler and located not less than 70 cm. (28 in.) apart on the same horizontal line may not be provided with gauge cocks;
- c. Gauge cocks shall be equipped with at least one (1) try-cock each; and
- d. For boilers of the locomotive type not over 90 cm. (35 in.) diameter, and for boilers of the fire box and watering types with a heating surface not exceeding 5 sq. m. (53 sq. ft.) only two (2) gauge cocks shall be required.

(2) Gauge cocks located above normal reaching distance from the floor or working level shall be provided with:

- a. permanently attached rods with chains for operation from the floor, and
- b. suitable means to prevent water or steam discharging on workers manipulating the rods or chains.

C.09 Fusible Plugs

(1) Fusible plugs, when used on power boilers, as additional low water alarms, shall be renewed at intervals not exceeding twelve (12) months. Casings which have been used shall not be refilled.

- (2) Fusible plugs, after inspection, should be replaced with the same or equivalent specifications of the original plug.
- (3) Fusible plugs shall not be used on power boilers operating at pressures exceeding 17.5 kg/ cm²g (250 psig).
- (4) Steam actuated fusible plugs, when used in power boilers, shall be located that they can be operated when the water level is at a point where a fire actuated fusible plug is located.

C.10: Blow-Off Requirement

- (1) Each power boiler, except once-through boilers with no fixed steam and water line, shall be equipped with at least one (1) blow-off pipe fitted with valve cock directly connected to the lowest water space, and the boiler shall be designed and installed that all water can be drained from it.
- (2) Each bottom blow-off pipe on a power boiler forming a part of a range of boilers having a common blow-off pipe, drain or pump, shall be fitted with:
 - (a) two (2) slow opening valves, or
 - (b) one (1) slow opening valve, and one (1) quick opening valve or cock, or
 - (c) a valve operated by a key which can only be removed when the valve is closed. The key shall be the only one available for the blow-off valves of the range of the boilers.
- (3) Valves for bottom blow-off pipes on power boilers shall be free from dams or pockets which may collect sediment and restrict the flow of water.
- (4) When exposed to direct furnace heat, bottom blow-off pipes on power boilers shall be protected by fire bricks or other heat-resistant materials arranged that the pipes can be readily inspected.
- (5) Blow-off pipings on power boilers shall discharge at a point where there is no danger of injury to workers, and shall not be connected to the sewer or the boiler, unless first passed through a blow-off tank.
- (6) Blow-off tanks when used, shall be:
 - a. provided with a vent pipe of sufficient size to prevent the accumulation of pressure in the tank; and
 - b. located that all parts are accessible for inspection.

C.11: Feed Water Systems

- (1) The discharge end of feed water pipes for boilers shall be:
 - a. located that the feed water at no time will discharge:
 - i. directly against surfaces exposed to direct radiation of the fires or to gases at high temperature, and
 - ii. close to any riveted joints of the furnace sheets or to the shell.
- (2) Feed pipes for power boilers shall be provided with a check valve near the boilers and a valve or stop cock between the check valve and the boiler.
- (3) When two or more power boilers are fed from a common source, the main feed pipe shall also be provided with a check valve between the water supply to prevent the water from backing out from one boiler to another.
- (4) Power boilers equipped with duplicated feed water arrangements shall conform to the requirements of 1163.09 on water supply source.
- (5) Where economizers or other feed water heating devices are connected directly to power boilers without intervening valves, the required feed and check valves shall be placed on the inlets of the economizers or water heaters.
- (6) Miniature boilers shall be provided with at least one (1) feed pump or other feeding device except on closed system boilers where a suitable connection or opening shall be provided to fill the boiler when cold or when the water main has sufficient pressure to feed the boiler at any time while under pressure.

D: Heating Boilers

D.01: Working Pressure and Temperature

- (1) The maximum allowable pressure of boilers used exclusively for low pressure steam heating shall not exceed 1.055 kg./cm²g (15 psig).
- (2) The maximum allowable working temperature at or near the outlets of hot water boilers shall not exceed 121OC (250OF).
- (3) Where the pressure on a low pressure steam boiler or the temperature of a hot water boiler exceeds any of those specified in the preceding paragraphs (1) and (2) the requirements of Rule 1163 shall BE USED.

D.02: Access and Openings

- (1) Steel plate low-pressure steam boiler shall be provided with suitable manhole or wash out openings to facilitate inspection, cleaning and maintenance. However, manhole openings may be omitted where the size or construction of the boiler is such that entrance is impracticable.
- (2) Manhole, handhole or washout openings in heads shall be provided, except boilers constructed where such openings are inaccessible or boilers of the locomotive or fire-box type when set in brick or boilers used exclusively for hot water heating and are not in compliance with the requirements of Rule 1163.03
- (3) Cast iron low pressure steam or hot water boiler shall be provided with suitable washout openings to permit the removal of sediments.
- (4) Access doors in steel-plate low pressure steam boiler settings shall not be less than 30 cm. x 40 cm. (12 in. x 16 in.).

D.03: Safety Valves

Each low-pressure steam boiler shall be equipped with at least one (1) safety valve which shall:

- (1) Conform with the requirements of Rule 1163.03 (2) to (8) and
- (2) be sealed and adjusted to discharge at a pressure not exceeding 1.055 kg/cm²g (15 psig) with the seal attached so that the valve cannot be taken apart without breaking the seal.

D.04: Water Relief Valves

- (1) Each hot water boiler shall be equipped with at least one (1) water relief valve placed on a vertical dead-end pipe attached to the cold water supply pipe close to the boiler or directly to the boiler and the discharge point free from any intervening valve or obstruction.
- (2) Water relief valves for hot water boilers shall be set to open at or below the maximum allowable working pressure.
- (3) Diaphragms, valves, seats or discs of rubber or of composition liable to fall due to deterioration when subjected to hot water or steam shall not be used on water relief valves for hot water boilers.
- (4) Water relief valves in hot water boiler shall be located where there is no danger of scalding persons.

D.05: Stop Valves

- (1) Where a stop valve is used in the supply pipe connection of a single low pressure steam or hot water boiler, a stop valve shall also be provided in the return pipe connection.

D.06: Water Column Pipe

Water column pipes on low pressure steam or hot water boilers shall conform to the requirements of Rule 1163.05 (1) to (6).

D.07: Steam Gauges

Each low pressure steam boiler shall be equipped with steam pressure gauge, conforming with the requirements of Rule 1163.06. However, scales on dials of steam gauges for low pressure steam boiler shall be graduated to not less than 2kg./cm.²g (28.5 psig) and the face of the pressure gauge not less than 75 mm. (3 in.).

D.08: Pressure or Altitude Gauge

(1) Each hot water boiler shall be provided with a pressure or altitude gauge connected to the boiler in a manner that it cannot be shut-off from the boiler except by a cock placed on the pipe near the gauge and provided with a tee or level handle so fitted that it will be parallel to the pipe when the cock is open.

(2) Scales on dials of pressure and altitude gauges on hot water boiler shall:

- a. be graduated to not less than one and one-half (1 1/2) times the maximum allowance pressure of the boiler; and
- b. have the maximum permissible working pressure indicated in red.

D.09: Pressure Combustion Regulators

When pressure combustion regulators are used on low pressure steam boilers, they shall operate to prevent the steam pressure from rising above 1kg./cm.2g (14.25 psig.).

D.10: Thermometers

Hot water boiler shall be equipped with a thermometer:

- a. properly located for easy reading when observing the water pressure; and
- b. sufficiently connected to indicate at all times the temperature of the water in the boiler.

D.11: Temperature Combustion Regulators

Each low pressure steam boiler shall be equipped with one or more water gauge glasses.

- (1) With the lower fitting provided with a valve or pet cock to facilitate cleaning, or
- (2) Otherwise conforming to the requirements of Rule 1163.08 (1) and (2).

D.12: Installation of Pipes

Hot water heating system shall be so installed that the fluid release column cannot be accidentally shut-off.

D.13: Blow-Off Equipment

Each low-pressure steam or hot water boiler shall be equipped with a blow-off connection conforming with the provisions of Rule 1163. 10 (1) to (6).

D.14: Feed Piping

- (1) Feed or make-up water shall not be discharged directly against any part of a low pressure steam boiler exposed to direct radiant heat.
- (2) Where feed or make-up water is introduced into hot water boilers from a steam or water pressure line,
- (3) Feed water shall not be introduced into low pressure steam or hot water boiler through the openings used for the water column gauge glasses or gauge cocks.

D.15: Automatic Fuel Cut-Off and Water Feeding Devices

Each automatically fed steam or vapor system boiler shall be equipped with an automatic low-water cutoff or water-feeding device constructed and located that when the surface of the water falls to the lowest safe water line:

- a. the water inlet valve cannot feed water into the boiler through the float chamber; and
- b. the device will automatically:
 - i. cut-off the fuel supply; or
 - ii. supply requisite feed water; or
 - iii. simultaneously cut-off the fuels and feed water supply.

E: Cleaning and Repairs

E.01:

Repairs and adjustments, such as tightening up flanged fittings, shall not be made on boilers and steam lines while under pressure.

E.02:

Before allowing workers to enter boilers for the purpose of making repairs, all blow-off, feed water, main steam stop and other valves shall be closed, locked and marked with tags or other devices to indicate that there are workers inside.

E.03:

Where the boiler to be cleaned or repaired is one of a battery of two or more boilers, and any of them is in service, the main steam valves shall be tightly closed and locked with the free flow drain open as required in 1163.04 (3).

E.04:

Where blow-off valves of several boilers are connected to the same header, the valves of any boiler in service shall be marked and locked to prevent opening into the boiler being cleaned or repaired.

E.05:

No worker shall enter a boiler for the purpose of cleaning or making repairs, unless another worker is stationed outside the manhole or other access opening ready to render assistance when needed.

E.06:

Workers shall never enter a boiler until it is sufficiently cooled off to ambient temperature. When entering a boiler, precautions shall be taken against hot flue dust or falling loose parts and explosion caused by water thrown on hot flue dust.

E.07:

Before any person enters a boiler, it shall be thoroughly ventilated by fans, blowers, or other means to expel any possible combustible or toxic gases or vapors, particularly when scales solvents have been used.

E.08:

During cleaning and repairing of boilers, especially on humid days, ventilation should be provided by running forced drafts or induced drafts at a low speed to eliminate flue gases from other boilers entering the boiler under repair.

E.09:

Lights used by workers in cleaning and repairing inside a boiler shall be in good condition suitable for the work.

E.10:

Blowtorches shall never be used inside boilers.

E.11:

The power source of steam or air driven tools used in cleaning or repairing boilers, shall be generated outside the boiler and all connections shall be inspected at frequent intervals.

E.12:

Tubes and shells of boilers cleaned by mechanical tools shall not be operated in one spot for any considerable length of time as this will reduce the strength of the metal.

E.13:

After cleaning operations on boilers:

- (1) One worker shall be detailed to examine the interior to see that no tools or other equipment are left inside the boilers, and
- (2) The boiler shall not be closed until it is absolutely certain that all workers are outside.

E.14:

(1) The amount of bulging on the boiler or fire box shall not exceed 2% of the area of the bulge. If the bulge exceeds 2%, the use of the boiler shall be discontinued or patch work shall be done in accordance with the provisions of Item B

(2) All materials used in boiler repair shall be certified by the supplier as to quality and specification of the materials subject to verification by the Industrial Safety Engineer before repairs can be made.

E.15:

Welding jobs performed on pressure parts of boilers and pressure vessels shall be undertaken by certified welders and in accordance with the procedural process of section ix (welding qualifications), ASME boiler and pressure vessel code.

E.16:

Boilers and pressure vessels locally fabricated shall be stamped by the Department indicating the following:

- (1) Name of manufacturer and year built;
- (2) Application number;
- (3) Manufacturer's serial number;
- (4) Design pressure and temperature; and
- (5) Rating in horsepower for boiler and cubic meter for pressure vessel.

F: Personal Protective Equipment

Workers in boiler rooms exposed to work hazards which cannot be otherwise eliminated, shall be provided with personal protective equipment conforming to Rule 1080.

G: Color Coding

Feed water and steam pipes emanating to and from the boiler shall be marked with identifiable color in conformity with Rule 1230.

H: Requirements in the Preparation of Boiler and Pressure Vessel Plans

Before a boiler or pressure vessel is installed, the owner/manager or his/her authorized representative shall file with the Bureau or in the Regional Office concerned (with available pme) an application for installation in quintuplet, accompanied by five (5) copies of each sheet of plans in white print. The following shall be incorporated in the plans:

(1) Location Plan:

The plan showing the site of the compound indicating any known landmarks, such as streets, private or public place or building and an arrow indicating NORTH direction drawn not necessarily to scale.

(2) Room Layout:

A layout of the workplace showing:

- a. the detail of the room drawn to scale indicating the position of the boiler or pressure vessel in relation to the surrounding walls and other machinery or equipment in the room;
- b. the type of material used for the room walls which may be of concrete, adobe, hollow blocks or other fire resistant construction.

(3) Installation and Foundation Plans:

- a. the front and side views of the boiler/pressure vessel including the details of its anchorage or setting to the concrete foundation;
- b. the water column assembly, main steam line, below-off line, safety valve or valves, feed water appliances, pressure gauge connection, manhole or handhole, in the case of boilers;
- c. the inlet and outlet pipes, drain pipe, inspection plug, manhole or handhole, glass gauge, relief or safety valves, and pressure gauge connection in case of pressure vessel;
- d. the clearance of the lowest portion of the boiler shell to the floor line shall not be less than 45 cm. (17.80 in.) in case of horizontal fire tube boiler.
- e. the type of furnace.

(4) Foundation Design Computation:

- a. the total weight of the boiler or pressure vessel and accessories;
- b. the weight of water inside the boiler or pressure vessel when full;
- c. the base area and volume of concrete foundation;
- d. the concrete mixture;
- e. the bearing capacity of the soil; and
- f. the factor of safety of the foundation.

(5) Detailed Construction Drawing:

- a. the sectional front and side front elevation of the boiler or pressure vessel indicating the diameter, thickness and length of the shell or drum and the dimensions, measurements, and other technical data of all other boiler parts, fittings and accessories.
- b. the details of longitudinal and circumferential joints, head attachments to boiler shell, nozzle and manhole or hand hole attachments to shell.
- c. the boiler/pressure vessel manufacturer's data and specification;
- d. the technical details of the furnace.

(6) Sizes of Plans:

All sheets of plans to be submitted shall be of the following sizes:

375 mm x 530 mm - minimum

530 mm x 750 mm

750 mm x 1065 mm - maximum

The size shall be 7.62 cm. in width while the total length of the lower part of the plan will be occupied by the title block to contain:

- a. Name in print, signature and seal of the professional mechanical engineer indicating his/her registration number, current/updated ptr number, place and date issued and tax identification number.
- b. Initials of the draftsman, date of plan prepared, sheet number and scale used. Minimum scale of 1:100 except for small and minute parts/details where a convenient scale may be used to show clearly the parts/details.
- c. Title of Plan.
- d. Name, print and signature of the owner/manager of the establishment indicating his/her tax identification number.
- e. Name and address of establishment.

(8) Installation:

a. Upon approval of the plan, installation shall be done under the supervision of a professional mechanical engineer. If minor deviations from the approved plans are done in the actual installations, the Bureau or the Regional Labor Office concerned shall be informed in writing or in person so that the necessary corrections can be noted. In cases where major alterations are done in the actual installation that may affect the original design, the necessary plans shall be resubmitted as a new application. The approved application and plans shall serve as a permit for installation.

b. Upon completion of the installation, the establishment shall request for final inspection and if found to be in accordance with the approved plans and standards, a permit to operate the boiler or pressure vessel for a period of one (1) year shall be issued effective on the date of inspection.