875—94.3(89) General requirements. This rule applies to all objects covered by this chapter and installed prior to September 20, 2006.

94.3(1) *Instruments, fittings and controls mounted inside boiler jackets.* Any or all instruments, fittings and controls required by this chapter may be installed inside of boiler jackets provided the water gage and pressure gage on a steam boiler or the thermometer and pressure gage on a water boiler are visible through an opening or openings at all times.

94.3(2) *Electrical code compliance.*

a. Wiring. All wiring for controls, heat-generating apparatus and other appurtenances necessary for the operation of the boiler or boilers shall be in accordance with the National Electric Code (1992). All boilers supplied with factory-mounted and factory-wired controls, heat-generating apparatus and other appurtenances necessary for the operation of the boilers shall be installed in accordance with the provisions of nationally recognized standards.

b. Circuitry. The control circuitry shall be grounded and shall operate at 150 volts or less. One of the two following systems may be employed to provide the control circuit:

(1) Two-wire, nominal 120-volt system with separate equipment ground conductor as follows:

This system shall consist of the line, neutral and equipment ground conductors. The control panel frame and associated control circuitry metallic enclosures shall be electrically continuous and be bonded to the equipment ground conductor.

The equipment ground conductor and the neutral conductor shall be bonded together at their origin in the electrical system for objects installed prior to September 20, 2006.

The line side of the control circuit shall be provided with a time delay fuse sized as small as practicable.

(2) Two-wire, nominal 120-volt system obtained by using an isolation transformer as follows:

The two-wire control circuit shall be obtained from the secondary side of an isolation transformer, shall be electrically continuous and shall be bonded to a convenient cold water pipe. All metallic enclosures of control components shall be securely bonded to this ground control circuit wire. The primary side of the isolation transformer will normally be a two-wire source with a potential 230, 208 or 440 volts.

Both sides of the two-wire primary circuit shall be fused. The hot leg on the load side of the isolation transformer shall be fused as small as practicable, and shall not be fused above the rating of the isolation transformer.

94.3(3) *Safety and safety relief valve discharge piping.* When a discharge pipe is used, its internal cross-sectional areas shall not be less than the full area of the valve outlet or of the total of the valve outlets discharging therein and shall be as short and straight as possible and so arranged as to avoid undue stress on the valve or valves. When an elbow is placed on a safety valve or safety relief valve discharge pipe, the elbow shall be located close to the valve outlet.

94.3(4) *Expansion and contraction.* Provisions shall be made for the expansion and contraction of steam and hot water mains connected to boilers.

94.3(5) *Return pipe connections.* The return pipe connections of each boiler supplying a gravity-return steam heating system shall be so arranged as to form a loop so that the water in each boiler cannot be forced out below the safe water level.

94.3(6) *Feed water connections.*

a. Feed water, makeup water or water treatment shall be introduced into a boiler through the return piping system. Alternatively, makeup water or water treatment may be introduced through an independent connection. The water flow from the independent feed water connection shall not discharge against parts of the boiler exposed to direct radiant heat from the fire. Makeup water or water treatment shall not be introduced through openings or connections provided for inspection, cleaning, safety valves, safety-relief valves, blowoffs, water columns, water gage glasses, pressure gages or temperature gages.

b. The makeup water pipe shall be provided with a check valve near the boiler and a stop valve or cock between the check valve and the boiler or between the check valve and the return pipe system.

94.3(7) *Oil heaters.*

a. A heater for oil or other liquid harmful to boiler operation shall not be installed directly in the steam or water space within a boiler.

b. Where an external-type heater for such service is used, means shall be provided to prevent the introduction into the boiler of oil or other liquid harmful to boiler operation.

94.3(8) *Bottom blowoff or drain valve.*

a. Each boiler shall have a bottom blowoff or drain pipe connection fitted with a valve or cock connected with the lowest water space practicable, with the minimum size of blowoff piping and valves as specified below:

Minimum Required Safety or Safety-Relief Valve Capacity (Pounds of Steam Per Hour)	Size of Blowoff Valves (Inches)
Up to 500	¾
501 to 1250	1
1251 to 2500	1¼
2501 to 6000	1½
6001 and larger	2

NOTE: Multiply 1,000 by the relieving capacity in pounds of steam per hour to determine the Btu's of safety relief valve discharge capacity.

b. Any discharge piping connected to bottom blowoff or bottom drain connections shall be full size to the point of discharge.

94.3(9) *Low-water fuel cutoff.*

a. Each automatically fired hot water heating boiler shall have an automatic low-water fuel cutoff which has been designed for hot water service, and it shall be so located as to automatically cut off the fuel supply when the surface of the water falls to the level established.

b. As there is no normal waterline to be maintained in a hot water heating boiler, any location of the low-water fuel cutoff above the lowest safe permissible water level established by the boiler manufacturer is satisfactory.

c. A coil-type boiler or a watertube boiler requiring forced circulation to prevent overheating of the coils or tubes shall have a flow-sensing device installed in the outlet piping in lieu of the low-water fuel cutoff to automatically cut off the fuel supply when the circulating flow is interrupted.

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