

481—394.5(89) Hot water heating boilers installed before July 1, 1960—requirements. Hot water heating boilers installed before July 1, 1960, shall be constructed and installed in accordance with this rule.

394.5(1) Safety relief valves.

a. Each hot water heating boiler will have at least one safety relief valve bearing the National Board “HV” stamp of the automatic-resetting type set to relieve at or below the maximum allowable working pressure of the boiler. The safety relief valve will have pop action when tested by steam. When more than one safety relief valve is used on a hot water heating boiler, the additional valve or valves must bear the National Board “HV” stamp and may be set within a range not to exceed 6 psig above the maximum allowable working pressure of the boiler up to and including 60 psig and 5 percent for those having a maximum allowable working pressure exceeding 60 psig. Safety relief valves will be so arranged that they cannot be reset to relieve at a higher pressure.

b. No safety relief valve will be smaller than ¾-inch nor larger than 4½-inch standard pipe size, except those boilers having a heat input not greater than 15,000 Btu per hour may be equipped with a safety relief valve of ½-inch standard pipe size bearing the National Board “HV” stamp. The inlet opening will have an inside diameter equal to or greater than the seat diameter. In no case will the minimum opening through any part of the valve be less than ½-inch diameter.

394.5(2) Temperature and pressure gage.

a. Each hot water boiler will have a temperature and pressure gage properly calibrated to the altitude connected to it or to its flow connection in such a manner that it cannot be shut off from the boiler except by a cock with tee or lever handle placed on the pipe near the gage. The handle of the cock will be parallel to the pipe in which it is located when the cock is open.

b. The scale on the dial of the temperature and pressure gage will be graduated approximately to not less than one and one-half nor more than three times the pressure at which the safety relief valve is set. The gage will be provided with effective stops for the indicating pointer at the zero point and at the maximum pressure point.

c. The temperature gage will be so located and connected that it will be easily readable. The thermometer will be so located that it will at all times indicate the temperature in degrees Fahrenheit of the water in the boiler at or near the outlet.

d. Piping or tubing for temperature and pressure gage connections will be of nonferrous metal when smaller than 1-inch pipe size.

394.5(3) Temperature control.

a. In addition to the operating control used for normal boiler operation, each individual, automatically fired hot water boiler will have a separate high-limit, temperature-actuated combustion control that will cut off the fuel supply to prevent the temperature of the water from rising over 250 degrees F. Separate controls may have a common connection to the boiler.

b. In a multiple boiler installation where the operating temperature actuated control may be installed in a header or other point common to all boilers and can be isolated from any or all of the boilers, there will be at least one high-limit, temperature-actuated combustion control mounted on each boiler.

394.5(4) Stop valves.

a. On single hot water heating boilers, stop valves will be located at an accessible point in the supply and return pipe connections as near the boiler nozzle as is convenient and practicable to permit draining the boiler without emptying the system.

b. Where two or more boilers are connected in a common system, a stop valve will be used in each boiler’s supply and return pipe connection.

394.5(5) Provisions for thermal expansion in hot water heating system.

a. All hot water heating systems incorporating hot water tanks or fluid relief columns will be so installed as to prevent freezing under normal operating conditions.

b. Systems with open expansion tanks require an indoor overflow from the upper portion of the expansion tank in addition to an open vent. The indoor overflow is to be carried within the building to a suitable plumbing fixture or to the basement.

c. An expansion tank adequate for the volume and capacity of the system will be installed. If the system is designed for a working pressure of 30 psi or less, the tank will be suitably designed for a

minimum hydrostatic test pressure of 75 psi. Expansion tanks for systems designed to operate above 30 psi will be constructed in accordance with ASME Code, Section VIII, Division I, in effect when installed. Provisions will be made for draining the tank without emptying the system, except for prepressurized tanks.

d. The expansion tank capacities for gravity hot water heating systems will be as follows:

Sq. Ft. of Installed Equivalent Direct Radiation	Tank Capacity, Gallons
Up to 350	18
Up to 450	21
Up to 650	24
Up to 900	30
Up to 1,100	35
Up to 1,400	40
Up to 1,600	2-30
Up to 1,800	2-30
Up to 2,000	2-35
Up to 2,400	2-40
2,400 and up	1 additional gallon per 33 square feet of additional equivalent direction radiation

e. The expansion tank capacities for forced hot water heating systems will be based on an average operating water temperature of 195 degrees F, a fill pressure of 12 psig, and a maximum operating pressure of 30 psig as follows:

System Volume, Gallons	Tank Capacity, Gallons
100	15
200	30
300	45
400	60
500	75
1,000	150
2,000	300

In calculating, include the volume of water in boiler, radiation and piping but not the expansion tank.
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