

13 NCAC 13 .0405 PRESSURE RELIEF DEVICES

- (a) Boilers and pressure vessels shall be protected from overpressurization by a pressure relief device. All pressure relief devices installed on any boiler or pressure vessel shall be constructed and stamped in accordance with the Accepted Design and Construction Code as defined in Rule .0101 of this Chapter.
- (b) All pressure relief devices shall be stamped and capacity certified by the manufacturer indicating compliance with the National Board. The stamping shall include the set pressure and the relieving capacity.
- (c) High pressure boilers with over 500 square feet of heating surface and electrically fired boilers having an input in excess of 1100 kW shall be provided with a minimum of two safety valves. For high pressure boilers with a combined bare tube and extended water-heating surface area exceeding 500 square feet, one safety valve is required if the design steam generating capacity of the boiler is less than 4,000 pounds of steam per hour.
- (d) Safety valves and safety relief valves for heating boilers shall have a seat diameter of not less than ½ inch, and not more than 4 ½ inches.
- (e) Pressure relief devices shall have a set pressure and relieving capacity in accordance with the requirements of the Accepted Design and Construction Code for the type of equipment on which the pressure relief device is installed. At least one pressure relief device shall have the set pressure set at not greater than the maximum allowable working pressure of the boiler or pressure vessel. The relieving capacity shall not be less than the minimum required relieving capacity indicated on the manufacturer's name plate or stamping, or as otherwise required by the Accepted Design and Construction Code. Safety relief valves installed on tank-type potable water heaters or hot water storage vessels shall be of the combination temperature and pressure relieving type. Instantaneous and coil-type water heaters and hot water supply boilers shall be equipped with a safety relief valve of the combination temperature and pressure relieving type, or as otherwise permitted by the Accepted Design and Construction Code.
- (f) All safety valves installed on high pressure boilers shall be installed on top of the boiler, or in the case of watertube boilers on top of the upper drum, with the spindle in the vertical position. All safety valves and safety relief valves installed on heating boilers shall be on top of the boiler or on an opening at the highest practicable part, as determined by industry standards, of the side of the boiler, but in no case shall the safety valve be installed below the normal operating level for a steam boiler. Safety valves and safety relief valves installed on hot water heating boilers, hot water supply boilers, and steam heating boilers shall be installed with the spindles mounted in the vertical position. Safety relief valves for water heaters may be installed with the spindles mounted in either the vertical or horizontal position. In no case may pressure relief devices be mounted on appurtenances, unless permitted by the Accepted Design and Construction Code.
- (g) The distance between the pressure relief device outlet nozzle on the boiler and the pressure relief device inlet shall be kept to a minimum consistent with the size of the pressure relief device and the pipe sizes required. In no case shall any valves or stops be installed in the inlet piping to the pressure relief device or in the discharge piping from the pressure relief device. The boiler outlet and the piping between the boiler outlet and the pressure relief device shall have a cross sectional area of not less than the cross sectional area of the pressure relief device inlet.
- (h) Discharge piping from the pressure relief device outlet shall be the same size, or larger, than the outlet pipe connection on the pressure relief device and shall be extended full size to a safe location. A safe location shall be interpreted to mean a location within six inches of the finished floor of the mechanical room, to a location outside the building terminating a safe distance above the building roof or to a location outside the building within six inches above the finished grade. For vessels such as organic fluid heaters where the medium presents a hazard, the discharge shall be to a containment vessel large enough to hold all anticipated pressure relief discharges. Discharge piping shall be designed to facilitate drainage or be fitted with drains to prevent liquid from lodging or collecting in the discharge side of the pressure relief device, and such piping shall lead to a safe location of discharge.
- (i) Multiple pressure relief devices may be piped to the point of discharge using a common discharge header pipe. The header pipe size shall have a diameter sufficient to provide an equivalent cross-sectional area equal to or larger than the sum of the cross-sectional areas of the pressure relief device outlets to which it is connected.
- (j) Pressure relief devices on pressure vessels may be installed with the spindle in the vertical or horizontal position. The pressure relief device inlet, discharge piping, and the requirement for piping the discharge to a safe location shall be the same as noted for boilers. The requirement for discharge piping is optional for pressure vessels used to store compressed air, inert gases, water, or other fluids no more hazardous than water.
- (k) Pressure relief devices for pressure vessels shall be installed directly on the pressure vessel unless the source of pressure is external to the vessel, and is under such direct control by the owner or user that the pressure cannot exceed the maximum overpressure permitted by the Accepted Design and Construction Code, and the pressure relief device cannot be isolated from the vessel, except as permitted by Paragraph (l) of this Rule.

(l) A full area stop valve that does not reduce the discharge capacity of the pressure relief device, may be installed between a pressure vessel and the pressure relief device if one of the following is satisfied:

- (1) the stop valve is normally locked or sealed in the open position, and may only be closed when there is an attendant stationed at all times at the stop valve when it is in the closed position for inspection, testing, or repair purposes; or
- (2) isolating the pressure relief device from the pressure vessel by closing the stop valve also isolates the pressure vessel from the source of pressure.

(m) Pressure relief devices shall be sealed to prevent the valve from being taken apart without breaking the seal. Pressure relief devices for boilers and pressure vessels containing air, water, or steam shall be provided with a test lever, pull test ring or other mechanism that may be used to test the operation of the valve. Pressure relief devices which are required to be provided with a testing mechanism shall be readily accessible for testing from the work platform or other means, such as a pull chain, shall be provided so that the pressure relief device can be tested from the work platform.

(n) When a hot water supply boiler or storage vessel is heated indirectly by steam or hot water in a coil or pipe, the pressure relief device capacity shall be determined by the heating surface available for heat transfer, and the pressure relief device shall not be less than 1 inch diameter.

(o) A person shall not:

- (1) attempt to remove, tamper, alter or conduct any work on any pressure relief device while the boiler or pressure vessel is in operation, except as permitted by the Accepted Design and Construction Code or the National Board Inspection Code;
- (2) load a pressure relief device in any manner to maintain a working pressure in excess of the maximum allowable working pressure as stated on the inspection certificate;
- (3) operate any boiler or pressure vessel without the safety appliances as described in this Chapter, the Accepted Design and Construction Code, and the National Board Inspection Code;
- (4) use a pressure relief device required by this Chapter as an operating pressure control; or
- (5) remove the seal and attempt to adjust or otherwise work on a pressure relief device unless the person or company removing the seal is an authorized holder of a National Board "VR" stamp.

(p) If an owner or user can demonstrate that a pressure vessel is operating in a system of such design that the maximum allowable working pressure cannot be exceeded, the Chief Inspector shall waive the requirement for installation of a pressure relief device if the pressure vessel meets the safety requirements greater than or equal to the level of protection afforded by this Chapter and the Accepted Design and Construction Code, and does not pose a danger to persons or property. This waiver shall only be granted when the source of pressure is under direct control of the owner or user of the pressure vessel.

(q) Pressure relief device piping shall be supported so that the piping is supported with no additional force being applied to the pressure relief device.

(r) Hydropneumatic storage tanks shall be provided with a relief valve of not less than ¾ inch NPS and rated in standard cubic feet per minute (SCFM). The relief valve shall be installed on top of the tank. This rule applies to any equipment or relief valves installed after January 1, 2009.

(s) Dead weight safety valves are prohibited from use on any boiler or pressure vessel regulated by this Chapter.

(t) When the minimum safety valve relieving capacity is not found on the data plate, the table in this Paragraph may be used to determine the required safety valve capacity for steam boilers. The factor noted in the table shall be multiplied by the heating surface of the boiler to determine required safety valve relieving capacity. When the table in this Paragraph is used for calculations, the additional requirements found in NBIC Part 4, Section 2 for calculating heating surface shall be utilized.

Table-0405 Guide for Estimating Steaming Capacity Based on Heating Surface		
	Firetube Boilers	Watertube Boilers
Boiler heating surface:		
Hand-fired	5	6
Stoker-fired	7	8
Oil, gas, or pulverized fuel	8	10
Waterwall heating surface:		
Hand-fired	8	8
Stoker-fired	10	12

Oil, gas, or pulverized fuel	14	16
Copper-finned watertube		
Hand-fired	N/A	4
Stoker-fired	N/A	5
Oil, gas, or pulverized fuel-fired	N/A	6

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