

CHAPTER 10 BOILERS, WATER HEATERS AND PRESSURE VESSELS

SECTION 1001 is amended follows:

1001.1 Scope. ~~This chapter shall govern the installation, alteration and repair of boilers, water heaters and pressure vessels.~~

~~**Exceptions:**~~

- ~~1. Pressure vessels used for unheated water supply.~~
- ~~2. Portable unfired pressure vessels and Interstate Commerce Commission containers.~~
- ~~3. Containers for bulk oxygen and medical gas.~~
- ~~4. Unfired pressure vessels having a volume of 5 cubic feet (0.14 m³) or less operating at pressures not exceeding 250 pounds per square inch (psi) (1724 kPa) and located within occupancies of Groups B, F, H, M, R, S and U.~~
- ~~5. Pressure vessels used in refrigeration systems that are regulated by Chapter 11 of this code.~~
- ~~6. Pressure tanks used in conjunction with coaxial cables, telephone cables, power cables and other similar humidity control systems.~~
- ~~7. Any boiler or pressure vessel subject to inspection by federal or state inspectors.~~

The purpose of this chapter is to establish and provide minimum standards for the protection of the public welfare, health and safety, and property by regulating and controlling the location of steam and hot-water boilers, water heaters and pressure vessels. Boilers and pressure vessels and their related piping are regulated by the *Oregon Boiler and Pressure Vessel Law*.

SECTION 1002 is amended as follows:

1002.1 General. Potable water heaters and hot water storage tanks shall be listed and labeled and installed in accordance with the manufacturer's installation instructions, the *International Plumbing Code* and where applicable this code. All water heaters shall be capable of being removed without first removing a permanent portion of the building structure. The potable water connections and relief valves for all water heaters shall conform to the requirements of the *International Plumbing Code*. ~~Domestic electric water heaters shall comply with UL 174 or UL 1453. Commercial electric water heaters shall comply with UL 1453. Oil fired water heaters shall comply with UL 732.~~

SECTION 1003 is amended as follows:

1003.1 General. ~~All pressure vessels shall bear the label of an approved agency and shall be installed in accordance with the manufacturer's installation instructions.~~ **Scope.** The requirements of this section shall apply to the boiler rooms, combustion air, chimneys and vents.

and fuel piping related to the construction, installation, repair and alteration of rooms for the installation of boilers and pressure vessels.

~~1003.2 Piping.~~ All piping materials, fittings, joints, connections and devices associated with systems utilized in conjunction with pressure vessels shall be designed for the specific application and shall be approved. Workmanship. All equipment, appurtenances, devices and piping shall be installed in a workmanlike manner conforming to provisions and intent of this chapter.

~~1003.3 Welding.~~ Welding on pressure vessels shall be performed by approved welders in compliance with nationally recognized standards.

SECTION 1004 is amended as follows:

BOILERS DEFINITIONS

~~1004.1 Standards.~~ Oil-fired boilers and their control systems shall be listed and labeled in accordance with UL 726. Electric boilers and their control systems shall be listed and labeled in accordance with UL 834. Boilers shall be designed and constructed in accordance with the requirements of ASME CSD 1 and as applicable, the ASME *Boiler and Pressure Vessel Code*, Sections I, II, ~~or IV-V, and IX~~; NFPA 8501; NFPA 8502 or NFPA 8504.

Definitions. Certain words and terms used in this chapter, unless clearly inconsistent with their context, shall mean as follows:

BOILER is as defined in ORS 480.515(2).

ORS 480.515(2) is not a part of this code but is reproduced here for the reader's convenience:

480.515 Definitions for ORS 480.510 to 480.670.

(2) "Boiler" or "boilers" means:

- (a) A closed vessel or vessels intended for the heating or vaporizing of liquids to be used externally to such vessel or vessels by the application of heat from combustible fuels, electricity or nuclear energy;
- (b) Related appurtenances including but not limited to pressure piping directly connected and related to the safe operation of a boiler; and
- (c) Pressure piping consisting of boiler or nonboiler external piping connected to a boiler, but not potable water nonboiler external piping.

DOMESTIC WATER HEATER is defined in ORS 480.525(1)(b).

ORS 480.525(1)(b) is not a part of this code but is reproduced here for the reader's convenience:

480.525 Exempt vessels.

- (1)(b) Domestic water heaters designed for heating potable water, equipped with an

approved pressure-relieving device, containing only water and that do not exceed:

- (A) Capacity of 120 gallons;
- (B) Water temperature of 210 degrees Fahrenheit;
- (C) Pressure of 150 pounds per square inch gauge pressure; or
- (C) Heat input of 200,000 BTU per hour.

1004.2 Installation. In addition to the requirements of this code, the installation of boilers shall conform to the manufacturers instructions. Operating instructions of a permanent type shall be attached to the boiler. Boilers shall have all controls set, adjusted and tested by the installer. The manufacturer's rating data and the nameplate shall be attached to the boiler.

1004.3 Working clearance. Clearances shall be maintained around boilers, generators, heaters, tanks and related equipment and appliances so as to permit inspection, servicing, repair, replacement and visibility of all gauges. When boilers are installed or replaced, clearance shall be provided to allow access for inspection, maintenance and repair. Passageways around all sides of boilers shall have an unobstructed width of not less than 18 inches (457 mm), unless otherwise approved.

1004.3.1 Top clearance. High pressure steam boilers having a steam generating capacity in excess of 5,000 pounds per hour (2268 kg/h) or having a heating surface in excess of 1,000 square feet (93 m²) or input in excess of 5,000,000 Btu/h (1465 kW) shall have a minimum clearance of 7 feet (2134 mm) from the top of the boiler to the ceiling. Steam heating boilers and hot water heating boilers that exceed one of the following limits: 5,000,000 Btu/h input (1465 kW); 5,000 pounds of steam per hour (2268 kg/h) capacity or a 1,000 square foot (93 m²) heating surface; and high pressure steam boilers that do not exceed one of the following limits: 5,000,000 Btu/h input (1465 kW); 5,000 pounds of steam per hour (2268 kg/h) capacity or a 1,000 square foot (93 m²) heating surface; and all boilers with manholes on top of the boiler, shall have a minimum clearance of 3 feet (914 mm) from the top of the boiler to the ceiling. Package boilers, steam heating boilers and hot water heating boilers without manholes on top of the shell and not exceeding one of the limits of this section shall have a minimum clearance of 2 feet (610 mm) from the ceiling.

1004.4 Mounting. Equipment shall be set or mounted on a level base capable of supporting and distributing the weight contained thereon. Boilers, tanks and equipment shall be secured in accordance with the manufacturer's installation instructions.

1004.5 Floors. Boilers shall be mounted on floors of noncombustible construction, unless listed for mounting on combustible flooring.

1004.6 Boiler rooms and enclosures. Boiler rooms and enclosures and access thereto shall comply with the *International Building Code* and Chapter 3 of this code. Boiler rooms shall be equipped with a floor drain or other approved means for disposing of liquid waste.

1004.7 Operating adjustments and instructions. Hot water and steam boilers shall have all operating and safety controls set and operationally tested by the installing contractor. A complete control diagram and boiler operating instructions shall be furnished by the installer for each installation.

SECTION 1005 is amended as follows:

BOILER CONNECTIONS PERMITS REQUIRED

~~1005.1 Valves.~~ Every boiler or modular boiler shall have a shutoff valve in the supply and return piping. For multiple boiler or multiple modular boiler installations, each boiler or modular boiler shall have individual shutoff valves in the supply and return piping.

~~Exception:~~ Shutoff valves are not required in a system having a single low pressure steam boiler.

~~Permits.~~ It shall be unlawful to install any boiler or pressure vessel regulated by this code without first obtaining a permit to do so, from the building official and an installation permit from the Oregon Building Codes Division, *Boiler and Pressure Vessel Program*.

~~1005.2 Potable water supply.~~ The water supply to all boilers shall be connected in accordance with the *International Plumbing Code*.

SECTION 1006 is amended as follows:

SAFETY AND PRESSURE RELIEF VALVES AND CONTROLS DETAILED REQUIREMENTS

~~1006.1 Safety valves for steam boilers.~~ All steam boilers shall be protected with a safety valve. Safety requirements.

The installation of all boilers and pressure vessels shall conform to the minimum requirements for safety established by this code.

~~1006.2 Safety relief valves for hot water boilers.~~ Hot water boilers shall be protected with a safety relief valve. Stack dampers. Stack dampers on boilers fired with oil or solid fuel shall not close more than 80 percent of the stack area when closed, except on automatic boilers with pre-purge, automatic draft control and interlock. Operative dampers shall not be placed within any stack, flue or vent of a gas-fired boiler, except on an automatic boiler with pre-purge, automatic draft control and interlock.

~~1006.3 Pressure relief for pressure vessels.~~ All pressure vessels shall be protected with a pressure relief valve or pressure limiting device as required by the manufacturer's installation instructions for the pressure vessel.

~~1006.4 Approval of safety and safety relief valves.~~ Safety and safety relief valves shall be listed and labeled, and shall have a minimum rated capacity for the equipment or appliances served. Safety and safety relief valves shall be set at a maximum of the nameplate pressure rating of the boiler or pressure vessel.

~~**1006.5 Installation.** Safety or relief valves shall be installed directly into the safety or relief valve opening on the boiler or pressure vessel. Valves shall not be located on either side of a safety or relief valve connection. The relief valve shall discharge by gravity.~~

~~**1006.6 Safety and relief valve discharge.** Safety and relief valve discharge pipes shall be of rigid pipe that is approved for the temperature of the system. The discharge pipe shall be the same diameter as the safety or relief valve outlet. Safety and relief valves shall not discharge so as to be a hazard, a potential cause of damage or otherwise a nuisance. High pressure steam safety valves shall be vented to the outside of the structure. Where a low pressure safety valve or a relief valve discharges to the drainage system, the installation shall conform to the *International Plumbing Code*.~~

~~**1006.7 Boiler safety devices.** Boilers shall be equipped with controls and limit devices as required by the manufacturer's installation instructions and the conditions of the listing.~~

~~**1006.8 Electrical requirements.** The power supply to the electrical control system shall be from a two-wire branch circuit that has a grounded conductor, or from an isolation transformer with a two-wire secondary. Where an isolation transformer is provided, one conductor of the secondary winding shall be grounded. Control voltage shall not exceed 150 volts nominal, line to line. Control and limit devices shall interrupt the ungrounded side of the circuit. A means of manually disconnecting the control circuit shall be provided and controls shall be arranged so that when de-energized, the burner shall be inoperative. Such disconnecting means shall be capable of being locked in the off position and shall be provided with ready access.~~

SECTION 1007 is amended as follows:

BOILER LOW-WATER CUTOFF EXPANSION TANKS

~~**1007.1 General.** All steam and hot water boilers shall be protected with a low water cutoff control. **Expansion tanks.**~~

~~All water heating systems provided with an air expansion tank shall be securely fastened to the structure; supports shall be adequate to carry twice the weight of the tank filled with water without placing any strain on connecting piping~~

~~All water heating systems incorporating hot-water tanks or fluid relief columns shall be installed to prevent freezing under normal operating conditions.~~

~~**1007.2 Operation.** The low water cutoff shall automatically stop the combustion operation of the appliance when the water level drops below the lowest safe water level as established by the manufacturer.~~

SECTION 1008 is amended as follows:

STEAM BLOWOFF VALVE- SAFETY OR RELIEF VALVE DISCHARGE

1008.1 General. ~~Every steam boiler shall be equipped with a quick-opening blowoff valve. The valve shall be installed in the opening provided on the boiler. The minimum size of the valve shall be the size specified by the boiler manufacturer or the size of the boiler blowoff valve opening. The discharge from relief valves shall be piped to within 18 inches (457 mm) of the floor or to an open receptacle, and when the operating temperature is in excess of 212°F. (100°C.), shall be equipped with a splash shield or centrifugal separator. When the discharge from safety valves would result in a hazardous discharge of steam inside the boiler room, such discharge shall be extended outside the boiler room. No valve of any description shall be placed between the safety valve and the atmosphere.~~

1008.2 Discharge. ~~Blowoff valves shall discharge to a safe place of disposal. Where discharging to the drainage system, the installation shall conform to the *International Plumbing Code*.~~

SECTION 1009 is amended as follows:

HOT WATER BOILER EXPANSION TANK GAS-PRESSURE REGULATORS

1009.1 Where required. ~~An expansion tank shall be installed in every hot water system. For multiple boiler installations, a minimum of one expansion tank is required. Expansion tanks shall be of the closed or open type. Tanks shall be rated for the pressure of the hot water system.~~

General. An approved gas-pressure regulator shall be installed on gas-fired boilers where the gas supply pressure is higher than that at which the main burner is designed to operate. A separate approved gas-pressure regulator shall be installed to regulate the gas pressure to the pilot or pilots. A separate regulator shall not be required for the pilot or pilots on manufacturer-assembled boiler-burner units which have been approved by the building official and on gas-fired boilers in Group R Occupancies of less than six units and in Group M Occupancies.

1009.2 Closed-type expansion tanks. ~~Closed-type expansion tanks shall be installed in accordance with the manufacturer's instructions. The size of the tank shall be based on the capacity of the hot water heating system. The minimum size of the tank shall be determined in accordance with the following equation:~~

~~—(Equation 10-1)~~

~~—For SI:~~

~~—where:~~

~~V_t = Minimum volume of tanks (gallons) (L).~~

~~V_s = Volume of system, not including expansion tanks (gallons) (L).~~

~~T = Average operating temperature (°F) (°C).~~

~~P_a = Atmospheric pressure (psi) (kPa).~~

~~P_f = Fill pressure (psi) (kPa).~~

P_o = Maximum operating pressure (psi) (kPa).

~~1009.3 Open-type expansion tanks.~~ Open-type expansion tanks shall be located a minimum of 4 feet (1219 mm) above the highest heating element. The tank shall be adequately sized for the hot water system. An overflow with a minimum diameter of 1 inch (25 mm) shall be installed at the top of the tank. The overflow shall discharge to the drainage system in accordance with the *International Plumbing Code*.

SECTION 1010 is amended as follows:

~~SECTION 1010 GAUGES~~

~~1010.1 Hot water boiler gauges.~~ Every hot water boiler shall have a pressure gauge and a temperature gauge, or a combination pressure and temperature gauge. The gauges shall indicate the temperature and pressure within the normal range of the system's operation.

~~1010.2 Steam boiler gauges.~~ Every steam boiler shall have a water gauge glass and a pressure gauge. The pressure gauge shall indicate the pressure within the normal range of the system's operation.

~~1010.2.1 Water-gauge glass.~~ The gauge glass shall be installed so that the midpoint is at the normal boiler water level.

SECTION 1010 CLEARANCE FOR ACCESS

1010.1 Access. When boilers are installed or replaced, clearance shall be provided to allow access for inspection, maintenance and repair, and passageways shall have an unobstructed width of not less than 18 inches (457 mm). Clearance for repair and cleaning may be provided through a door or access panel into another area, provided the opening is of sufficient size.

Package boilers, miniature boilers, low-pressure boilers and hot-water supply boilers with no manhole on top of shell shall have a minimum clearance of 2 feet (610 mm) from the ceiling.

SECTION 1011 is amended as follows:

~~SECTION 1011 TESTS~~

~~1011.1 Tests.~~ Upon completion of the assembly and installation of boilers and pressure vessels, acceptance tests shall be conducted in accordance with the requirements of the *ASME Boiler and Pressure Vessel Code*. Where field assembly of pressure vessels or boilers is required, a copy of the completed U-1 Manufacturer's Data Report required by the *ASME Boiler and Pressure Vessel Code* shall be submitted to the code official.

~~1011.2 Test gauges.~~ An indicating test gauge shall be connected directly to the boiler or pressure vessel where it is visible to the operator throughout the duration of the test. The pressure gauge

~~scale shall be graduated over a range of not less than one and one half times and not greater than four times the maximum test pressure. All gauges utilized for testing shall be calibrated and certified by the test operator.~~

SECTION 1011 is amended as follows:

SECTION 1011 BOILER ROOM ENCLOSURES

1011.1 Boiler rooms. Boiler rooms and enclosures and access thereto shall comply with Chapter 3 of this code and the *Building Code*.

SECTION 1012 is amended as follows:

SECTION 1012 FLOORS

1012.1 General. Boilers shall be mounted on floors of noncombustible construction unless listed for mounting on combustible floors. The floor and related structural supports shall be designed as required in the building code to carry the loads imposed by the boiler and appurtenances.

SECTION 1013 is amended as follows:

SECTION 1013 CHIMNEYS OR VENTS

1013.1 General. When required, boilers shall be connected to a chimney or vent as provided for other fuel-burning equipment in Chapter 8 of this code.

SECTION 1014 is amended as follows:

SECTION 1014 DRAINAGE

1014.1 Drains. The boiler room shall have an approved floor drain or equivalent means for disposing of accumulation of liquid wastes incidental to cleaning or recharging.

SECTION 1015 is amended as follows:

SECTION 1015 FUEL SUPPLY PIPING

1015.1 Piping. Fuel supply piping shall conform to Chapter 13, Appendix C or the standards cited in Chapter 15, Referenced Standards, Tanks, Piping, Valves, etc.

SECTION 1016 is amended as follows:

SECTION 1016 AIR FOR COMBUSTION AND VENTILATION

1016.1 General. Air for combustion and ventilation shall be according to Chapter 7 or Appendix C of this code.

SECTION 1017 is amended as follows:

SECTION 1017 STEAM AND WATER PIPING

<p>NOTE: Boilers and pressure vessels and related piping are regulated by the state of Oregon Boiler and Pressure Vessel Law (ORS 480.510 to 480.670).</p>

1017.1 General. Steam piping is regulated according to and under the jurisdiction of the Oregon Boiler and Pressure Vessel Law and related administrative rules and the jurisdiction of Oregon Building Codes Division, Boiler and Pressure Vessel Program. Water piping for hot-water heating systems and hydronics shall be regulated and installed according to Chapter 12 of this code.