CHAPTER 10
BOILERS, WATER HEATERS AND PRESSURE VESSELS

SECTION MC 1001
GENERAL

1001.1 Scope. This chapter shall establish the minimum safety requirements for and 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.

SECTION MC 1002
WATER HEATERS

1002.1 General. Potable water heaters and hot water storage tanks shall be listed and labeled in accordance with the manufacturer’s installation instructions, the New York City Plumbing Code and 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 New York City 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.

1002.2 Water heaters utilized for space heating. Water heaters utilized both to supply potable hot water and provide hot water for space-heating applications shall be listed and labeled for such applications by the manufacturer, and shall be built in accordance with the New York City Plumbing Code. Domestic electric water heaters shall comply with one of the following standards: UL 174 or UL 1453, Commercial electric water heaters shall comply with UL 1453. Oil-fired water heaters shall comply with UL 732.

1002.3 Supplemental water-heating devices. Potable water-heating devices that utilize refrigerant-to-water heat exchangers shall be approved and installed in accordance with the New York City Plumbing Code and the manufacturer’s installation instructions.

SECTION MC 1003
PRESSURE VESSELS

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. The requirements for unfired pressure vessels shall be the same as required for boilers designed for the same operating temperatures.

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.

1003.3 Welding. Welding on pressure vessels shall be performed by approved certified welders in compliance with nationally recognized standards, ASME Boiler and Pressure Vessel Code, Sections VIII and IX; 12 NYCCR 4-6.2; and 12 NYCCR 14-3.3 through 14-3.18.

SECTION MC 1004
BOILERS

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, IV, V, VI, VIII and IX; 12 NYCCR Parts 4 and 14; NFPA 8501; NFPA 8502; and NFPA 8504.

1004.2 Installation. In addition to the requirements of this code, the installation of boilers shall conform to the manufacturer’s 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...
BOILERS, WATER HEATERS AND PRESSURE VESSELS

not less than 18 inches (457 mm), unless otherwise approved, by the commissioner.

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 and appliances shall be set or mounted on a level base capable of supporting and distributing the weight contained thereon. Boilers, tanks and equipment shall be securely anchored to the structure. Equipment and appliances requiring vibration isolation shall be installed as designed by a registered design professional 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 New York City 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.

1004.8 Burner controls. Gas and oil modulating burners shall be provided with burner controls (oil and gas equivalent ratings) in accordance with Table 1004.8.

SECTION MC 1005
BOILER CONNECTIONS

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 of 350,000 Btu/h (103 kW) output or less.

1005.2 Potable water supply. The water supply to all boilers shall be connected in accordance with the New York City Plumbing Code.

SECTION MC 1006
SAFETY AND PRESSURE RELIEF VALVES AND CONTROLS

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

1006.2 Safety relief valves for hot water boilers. Hot water boilers shall be protected with a safety relief valve.

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 Standards 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.

TABLE 1004.8
MINIMUM CONTROL REQUIREMENTS

<table>
<thead>
<tr>
<th>TYPE OF CONTROL</th>
<th>#6 Oil</th>
<th>#4 Oil</th>
<th>#2 Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-Off</td>
<td></td>
<td></td>
<td>&lt;10</td>
</tr>
<tr>
<td>Low-High-Off with low fire start</td>
<td>20 to &lt;30</td>
<td>10 to &lt;30</td>
<td>10 to &lt;30</td>
</tr>
<tr>
<td>Low-High-Low-Off with proven low fire start</td>
<td>30 to &lt;50</td>
<td>30 to &lt;50</td>
<td>30 to &lt;50</td>
</tr>
<tr>
<td>Full Modulation with proven low fire start</td>
<td>≥ 50</td>
<td>≥ 50</td>
<td>≥ 50</td>
</tr>
<tr>
<td>Full Modulation with proven low fire start as well as cross-limited oxygen trim (dry cell electrochemical type)</td>
<td>≥ 350</td>
<td>≥ 350</td>
<td>≥ 350</td>
</tr>
</tbody>
</table>

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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 New York City 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 deenergized, 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.

1006.8.1 Remote control (shut down). A remote control shall be provided to stop the flow of oil and/or gas and combustion air to any burner or fuel-burning internal combustion equipment. Such control shall be located outside all means of egress to the room in which the burner or equipment is located and as close to such entrances as practicable, except that when an outside location is impracticable, such control may be located immediately inside the room in which the burner or equipment is located, provided such location is accessible at all times. All such controls shall be labeled: “REMOTE CONTROL FOR BURNER.”

SECTION MC 1008
BOILER BLOWOFF/BLOWDOWN VALVES

1008.1 General. Every boiler shall be equipped with blowoff/blowdown valve(s). The valve(s) shall be installed in the openings provided on the boiler. The minimum quantity and size of each valve shall be the quantity and size specified by the boiler manufacturer or the quantity and size of the boiler blowoff/blowdown valve opening.

1008.2 Discharge. Blowoff/blowdown valves shall discharge to a safe place of disposal. Where discharging to the drainage system, the installation shall conform to the New York City Plumbing Code.

SECTION MC 1009
HOT WATER BOILER EXPANSION TANK

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.

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:

\[ V_t = \left( \frac{P_a}{P_f} - \frac{P_a}{P_o} \right) \frac{V_s}{P_f} \]  

(Equation 10-1)

For SI:

\[ V_t = \left( \frac{P_a}{P_f} - \frac{P_a}{P_o} \right) \frac{V_s}{P_f} \]

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 New York City Plumbing Code.

SECTION MC 1007
BOILER LOW-WATER CUTOFF

1007.1 General. All steam and hot water boilers shall be protected with dual low-water cutoff control.

1007.1.1 High-pressure boiler. If the low-water cutoff devices are mounted externally to the boiler, the main and auxiliary low-water cutoffs shall be connected to the boiler using isolated steam side and water side connection. No other control devices, gauges or valves except for the water column drain shall be connected to the tappings on the boiler used for low-water cutoffs.

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 and in accordance with ASME CSD-1.
### SECTION MC 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 installed with a siphon 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 MC 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. Boilers shall not be placed in operation upon completion of construction until they have been inspected and tested and a certificate of compliance has been issued by the commissioner. All final inspections and tests for boilers shall be made by a qualified boiler inspector in the employ of the department or a duly authorized insurance company as provided in Section 204 of the Labor Law of the State of New York. Equipment having a Btu input of not more than 350,000 Btu/h (103 kW) shall be exempt from this requirement. Where field assembly of pressure vessels or boilers is required, a copy of the completed H-2, P-2 or U-1 Manufacturer’s Data Report required by the ASME Boiler and Pressure Vessel Code shall be submitted to the department.

**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.

**1011.3 Periodic boiler inspections.** Periodic boiler inspections shall be performed in accordance with Section 28-303 of the Administrative Code.