

## CHAPTER 13

# FUEL-OIL PIPING AND STORAGE

### SECTION MC 1301 GENERAL

**1301.1 Scope.** This chapter shall govern the design, installation, construction and repair of fuel-oil storage and piping systems. The storage of flammable and combustible liquids not addressed in this chapter shall be in accordance with the *New York City Fire Code*.

**1301.2 Storage and piping systems.** Fuel-oil storage and piping systems shall comply with the requirements of Chapter 13 and, to the extent not otherwise provided for in this code, shall comply with the requirements of NFPA 31. All above-ground and underground storage facilities with a combined storage capacity of over 1,100 gallons (4160 L) shall also comply with the requirements of the *New York State Department of Environmental Conservation's Petroleum Bulk Storage Code*; 6 NYCRR Parts 612, 613 and 614.

**1301.3 Fuel type.** An appliance shall be designed for use with the type of fuel to which it will be connected. Such appliance shall not be converted from the fuel specified on the rating plate for use with a different fuel without securing reapproval from the commissioner.

**1301.4 Fuel tanks, piping and valves.** The tank, piping and valves for appliances burning oil shall be installed in accordance with the requirements of this chapter. When oil burning equipment is served by a tank located such that any part of the tank is above the level of the burner inlet connection and where the fuel supply line is taken from the top of the tank, an approved anti-siphon valve or other siphon-breaking device shall be installed. The anti-siphon valve or siphon-breaking device shall be located at the highest point in the supply line.

**Exceptions:** An anti-siphon valve or other siphon-breaking device shall not be required where either:

1. An approved foot valve is used in the tank, or
2. No. 6 fuel oil is used.

**1301.5 Out of service system.** Fuel-oil storage systems that are temporarily or permanently taken out of service shall comply with the requirements of the *New York City Fire Code*.

**1301.6 Fuel-oil spill and overfill prevention equipment.** Fuel-oil spill and overfill prevention equipment shall comply with EPA 40 CFR Parts 280, and Section 1305.6.6.

**1301.7 Portable fire extinguishers.** Portable fire extinguishers with a minimum weight of 30 pounds (13.64 kg) shall be provided as required by the *New York City Fire Code* and NFPA 10.

**1301.8 Absorbent materials.** The building owner shall maintain a sufficient quantity of absorbent materials near fuel-oil storage tanks, pumps, and related equipment to control leaks and slipping hazards.

**1301.9 Certificate of fitness.** Where fuel-oil piping systems utilize pumps to transfer fuel oil to equipment at levels above

the lowest floor or to storage tanks at levels above the lowest floor in buildings, a qualified employee or contracted general company holding a certificate of fitness from the Fire Department shall maintain the fuel-oil system.

### SECTION MC 1302 MATERIAL

**1302.1 General.** Piping materials shall conform to the standards cited in this section.

**1302.2 Rated for system.** All materials shall be rated for the operating temperatures and pressures of the system, and shall be compatible with the type of liquid being handled by the system.

**1302.3 Pipe standards.** Fuel-oil pipe shall comply with the standards listed in Table 1302.3.

**Exception:** Piping for fuel-oil systems utilizing a transfer pump to equipment at levels above the lowest floor or to storage tanks at levels above the lowest floor in buildings shall comply with the requirements of Section 1305.9.5.

**TABLE 1302.3\*†  
FUEL OIL PIPING**

MATERIAL	STANDARD (see Chapter 15)
Brass pipe	ASTM B 43
Copper or copper-alloy pipe	ASTM B 42; ASTM B 302
Copper or copper-alloy tubing (Type K)	ASTM B 75; ASTM B 88; ASTM B 280
Labeled pipe	(See Section 1302.4)
Nonmetallic pipe	ASTM D 2996
Steel pipe	ASTM A 53; ASTM A 106

a. Brass tubing, steel tubing and copper tubing L or M are not permitted.

**1302.4 Nonmetallic pipe.** All nonmetallic pipe shall be listed and labeled as being acceptable for the intended application for flammable and combustible liquids. Nonmetallic pipe shall be installed only outside, underground.

**1302.5 Fittings and valves.** Fittings and valves shall be approved for the piping systems, and shall be compatible with, or shall be of the same material as, the pipe or tubing.

**1302.6 Bending of pipe.** Pipe shall be approved for bending. Pipe bends shall be made with approved equipment. The bend shall not exceed the structural limitations of the pipe.

**1302.7 Pumps.** Pumps that are not part of an appliance shall be of a positive-displacement type. The pump shall automatically shut off the supply when not in operation. Pumps shall be listed and labeled in accordance with UL 343.

**1302.8 Flexible connectors and hoses.** Flexible metal connectors and hoses used where rigid connections are impractical or to reduce the effect of jarring and vibration shall be listed and

labeled in accordance with UL 536 and shall be installed in compliance with its label and the manufacturer's installation instructions. Connectors made from combustible materials shall not be used inside buildings or above ground outside of buildings.

### SECTION MC 1303 JOINTS AND CONNECTIONS

**1303.1 Approval.** Joints and connections shall be approved and of a type approved for fuel-oil piping systems. All threaded joints and connections shall be made tight with suitable lubricant or pipe compound. Unions requiring gaskets or packings, right or left couplings, and sweat fittings employing brazing material having a melting point of less than 1,000°F (538°C) shall not be used in oil lines. Cast-iron fittings shall not be used. Joints and connections shall be tight for the pressure required by test.

**1303.1.1 Joints between different piping materials.** Joints between different piping materials shall be made with approved adapter fittings. Joints between different metallic piping materials shall be made with approved dielectric fittings or brass converter fittings.

**1303.2 Reserved.**

**1303.3 Joint preparation and installation.** Where required by Sections 1303.4 through 1303.10, the preparation and installation of brazed, threaded and welded joints shall comply with Sections 1303.3.1 through 1303.3.4.

**1303.3.1 Brazed joints.** All joint surfaces shall be cleaned. An approved flux shall be applied where required. The joints shall be brazed with a filler metal conforming to AWS A5.8.

**1303.3.2 Mechanical joints.** Mechanical joints utilizing an elastomeric and/or compression seal are not permitted.

**1303.3.3 Threaded joints.** Threads shall conform to ASME B1.20.1. Pipe-joint compound or tape shall be applied on the male threads only.

**1303.3.4 Welded joints.** All joint surfaces shall be cleaned by approved procedure. The joint shall be welded with an approved filler metal.

**1303.4 Brass pipe.** Joints between brass pipe or fittings shall be brazed, mechanical, threaded or welded joints complying with Section 1303.3.

**1303.5 Reserved.**

**1303.6 Copper or copper-alloy pipe.** Joints between copper or copper-alloy pipe or fittings shall be brazed, mechanical, threaded or welded joints complying with Section 1303.3.

**1303.7 Copper or copper-alloy tubing.** Joints between copper or copper-alloy tubing or fittings shall be brazed or mechanical joints complying with Section 1303.3 or flared joints. Flared joints shall be made by a tool designed for that operation.

**1303.8 Nonmetallic pipe.** Joints between nonmetallic pipe or fittings shall be installed in accordance with the manufacturer's instructions for the labeled pipe and fittings.

**1303.9 Steel pipe.** Joints between steel pipe or fittings shall be threaded or welded joints complying with Section 1303.3.

**1303.10 Reserved.**

**1303.11 Piping protection.** Proper allowance shall be made for expansion, contraction, jarring and vibration. Piping other than tubing, connected to underground tanks, except straight fill lines and test wells, shall be provided with flexible connectors, or otherwise arranged to permit the tanks to settle without impairing the tightness of the piping connections. Piping serving equipment at levels above the lowest floor or storage tanks at levels above the lowest floor in buildings shall also comply with the requirements of Sections 1305.9.6 and 1305.9.7.

### SECTION MC 1304 PIPING SUPPORT

**1304.1 General.** Pipe supports shall be in accordance with Section 305. Piping serving equipment at levels above the lowest floor or storage tanks at levels above the lowest floor in buildings shall also comply with the requirements of Sections 1305.9.6 and 1305.9.7.

### SECTION MC 1305 FUEL-OIL SYSTEM INSTALLATION

**1305.1 General.** Fuel-oil piping systems shall be installed in accordance with this section.

**1305.2 Protection of pipe, equipment and appliances.** All fuel-oil pipe, equipment and appliances shall be protected from physical damage. Piping serving equipment at levels above the lowest floor or storage tanks at levels above the lowest floor in buildings shall also comply with the requirements of Section 1305.9.

**1305.2.1 Flood hazard.** All fuel-oil pipe, tanks, equipment and appliances located in areas of special flood hazard shall comply with Appendix G of the *New York City Building Code*.

**1305.3 Supply piping.** Supply piping shall comply with the requirements of Sections 1305.3.1 through 1305.3.7.

**1305.3.1 Size.** The fuel-oil system shall be sized for the maximum capacity of fuel oil required. The minimum size of a supply line shall be  $\frac{3}{8}$ -inch (9.5 mm) inside diameter nominal pipe or  $\frac{3}{8}$ -inch (9.5 mm) OD tubing.

**1305.3.2 Connections to tank.** Supply piping shall connect to the top of the fuel-oil tank.

**Exception:** Storage tanks in buildings that comply with all of the following conditions:

1. The tank is located above ground on the lowest floor;
2. The tank does not exceed 330 gallons (1250 L); and
3. The tank is provided with a  $\frac{3}{4}$ -inch (19.1 mm) opening for gravity discharge and a 1-inch (25 mm) opening in the bottom for cleaning and protection against corrosion.

**1305.3.3 Pumps.** Fuel oil shall be supplied by a transfer pump or automatic pump or by other approved means.

**1305.3.4 Smoke detectors.** Appropriate safeties shall be provided so that detection of smoke or heat within the generator or equipment room shall prevent additional fuel oil from being pumped into the piping system within such room, including a fusible link operated lever gate valve in the supply pipe at the wall of the generator room.

**1305.3.5 Horizontal runouts.** Horizontal runouts from risers to the generator or equipment room shall follow as direct a route as practicable.

**1305.3.6 Direct feed.** Systems where day tanks are absent (such as generator installations where fuel oil is taken directly from a fuel-oil pipe or header into the engine) shall comply with Section 1305.9.12.

**1305.3.7 Piping from transfer pump to equipment or storage tanks above the lowest floor.** Supply piping from a transfer pump to equipment at levels above the lowest floor or storage tanks at levels above the lowest floor in buildings shall also comply with the requirements of Section 1305.9.

**1305.4 Return piping.** Return piping shall connect to the top of the fuel-oil tank. The minimum size of a return line shall be  $\frac{1}{4}$ -inch (6.4 mm) inside diameter nominal pipe or  $\frac{5}{16}$ -inch (7.9 mm) outside diameter tubing. Valves shall not be installed on return piping unless a means of relieving overpressure is provided. Return piping serving equipment at levels above the lowest floor or storage tanks at levels above the lowest floor in buildings shall also comply with the requirements of Section 1305.9.

**1305.5 System pressure.** The system shall be designed for the maximum pressure required by the fuel-oil-burning appliance. Air or other gases shall not be used to pressurize tanks. Pressure in a storage tank for the purpose of discharging oil shall be prohibited.

**1305.6 Fill piping.** Fill piping shall comply with the requirements of Sections 1305.6.1 through 1305.6.6.

**1305.6.1 Size.** Fill piping shall be a minimum of 2 inches (51 mm) in diameter or 3 inches (76 mm) for No. 6 fuel oil.

**1305.6.2 Termination location.** A fill pipe shall terminate outside of a building at or above grade at a point least 2 feet (610 mm) from any building opening and 5 feet (1524 mm) away from any subway grating at the same or lower level. A fill pipe shall terminate in a manner designed to minimize spilling when the filling hose is disconnected. Where No. 6 fuel oil is used, the fill pipe terminal shall be within 3 feet (914 mm) of the curb unless otherwise required by the Department of Transportation or the Transit Authority. If facilities exist for an oil delivery truck to drive onto the premises, the fuel-oil terminal may be located elsewhere other than the curb.

**1305.6.3 Separate fill piping.** Each storage tank shall be provided with a separate fill pipe, except that where a bat-

tery of tanks containing the same grade of oil is installed, a common fill and header pipe may be installed.

**1305.6.4 Check valve.** Where the top of the storage tank is above the fill pipe terminal, the fill pipe shall be connected to the top of the tank and provided with a shutoff valve and swing check valve, both of which shall be located at the fill pipe terminal. The shutoff valve and swing check valve may be installed in an accessible location inside the building at or below the level of the fill pipe terminal.

**1305.6.5 Terminal opening.** The fill opening shall be equipped with a tight metal cover designed to discourage tampering. All fill pipe terminals shall be of an approved type and shall be provided with lugs for embedding in concrete. In lieu of lugs, a set screw or threads to fasten the terminal to the fill pipe may be used. The outer flange of the fill pipe terminal or the seal cap shall be permanently marked: FUEL OIL. The fill pipe terminal shall be threaded or provided with other equivalent means to receive the seal cap. The seal cap shall be suitably slotted for receiving an opening wrench, and an oilproof gasket inserted in a groove in the fill pipe terminal shall be provided so as to make the seal cap leakproof. A strainer shall not be required but if used, shall be of at least  $\frac{1}{8}$ -inch (3.2 mm) mesh. Where a storage system for volatile flammable oil and a storage system for fuel oil are to be used in the same premises, the terminal of the fuel-oil pipe shall be provided with a left-handed thread and the fill pipe fitting shall be of a different size than that required for the fill pipes to the tanks containing the volatile flammable oil.

**1305.6.6 Spill containment.** For fill pipes serving tanks greater than 660 gallons (2500 L), an approved overflow/spill containment device shall be provided.

**1305.7 Normal vent piping.** Normal vent piping shall comply with the requirements of Sections 1305.7.1 through 1305.7.9.

**1305.7.1 Size.** Normal vent sizes shall comply with the sizes listed in Tables 1305.7(1) and 1305.7(2); provided, however, for tanks other than those complying with the alternate tank design and construction standards contained in Section 1305.14, the normal vent shall not be smaller in size than the supply pipe.

**TABLE 1305.7(1)  
VENT PIPING FOR UNDERGROUND TANKS**

TANK SIZE	MINIMUM VENT DIAMETER
660 gallons (2500 L) or less	1 $\frac{1}{4}$ inch (32 mm)
661 gallons (2505 L) to 3,000 gallons (11 355 L)	1 $\frac{1}{2}$ inch (38 mm)
3,001 gallons (11 360 L) to 10,000 gallons (37 850 L)	2 inch (51 mm)
10,001 gallons (37 855 L) to 20,000 gallons (75 700 L)	2 $\frac{1}{2}$ inch (64 mm)
Larger than 20,000 gallons (75 700 L)	3 inch (76 mm)



**TABLE 1305.7(2)**  
**VENT PIPING FOR TANKS INSTALLED INSIDE BUILDINGS**

TANK SIZE	MINIMUM VENT DIAMETER
660 gallons (2500 L) or less	1 <sup>1</sup> / <sub>4</sub> inch (32 mm) <sup>a</sup>
Larger than 660 gallons (2500 L)	Sized to prevent abnormal pressure in the tank during filling but not smaller than the pipe size specified in Table 1305.7(1)

a. For tanks constructed to UL 80 specifications the minimum vent diameter shall be 2 inches (51 mm) or, for tanks constructed to UL 142 specifications, the minimum vent diameter shall not be less than as required by Section 1305.8.4.

**1305.7.2 Termination location.** The location of the normal vent pipe terminations shall comply with the following:

1. Liquid fuel normal vent pipes shall terminate outside of buildings in a nonhazardous location at a point not less than 2 feet (610 mm) measured vertically or horizontally from any building opening and not less than 2 feet (610 mm) nor more than 12 feet (3658 mm) above the fill pipe terminal.
2. If the normal vent pipe terminal is not visible from the fill pipe terminal location, a 1-inch (25 mm) tell-tale line shall be connected to the tank and shall parallel the fill pipe and terminate at the fill pipe terminal with an unthreaded end. Such tell-tale lines shall be provided with a check valve set to prevent flow of surface water to the storage tank.
3. Normal vent pipes shall terminate sufficiently above the ground to avoid being obstructed with snow or ice.
4. Normal vent pipes from tanks containing heaters shall be extended to a location where oil vapors discharging from the normal vent will be readily diffused.

**1305.7.3 Termination caps.** Outer ends of normal vent pipes shall terminate in a weatherproof vent cap or fitting or be provided with a weatherproof hood. All normal vent caps shall have a minimum free open area equal to the cross-sectional area of the normal vent pipe and shall not employ screens finer than No. 4 mesh.

**1305.7.4 Tank pressure.** The tank shall be designed for the maximum static head that will be imposed with the normal vent piping filled with oil.

**1305.7.5 Multiple tanks.** A normal vent pipe shall be provided for each storage tank. Normal vent piping from multiple tanks of the same grade oil with not more than 660 gallons (2500 L) aggregate capacity may be combined. Where a battery of storage tanks complying with the alternate tank design and construction standards contained in Section 1305.14 designed to hold the same grade of oil with not more than 660 gallons (2500 L) aggregate capacity is installed, normal vent pipes may be run into a main header.

**1305.7.6 Pitch.** Normal vent pipes shall drain toward the tank. The normal vent pipes shall have no sags or traps where liquid can collect.

**1305.7.7 Protection.** Normal vent pipes shall be located so that they are not subjected to physical damage.

**1305.7.8 Cross-connection.** Liquid fuel normal vent pipes shall not be cross-connected with fill pipes, lines from burners or overflow lines from auxiliary tanks.

**1305.7.9 Tanks above the lowest floor.** For tanks installed above the lowest floor, the normal vent shall be piped, in an approved manner, into the vent or top of tank of the lowest floor storage tank that supplies the fuel to such tank.

**1305.8 Emergency relief vent piping.** Each primary tank, the interstitial space of a secondary containment tank and each compartment of a compartment tank complying with UL 142 shall be provided with emergency relief venting. A tank's emergency relief vent piping and normal vent piping shall be combined. The design and installation of the combined normal and emergency relief vent shall be in accordance with Section 1305.7 and Sections 1305.8.1 through 1305.8.4.

**1305.8.1 Piping.** The combination normal and emergency relief venting shall be provided through an open vent pipe connected directly, as applicable, to the primary tank, interstitial space or compartment. The use of a self-closing manway cover, a manway cover provided with long bolts that permit the cover to lift under internal pressure, or other type emergency relief vent device, shall be prohibited.

**1305.8.2 Termination.** Combination normal and emergency relief vent piping shall terminate outdoors.

**1305.8.3 Tanks above the lowest floor.** For tanks installed inside of buildings above the lowest floor, the combination normal and emergency vent piping shall be piped, in an approved manner, into the vent or top of tank of the lowest floor storage tank that supplies the fuel to such tank.

**1305.8.4 Capacity.** The total relief venting capacity of the combination normal and emergency relief venting shall be in accordance with Section 4.2.5.2 of NFPA 30. Construction documents shall include calculations demonstrating that the extension of the normal and emergency vent piping is adequately sized to provide the required emergency vent flow while limiting the backpressure to less than the maximum pressure permitted by the design of the tank. Additionally, consistent with Section 4.2.5.2.5 of NFPA 30, where the design provides for a reduction in the required emergency relief venting capacity based upon the properties of the fuel oil to be stored in the tank, the construction documents shall include supporting calculations.

**1305.9 Supplemental requirements for piping from transfer pumps to equipment or storage tanks above lowest floor.** Fuel-oil piping systems utilizing pumps to transfer fuel oil to equipment at levels above the lowest floor or storage tanks at levels above the lowest floor in buildings shall comply with the requirements of Sections 1305.9.1 through 1305.9.12.

**1305.9.1 Shaft enclosure.** The piping from a transfer pump to equipment at levels above the lowest floor or storage tanks at levels above the lowest floor in buildings, the return piping, and vent piping shall be enclosed in a shaft constructed of 4-inch (102 mm) concrete or masonry having a 4-inch (102 mm) clearance from all pipe or pipe covering, except that no such enclosures shall be required within the room containing the pump, tank, or equipment where such

room is itself enclosed with construction and materials having at least a 2-hour fire-resistance rating.

**1305.9.2 Ducts or other piping in shafts.** Pipe shafts containing fuel-oil piping shall not be penetrated by or contain other piping or ducts.

**1305.9.3 Horizontal offsets.** Where it is necessary to make horizontal offsets in the supply piping and pipe shafts, such piping shall be enclosed in a sleeve of other piping of at least No. 10 standard Gage steel, two sizes larger than the supply piping and arranged to drain into the shaft. Horizontal piping offsets shall be further enclosed in construction having a 2-hour fire-resistance rating except that no such enclosure or pipe sleeve shall be required within the room containing the pump, tank, or equipment where such room is itself enclosed with construction and materials having at least a 2-hour fire-resistance rating.

**1305.9.4 Drain at base of shafts; leak detection.** A drain pipe shall be installed at the base of shafts enclosing the supply and overflow piping. The pipe shall lead to a dedicated sump or minimum 55-gallon (208 L) container with a leak detection alarm, arranged so as to sound an alarm and stop the transfer pump. The alarm shall be connected to a local audible alarm and to a remote alarm located at a supervising station. The wiring shall comply with the *New York City Electrical Code*.

**1305.9.5 Piping materials.** Oil lines for equipment or tanks shall be steel pipe ASTM A 53 or ASTM A 106, grade B seamless Schedule 40 with welded connections up to the oil tank or equipment, except that fittings at the tank or equipment, shutoff valves and other fuel-oil flow and control devices may be screwed or flanged.

**1305.9.6 Expansion.** Provision shall be made for expansion in piping without the use of expansion joints.

**1305.9.7 Movement and vibration.** The piping shall be located and secured from movement so as to prevent undue stress on the piping and to isolate the piping from vibrations from any equipment.

**1305.9.8 Connections to header.** Pipe connections to the main header (supply or return) shall be made from the top of the header, except for systems with equipment above the lowest floor where such equipment is designed to operate utilizing fuel pumped as needed from the lowest floor and without utilizing fuel oil stored above the lowest floor.

**1305.9.9 Air vents and breakers.** Required air vents and vacuum breakers shall be designed for their required use.

**1305.9.10 Curb or pan.** All air vents and vacuum breakers shall be hard-piped to a curb or pan.

**1305.9.11 Pipe size; fuel storage above the lowest floor.** In systems with equipment above the lowest floor where such equipment is designed to operate utilizing fuel stored above the lowest floor, piping diameters shall not exceed 4 inches (102 mm). However, where an applicant demonstrates by the inclusion of calculations in the construction documents that a greater diameter is necessary to ensure the proper flow for the functioning of the system, such greater

diameter may be permitted. Piping shall not be used for fuel storage purposes.

**1305.9.12 Pipe size; without fuel storage above the lowest floor.** In systems with equipment above the lowest floor, where such equipment is designed to operate utilizing fuel pumped as needed from the lowest floor and without utilizing fuel oil stored above the lowest floor, piping diameters throughout such systems shall not exceed the design flow (three times the maximum firing rate as calculated by the engineer or architect). However, piping diameters within rooms containing such equipment may exceed the calculated design flow pipe size to provide limited reservoir storage to prime equipment, provided such reservoir storage is counted toward the maximum permitted oil storage per story, as provided for in Section 1305.11.1.3.

**1305.10 Devices to control flow to oil-burning equipment.** The following requirements shall apply:

1. The pressure in oil lines to oil-burning equipment located above the lowest floor of a building shall not be more than is required to circulate oil to and from the burners, and all parts of the oil system shall be capable of withstanding the maximum working pressure in that part of the system.
2. A remote control shall be provided to stop the flow of oil to any burner wherever located, and to any oil-burning equipment located on levels above the lowest floor in buildings. Such control shall be located outside the entrance to the room in which the burner is located and as close to such entrance as practicable, except that when an outside location is impracticable, such control may be located immediately inside the room in which the burner is located, provided such location is accessible at all times. All such controls shall be permanently labeled: "REMOTE CONTROL FOR OIL BURNER," "REMOTE CONTROL FOR GENERATOR," or as appropriate to the oil-burning equipment. On storage tanks of 60 gallons (227 L) or less capacity used with manually operated equipment, such remote control may be installed in the supply lines between tank and burner.
3. In systems where either steam or air is used for atomizing the oil, the oil and the atomizing supply shall be interlocked so that where the supply of either is interrupted, the supply of the other will be immediately cut off.

**1305.11 Limitations on quantities of fuel-oil storage.** Quantities of fuel-oil storage shall be limited in accordance with the provisions of this section. For the purposes of this section, fuel oil stored on roofs shall be deemed inside of buildings and located on the floor to which they are adjacent.

**1305.11.1 Inside of buildings.** A total of not more than 100,000 gallons (378 000 L) shall be stored inside of any building. Oil storage inside of buildings shall also comply with applicable requirements of Sections 1305.11.1.1 through 1305.11.1.3.

**1305.11.1.1 Inside of buildings; below ground.** The maximum size of each below-ground oil-storage tank inside of a building shall be 35,000 gallons (132 475 L).

**1305.11.1.2 Inside of buildings; above ground on the lowest floor.** Fuel-oil storage tanks installed above ground on the lowest floor of a building shall be mounted on and anchored by adequate noncombustible supports. The maximum size of each individual tank shall be 660 gallons (2500 L), and a total of not more than 1375 gallons (5200 L) shall be stored within the same 2-hour fire area.

**Exceptions.** Fuel-oil storage tanks shall be permitted to exceed 660 gallons (2500 L), and the total quantity within a fire area shall be permitted to exceed 1375 gallons (5200 L) in accordance with any one of the following options:

1. **Buildings of Type I, II, IIIA, IV or VA construction with a total limit of 15,000 gallons.** The maximum size of each individual tank shall be 15,000 gallons (56 775 L) provided that all such tanks are located in a room or enclosure dedicated to oil storage that is separated from the rest of the building by fire-resistance-rated construction of at least 3 hours. Notwithstanding Section 1305.11.1, in such cases, the maximum total quantity in the building shall be limited to 15,000 gallons (56 775 L).
2. **Buildings of Type IIIB or VB construction with a total limit of 10,000 gallons.** The maximum size of each individual tank shall be 10,000 gallons (37 850 L) provided that all such tanks are located in a room or enclosure dedicated to oil storage that is separated from the rest of the building by fire-resistance-rated construction of at least 3 hours. Notwithstanding Section 1305.11.1, in such cases, the maximum total quantity in the building shall be limited to 10,000 gallons (56 775 L).
3. **Buildings of any type construction with a total limit of 100,000 gallons.** The maximum size of each individual tank shall be 25,000 gallons (94 625 L) provided that all such tanks are enclosed in a vault (i) with walls, floor, and top having a fire-resistance rating of not less than 3 hours, (ii) with such walls bonded to the floor, and (iii) with such top and walls of the vault independent of the building structure. An exterior building wall having a fire-resistance rating of not less than 3 hours shall be permitted to serve as a wall of the vault. The vault shall be located in a dedicated room or area of the building that is cut off vertically and horizontally from other areas and floors of the building by assemblies having a fire-resistance rating of not less than 2 hours. Where the aggregate fuel-oil storage on the lowest level of the building exceeds 50,000 gallons (189 250 L), such storage shall be protected with an alternate extinguishing system complying with Section 904 of the *New York City Building Code*.

**1305.11.1.3 Inside of buildings; above the lowest floor.** Fuel oil above the lowest floor inside of a building shall be limited to 330 gallons (1249 L) per story. The maximum quantity shall include oversized piping as described in Section 1305.9.12. Piping installations shall comply with the requirements of Section 1305.9.

**1305.11.2 Outside of buildings.** Oil storage outside of buildings shall comply with applicable requirements of Sections 1305.11.2.1 and 1305.11.2.2.

**1305.11.2.1 Outside of buildings; below ground.** The maximum size of each below-ground oil-storage tank outside of a building shall be 35,000 gallons (132 475 L).

**1305.11.2.2 Outside of buildings; above ground.** The maximum size of each above-ground oil-storage tank outside of a building shall be 100,000 gallons (378 000 L).

**1305.12 Standards for tank design.** Tanks shall be designed and constructed in compliance with Sections 1305.12.1 and 1305.12.2.

**1305.12.1 Below ground.** Tanks located below ground, inside or outside of buildings, shall comply with any one of the following design standards, as appropriate for the specific installation as determined by the engineer:

1. UL 58; such tanks shall be listed and labeled;
2. UL 1316; such tanks shall be listed and labeled; or
3. Alternate tank design and construction standards contained in Section 1305.14

**1305.12.2 Above ground.** Tanks located above ground, inside or outside of buildings, shall comply with any one of the following design standards, as appropriate for the specific installation as determined by the engineer:

1. UL 80; such tanks shall be listed and labeled;
2. UL 142; such tanks shall be listed and labeled;
3. *ASME Boiler and Pressure Vessel Code*, Section VIII, Division 1 or 2; such tanks shall be listed and labeled; or
4. Alternate tank design and construction standards contained in Section 1305.14.

**1305.13 Installation of tanks.** Tanks shall be installed in accordance with the provisions of Sections 1305.13.1 through 1305.13.4. For the purposes of this section, fuel oil stored on roofs shall be deemed inside of buildings.

**1305.13.1 Below ground.** Tanks located below ground, inside or outside of buildings, shall comply with the following requirements:

1. **Containment.** Fuel-oil tanks having a capacity of more than 660 gallons (2500 L) shall be provided with secondary containment intended to prevent any leakage of fuel oil from the tank from entering the environment. The capacity of the containment shall equal or exceed the capacity of the tank served.
2. **Burial.** Regardless of capacity, fuel-oil tanks shall be buried with the top of the tank at least 2 feet (610 mm) below ground. Tanks shall be placed in firm soil and



shall be surrounded by clean sand or well-tamped earth, free from ashes or other corrosive substance, and free from stones that will not pass a 1-inch (25 mm) mesh.

3. **Anchorage.** When necessary to prevent floating, fuel-oil tanks, regardless of capacity, shall be securely anchored.
4. **Distance to foundations.** Regardless of capacity, no fuel-oil tank shall be buried within 3 feet (914 mm) of any foundation wall or footing.
5. **Special limitations near subways.** Regardless of capacity, no fuel-oil tank shall be placed within 20 feet (6096 mm) of the outside line of a subway wall. For the purpose of the foregoing requirement, a subway shall be deemed to include any subsurface railroad or rapid transit roadbed.

**1305.13.2 Above ground; on the lowest floor inside a building.** Tanks located above ground, on the lowest floor inside of buildings, shall comply with the following requirements:

1. **Containment.** Fuel-oil tanks having a capacity of more than 660 gallons (2500 L) storage shall be provided with secondary containment intended to capture any leakage of fuel oil from the tank. The capacity of the containment shall equal or exceed the capacity of the tank served.
2. **Special limitations near subways.** Regardless of capacity, fuel-oil tanks located within the outer lines of the subway, or within 20 feet (6096 mm) of the outside line of a subway shall be placed within a welded steel oil-tight pan of not less than No. 18 Gage metal suitably reinforced and of capacity to contain the contents of the tank. For the purpose of the foregoing requirement, a subway shall be deemed to include any subsurface railroad or rapid transit roadbed.

**1305.13.3 Above ground; above the lowest floor inside a building.** Regardless of capacity, fuel-oil tanks and fuel-oil-burning equipment located above ground, above the lowest floor inside of buildings, shall comply with the following requirements:

1. **Enclosure of room.** Fuel-oil tanks and fuel-oil-burning equipment shall be located in a dedicated room or enclosure, having a fire-resistance rating of at least 2 hours. Rooftop tanks need not be enclosed provided that all exterior walls and roof surfaces within 10 feet (3048 mm) horizontally and 20 feet (6096 mm) vertically have a fire-resistance rating of at least 2 hours.
2. **Fire-extinguishing system.** Rooms containing fuel-oil tanks and fuel-oil-burning equipment shall be equipped with an automatic sprinkler system in accordance with Section 903.3.1 of the *New York City Building Code*. To prevent overfilling of the containment barriers, sprinkler shut-offs shall be located on the outside of tank and generator rooms and prominently placarded for immediate control by the Fire Department.

3. **Smoke detection.** Rooms containing fuel-oil tanks and fuel-oil-burning equipment shall be equipped with automatic smoke detection in accordance with Section 907 of the *New York City Building Code*, except that heat detectors may be utilized where, during normal operation, products of combustion are present in sufficient quantity to actuate a smoke detector.

4. **Ventilation.** Rooms containing fuel-oil tanks shall be ventilated to limit the concentration of vapors within the room at or below 25 percent of the Lower Flammable Limit (LFL) of the fuel oil being used.

5. **Containment.** Fuel-oil tanks, fuel-oil-burning equipment, and related equipment shall be provided with secondary containment area intended to capture any leakage of fuel oil. Floor drains shall be prohibited in containment areas. For tanks, the capacity of the containment area shall equal or exceed 2 times the capacity of the tank served. For fuel-oil-burning equipment, the capacity of the containment area shall equal or exceed 1.5 times the storage capacity of the equipment.

6. **Transfer pumps.** Fuel-oil tanks shall be filled by means of a transfer pump supplied from a primary storage tank located on the lowest floor. A separate transfer pump and piping circuit shall be provided for each storage tank installed above the lowest floor. No intermediate pumping stations shall be provided between the storage tank and the transfer pump. Appropriate devices shall be provided for the automatic and manual starting and stopping of the transfer pumps so as to prevent the overflow of oil from these storage tanks.

7. **Indicators and alarms.** Indicators and alarms shall be provided for fuel-oil tanks and rooms containing fuel-oil-burning equipment, including a level sensor for height and capacity of fuel oil, high and low levels, and leak detection. The float switch shall be provided within the containment areas and shall be arranged so as to sound an alarm and stop the transfer pump in case of failure of the tank or the control in the tank. These indicators shall be connected to a local audible alarm in the tank room and to a remote alarm located at a supervising station. The wiring shall comply with the *New York City Electrical Code*.

8. **Weekly testing.** The operation of the float switch shall be tested at least once each week by the holder of the certificate of fitness as provided for in Sections 1301.9 and 1308.3.

**1305.13.4 Above ground; outside a building.** Tanks located above ground, outside of buildings, shall comply with the following requirements:

1. **Containment.** Regardless of capacity, each fuel-oil storage tank shall be protected by an embankment or dike. Such protection shall have a capacity at least 1½ times the capacity of the tank so surrounded and shall be at least 4 feet (1219 mm) high, but in no case shall

the protection be higher than one-quarter the height of the tank when the height of the tank exceeds 16 feet (4877 mm). Embankments or dikes shall be made of earthwork with clay core, of masonry, of reinforced concrete or of steel. Earth work embankments shall be firmly and compactly built of good earth free from stones, vegetable matter, or other similar material, and shall have a flat section of at least 3 feet (914 mm) at the top and a slope of at least  $1\frac{1}{2}$  (457 mm) rise to 2 feet (610 mm) of run on all sides. Concrete, masonry or steel dikes shall be designed so as to contain safely all of the oil in the tank so surrounded. Embankments or dikes shall be continuous and unpierced, and the outside toe shall be located at least 5 feet (1524 mm) inside of the property line, and no less than 5 feet (1524 mm) from a driveway or parking area.

**2. Distances to buildings, lot lines and other tanks.**

Storage tanks of a capacity greater than 330 gallons (1250 L) shall be not less than  $1\frac{1}{4}$  tank diameters and in no case less than 10 feet (3048 mm) from the tax lot line, the nearest building or adjacent tank. However, in no case shall the clearance between individual tanks and the tax lot line be less than the distance fixed by the following formula:†

$$M.C. = 10 + 4[(G - 275) / 5000] \quad (\text{Equation 13-1})$$

where:

*M.C.* = Minimum clearance from nearest surface of tank to tax lot line, in feet.

*G* = Capacity of tank, in gallons.

**3. Means of egress.** Tanks shall be located so as not to obstruct or interfere with any means of egress.

**1305.14 Alternate tank design and construction standards.**

Oil-storage tanks, other than those conforming to *ASME Boiler and Pressure Vessel Code*, Section VIII, Division 1 or 2, UL 58, UL 80, UL 142, or UL 1316 shall be designed, constructed and installed in accordance with the requirements of Sections 1305.14.1 through 1305.14.5.

**1305.14.1 General construction standards.** All tanks shall comply with the requirements of Sections 1305.14.1.1 through 1305.14.1.9.

**1305.14.1.1 Materials and workmanship.** All fuel-oil storage tanks shall be built of steel plates or sheets, made by the open hearth or basic oxygen process. Such steel shall be free from physical imperfections, and shall be new, in good condition and free from rust.

**1305.14.1.2 Assembly.** Tanks, flanges or other pipe connections shall be welded. Filler of any kind between plates shall be prohibited.

**1305.14.1.3 Corrosion resistance.** Tanks to be buried shall be cleaned and then coated on the outside with two coats of corrosion protective material. They shall be further protected by a coating of hot tar, asphalt, or equivalent rust-resistive material, applied at the work site. Tanks installed inside buildings above ground shall be coated with one coat of corrosion protective material.

**1305.14.1.4 External loads on underground tanks.** All buried storage tanks shall be constructed of at least  $\frac{1}{4}$ -inch-thick (6.4 mm) metal and shall be designed to withstand any external loads to which the tank may be subjected.

**1305.14.1.5 Identification.** At the time of installation all storage tanks shall bear a permanently fixed plate, spot welded or equivalent, bearing the name of the tank manufacturer, the gage of the material, and capacity of the tank. Shop-fabricated storage tanks shall be installed without structural alteration.

**1305.14.1.6 Openings.** All openings shall be through the top of the storage tank, except that storage tanks of 275 gallon (1041 L) capacity or less, located above ground but below the lowest story, may be provided with a  $\frac{3}{4}$ -inch (19.1 mm) opening for gravity discharge and a 1-inch (25 mm) opening in the bottom for cleaning and protection against corrosion.

**1305.14.1.7 Manholes.** Tanks for No. 1, No. 2, No. 3 and No. 4 commercial-grade oils need not have manholes. However, if manholes are used for tanks containing such oils, the manhole covers shall be bolted and made gas tight. Tanks for No. 5 and No. 6 commercial-grade oils shall have manhole covers bolted or otherwise secured to the tanks and kept hydrostatically tight at all times. Tanks 275 gallon (1041 L) capacity or less, and all other tanks without manholes, shall be provided with a 2 screwed connection on the top of the tank to permit measuring the level of the oil within.

**1305.14.1.8 Electrical grounding.** Tanks outside of buildings shall be electrically grounded in accordance with the requirements for equipment grounding of the *New York City Electrical Code*.

**1305.14.1.9 Protection from heat and flame.** Tanks shall be located at least 7 feet (2134 mm), measured in the most direct manner, from any source of exposed flame unless protected as provided in Section 1305.11.1.2, Exception 3, and at least 2 feet (610 mm) from any surface where the temperature exceeds 165°F (74°C).

**1305.14.2 Additional construction standards for cylindrical tanks exceeding 275 gallons (1041 L).** Cylindrical tanks, including oval, elongated oval, or round tanks, exceeding 275 gallons (1041 L) shall comply with the requirements of Sections 1305.14.2.1 through 1305.14.2.3.

**Exception:** Such above-ground vertical tanks that are outside of buildings shall comply with Sections 1305.14.1 and 1305.14.5.

**1305.14.2.1 Thickness.** The minimum thickness shall be as follows:

1. Tanks 36 inches (914 mm) in diameter or less shall have at least a  $\frac{1}{4}$ -inch (6.4 mm) shell and  $\frac{1}{4}$ -inch (6.4 mm) heads.
2. Tanks 37 inches (940 mm) to 72 inches (1829 mm) in diameter shall have at least a  $\frac{1}{4}$ -inch (6.4 mm) shell and  $\frac{5}{16}$ -inch (7.9 mm) heads.



3. Tanks 73 inches† (1854 mm) to 120 inches (3048 mm) in diameter shall have at least a  $\frac{5}{16}$ -inch (7.9 mm) shell and  $\frac{3}{8}$ -inch (9.5 mm) heads.
4. Tanks over 120 inches (3048 mm) in diameter shall be of at least  $\frac{3}{8}$ -inch (9.5 mm) steel and shall be stiffened by angle rings or equivalent members so as to retain their cylindrical form.

**1305.14.2.2 Dished heads.** Dished heads for such tanks shall have a curvature the radius of which is not greater than the diameter of the tank. Dished heads shall be formed with an adequate cylindrical extension rim to provide a welding surface.

**1305.14.2.3 Flat heads.** If flat heads are used, they shall be braced in the same manner as described for the bracing of flat sides of rectangular tanks as provided for in Section 1305.14.3.

**1305.14.3 Additional construction standards for rectangular tanks exceeding 275 gallon (1041 L).** Rectangular tanks exceeding 275-gallon (1241 L) capacity shall comply with the requirements of Sections 1305.14.3.1 through 1305.14.3.6.

**1305.14.3.1 Thickness.** Plates for rectangular tanks of more than 275 gallon (1040 L) capacity shall be at least  $\frac{5}{16}$  inch (7.9 mm) thick.

**1305.14.3.2 Corners.** Corners may be made up by bending the plates or by using angles.

**1305.14.3.3 Seams.** All tanks shall have full penetration  $\frac{5}{16}$  welds at all seams.

**1305.14.3.4 Bracing.** All flat surfaces of rectangular tanks shall be braced by structural members or rods.

**1305.14.3.5 Structural work.** All structural members shall be designed in accordance with the requirements of the *New York City Building Code*.

**1305.14.3.6 Connections.** Connections between bracing members and the sides of the tank shall be designed so that the connection will not fail before the member will fail.

**1305.14.4 Additional construction standards for tanks 275 gallons (1041 L) or less.** Storage tanks with a capacity of less than or equal to 275 gallons (1041 L) shall have a minimum thickness of shell and head plates of No. 10 manufacturer's standard Gage steel plate. Storage tanks of 60 gallon (227 L) capacity or less shall be similarly constructed but need not be thicker than No. 14 manufacturer's standard Gage.

**Exceptions:**

1. Such vertical above-ground cylindrical tanks outside of buildings shall comply with Sections 1305.14.1 and 1305.14.5.
2. Such underground tanks need comply only with Section 1305.14.1.
3. Storage containers of 6 gallons (23 L) or less used with burners or oil-burning heaters need only be designed so as to withstand a hydrostatic pressure

test of at least 5 psi (34 kPa) without permanent deformation, rupture, or leakage, and shall be approved. Such containers shall be installed with rigid metal fasteners for wall, floor, or stand-type installations, and shall be protected against mechanical damage. Portable storage containers of 6 gallons (23 L) or less may be filled by a pump mounted on a storage tank, provided that the pump is approved.

**1305.14.5 Additional construction standards for vertical above-ground cylindrical tanks outside of buildings exceeding 6 gallons (23 L).** Vertical above-ground cylindrical storage tanks exceeding 6 gallons (23 L) that are located outside of buildings shall comply with the requirements of Sections 1305.14.5.1 through 1305.14.5.3.

**1305.14.5.1 Plates.** Such tanks shall be built of steel plates of the quality required for cylindrical tanks in accordance with Section 1305.14.2.

**1305.14.5.2 Thickness.** The minimum thickness of shell or bottom plates shall be  $\frac{1}{4}$  inch (6.4 mm), and the minimum thickness of roof plates  $\frac{1}{8}$  inch (3.2 mm). The thickness of shell plates shall be determined in accordance with the following formula:

$$t = \frac{P \times R \times F}{T \times E} \quad \text{(Equation 13-2)†}$$

where:

$t$  = Thickness of shell plate in inches.

$P$  = Head pressure at bottom of ring under consideration in psi.

$R$  = Radius of shell, in inches.

$F$  = Factor of safety (taken as 5).

$T$  = Tensile strength of plate, in psi, as verified by mill test certificate.

$E$  = Efficiency of vertical joint in ring under consideration.  $E$  shall in no case be taken greater than 1.00.

**1305.14.5.3 Seams.** Roof plates shall have welded water-tight seams, and the roof shall be built to shed water. Bottom plates shall have welded seams. Shell plate seams shall be designed to develop the full strength of the plate.

## SECTION MC 1306 OIL GAUGING

**1306.1 Level indication.** All tanks located inside buildings shall be equipped with a method of determining the oil level.

**1306.2 Test wells.** Test wells shall not be installed inside buildings. Unused tank openings shall be permanently sealed. For outside service, test wells shall be equipped with a tight metal cover designed to discourage tampering.

**1306.3 Inside tanks.** The gauging of inside tanks by means of measuring sticks shall not be permitted. An inside tank pro-

vided with fill and vent pipes shall be provided with a device to indicate either visually or audibly at the fill point when the oil in the tank has reached a predetermined safe level.

**1306.4 Gauging devices.** Gauging devices such as liquid level indicators or signals shall be designed and installed so that oil vapor will not be discharged into a building from the liquid fuel supply system.

**1306.5 Gauge glass.** A tank used in connection with any oil burner shall not be equipped with a glass gauge or any gauge which, when broken, will permit the escape of oil from the tank.

**1306.6 Storage above lowest floors.** Fuel oil stored above the lowest floor shall also comply with the indicator requirements of Section 1305.13.3, Item 7.

## SECTION MC 1307 FUEL-OIL VALVES

**1307.1 Building shutoff.** A shutoff valve shall be installed on the fuel-oil supply line at the entrance to the building. Inside or above-ground tanks are permitted to have valves installed at the tank. The valve shall be capable of stopping the flow of fuel oil to the building or to the appliance served where the valve is installed at a tank inside the building.

**1307.2 Appliance shutoff.** A shutoff valve shall be installed at the connection to each appliance where more than one fuel-oil-burning appliance is installed.

**1307.3 Pump relief valve.** A relief valve shall be installed on the pump discharge line where a valve is located downstream of the pump.

**1307.4 Fuel-oil heater relief valve.** A relief valve shall be installed on the discharge line of fuel-oil-heating appliances.

**1307.5 Relief valve operation.** Relief valves shall be set to discharge at not more than  $1\frac{1}{2}$  times the maximum working pressure of the system. The discharge from relief valves shall be returned to the storage tank or to the supply line. Shutoff valves are not permitted in the line of relief.

## SECTION MC 1308 TESTING

**1308.1 Testing required.** Fuel-oil storage tanks, other than tanks complying with the alternate tank design and construction standards contained in Section 1305.14, shall be tested in accordance with NFPA 31.

**1308.2 Hydrostatic test.** All liquid-fuel piping, and all tanks complying with the alternate tank design and construction standards contained in Section 1305.14, shall be hydrostatically tested for tightness by the contractor who made the installation before the work is closed in and before the system is operated. The piping shall be tested at  $1\frac{1}{2}$  times the maximum working pressure applicable to that part of the piping system but at a pressure less than the test pressure required for the storage tank. The minimum pressure for testing tanks shall be  $1\frac{1}{2}$  times the maximum working pressure applicable to the tank but in no case less than 25 psig (172 kPag), except as provided for containers 6 gallons (23 L) or less in capacity as provided for in

Section 1305.14.4, Exception 3. The hydrostatic pressure shall be maintained until all joints and connections have been visually inspected for leaks, but in no case for less than  $\frac{1}{2}$  hour. The tank shall not show any permanent deformation as a result of the test. A record shall be kept of the pressure tests showing the name of the contractor and the pressures at which the piping and the tank were tested.

**1308.3. Weekly testing.** For fuel-oil tanks and fuel-oil-burning equipment located above ground, above the lowest floor inside of buildings, the operation of the float switch shall be tested at least once each week by the holder of the certificate of fitness as provided for in Sections 1301.9 and 1305.13.3, Item 8.