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527 CMR 4.00: OIL BURNING EQUIPMENT

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4.01: Scope

(1) 527 CMR 4.00 shall apply to the installation of oil burning equipment that has the principal intent of producing heat. It applies to oil-fired stationary equipment, including but not limited to industrial, commercial, and residential-type steam, hot water, or warm air heating plants; domestic-type range burners and space heaters; portable oil burning equipment; and, further, including all accessory equipment and control systems, whether electric, thermostatic, or mechanical, and electrical wiring in connection therewith. 527 CMR 4.00 shall not apply to diesel fueled engines.

(2) 527 CMR 4.00 does not apply to internal combustion engines, oil lamps, and portable devices such as blow torches, melting pots, and weed burners.

(3) 527 CMR 4.00 shall not apply to fuel oil burners installed in steam boilers of nine horsepower and over and operated above 15 PSI both conditions existing based on M.G.L. c. 146, § 48, Licenses of Engineers and Firemen, but shall apply to the fuel oil storage tank, permit or license in connection therewith.

4.02: Definitions

For the purpose of 527 CMR 4.00, the following words shall have the meanings respectively assigned to them:

Air Heater. An indirect-fired appliance intended to supply heated air for space heating and other purposes, but not intended for permanent installation.

Air Pressure Switch. An electrical switch designed to prove that the proper draft has been established by the power venter or burner and allows the burner to operate. If the power venter or burner is not performing so as to satisfy the operating requirements of the equipment for safe performance, the switch will de-energize the burner control circuit preventing the burner from operating.

Anti-flooding Device. A primary safety control that causes the flow of fuel to be shut off upon a rise in fuel level or upon receiving excess fuel, and which operates before the hazardous discharge of fuel can occur.

Appliances, Industrial.

(a) Low-Heat Industrial Appliance. An industrial appliance such as a commercial cooking range, pressing machine boiler at any pressure, bake oven, candy furnace, stereotype furnace, drying and curing appliance, and other process appliances in which materials are heated or melted at temperatures (excluding flue-gas temperatures) not exceeding 600°F (316°C).

Appliances otherwise classed as medium-heat appliances may be considered as low-heat appliances if not larger than 100 cubic feet (2.8 m^3) in size excluding any burner equipment and blower compartment.

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(b) Medium-Heat Industrial Appliance. An industrial appliance such as an annealing furnace (glass or metal), charcoal furnace, galvanizing furnace, gas producer, commercial or industrial incinerator, and steam boiler operating at over 50 psig (345 kPa) pressure when such appliance is larger than 100 cubic feet (2.8 m^3) in size, and other furnaces classified as medium-heat appliances in accordance with recognized good practice.

Appliances otherwise classed as medium-heat appliances may be considered as low-heat appliances if not larger than 100 cubic feet (2.8 m^3) in size excluding any burner equipment and blower compartment.

(c) High-Heat Industrial Appliance. An industrial appliance such as billet and bloom furnace, blast furnace, brass melter, cupola, glass furnace, open-hearth furnace, and ceramic kiln and vitreous enamelizing oven (ferrous metals) when such appliances are larger than 100 cubic feet (2.8 m^3) in size, and other furnaces classified as high-heat appliances in accordance with recognized good practice.

Application Permit/Certificate of Completion. A standard form issued for use in all jurisdictions throughout the Commonwealth.

Approved. Unless otherwise indicated, listed or approved by a nationally recognized testing laboratory.

Authority Having Jurisdiction. The state fire marshal or his designee.

Boiler. A closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, by the application of heat from combustible fuels in a self-contained or attached furnace.

Boiler, High Pressure. A boiler for generating steam at pressures in excess of 15 psi (103 kPa), or for heating water to a temperature in excess of 250°F (121°C) or at a pressure in excess of 160 psi (1103 kPa).

Boiler, Hot Water Supply. A low-pressure hot water boiler having a volume exceeding 120 gallons (454 L), or a heat input exceeding 200,000 Btu per hour (58.6 kw) or an operating temperature exceeding 200°F (93°C) that provides hot water to be used externally to itself.

Boiler, Low Pressure. A boiler for generating steam at pressures not in excess of 15 psig (103 kPa) or for furnishing water at a temperature not in excess of 250°F (121°C) at pressures not in excess of 160 psig (1103 kPa).

Burner, Automatically Ignited. A burner equipped so that main burner fuel may be turned on and ignited automatically.

Burner, Manually Ignited. A burner equipped so that main burner fuel is turned on only by hand and ignited under supervision.

Burner, Mechanical Draft Type. A burner that includes a power-driven fan, blower, or other mechanism as the primary means for supplying the air for combustion.

Burner, Natural Draft Type. A burner that depends primarily upon the natural draft created in the chimney or venting system to induce the air required for combustion into the burner.

Central Heating Appliance. A stationary heating appliance comprising the following classifications: boilers, central furnaces, floor furnaces, and wall furnaces. A floor-mounted unit heater to be connected to a duct system is classified also as a central heating appliance.

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Centralized Oil Distribution System. A system of piping through which oil is supplied from a separate central supply tank or tanks to more than one building, mobile home, recreational vehicle, or other structure.

Certificate of Completion. A standard form issued for use in all jurisdictions throughout the Commonwealth.

Chimney. *See* 780 CMR: *Massachusetts State Building Code*.

Chimney Connector. The pipe that connects a fuel-burning appliance to a chimney.

Clearance. The distance between a heat-producing appliance, chimney, chimney connector, vent, vent connector, or plenum, and other surfaces.

Combustible Material. Material made of or surfaced with wood, compressed paper, plant fibers, plastics, or other material that will ignite and burn, whether flame-proofed or not, or whether plastered or unplastered.

Confined Space. Any space whose volume is less than 50 cubic feet per 1,000 Btu/hr (4.8m^3 per kw) of the aggregate input rating of all fuel-burning appliances installed therein.

Constant-Level Valve. A device for maintaining within a reservoir a constant level of oil fuel for delivery to an oil burner.

Control, Limit. An automatic safety control responsive to changes in fluid flow or level, pressure, or temperature, and which is normally set beyond the operating range for limiting the operation of the controlled equipment by shutting off the energy supply.

Control, Primary Safety (Combustion Safeguard). A safety control responsive directly to flame properties, sensing the presence or absence of flame and, in the event of ignition failure or unintentional flame extinguishment, causing safety shutdown.

Control, Safety. Automatic controls (including relays, switches, and other auxiliary equipment used in conjunction therewith to form a safety-control system) that are intended to prevent unsafe operation of the controlled equipment.

Cooking Appliance, Floor-Mounted Restaurant-type. A range, oven, broiler, or other miscellaneous cooking appliance of a type designated for use in hotel and restaurant kitchens and for mounting on the floor.

Damper. A valve or plate for controlling draft or the flow of gases including air.

Direct-Fired Appliance. A fuel-burning appliance in which the products of combustion (flue gases) are mixed with the medium (*e.g.*, air) being heated.

Direct Vent Appliance. A system consisting of an appliance, combustion air and flue gas connections between the appliance and the outside atmosphere, and a vent cap supplied by the manufacturer, and constructed so that all air for combustion is obtained from the outside atmosphere and all flue gases are discharged to the outside atmosphere.

Draft Booster. A power operated fan, blower, or other device installed in the chimney connector to increase the natural draft developed in the connected chimney.

Draft Regulator, Barometric. A device built into a fuel-burning appliance or made a part of a chimney connector or vent connector, which functions to reduce excessive draft through an appliance to a desired value by admitting ambient air into the appliance chimney, chimney connector, vent or vent connector.

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Fire Wall. *See* 780 CMR: *Massachusetts State Building Code*.

Flue Collar. That portion of an appliance designed for attachment of a chimney or vent connector or a draft hood.

Fuel Oil. Any oil as specified by the American Society for Testing and Materials (ASTM) standard D396-90, Standard Specification for Fuel Oils; or ASTM D6751-02, Standard Specification of Biodiesel Fuel (B100) Blend Stock for Distillate Fuels.

Furnace, Central Warm-Air. A self-contained indirect-fired or electrically heated appliance designed to supply heated air through ducts to spaces remote from or adjacent to the appliance location.

(a) Gravity-type Central Furnace. A central furnace depending primarily on circulation of air by gravity.

(b) Gravity-type Central Furnace with Integral Fan. A central furnace equipped with a fan as an integral part of its construction and operable on gravity systems only. The fan is used only to overcome the internal resistance to air flow.

(c) Gravity-type Central Furnace with Booster Fan. A central furnace equipped with a booster fan that does not materially restrict free circulation of air by gravity flow when such a fan is not in operation.

(d) Forced-Air-type Central Furnace. A central furnace equipped with a fan that provides the primary means for circulation of air.

1. Horizontal-type Central Furnace. A furnace designed with air flow through the furnace essentially in a horizontal path.
2. Upflow-type Central Furnace. A furnace designed with air flow essentially in a vertical path, discharging air at or near the top of the furnace.
3. Downflow-type Central Furnace. A furnace designed with air flow essentially in a vertical path, discharging air at or near the bottom of the furnace.

Furnace, Duct. A central furnace designed for installation in a duct of an air distribution system to supply warm air for heating and that depends for air circulation on a blower not furnished as part of the furnace.

Furnace, Floor. A self-contained indirect-fired or electrically heated furnace designed to be suspended from the floor of the space to be heated. A fuel-burning floor furnace is designed to take air for combustion from outside the space being heated and is provided with means for observing flame and lighting the appliance from such space.

Furnace, Stationary-type Industrial. A low-, medium- or high-heat appliance classified in accordance with its character and size and the temperatures developed in the portions thereof where substances or materials are heated for baking, drying, roasting, melting, vaporizing, or other purposes.

Gallon of Oil. The amount of oil that will occupy one standard U.S. Gallon (231 cubic inch) at a temperature of 60°F (16°C).

Gravity Feed Burner. A burner which receives its oil supply by static head due to elevation of the supply source.

Heat Reclaimer (Chimney Connector Type). A heat exchanger intended to be installed in a chimney connector, between a heating appliance and the chimney, to transfer heat from the flue gases through metal to air or water.

Heating and Cooking Appliance. An oil-fired appliance not intended for central heating. These appliances include kerosene stoves, oil stoves, and conversion range oil burners.

Indirect-fired Appliance. A fuel-burning appliance in which products of combustion (flue gases) are not mixed in the appliance with the medium (*e.g.*, air) being heated.

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Installation. The complete setting-in-place, ready for operation of an oil burning appliance together with its accessories and equipment, or any change in an existing oil burner installation. (Note: Cleanings and nozzle, filter, pump, transformer or motor replacement are not considered installations.

International System of Units (SI Units). A universal, unified, self-consistent system of measurement units based on the MKS (meter, kilogram, second) system.

Kerosene Stove. A vented, self-contained, self-supporting kerosene burning range or room heater.

Labeled. Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization acceptable to the state fire marshal and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed. Equipment or materials included in a list published by an organization acceptable to the marshal and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Marshal. The State Fire Marshal

Nationally Recognized Testing Laboratory. An organization which tests for safety and lists, labels or accepts equipment or materials and which meets the criteria in 527 CMR 49.00: *Appendix C*.

Oil Burner. A device for burning oil in heating appliances such as boilers, furnaces, water heaters, ranges, and the like. A burner of this type may be furnished with or without a primary safety control; and it may be a pressure atomizing gun type, a horizontal or vertical rotary type, or a mechanical or natural draft vaporizing type.

Oil Burner Installation. A listed oil burner of any type with listed electrical or mechanical operating and safety controls including its own tank, piping, wiring, controls and related devices and including all oil burners, oil-fired units, and heating and cooking appliances.

Oil Burning Stove. A self-contained, free standing, above-the-floor indirect-fired appliance equipped with one or more oil burners. It may be equipped with an integral oil tank or may be designed for connection to a separate oil supply tank.

Oil-fired Unit. An appliance equipped with one or more oil burners and all the necessary safety controls, electrical equipment and related equipment manufactured for assembly as a complete unit. This definition does not include kerosene stoves or oil stoves.

Oil Safety Valve. A listed device that:

(a) when installed at the supply tank in gravity feed oil systems, prevents the flow of oil should the supply line to the burner rupture or break;

(b) and protects the oil burner pump from input pressure exceeding three psi.

Permit. Any permit required by 527 CMR 4.00 and issued by the head of the fire department under the authority of M.G.L. c. 148, §§ 10A, 23 and 24.

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Post Purge Control. An electrical control that is designed to allow the power venter or burner to operate after the burner flame has shut off, thus purging the vent system and heating appliance of combustion gases.

Power Venter. An electrically operated mechanical fan that is designed and listed to produce a negative draft at the heating appliance to exhaust combustion gases.

Pump, Automatic Oil. A pump, not an integral part of an oil burner, that automatically pumps oil from the supply tank and delivers the oil by gravity under a constant head to an oil-burning appliance. The pump is designed to stop pumping automatically in case of total breakage of the oil supply line between the pump and the appliance.

Pump, Oil Transfer. An oil pump, automatically or manually operated, that transfers oil through continuous piping from a supply tank to an oil-burning appliance or to an auxiliary tank, and that is not designed to stop pumping automatically in case of total breakage of the oil supply line between the pump and the appliance.

Range. An appliance intended primarily for cooking, including roasting, baking, or broiling or any combination of these functions.

Range Oil Burner. A gravity-feed sleeve-type oil burner having non-adjustable wicks designed for installation in a stove used primarily for cooking.

Readily Accessible. Capable of being reached easily and quickly for operation, maintenance, and inspection.

Room Heater. A self-contained, vented, free-standing air-heating appliance intended for installation in the space being heated and not intended for duct connection.

Room Heater, Circulating. A vented room heater with an outer jacket surrounding the heat exchanger arranged with openings at top and bottom so that air circulates between the heat exchanger and the outer jacket. Room heaters that have openings in an outer jacket to permit some direct radiation from the heat exchanger are classified as radiant type.

Room Heater, Radiant. A room heater designed to transfer heat primarily by direct radiation.

Secondary Safety Control. A normally closed thermally activated electrical control, designed to de-energize the burner control circuit and shut down the burner when a positive pressure occurs in the power vent system. This control shall be equipped with a manual reset device.

Shall. Indicates a mandatory requirement.

Sump. The receptacle employed with a vacuum tank.

Tank, Auxiliary. A tank having a capacity of not over 60 gallons (227 L) listed for installation in the supply piping between a burner and its main fuel supply tank. It may be included as an integral part of an automatic pump, or a transfer pump, or may be a separate tank.

Tank, Gravity. A supply tank from which the oil is delivered directly to the burner by gravity.

Tank, Integral. A tank that is furnished by the manufacturer as an integral part of an oil-burning appliance.

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Tank, Supply. A separate tank connected directly or by a pump to the oil-burning appliance.

Tank, Vacuum or Barometric. A tank not exceeding five-gallons (11-L) capacity, which maintains a definite level of oil in a sump or similar receptacle by barometric feed. Fuel is delivered from the sump to the burner by gravity.

Unconfined Space. Any space whose volume is equal to or greater than 50 cubic feet per 1,000 Btu/hr (4.8m^3 per kw) of the aggregate input rating of all fuel-burning appliances installed therein. Rooms connecting directly with the space in which the appliances are located by means of openings that have no doors or closures, unless fully louvered, shall be considered part of the unconfined space.

Unit Heater. A self-contained heating appliance, which may or may not include an integral fan for circulating air, which may be of the floor-mounted or suspended type, intended for the heating of the space in which it is installed. A unit heater may be an indirect-fired fuel-burning appliance, or may utilize steam, hot water, or electricity.

Valve, Manual Oil Shutoff. A manually operated valve in an oil line for the purpose of turning on or completely shutting off the oil supply to the burner.

Valve, Oil Control. An automatically or manually operated device consisting essentially of an oil valve for controlling the fuel supply to a burner.

(a) Metering (Regulating) Valve. An oil control valve for regulating burner input.

(b) Safety Valve. An automatic oil control valve of the "on" and "off" type (without any by-pass to the burner) that is actuated by a safety control or by an emergency device.

Vent Hood. A device which is part of the vent system that is designed to terminate combustion gases to the outside atmosphere.

Vent, Type L. A passageway, vertical or nearly so, composed of listed factory-built components assembled in accordance with the terms of listing for conveying flue gases from oil and gas appliances or their vent connectors to the outside atmosphere.

Wall Furnace. A self-contained, vented appliance complete with grills or equivalent, designed for incorporation in or permanent attachment to the structure of a building, mobile home, or recreational vehicle, and furnishing heated air directly into the space to be heated through openings in the casing.

Such appliances shall not be provided with duct extensions beyond the vertical and horizontal limits of the casing proper, except that boots, not to exceed ten inches (254 mm) beyond the horizontal of the casing, for extension through walls of nominal thickness, may be permitted.

When provided, such boots shall be supplied by the manufacturer as an integral part of the appliance. This definition excludes floor furnaces, unit heaters, and central furnaces.

Water Heater. An indirect-fired fuel burning or electrically heated appliance for heating water to a temperature not more than 200°F (93°C) having an input not greater than 200,000 Btu or 58.6 kw per hr and a water containing capacity not exceeding 120 U.S. gallons (454 L).

For additional definitions of terms relating to chimneys and heat-producing appliances, refer to 780 CMR: *Massachusetts State Building Code*.

4.03: General Requirements

(1) Approval of Oil Burner: Equipment, Permits and Certificates.

(a) Installation. All fuel oil burners and all equipment in connection therewith shall be installed and maintained in accordance with the manufacturers installation and operation manual 527 CMR 4.00. Chimneys, connectors, direct vent systems and power venters shall also be installed in accordance with 780 CMR: *Massachusetts State Building Code*.

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(b) Permits. Fuel oil in excess of ten gallons used in connection with an oil burner shall not be stored in or adjacent to any building or other structure without a permit. The head of the fire department may grant a temporary permit for the keeping and use of fuel oil under such terms as he may prescribe. A permit shall not be required for routine burner maintenance, such as the replacement of burner controls and components, nozzles, ignition electrodes, or filters; however, a combustion performance test shall be conducted. [*See* Form 1]

No fuel oil burner shall be installed in any building or other structure without a permit first having been obtained from the head of the fire department. A permit is required for the replacement or upgrade of an oil line. A combustion performance test is not required when tank replacement is the only work being conducted under a permit.

(c) Automatic Shut Off. Any fuel oil burner for which a competent attendant will not be CONSTANTLY on duty in the room where the burner is located, while the burner is in operation, shall be provided with an approved automatic means to prevent abnormal discharge of oil.

(d) Application to Install. No persons shall make an installation or alteration of any fuel oil burning equipment unless an application for a permit from the head of the fire department has been submitted. This form [*See* Form 1] shall be used by all fire departments throughout the Commonwealth. Electronic media storage is permissible.

The application form for such permit shall set forth the name of the owner or occupant of the building or other structure, the person or company who proposes to make the installation of such equipment and the address where such installation is to be made.

If an oil burner installation is made under emergency conditions, said application shall be made within 24 hours thereafter, excluding Saturdays, Sundays and holidays.

(e) Maximum Fuel Allowed Without a License. In accordance with the provisions of M.G.L. c. 148, § 13, as amended, the Board of Fire Prevention Regulations hereby prescribes 10,000 gallons of light fuel oil or 10,000 gallons of heavy fuel oil as the maximum amount of fuel oil that may be kept for use in a building or other structure without a license and registration or either of them, provided that a permit has been obtained and provided that the tank installation is in accordance with 527 CMR 4.00 and applicable rules of 527 CMR 9.00: *Tanks and Containers*.

(f) Certificate of Completion. The person or persons making the installation shall within 72 hours (excluding Saturday, Sunday and holidays) after test-firing the burner, file with the head of the fire department a certificate of completion on a form provided herein.

Upon receipt of such certification of completion, the head of the fire department shall make an inspection; if same is found to be in accordance with 527 CMR 4.00, the head of the fire department shall issue to the owner or occupant a permit for the keeping, storage and use of fuel oil in connection therewith, except where such storage is otherwise authorized by license; provided, however, that if such installation is found not be in accordance with 527 CMR 4.00, the permit shall be withheld and shall not be issued until the proper corrections have been made as directed. If after 30 days, an inspection is not conducted, the delivery of fuel oil shall not be prohibited for lack of a permit to store. [*See* Form 1]

The head of the fire department may waive the inspection for installations required by 527 CMR 4.04(1)(f).

(g) Certificate of Competency. (*See* M.G.L. c. 148, § 10D, and the applicable provisions of St. 1964, c. 680.) A person holding a certificate of competency as an oil burner technician may connect or disconnect for the purpose of repair or replacement, any device or control required by 527 CMR 4.00 to be part of an oil burner installation, or being an integral part of the oil burning equipment, at the connection on such device, control or part to be repaired or replaced, notwithstanding any contrary provision of M.G.L. c. 141.

Any person licensed as an electrician under M.G.L. c. 141 may do any electrical work in connection with the alteration, repair or installation of oil burning equipment without being certified as an oil burner technician.

(h) Exposure to Fire. If any oil tank, oil burner, oil burner control or wiring related to an oil burner has been exposed to fire and is suspected of being damaged, the entire installation shall be made inoperative by the head of the fire department who shall so notify the owner or occupant of the building or structure. Said installation shall not be operated until approved by the head of the fire department.

(i) Tank Removal. Unless otherwise provided for in 527 CMR 9.00: *Tanks and Containers*, a permit shall be obtained from the head of the fire department for the removal of a fuel oil storage tank.

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The Commonwealth of Massachusetts Department of Fire Services

527 CMR 4.00 - Form 1

Application for Permit, Permit, and Certificate of completion for the Installation or Alteration of Fuel Oil Burning Equipment and the Storage of Fuel Oil

_____
(City or Town) (Date)

Permit #'s: FD _____ Elec. _____ FDID#: _____ Fee Paid: _____

Owner/Occupant Name: _____ Tel #: _____

Installation Address: _____ Serviced Floor or Unit #: _____

☐ Heating Unit ☐ Domestic Water Heater ☐ Power Vent ☐ Other _____
Burner: ☐ New ☐ Existing Location: _____

Mfg: _____

Type: _____ Model # or Size: _____ Nozzle Size: _____
☐ Fuel Oil ☐ Kerosene ☐ Waste oil
Storage Tank: ☐ New ☐ Existing Location: _____

Type: _____ Capacity: _____ gals. No. of Tanks: _____

Special requirements (or additional safety devices) _____

_____

☐OSV Valve ☐Oil line protected ☐Sheet Rock ☐Sprinkler AFUE: ☐yes ☐no EF: ☐yes ☐no
(Furnace and boilers) (Water heater)

Co. Name: _____ Tel # _____

Address: _____ City: _____ Zip: _____

Completion Date: _____

Combustion Test: Gross Stack Temp.: _____ Net Stack Temp.: _____

CO^2 Test: _____ Breech Draft: _____

Smoke: _____ Overfire Draft: _____ Efficiency rating %: _____

I, the undersigned certify that the installation of fuel burning equipment has been made in accordance with M.G.L. c. 148 and 527 CMR 4.00 currently in effect. Furthermore, this installation has been tested in accordance with such requirements, is now in proper operating condition and complete instructions as to its use and maintenance have been furnished to the person for whom the installation (or alteration) was made.

Installer: _____
Print Name *Cert of C#* *Signature (no Stamp)*

Address: _____ City: _____

Once signed by the fire department, this is a PERMIT for the storage and use of oil burning equipment.

Approved by: _____ Date: _____

Keep Original as application. Issue duplicate as permit. This form may be photocopied.

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The Commonwealth of Massachusetts
Department of Fire Services

527 CMR 4.00 - Form 1A

Certificate of Compliance
M.G.L. c. 148, § 38J

City or Town: _____

Street Name & Number: _____

Name of Property Owner: _____

This certifies that a visual inspection of the fuel supply line(s) for the aboveground heating oil storage tank was completed in accordance with M.G.L. c. 148, § 38J(d) for the residential property identified above, and the following equipment was observed:

☐ Each fuel supply line is enclosed with a continuous non-metallic sleeve

☐ Each fuel supply line is equipped with an oil safety valve

This visual inspection and certification was completed on:

Date: _____

By: (Signature of Oil Burner Technician) _____

(Print Name of Oil Burner Technician) _____

Certificate of Competency #: _____

Upon completion of Form 1A, the property owner shall receive a copy of the form and a copy shall also be submitted to the head of the local fire department or a designee.

This form can be photocopied or reproduced in triplicate.

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(2) Fuel Oil. The grade of fuel oil used for any fuel oil burner shall be one which tests and experience have been shown to be suitable for use with that burner, but in no case shall the grade of fuel oil be heavier than that for which the burner has been designed or adjusted.

(3) Gravity Feed to Burners. Gravity feed shall be used only with a burner arranged to prevent abnormal discharge of oil at the burner by automatic means specifically approved for the burner in which it is used.

(4) Fuel Oil Delivery.

(a) Fuel oil shall not be delivered to any storage tank unless the deliverer has knowledge that a permit has been obtained in accordance with 527 CMR 4.03(1)(b) and that such a permit is in effect at the time of delivery. Such knowledge may be considered to consist of any of the following:

1. Verification by the head of the fire department that such a permit is in effect.
2. Written verification from the owner or customer that the permit is either in his possession or is posted on the premises.
3. Observation that such a permit is in the possession of the owner or customer, or is posted on the premises.

(b) Fuel oil shall not be delivered to a storage tank by means of a pump or under pressure in any case where a tight connection is made between the discharge line and the tank inlet, unless such storage tank is designed to withstand the additional stress to which it may be subjected or unless the vent pipe for such tank is of sufficient size to relieve the tank of any undo pressure in excess of five psi. The delivery truck operator shall remain at the fill point during the entire operation.

(c) Fuel oil equal to the maximum capacity of the storage tank may be delivered without such a permit being in effect whenever an oil burner installation is first made provided that an application has been made in accordance with 527 CMR 4.03(1)(d).

(5) Tanks - General

(a) A tank for the keeping of fuel oil shall not be buried nor otherwise concealed inside or outside of any building or other structure until it has been inspected and approved by the head of the fire department.

(b) A supply tank larger than ten gallons (38 L) but not larger than 660 gallons (2500 L) shall meet the construction provisions of Standard UL 80, UL 2258 or be a secondary containment type tank meeting the following standards:

1. The primary tank shall meet the German Institute for Construction Technology (DIBt) Standard PA-VI-321, Requirements and Test Methods for Thermoplastic Tanks Made From Blow Molded Polyethylene, Rotationally Molded Polyethylene and Anionic Polymerization of Polyamide-6, or an equivalent standard.
2. The secondary containment shall be provided by a liquid tight outer jacket of galvanized steel or stainless steel with a minimum 18 gauge nominal thickness.
3. A means of detecting a leak from the primary tank into the secondary tank shall be provided.

(c) Supply tanks larger than 660 gallon capacity shall meet the provisions of Standard UL 142.

(d) A supply tank shall be of such size and shape that it can be installed in and removed from the building as a unit. Any person removing a fuel oil tank from inside a building for a purpose other than replacement or repair, shall remove all fill and vent pipes previously connected to said tank.

(e) A shutoff valve as described in 527 CMR 4.04(2)(i) shall be provided immediately adjacent to the burner supply connection at the bottom of a supply tank.

(f) A supply tank larger than ten-gallon capacity shall be provided with an open-vent pipe having a minimum 1¼ inches diameter and a fill pipe not larger than the diameter of the vent, both terminating outside the building. (*See* Table 4.03 1.)

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Table 4.03 1.

Aggregate Capacity of Tanks: U.S. Gallons	Diameter of Vent Iron Pipe Size
550 or less	1¼ in.
551 to 1320	1½ in.

For SI Units: 1 gal. = 3.785 L; 1 in. = 25.40mm

NOTE: Where tanks are filled by the use of a pump through tight connections, a vent pipe not smaller in size than the discharge of the pump should be used.

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(g) A supply tank provided with fill and vent pipes shall be equipped with a gaging device.
(h) Any unused opening in a tank equipped with fill and vent pipes shall be closed vapor-tight by a pipe plug or cap screwed up tightly.
(i) All fill and vent piping shall be standard cast iron, steel or brass pipe, with standard steel, malleable iron, cast iron or brass fittings. Plastic pipe and soldered copper tubing and fittings shall not be used for fill and vent piping.
(j) Cross connection of oil supply and return lines to two or more supply tanks to the same burner shall be acceptable and shall be made by a pipe no smaller than ½ inch iron pipe or ½ inch O.D. tubing.
(k) Two supply tanks may be provided with a single fill and a single vent provided:
1. The fill and vent pipes are not connected to the same tank,
2. The crossover pipe is a minimum two inch diameter with swing joints and a ground joint union,
3. The vent to the outside is a minimum two inch diameter.
(l) All new or replacement tanks shall be securely supported by rigid noncombustible supports to prevent settling, sliding or lifting. Tanks shall be mounted on a continuous concrete slab extending eight inches beyond the perimeter of the tank or tanks.

(6) Unenclosed Tanks: Installation Inside Buildings.
(a) A supply or storage tank located above the lowest story, cellar, or basement shall not exceed 60-gallon (227 L) capacity and the total capacity of tanks so located shall not exceed 60 gallons (227 L). Exception: Tanks located in attached grade level space with no usable space beneath it.
(b) A supply tank shall not be larger than 660 gallons. The aggregate capacity of any unenclosed tanks installed inside a building, or any portion of a building separated from another portion of a building by a fire separation, shall be 1320 gallons. The fire separation wall shall consist of two-hour rated fire resistive assemblies with opening protection and continuity in conformance with 780 CMR: T*he Massachusetts Building Code*.
(c) An unenclosed supply tank not larger than ten gallons (38 L) shall be placed not less than two feet (0.6 m) horizontally from any source of heat either in or external to the appliance being served but in any case shall be located so that the temperature of the oil in the tank will not exceed 100°F (38°C).
(d) An unenclosed supply tank larger than ten gallons (38 L) shall be placed not less than five feet (1.5 m) from any fire or flame either in or external to any fuel burning appliance, nor shall such a tank be placed within three ft (0.9m) any utility service meters, switch panels and shutoff valves.
(e) When a supply tank larger than ten-gallon (38 L) capacity is provided with an opening in the bottom for use as a burner supply connection or as a drain, the tank shall be pitched toward the opening.
(f) When tanks are installed inside garages or other areas subject to vehicular impact, physical barriers shall be provided. The physical barrier shall consist of substantial pipes, or similar barriers.
(g) All threaded joints and connections shall be made tight with suitable lubricant or pipe compound. Teflon tape shall not be used. Unions and fittings requiring gaskets or packing, or compression type fittings shall not be used in oil lines.

(7) Enclosed Tanks: Installation Inside Buildings.
(a) Individual supply tanks larger than 660 gallon capacity shall be enclosed. The enclosure shall consist of two-hour rated fire resistive assemblies with opening protection and continuity in conformance with 780 CMR: *The Massachusetts Building Code*.
(b) Each tank enclosure shall be provided with a noncombustible liquid tight sill or ramp at least six inches high. If the sill or ramp is more than six inches high, the walls to a height corresponding to the level of the oil that will be retained shall be built to withstand the lateral pressure due to the liquid head.
(c) Regardless of enclosure, a supply or storage tank located above the lowest story, cellar, or basement shall not exceed 60 gallon capacity, and the total capacity of tanks so located shall not exceed 60 gallons.

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4.03: continued

(d) Enclosed tanks shall be supported at least four inches above the floor by masonry saddles at least 12 inches thick, spaced not more than eight feet on centers and extending the full width of the tank. At least 15 inches clearance shall be provided between the tank and the top and walls of the tank enclosure for the purpose of inspection and repair.

(e) All connections to an enclosed supply tank of more than 660 gallon capacity shall be made through the top of the tank, and the transfer of oil shall be by pump only and through continuous piping to and from the consuming appliance.

(8) Tanks: Installations Outside Buildings.

(a) Underground tanks and piping, individual aboveground tanks larger than 660 gallons capacity, more than two tanks at one location, or multiple tanks with an aggregate capacity over 660 gallons, shall meet the provisions of 527 CMR 9.00: *Tanks and Containers*.

(b) A supply tank larger than ten gallon capacity but not larger than 660 gallon capacity shall meet the construction provisions of Standard UL 80. Supply tanks of more than 660 gallon capacity shall meet the construction provision of Standard UL 142.

(c) For each oil burner installed in a building or other structure, a fuel oil tank of not more than 660 gallon capacity or two tanks of aggregate 660 gallon capacity may be located outside and adjacent to such building or structure provided the tank is suitably protected from physical damage incident to outside use and protected from atmospheric corrosion. Protection from atmospheric corrosion shall consist of at least one coat of organic alkyd resin type or asphalt base type paint on the exterior tank surface. If during transportation or installation the original protective coating has been damaged, these areas shall be recovered. The tank shall not block normal means of egress.

(d) Tanks installed outside of buildings shall be mounted on a continuous concrete slab at least four inches in depth and extending eight inches beyond the perimeter of the tank or tanks.

Tanks installed outside of buildings shall be securely supported by rigid non-combustible supports to prevent settling, sliding or lifting.

(9) Fill and Vent Piping.

(a) A supply tank shall be equipped with an open vent or an automatic operated vent, terminating outside the building. Vent openings and vent pipes shall be of ample size to prevent abnormal pressure in the tank during filling but not smaller than the pipe size specified in Table 4.03 1.

(b) Vent pipes shall be installed as to drain toward one tank without sags or traps in which liquid can collect. They shall be located so that they will not be subjected to physical damage. Vent pipes from tanks may be connected into one outlet pipe, The outlet pipe shall be at least as large as the largest individual vent pipe connected thereto. The lower end of a vent pipe shall enter the tank through the top and shall extend into the tank not more than one inch (25 mm).

(c) Vent pipes shall terminate outside of buildings at a point not less than two feet (0.6m) measured vertically or horizontally from any building opening.

Outer ends of vent pipes shall terminate in a weatherproof vent cap or fitting or be provided with a weatherproof hood. All vent caps shall have a minimum free open area equal to the cross-sectional area of the vent pipe and shall not employ screens finer than four mesh. Vent pipes shall terminate at least three feet from grade to avoid being obstructed with snow and ice. Vent pipes from tanks containing heaters shall be extended to a location where oil vapors discharging from the vent will be readily diffused. If the static head with a vent pipe filled with oil exceeds ten psi (70 kPa), the tank shall be designed to withstand the maximum static head which will be imposed.

A fixed sash window shall not be considered an opening for the purpose of 527 CMR 4.03(9)(c).

(d) Vent pipes shall not be cross-connected with pipes other than vent pipes. Two supply tanks connected to the same burner shall be permitted to be cross-connected and provided with a single fill and a single vent, but when so connected they shall be on a common slab, at the same height, and rigidly secured, one to the other. (*See* Figures 4.03 1. and 2.)

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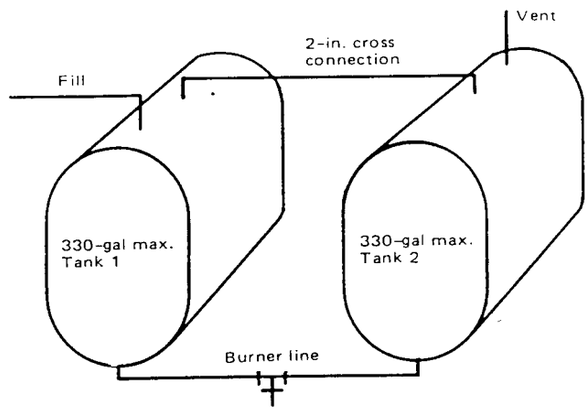
4.03: continued

1. Recommended arrangement of two fuel tanks of not more than 660 gallons (2500 L) aggregate capacity.

Figure 4.03 1.



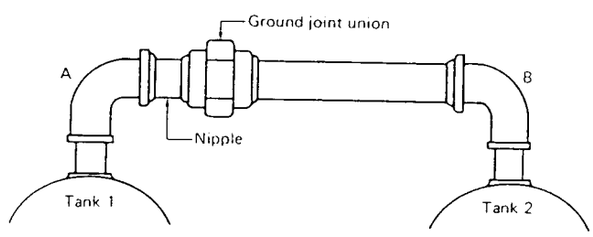
Recommended arrangement of two fuel oil tanks of not more than 660 gal (2500 L) aggregate capacity.

For SI Units: 1 gal. = 3.785 L; I in. = 25.4 mm.

In this arrangement of two tanks only one fill pipe and one vent pipe are used. During filling, oil enters Tank No. 1. The displaced vapors pass through the cross connection at top into Tank No.2. The expansion zone for both tanks is obviously in Tank No.2 until the tanks equalize after filling is completed.

2. This shows the detail of the cross connection that can be used in Figure 4.03 1.

Figure 4.03 2.



Swing joints (not shown) are normally used between A and B to permit tanks to settle without impairing the tightness of the pipe connections.

(e) A storage tank of more than 60 gallon capacity, other than an outside above ground tank, shall be filled only through a fill pipe which terminates outside the building at a point at least two feet from any building opening at the same or lower level. A fixed sash window shall not be considered an opening for the purpose of 527 CMR 4.03(10). Fill pipes may pass through other than masonry walls provided the openings for such pipes are made oil tight. A fill terminal shall be closed tight, when not in use, by a metal cover designed to prevent tampering; and shall be properly identified as a fuel oil fill terminal by an approved metal plate or tag or other permanent device.

(10) Oil Burner Supply Piping. When a tank contains a heater, the tank end of the fill pipe shall be sealed by a trap or shall be extended to a point below the lower end of the suction pipe.

(a) A return line from a burner or pump to a supply tank shall enter the top of the tank.

(b) Cross connections of fill piping between two supply tanks shall not exceed 660 gallon (2,500 L.) aggregate capacity.

(c) An auxiliary tank shall be filled by a pump transferring the oil through continuous piping from the supply tank.

(d) An auxiliary tank shall be located at a level above the top of the supply tank from which it is filled.

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4.03: continued

(e) An auxiliary tank shall be provided with an overflow pipe draining to the supply tank and extending into the top of the supply tank not more than one inch (25 mm). This requirement does not apply to an auxiliary tank specifically listed for use without an overflow pipe.
(f) An overflow pipe from an auxiliary tank and a return line from a burner or pump shall have no valves or obstructions.

(11) Oil Gauging.
(a) All storage tanks in which a constant level of oil is not maintained by an automatic pump shall be equipped with a method of determining oil level. On cross connected tanks provided with a single fill and single vent, the gauge shall be installed on the tank vented to the outside.
(b) Test wells shall not be installed inside buildings. For outside service they shall be equipped with a tight metal cover designed to discourage tampering.
(c) Gaging devices such as liquid level indicators or signals shall be designed and installed so that oil or vapor will not be discharged into a building from the fuel supply system. Inside tanks provided with fill and vent pipes used for No. 1 or No. 2 fuel oil 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.
(d) No tank used in connection with any oil burner shall be equipped with a glass gage or any gage which, when broken, will permit the escape of oil from the tank.

4.04: Oil Burners, Light Fuel Oil Type

(1) Oil Supply and Return Lines.
(a) All oil supply and return lines between the oil supply tank and the oil burner shall be standard cast iron, steel or brass pipe, or copper tubing, with standard steel, malleable iron, cast iron, brass or copper fittings. Exception: Tanks and piping subject to the provisions of 527 CMR 9.00: *Tanks and Containers*.
(b) Listed flexible hose shall be permitted to be used to reduce the effects of jarring and vibration or where rigid connections are impractical, and shall be installed in full compliance with its listing.
(c) All threaded joints and connections shall be made tight with suitable lubricant or pipe compound. Teflon tape shall not be used. Unions requiring gaskets or packings, right or left couplings, and sweat fittings employing solder having a melting point of less than 500°F (260°C) shall not be used in oil lines. Compression type fittings shall not be used.
Exception: Mechanical connections on tubing of the flare type or gaugeable, two ferrule, swage type fittings are acceptable.
(d) Piping used in the installation of oil burners and appliances other than conversion range oil burners shall be not smaller than ⅜-inch iron pipe size or ⅜-OD tubing except that ¼-inch pipe or 5/16-OD tubing may be used in the suction line of systems where the top of the tank is below the level of the oil pump. Copper tubing shall have 0.035-inch nominal and 0.032-inch minimum wall thicknesses.
(e) Oil supply and return lines shall be rigidly secured in place and protected from injury and shall be protected against corrosion. All new oil supply and return lines in direct contact with concrete or earth shall be enclosed with a continuous non-metallic sleeve that extends out of the concrete or earth a minimum of four inches on each end. Perimeter lines may be placed in an outer protective covering, in addition to the continuous non-metallic sleeve, when subject to physical damage.

On existing installations, whenever a burner, boiler, furnace or tank is replaced, the oil supply and return line shall either be replaced and enclosed with a continuous sleeve as for new installations or a listed oil safety valve shall be installed at the tank end of the oil supply line in accordance with the manufacturer's instructions. All return lines shall be enclosed with a continuous sleeve.

An oil safety valve and continuous non metallic sleeve is not required when the oil supply and return lines are not indirect contact with concrete, earth or any floor surface. burner is located above the oil supply tank and the entire oil supply line is connected to, and above the top of the tank.

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4.04: continued

Effective September 30, 2011 the owner of a residential property defined as a one to four dwelling unit used for living or sleeping (M.G.L. 148, § 38J) with oil supply and return lines not enclosed with a continuous non-metallic sleeve or equipped with a listed oil safety valve, shall either replace the line and enclose it with a continuous sleeve as for new installations or shall have a listed oil safety valve installed at the tank end of the supply line in accordance with the manufacturer's instructions.

Nothing in 527 CMR 4.00 shall prohibit overhead installation of oil supply and return lines or cross connection of oil supply lines from multiple tanks.

(f) Oil supply lines and return lines to tanks exposed to freezing temperatures shall be connected to the top of the tank. 527 CMR 4.04(1)(f) shall not apply to gravity feed oil burners using #1 fuel oil, range oil or kerosene.

(g) Oil supply lines shall be properly reamed; joints and connections shall be made oil tight; and in no case shall any joint or connection be concealed with a wall, partition or floor.

(h) Proper allowance shall be made for expansion, contraction, jarring and vibration. Pipe lines, other than tubing connected to underground tanks, shall be provided with double swing joints or flexible connectors, or otherwise arranged to permit the tanks to settle without impairing the tightness of the pipe connections.

(i) Piping systems shall be maintained liquid tight. A piping system that has leaks shall be emptied of liquid and repaired.

(j) The oil supply line to a burner shall be provided with a listed filter assembly. 527 CMR 4.04(1)(j) shall not apply to gravity feed oil burners.

(2) Oil Pumps and Valves.

(a) Where oil is supplied to a burner requiring gravity feed and a constant level valve is not incorporated in the burner assembly or in an auxiliary tank used in connection with an automatic pump, an approved constant level valve shall be installed in the oil feed line as close to the burner as practicable, to insure uniform delivery of oil to the burner.

Unless the constant level valve is equipped with an anti-flooding device it shall be provided with a vent line carried to a point higher than the top of the supply tank and terminated with a return bend.

(b) An oil pump not a part of a burner shall be a positive displacement type that automatically shuts off the oil supply when stopped.

(c) An automatic pump not, an integral part of a burner shall be a listed type installed in full compliance with its listing.

(d) A readily accessible manual shutoff valve as described in 527 CMR 4.04(2)(i) shall be installed at each point where required to properly control the flow of fuel in normal operation and where required to avoid oil spillage during servicing. The valve shall be installed to close against the supply.

(e) Where a shutoff is installed in the discharge line of an oil pump not an integral part of a burner, a pressure relief valve shall be connected into the discharge line between the pump and the shutoff valve and arranged to return surplus oil to the supply tank or to bypass it around the pump, unless the pump includes an internal bypass.

(f) Any fuel oil line incorporating a heater shall be provided with a relief valve arranged to discharge to the return line when any valve, pump, or other device may prevent the release of excessive pressure because of the expansion of the oil when heated.

(g) Where oil is supplied to a burner requiring uniform flow by gravity feed and a constant level valve is not incorporated in the burner assembly or the oil is not supplied by an automatic pump, a constant level valve shall be installed in the supply line at the gravity tank or as close thereto as practicable, to ensure uniform delivery of oil to the burner.

The vent opening of such constant level valve shall be connected by piping or tubing to the outside of the building, unless the constant level valve is provided with an anti-flooding device. Vent piping or tubing of constant level valves shall not be connected to tanks or tank vents.

(h) Provision shall be made for adequate ventilation of enclosures, such as vaults or pits, where pumps and accessories are installed prior to entering for inspection or repair.

(i) Only readily accessible hand operated, fusible, springloaded valves of an approved automatic type shall be installed in the oil supply line, one near each burner and one close to each supply tank so as to automatically stop the flow of oil in case of fire. Manual opening and ball spring check valves shall not be permitted.

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4.04: continued

(3) Oil Burner Controls.

(a) Oil burning equipment shall be provided with a means for manually stopping the flow of oil to the burner. Said means shall be at a convenient and safe location.

This shall be accomplished by the installation of a quick-closing ¼ turn valve in the oil supply line or by means of an electrical switch in the burner electrical circuit.

The valve or switch shall be plainly marked to indicate its purpose and placed outside the entrance to the room where the burner is located or outside of the cellar/basement door at first floor level in an exposed location clearly visible and readily accessible at all times.

(b) An automatic operated oil burner used in connection with a hot water, steam or warm air heating system shall be equipped with an approved controller that will shut down the burner in the event of abnormal pressure in the steam boiler or overheating within the hot water boiler or warm air furnace.

This controller, acting as a limit safety, shall be in addition to and separate from the regular operating control of the burner, and shall be connected into the burner supply circuit.

(c) If a gas pilot is used for ignition, pilot flame must be proven in 15 seconds or less and before oil can be delivered to the burner. Each gas pilot line shall be installed in accordance with 248 CMR 2.00: *Uniform State Plumbing Code and Massachusetts Fuel Gas Code*.

Exception: 527 CMR 4.04(3)(c) shall not apply to burners specifically constructed and Listed for the burning of used motor oils. The primary controls shall be installed in accordance with the manufacturer's instructions.

1. Each fully automatic oil burner having a firing rate of no more than 20 gallons per hour shall be equipped with a type of approved primary safety control which shall shut off the oil supply to the burner within 15 seconds if ignition is not established or in the event of flame failure after combustion has been established. Once combustion is established and in the event of flame failure, the oil supply shall be shut off to the burner within three seconds nominal unless the ignition is re-energized in not less then 0.8 seconds after flame extinguishment occurs. The installation of intermittent (formerly called constant) ignition primary safety controls shall not be permitted after April 1, 2012.

2. Each fully automatic oil burner having a starting firing rate over 20 gallons per hour shall be provided with a proven source of ignition. The pilot verification control shall prove the presence of an adequately sized and positioned ignitor to safely and smoothly ignite the main fuel prior to allowing the main fuel valve to open.

The time for trial for pilot proving shall be limited to a maximum of 15 seconds. The time for trial for main flame ignition shall be limited to a maximum of 60 seconds. In the event of a flame failure once combustion is established, the oil supply shall be shut off to the burner within three seconds nominal.

3. Each fully automatic oil burner having a firing rate of over 20 gallons per hour, but equipped to provide an initial proven firing rate of more than seven gallons per hour and not more than 20 gallons per hour shall be equipped with a flame verification control which shall provide a trial for ignition of not more than 15 seconds after the oil valve opens.

The burner may increase to maximum firing rate after the main flame is proven. In the event of flame failure once combustion is established the oil supply shall be cut off to the burner within three seconds nominal.

4. The flame verification primary control shall include a safe start circuit to prevent initiation of the ignition cycle in the event of a component failure in the flame verification primary circuit and flame detector. In addition the flame verification primary control used on any burner with a firing rate of more than 20 gallons per hour shall include provisions for a continuous circuit component check of the flame verification primary circuit and the flame detector throughout the flame proving period. (The continuous circuit component check requirement shall apply to all new installations and took effect January 1, 1970.)

5. Each fully automatic oil burner having a firing rate of over 20 gallons per hour, but equipped to provide an initial proven firing rate of not more than seven gallons per hour shall be equipped with a flame verification control which shall provide a trial for ignition of not more than 30 seconds.

The burner may increase its maximum firing rate after the main flame is proven. In the event of flame failure once combustion is established, the oil supply shall be shut off to the burner within three seconds nominal.

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4.04: continued

6. A burner which requires a separate power operated louver, fan, or blower to supply air for combustion shall be equipped with an approved combustion air supervisory switch to interrupt burner operation on loss of adequate air for combustion.

7. When used with burners induced and/or forced draft fans shall be electrically interlocked with motor starters of burner motors to prevent the burner operation when draft fans are not operating.

(d) When a boiler is equipped with an oil burner, it shall be equipped with an approved low water cut off that will shut off the power supply to any automatic oil burner in the event of low water. Said cut off shall be connected into the main burner supply circuit.

(e) Each automatically fired hot water heating boiler with heat input greater than 500,000 Btu per hour shall have a listed automatic low water fuel cut off which has been designed for hot water service, so located as to automatically cut off the fuel supply when the surface of the water falls to the lowest safe permissible water level established by the boiler manufacturer.

(4) Electric Wiring and Equipment.

(a) A person holding a certificate of competency as an oil burner technician may connect or disconnect for the purpose of installation, alteration, repair or replacement, any device, wiring or control required by 527 CMR 4.00 to be part of an oil burner installation, or being an integral part of the oil burning equipment, at the connection on such device, wiring control or part to be replaced, from the thermal disconnect to the oil burning appliance. All electrical wiring shall be in accordance with 527 CMR 12.00: *Massachusetts Electrical Code*.

(b) Oil burners electrically controlled, driven and/or operated shall be supplied from a separate branch circuit located at the service disconnect panel, or at branch circuit sub-panel. This circuit shall be clearly marked for the equipment it controls.

All protective, control and emergency devices shall be series-connected from the electrical distribution panel, through the emergency switch, through the thermal switch, to the service switch in the un-grounded line conductors. The burner controls shall be installed in the un-grounded supply conductors of the circuit and shall not exceed 150 volts to ground.

(c) A control (service switch) to start and stop a light fuel oil burner shall be installed at a location where the operator can view the fire. The switch shall be located at a maximum of three feet from the burner.

(d) Where a stack relay control is used, it shall be so installed that it can be readily removed from the stack mounting flange for inspection of the metallic element without disconnecting the wiring.

(e) An electrical thermal switch fused to break the ungrounded conductor in the main circuit at 165°F, shall be installed in the main power line within six feet over the top of the burner-boiler or burner-furnace.

If the ceiling above the burner boiler or burner furnace exceeds 12 feet in height, an additional thermal switch shall be installed at a height of ten feet and connected in series with the lower switch.

(f) Electrical equipment shall not obstruct clear access to clean out and service panels.

(5) Installation of Indoor Appliances.

(a) An oil burner shall be installed by a person having a certificate of competency in accordance with M.G.L. c. 148, § 10C or directly supervised by or in the presence of a person having a certificate of competency and in accordance with the instructions of the manufacturer of all equipment made part of the oil burner installation.

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4.04: continued

(b) All piping, fittings, connections and tanks shall be tight and free from oil leaks.

(c) Before installing or remodeling any oil-burning equipment for commercial or industrial applications, plans or sketches showing the relative location of burners, tanks, pumps, piping, and elevations of buildings and their lowest floors or pits, relating to the proposed installation or alteration, shall be submitted to the head of the fire department upon request.

(d) The installation shall be made in accordance with the instructions of the manufacturer. Such instructions shall include directions and information as deemed by the manufacturer to be adequate for attaining proper and safe installation, maintenance, and use of the appliance. These instructions shall be left with the owner.

(e) The installation shall be such as to provide reasonable accessibility for cleaning heating surfaces, removing burners, replacing motors, controls, air filters, draft regulators, and other working parts, and for adjusting, cleaning, and lubricating parts requiring such attention.

(f) Oil-burning appliances shall be installed only in locations where combustible dusts and flammable gases or vapors are not normally present.

1. Combustible construction within five feet of and directly over an oil fired boiler or furnace shall be protected with noncombustible material of at least one hour fire resistive rating. Such overhead protection shall extend four feet in all directions from the top center of the boiler or furnace but in no case less than two feet beyond the perimeter of said replacement of existing boilers, furnaces, and domestic hot water heaters other than electric hot water heaters and gas-fired installations.

2. In lieu of noncombustible material of at least one hour fire resistive rating, a high temperature (250 to 300°F) rated, pendent, automatic sprinkler supplied from the domestic cold water supply over the center of the furnace or boiler, shall be acceptable. It shall have a "K" factor between 2.5 and 4.0 (reduced orifice), and the water supply shall be capable of supplying at least ten gallons per minute (GPM) at a residual pressure of seven pounds per square inch (PSI) at the location of the sprinkler for ten minutes. The installation of an automatic sprinkler shall be made in accordance with 248 CMR: *Massachusetts Plumbing and Gas Code*.

Exception: 527 CMR 4.04(5)(f)1. and 2. shall not apply to new installations or replacement of existing boilers or furnaces that have an A.F.U.E. (Annual Fuel Utilization Efficiency) rating or domestic hot water heaters that have an EF (Energy Factor) rating in accordance with standards of the United States Department of Energy (D.O.E.).

(g) After installation of the oil-burning equipment, operation and combustion performance tests shall be conducted to make certain that the burner is operating in a safe and acceptable manner and that all controls and safety devices function properly.

(h) Contractors installing industrial oil-burning systems shall furnish diagrams to the owner/occupant showing the main oil lines and controlling valves.

(i) A boiler or furnace in which an oil burner is installed shall be connected by a connector pipe to a chimney flue which has sufficient draft to assure safe operation of the burner. Each section of connector pipe shall be mechanically secured.

(j) An approved automatic draft control is required for light fuel oil burners, except where the equipment is so designed as to otherwise control the draft.

(k) A combustion chamber shall be constructed in accordance with the specifications of the oil burner manufacturer and the boiler or furnace manufacturer.

(l) Safety performance tests shall be conducted where more than one burner is installed in a single combustion chamber or where a single burner has more than one firing head in order to make sure that the automatic device for preventing abnormal discharge of oil at the burners or burner will function properly in the event of failure of one of more units to ignite on starting or in the event of flame extinguishment of one or more units during operation.

(m) Air for Combustion and Ventilation - General

1. Appliances shall be installed in a location in which the facilities for ventilation permit satisfactory combustion of oil, proper venting, and the maintenance of ambient temperature at safe limits under normal conditions of use. On a new or replacement installation, appliances in residential garages and in adjacent spaces that open to the garage and are not part of the living space of a dwelling unit, shall be installed so that all burners and burner ignition devices are located at least 18 inches above the floor, unless such appliance has a sealed combustion system where the combustion air is taken from the exterior of the garage. When appliances are enclosed in a separate compartment having access only from outside the garage, such appliance may be installed at floor level, provided that the required air from combustion is taken from the exterior. Appliances shall be located or protected so they are not subject to vehicular damage.

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4.04: continued

Appliances shall be located in such a manner as not to interfere with proper circulation of air within the confined space. When buildings are so tight that normal infiltration does not meet air requirements, outside air shall be introduced. Ducts used to convey air from the outdoors shall be of the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be not less than three in. (76 mm). Whenever an oil appliance is used in a sealed combustion application, the air inlet and vent outlet shall be on the same surface wall.

2. For residence-type installations and similar usages, the requirements of 527 CMR 4.04(5)(m)1. normally may be obtained by application of one of the methods covered in 527 CMR 4.04(5)(n)1. through 3.

3. For installations of commercial and industrial equipment see 527 CMR 4.04(5)(n)6.

(n) Confined and Unconfined Spaces

1. Air for combustion shall be provided in the following manner:

a. Through a pipe or duct connected to a suitable air intake hood located outside and connected directly to the air inlet of the burner. A suitable relief shall be provided to allow air to flow to the burner should the outside air inlet be blocked.

b. Through a pipe or duct connected to a suitable air intake hood located outside and connected directly to the oil burner enclosure of a furnace or boiler.

c. Through a pipe or duct connected to a suitable air intake hood located outside and connected to a enclosed vent damper located next to the burner or burners. The damper shall be closed when the burner is not operating and opened when the burner is operating. The vent damper shall be wired in the burner circuit so as to prevent the burner from operating should the damper be in a closed position.

d. The size of the pipe or duct used for combustion air shall be of sufficient size to satisfy the combustion air requirements of the burner manufacturer.

2. Ventilation Air Unconfined Spaces.

a. In unconfined spaces in buildings of conventional frame, brick or stone construction, infiltration normally is adequate to provide air for ventilation.

b. If the unconfined space is within a building having insufficient air because of tight construction, the air for ventilation shall be obtained from outdoors or from spaces freely communicating with the outdoors. Under these conditions a permanent opening or openings having a total free area of not less than one square inch per 5,000 Btu per hour (28 sq. in. per gal. per hr.) of total input rating of all appliances shall be provided.

3. Ventilation Air Confined Spaces.

a. All Air from Inside Building. The confined space shall be provided with two permanent openings, one near the top of the enclosure and one near the bottom. Each opening shall have a free area of not less than one square inch per 1,000 Btu per hour (140 sq. in. per gal. per hr.) of the total input rating of all appliances in the enclosure freely communicating with interior areas having in turn adequate infiltration from the outside. [*See* Figure 4.04 1.]

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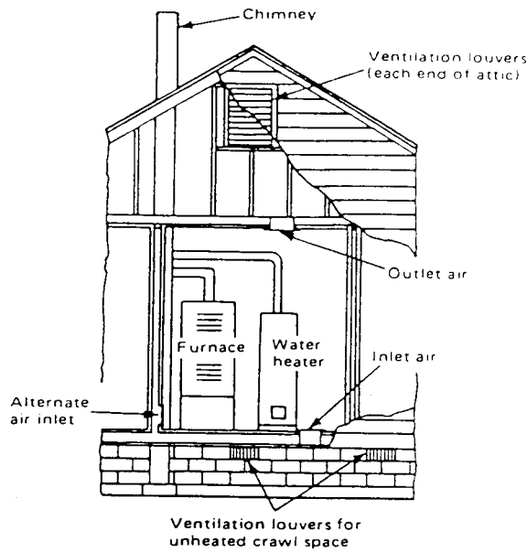
Figure 4.04 1.



Note: The inlet and outlet air openings shall each have a free area of not less than 1 sq in. per 4000 Btu per hr (35 sq in. per gal per hr) of the total input rating of all appliances in the enclosure.

Appliances located in confined spaces. All air from outdoors; inlet air from ventilated crawl space and outlet air to ventilated attic.

b. When there is insufficient air for ventilation in the confined space and the freely communicating interior area air for proper ventilation, air shall be supplied in one of the following ways:

i. The enclosure shall be provided with two openings for ventilation located and sized as described in 527 CMR 4.04(5)(n)3.a. In addition, there shall be one opening directly communicating with outdoors or to such spaces (crawl or attic) that freely communicate with outdoors. This opening shall have a free area of not less than one square inch per 10,000 Btu per hour (14 sq. in. per gal. per hr.) of all appliances in the enclosure.

ii. The confined space shall be provided with two permanent openings, one in or near the top of the enclosure and one in or near the bottom. The openings shall communicate directly, or by means of ducts, with outdoors or to such spaces (crawl or attic) that freely communicate with outdoors. [*See* Figures 4.04 2. and 3.]

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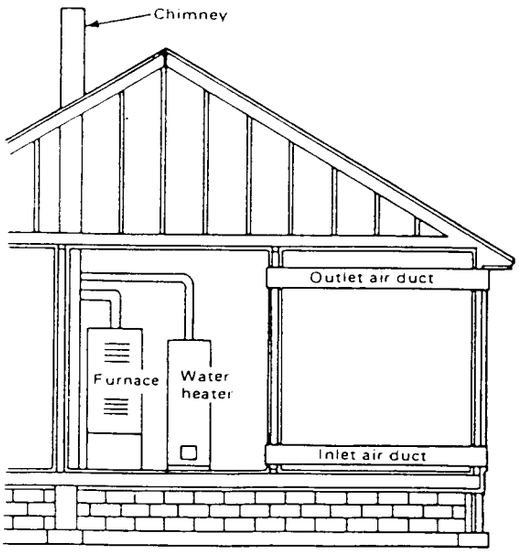
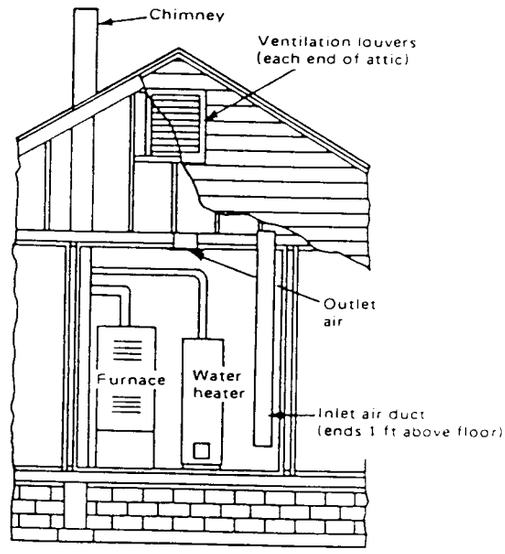
Figures 4.04 2. and 3.



Note. Each air duct opening shall have a free area of not less than 1 sq in. per 2000 Btu per hr (70 sq in. per gal per hr) of the total input rating of all appliances in the enclosure.

Appliances located in confined spaces — all air from outdoors.



Note: The inlet and outlet air openings shall each have a free area of not less than 1 sq in. per 4000 Btu per hr (35 sq in. per gal per hr) of the total input rating of all appliances in the enclosure.

Appliances located in confined spaces — all air from outdoors through ventilated attic.

When directly communicating with outdoors or by means of vertical ducts, each opening shall have a free area of not less than one square inch per 4,000 Btu per hour (35 sq. in. per gal. per hr.) of total input rating of all appliances in the enclosure. If horizontal ducts are used, each opening shall have a free area of not less than one square inch per 2,000 Btu per hour (70 sq. in. per gal. per hr.) of total input of all appliances in the enclosure.

4. Louvers and Grilles. In calculating free area in 527 CMR 4.04(5)(n)1., 2., 3. and 6., consideration shall be given to the blocking effect of louvers, grilles, or screens protecting openings. Screens used shall not be smaller than ¼ inch (6.3 mm) mesh and shall be readily accessible for cleaning.

If the free area through a design of louver or grille is known, it shall be used in calculating the size opening required to provide the free area specified. If the design and free area is not known, it may be assumed that wood louvers will have 20-25% free area and metal louvers and grilles will have 60-75% free area.

5. Special Conditions. Where an appliance is installed in a location in which the operation of exhaust fans, kitchen ventilation systems, clothes dryers, or fireplaces may create conditions of unsatisfactory combustion or venting, special provisions shall be made subject to the approval of the head of the fire department.

6. Combustion Air. For commercial and industrial equipment, permanent facilities for supplying an ample amount of outside air shall be provided in accordance with the following:

a. For furnace or boiler rooms adjacent to outside walls, and where combustion air is provided by natural ventilation from the outside, there shall be a permanent air supply inlet having a total free area of not less than one square inch per 4,000 Btu per hour (35 sq. in. per gal. per hr.) (5.5 cm^2 per kw) of total input rating of the burner or burners and in no case less than 35 square inch (0.425 m^2).

b. For furnace or boiler rooms not adjacent to outside walls, the combustion air shall be supplied in a manner acceptable to the head of the fire department.

7. Specially Engineered Installations. The size of air openings shall not necessarily govern when special engineering methods designed and certified by a Massachusetts registered professional engineer assure an adequate supply of air for combustion and ventilation.

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(o) Requirements for Specific Appliances (Clearances, Mounting, etc.).

1. Boilers, Furnaces, Floor-Mounted Unit Heaters, and Water Heaters. Appliances in rooms shall be installed with the clearances from combustible material not less than as indicated in Figure 4.04 4. and Table 4.04 1., except that appliances specifically listed for installation at lesser clearance may be installed in accordance with their listing. In no case shall the clearance be such as to interfere with the requirements for combustion air and accessibility. On existing installations, whenever a burner, boiler or furnace is replaced, appliances and chimney connectors shall meet the requirements of 4.04(5) and 4.04(9).

Figure 4.04 4.

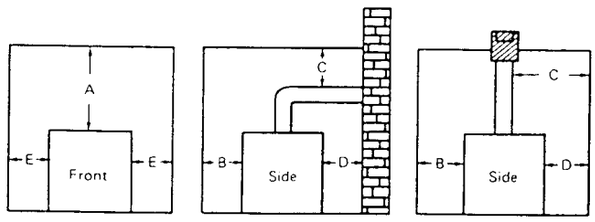

Table 4.04 1.

	Clearances, in.				
Classification as to Type of Appliance	A Above[1]	B Front	C Chimney Con-nector[4]	D Rear	E Sides
Form I	2[2]	24	18	6	6
Form II[3]	6	24	18	6	6
Form III	18	48	18	18	18
Form IV	18	96	36	36	36
Form V[3]	5	24	18	18	18

For SI Units: one in. = 25 mm; one ft. = 0.3048 m.

NOTE 1: This column indicates clearances above the top of the appliance or above the top and from the sides of furnace bonnet or plenum.
NOTE 2: This clearance may be reduced to one inch (25 mm) for a listed, forced air or gravity system equipped with a limit control that cannot be set higher than 200°F
NOTE 3: The clearance from the bottom of a suspended furnace or unit heater to combustible material shall be not less than 18 inches (0.5 mm).
NOTE: *See* 527 CMR 4.04(9)(b) for installation of chimney connectors.

Description of Classifications - Refer to Table
Form I. Automatically fired warm-air furnaces, except horizontal types, and floor-mounted unit heaters equipped with approved limit controls that cannot be set higher than 250°F (121°C), not larger than 100 cubic feet in size (excluding blower compartments and burner equipment).
Form II. Horizontal-type warm-air furnaces, and water-wall-type heating boilers operating at not in excess of 250°F (121°C) for water boilers and at not over 15 psig pressure for steam boilers, and water heaters, not larger than 100 cubic feet in size (excluding burner equipment and blower compartments of furnaces).
Form III. Low-heat appliances, which include steam boilers operating at not more than 50 psig pressure, or not larger than ten boiler horsepower regardless of operating pressure, and boilers, furnaces except floor furnaces, and heaters not classified under Forms I, II, IV, and V.

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Form IV. Medium-heat appliances, which include steam boilers other than as classified above.

Form V. Suspended-type unit heaters not more than 100 cubic feet in size (excluding fan and burner equipment).

2. Appliances shall be permitted to be installed in rooms, but not in alcoves or closets, with lesser clearances to combustible material, provided the combustible material or appliance is protected as described in Table 4.04 2. and Figures 4.04 5., 6. and 7.

Table 4.04 2.

Reduction of Clearances with Specified Forms of Protection

	Where the required clearance with no protection from appliance connector is:									
Type of Protection	36 inches		18 inches		12 inches		9 inches		6 inches	
	Allowable Clearance with Specified Protection (inches)									
Applied to and covering all surfaces of combustible material within the distance specified as the required clearance with no protection.	Above	Sides & Rear	Above	Sides & Rear	Above	Sides & Rear	Above	Sides & Rear	Above	Sides & Rear
(a) 3½-in. thick masonry wall without ventilated air space	-	24	-	12	-	9	-	6	-	5
(b) ½-in. insulation board over 1-in. glass fiber or mineral wool batts	24	18	12	9	9	6	6	5	4	3
(c) 0.024 (24-gauge) sheer metal over 1 in. glass fiber mineral wool batts reinforced with wire on rear face with ventilated air space	18	12	9	6	6	4	5	3	3	3
(d) 3½in.-thick masonry wall with ventilated air space										
(e) 0.024 (24-gauge) sheet metal with ventilated air space	-	12	-	6	-	6	-	6	-	6
(f) ½in.-thick insulation board with ventilated air space	18	12	9	6	6	4	5	3	3	2
(g) 0.024 (24-gauge) sheet metal with ventilated air space over 0.024 (24-gauge) sheet metal with ventilated air space	18	12	9	6	6	4	5	3	3	3
(h) 1-in. glass fiber or mineral wool batts sandwiched between 2 sheets 0.024 (24-gauge) sheet metal with ventilated air space	18	12	9	6	6	4	5	3	3	3
	18	12	9	6	6	4	5	3	3	3

Notes

1. Reduction of clearances from combustible materials shall not interfere with combustion air, draft regulators, and accessibility for servicing.

2. All clearances shall be measured from the outer surface of the combustible material to the nearest point on the surface of the appliance or connector, disregarding any intervening protection applied to the combustible material.

3. Spacers and ties shall be of noncombustible material. No spacer or tie shall be used directly opposite an appliance or connector.

4. With all the clearance reduction systems using ventilated air space, adequate provision for air circulation shall be provided as described. *See* Figures 4.04(5)(o)2.b. and c.

5. There shall be at least 1 inch (25 mm) clearance between the reduction system and combustible walls and ceilings for reduction systems using ventilated air space.

6. If a wall protector is mounted on a single flat wall away from corners. adequate air circulation may be provided by leaving only the bottom and top edges, or only the side and top edges open. with at least one inch (25 mm) air gap.

7. Mineral wool batts (blanket or board) shall have a minimum density of eight lb/ft^3(128 kg/m^3) and a minimum melting point of 1500°F (816°C).

8. Insulation material used as part of a clearance reduction system shall have a thermal conductivity of 1.0 (Btu-in)(sq ft-hr-°F) or less.

9. There shall be at least one inch (25 mm) between the appliance or connector and the protector. In no case shall the clearance between the appliance or connector and the combustible material be reduced below

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that allowed in the table.

10. All clearances and thicknesses are minimum. Larger clearances and thicknesses are acceptable.

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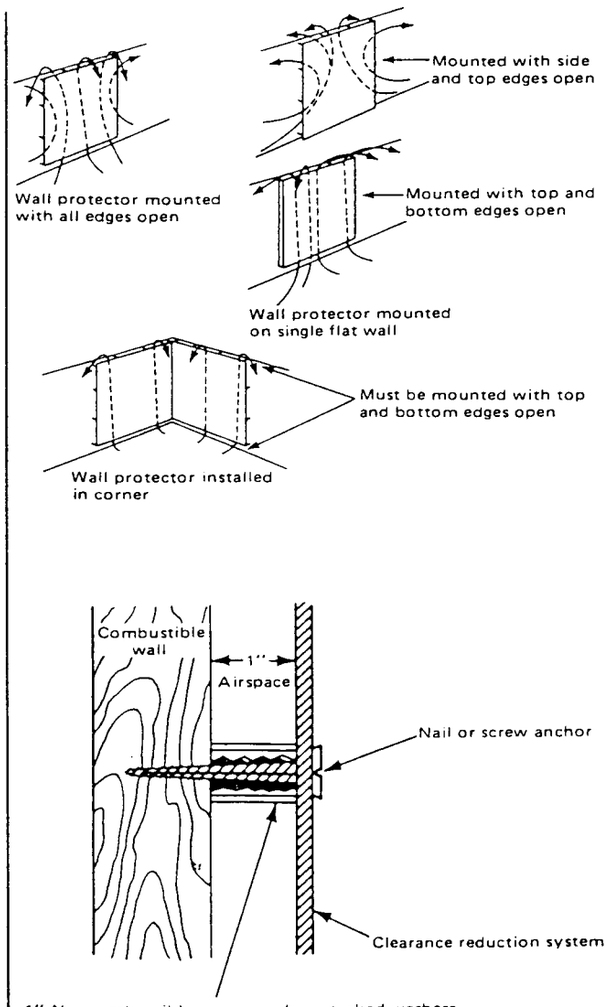
Figure 4.04 5.



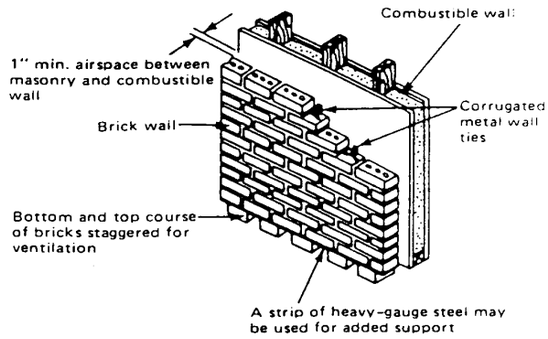
1" Noncombustible spacer such as stacked washers, small-diameter pipe, tubing, or electrical conduit.

Masonry walls may be attached to combustible walls using wall ties.

Do not use spacers directly behind appliance or connector.

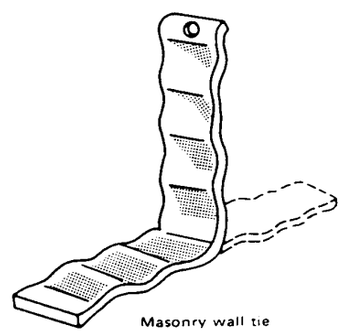
Wall protector clearance reduction system.

Figure 4.04 6.



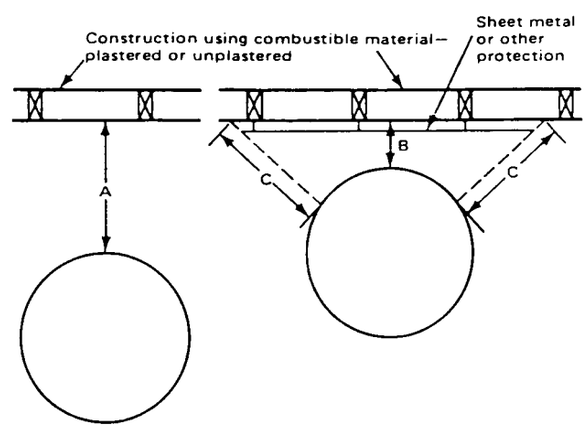
Note: Do not place masonry wall ties directly behind appliance or connector

Masonry clearance reduction system



Masonry clearance reduction system.

Figure 4.04 7



Extent of protection necessary to reduce clearances from appliances or chimney connectors.

Appliance or Connector

"A" equals the required clearance with no protection, specified in Table 4-4.1(b).

"B" equals the reduced clearance permitted. The protection applied to combustible materials is required to extend far enough in each direction to make "C" equal "A." Plastered constructions having combustible supports are classed as combustible regardless of the type of lath.

3. Floor-mounted appliances shall be placed on the ground, or on floors of fire-resistive construction with noncombustible flooring or surface finish and with no combustible material against the underside thereof, or on fire-resistive slabs or arches having no combustible material against the underside thereof. Such construction shall extend not less than 12 inch (0.3 m) beyond the appliance on all sides.

4. Appliances listed specifically for installation on a floor constructed of combustible material may be placed in accordance with the conditions of such listing.

5. Appliances shall be permitted to be placed on combustible floors although not listed for such installation, provided the floor under the appliance is protected in accordance with the requirements of accepted building code practice. An appliance listed for installation under Form I or II in Table 4.04 1. may be placed on a combustible floor protected with hollow masonry not less than four inch (100 mm) thick covered with sheet metal not less than 24 gage.

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Such masonry shall be laid with ends unsealed and joints matched in such a way as to permit free circulation of air from side to side through the masonry to accommodate a downflow furnace. For such installations the furnace shall be securely anchored to maintain the clearances required in Table 4.04 1.

6. The supply and return duct system of a central heating appliance shall be installed in accordance with NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems, and NFPA 90B, Standard for the Installation of Warm Air Heating and Air Conditioning Systems and the mechanical code referenced by 780 CMR: *Massachusetts State Building Code*.

7. A return system shall be arranged so that negative pressure from the circulating fan cannot affect the air supply for combustion or act to draw products of combustion from joints or openings in the appliance, chimney connectors, or chimney.

8. A downflow furnace shall be installed so that there are no open passages in the floor through which flame or hot gases from a fire originating in the room below the floor can travel to the room above.

9. A downflow furnace shall be automatically operated and equipped with an approved temperature limit control that will limit outlet air temperature to 200°F (93°C). The furnace shall be designed to prevent unsafe temperatures in the event of reverse flow.

(p) Attic Furnaces. A furnace may be installed in an attic provided it is listed for such installation and installed in accordance with its conditions of listing.

(q) Duct Furnaces.

1. A duct furnace shall be installed with clearances of at least six inches (150 mm) to adjacent walls, ceilings, and floors of combustible material, except a duct furnace listed for installation at lesser clearance may be installed in accordance with its listing.

2. A duct furnace flue pipe shall be installed to provide a clearance to combustible material of not less than 18 inches (0.5 m).

3. A duct furnace and its chimney connector shall be permitted to be installed in a room but not in a confined space, such as an alcove or closet, with reduced clearances to combustible material, provided the combustible material is protected as described in Table 4.04 2., and Figures 4.04 5., 6., and 7.

4. A duct furnace shall be firmly supported.

5. Access panels shall be provided in the ducts on both the upstream and downstream sides of the furnace.

6. Controls shall be located outside the duct except for the sensing element of a control.

(r) Floor Furnaces.

1. Floor furnaces shall not be installed in floors of combustible construction unless specifically listed for such installation and installed in accordance with their listing.

2. The floor around the furnace shall be braced and headed with a framework of material not lighter than the joists. Floor furnaces shall be supported independently of the floor grilles.

3. With the exception of wall-register models, a floor furnace shall be placed not closer than six inches (150 mm) to the nearest wall, and wall-register models shall be placed not closer than six inches (150 mm) to a comer.

The furnace shall be so placed that a door, drapery, or similar object cannot be nearer than 12 inches (0.3 m) to any portion of the register of the furnace.

4. The bottoms of the floor furnaces shall have at least six inches (150 mm) clearance from the ground. Where the ground must be excavated to provide this clearance, the excavation shall extend at least 12 inches (0.3 m) beyond the furnace on all sides, and not less than 18 inches (0.5 m) on the control side. Where such excavation exceeds 12 inches (0.3 m), or the ground contour and ground moisture conditions are such that water seepage is likely, a watertight pan constructed of copper, galvanized iron, or other suitable corrosion-resistant material and properly anchored in place, or a waterproof concrete pit, shall be provided under the furnace. The sides of a pan or pit shall extend four inches (100 mm) above ground level.

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5. Floor furnaces shall be made readily accessible. Openings in foundation walls and trap doors in floors shall be not smaller than 18 inches by 24 inches (0.5 m by 0.6 m). Under-floor passageways to the furnace shall be not less than 24 inches high by 24 inches wide (0.6 m by 0.6 m).

6. Provision shall be made for proper air supply for combustion.

7. Listed floor furnaces may be installed in an upper floor provided the furnace assembly projects below into a utility room, closet, garage, or similar nonhabitable space. In such installations, the floor furnace shall be enclosed completely (entirely separated from the nonhabitable space) with means for air intake and with access facilities for servicing on the control side. The minimum furnace clearances shall be six inches (150 mm) to all sides and bottom.

The enclosure shall be constructed of portland cement plaster on metal lath or material of equal fire resistance.

8. No floor furnace shall be installed in the floor of any aisle or passageway of any auditorium, public hall, or public assembly room or in an exit way from any such room or space.

9. A floor furnace chimney connector shall be installed with clearances to combustible material of not less than nine inches (225 mm).

10. A floor furnace chimney connector shall be permitted to be installed with lesser clearances to combustible material provided the combustible material is protected as described in Table 4.04 2., and Figures 4.04 5., 6., and 7.

(s) Furnaces Used with Refrigeration Systems.

1. A furnace shall not be installed in conjunction with a refrigeration coil when circulation of cooled air is provided by the blower unless the blower has sufficient capacity to overcome the external static resistance imposed by the duct system, furnace, and cooling coil at the air throughout required for heating or cooling, whichever is greater.

2. To avoid condensation within heating elements, furnaces used in conjunction with cooling equipment shall be installed in parallel with or on the upstream side of cooling coils unless the furnace has been specifically listed for downstream installation. With a parallel flow arrangement, the dampers or other means used to control the flow of air shall be sufficiently tight to prevent any circulation of cooled air through the unit.

3. When furnaces are to be located upstream from cooling units, the cooling unit shall be so designed or equipped as to not develop excessive temperatures or pressures.

4. Furnaces may be installed downstream from evaporative coolers or air washers if the heating element is made of corrosion-resistant material.

Stainless steel, ceramic-coated steel, or an aluminum-coated steel in which the bond between the steel and the aluminum is an iron-aluminum alloy are considered to be corrosion resistant. Air washers operating with chilled water, which delivers air below the dew point of the ambient air at the appliance, are considered as refrigeration systems.

(t) Industrial Furnaces and Boilers, Stationary Type.

1. Industrial furnaces and power boilers, stationary type, shall include low-heat, medium-heat and high-heat appliances. *See* definitions.

2. Low-heat Appliances:

a. Low-heat appliances shall be installed with clearances not less than those indicated by Form III, in Table 4.04 1.

b. Low-heat appliances that are approved for installation with lesser clearances than specified in 527 CMR 4.04(5)(t)2.a. may be installed in accordance with their listing.

c. Low-heat appliances shall be permitted to be installed with lesser clearances to combustible material provided the combustible material is protected as described in Table 4.04 2.

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d. Floor-mounted low-heat appliances, except as provided in 527 CMR 4.04(5)(t)2.e and f., shall be placed on the ground, or on floors of fire-resistive construction with noncombustible flooring or surface finish and with no combustible material against the underside thereof, or on fire-resistive slabs or arches having no combustible material against the underside thereof. Such construction shall extend not less than 12 inches (0.3 m) beyond the appliance on all sides.

e. Appliances that are listed specifically for installation on a floor constructed of combustible material shall be permitted to be placed in accordance with the conditions of such listing.

f. Low-heat appliances shall be permitted to be placed on combustible floors although not listed for such installation, provided the floor under the appliance is protected in accordance with the requirements of accepted building code practice.

3. Medium-heat Appliances:

a. Medium-heat appliances shall be installed with clearances not less than those indicated by Form IV, Table 4.04 1.

b. Medium-heat appliances shall be placed on the ground or on floors of fire-resistive construction with noncombustible flooring or surface finish and with no combustible material against the underside thereof, or on fire-resistive slabs or arches having no combustible material against the underside thereof. Such construction shall extend not less than three feet (one m) beyond the appliance on all sides.

c. Medium-heat appliances may be placed on combustible floors although not listed for such installation, provided the floor under the appliance is protected in accordance with accepted building code practice.

d. Rooms containing medium-heat appliances shall be provided with means of ventilation adequate to prevent accumulation of hot air over or near the appliance.

4. High-heat Appliances:

a. High-heat appliances shall be installed with clearances to combustible material of not less than ten feet (three m) at the sides and rear, and not less than 15 feet (4.5 m) above, and not less than 30 feet (nine m) at the front or side where hot products are removed.

b. Rooms containing high-heat appliances shall be provided with means of ventilation adequate to prevent accumulation of hot air over or near the appliance.

c. High-heat appliances shall be mounted on the ground, or on floors of fire-resistive construction with noncombustible flooring or surface finish and with no combustible material or construction against the underside thereof; floors that shall in all cases extend not less than ten feet (three m) on all sides and not less than 30 feet (nine m) at the front or side where hot products are removed.

(u) Miscellaneous Heaters (Air Heater, Salamander, etc.).

1. A direct-fired heater, or salamander, shall not be used within an enclosed space or in proximity to combustible material. It may be used where salamanders fired by coal or coke are allowed.

2. An air heater shall be of a type designed to discharge air at a temperature of not more than 250°F (121°C).

3. A flexible duct, if used, shall be made of material resistant to heat and flame that will withstand prolonged exposure to temperatures as high as 250°F (121°C).

4. An air heater installed inside a building shall be provided with a chimney connector to conduct the flue gases to the outside.

(v) Recessed Wall Furnaces.

1. Listed recessed wall furnaces may be installed in combustible construction. Because of the necessity for closely correlating the installation of recessed wall furnaces with the building construction, the authority having jurisdiction shall be consulted for the proper installation methods to be followed. Recessed wall furnaces shall be installed in accordance with the manufacturer's instructions.

2. Recessed wall furnaces shall be located so as not to cause a hazard to walls, floors, curtains, furniture, doors, etc. The face of a warm air register shall be not less than 36 inches (one m) from any wall or combustible surface directly opposite the register.

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4.04: continued

3. Panels, grilles, and access doors that must be removed for normal servicing operations shall not be attached to the building construction.

4. Adequate combustion and circulating air shall be provided.

(w) Restaurant-Type Cooking Appliances, Floor Mounted.

1. Floor-mounted restaurant-type cooking appliances shall be installed with clearances to combustible material of not less than 18 inches (0.5 m) at the sides and rear of the appliance and from the chimney connector thereof, and not less than 48 inches (1.2 m) above the cooking top and at the front of the appliance.

2. Floor-mounted restaurant-type cooking appliances that are listed for installation with lesser clearances than specified in 527 CMR 4.04(5)(w)1. may be installed in accordance with the conditions of their listing.

3. Floor-mounted restaurant-type cooking appliances shall be permitted to be installed in rooms, but not in confined spaces such as alcoves, with lesser clearance to woodwork or other combustible material, provided the combustible material is protected as described in Table 4.04 2, Protection Types (b), (c), and (d). Where a wall or cabinet of combustible material adjacent to the cooking top section of the appliance is not shielded from the cooking top section by a high shelf, warming closet, or other such part of the appliance, the protection shall extend for a distance of at least two feet. (0.6 m) above the surface of the cooking top. Such wall or cabinet shall be protected even though the appliance is listed for "close-to-the-wall" installation.

4. Floor-mounted appliances, except as provided in 527 CMR 4.04(5)(w)5. and 6., shall be placed on floors of fire-resistive construction with noncombustible flooring or surface finish and with no combustible material against the underside thereof, or on fire-resistive slabs or arches having no combustible material against the underside thereof. Such construction shall in all cases extend not less than 12 inches (0.3 m) beyond the appliance on all sides.

5. Floor-mounted appliances that are specifically listed for installation on a floor constructed of combustible material shall be permitted to be placed in accordance with the conditions of such listing.

6. Floor-mounted appliances shall be permitted to be placed on combustible floors although not listed for such installation, provided the floor under the appliance is protected in accordance with the requirements of accepted building code practice.

(x) Unit Heaters, Suspended Type.

1. Suspended-type unit heaters shall be installed with clearances to combustible material not less than those indicated in Table 4.04 1.

2. Suspended-type unit heaters that are listed for installation with lesser clearances than specified in 527 CMR 4.04(5)(x)1. shall be permitted to be installed in accordance with their listing.

3. Suspended-type unit heaters shall be permitted to be installed with lesser clearances to combustible material provided the combustible material is protected as described in Table 4.04 2., and Figures 4.04 5., 6., and 7.

4. Suspended-type heaters shall be safely and adequately supported. Hangers or brackets supporting heaters shall be metal.

5. The location of any suspended unit heater or the duct work attached thereto shall be such that a negative pressure will not be created in the room in which the unit heater is located.

6. A suspended unit heater shall not be attached to a warm air duct system unless listed for such installation.

(6) Installation of Outdoor Appliances.

(a) Appliances listed for outdoor installation may be installed without additional environmental protection in accordance with the terms of their listing and shall be accessible for servicing.

(b) Appliances not listed for outdoor installation may be installed outdoors if approved for such installation. Among the factors to be considered in judging the acceptability of appliances installed outdoors are:

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1. protection from physical damage;
2. location of combustion air and other openings into the appliance;
3. surface temperatures;
4. weatherproofing;
5. adequate and safe venting; and
6. clearances to adjacent combustibles.

(7) Applications on Roofs.

(a) General.

1. Appliances on roofs shall be designed or enclosed to withstand climatic conditions in the area in which they are installed. If enclosures are provided, each enclosure shall permit easy entry and movement, shall be of reasonable height, and shall have at least 30-inches (0.76-m) clearance between the entire service access panel of the equipment and the wall of the enclosure.

2. Roofs on which equipment is to be installed shall be capable of supporting the additional load or shall be reinforced to support the additional load.

3. All access locks and screws and bolts shall be of corrosion-resistant material.

(b) Installation.

1. Appliances shall be installed in accordance with their listing and with the manufacturer's instructions.

2. Appliances shall be installed on a well-drained surface of the roof. At least six feet (1.8 m) of clearance shall be maintained between any part of the appliance and the edge of the roof or similar hazard. Alternatively, rigidly fixed rails or guards at least 42 inches (1.1 m) high shall be provided on the exposed side of the appliance. Parapets or other parts of the building structure that are at least 42 inches (1.1 m) shall be permitted to be used in lieu of rails or guards.

3. All equipment requiring an external source of electrical power shall be provided with a readily accessible electrical disconnect that will completely de-energize the equipment. This disconnect shall be installed within sight of the equipment. All equipment requiring an external source of electrical power shall be provided with a 120-volt AC ground-type receptacle outlet that is located adjacent to the equipment. This receptacle outlet shall be connected to the supply side of the electrical disconnect.

4. Where water stands on the roof at the equipment or in the passageways leading to the equipment, or where the roof is of a water-sealed design, a suitable platform or walkway, or both, shall be provided above the water line. The platform or walkway shall be located adjacent to the equipment and the control panels so that equipment can be safely serviced.

5. Appliances located on roofs or other elevated platform shall be accessible.

(8) Preheating of Oil. Where preheating of oil is utilized, it shall be by an approved heater.

(9) Disposal of Flue Gases.

(a) General. All oil fired appliances other than direct-fired heaters, listed kerosene stoves, and listed portable kerosene heaters, shall be exhausted as described below.

527 CMR 4.04(9) recognizes that the choice of venting materials and methods of installation of venting systems are dependent on the operating characteristics of the oil burning appliance.

The operating characteristic of vented oil heating appliances can be categorized with respect to:

1. positive or negative pressure within the venting system; and

2. whether or not the equipment generates flue or vent gases which may condense in the venting system.

b. Chimneys and Chimney Connectors.

1. Masonry chimneys and metal chimneys (smokestacks) shall be built in accordance with 780 CMR: *the Massachusetts State Building Code*.

2. Factory built chimneys shall be listed and shall be installed and used in accordance with their listing and manufacturer's instructions.

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4.04: continued

3. Prior to installation of an oil burner or oil burning appliance, the chimney or venting system to which it is to be connected shall be examined by the installer and shown to be in good condition.
4. An appliance shall be placed so that the chimney connector will be as short as practicable. The horizontal length of a chimney connector for natural-draft burners shall not exceed ten feet. unless a draft booster is used. For appliances requiring a negative chimney draft, the chimney connector shall be no longer than 75% of the chimney above the chimney-connector inlet.
5. No chimney connector shall pass through any floor or ceiling.
6. No chimney connector of any medium - or - high-heat appliance shall pass through any combustible wall or partition. Chimney connectors of other appliances shall not pass through combustible walls or partitions unless they are guarded at the point of passage by (1) metal ventilated thimbles not less than 12 inches larger in diameter than the connector or (2) metal or burned fire clay thimbles built in brickwork or other approved fireproofing materials extending not less than eight inches beyond all sides of the thimble; or, in lieu of such protection, all combustible material in the wall or partition shall be cut away from the chimney connector a sufficient distance to provide the clearance required from such connector. Any material used to close up such opening shall be noncombustible insulating material.
7. A thimble shall be installed and extended through a chimney wall to the inner face or liner but not beyond. The thimble shall be permanently cemented in place to facilitate removal of the chimney connector for cleaning.
8. The chimney connector for its entire length shall be not smaller than the flue collar of the appliance unless otherwise recommended by the appliance or chimney manufacturer. The chimney connector throughout its entire length shall be readily accessible for inspection, cleaning, and replacement. The crimped end of all sections of smoke pipe shall be positioned in the outward direction of the exhaustion of flue gases.
9. The chimney connector shall be of steel or refractory masonry and shall be maintained in good condition.
10. The chimney connector shall maintain a pitch or rise of at least ¼ inch to the foot (6.3 mm to the 0.3 m) (horizontal length of pipe) from the appliance to the chimney.
11. The chimney connector shall be installed so as to avoid sharp turns or other construction features that would create excessive resistance to the flow of flue gases. No device which will obstruct the free flow of flue gases shall be installed in a chimney connector or chimney. This shall not be construed to prohibit the use of devices specifically listed for installation in a chimney connector such as heat reclaimers, automatic dampers, and safety controls.
12. The chimney connector shall be securely supported and joints fastened. Each section of smoke pipe shall be secured with at least three metal screws located not less than ½ inch from the point where the sections join.
13. Clearance from combustible construction or materials shall be in accordance with Table 4.04 1. except as permitted by 527 CMR 4.04(9)(b)6. and Table 4.04 2.
14. A connector shall not be connected to a chimney flue serving a fireplace unless the fireplace opening is sealed or the chimney flue that vents the fireplace is permanently sealed below the connection.
15. Connectors serving appliances operating under natural draft shall not be connected into any portion of a mechanical draft system operating under a positive pressure.
16. Connectors for appliances installed in attics shall be of a Type L vent material or the chimney shall be attached directly to the appliance.
17. Galvanized steel pipe connectors shall be constructed as described in 527 CMR 4.04: *Table 4.04 3*.

Table 4.04 3.

Diameter of Connector in Inches	**Min. Galvanized Sheet gage No.**	**Min. Thickness in Inches**
Less than 6	26	0.019
6 to 10	24	0.023
Over 10	22	0.029

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4.04: continued

(c) Type L Venting Systems.

1. Listed Type L venting systems may be employed with appliances listed as suitable for use with Type L venting systems.

2. Type L venting systems shall be installed and used in accordance with their listings and the manufacturer's instructions.

3. A Type L venting system shall be capable of producing a draft not less than that for which the appliance(s) connected thereto is listed and as recommended by the manufacturer of the appliance.

4. The flue-gas exit of a Type L venting system shall be at least two feet (0.6 m) above the highest point where it passes through the roof of a building and at least two feet (0. 6 m) higher than any portion of a building within ten feet (3 m) of such Type L venting system.

5. Vent connectors used with type L venting systems shall be installed the same as chimneys connectors in 527 CMR 4.04(9)(b).

(d) Power Vent Systems.

1. A power vent system shall consist of a power venter, vent hood (or a combination power vent hood), air pressure switch and post purge control. If the air pressure switch is of the adjustable type, a secondary safety control shall be required.

2. Power vent systems must be listed, labeled, approved and installed in accordance with their listings and manufacturers installation instructions.

3. When a separate power venter and vent hood is employed, the power venter shall be installed as close to the vent hood as possible.

4. All joints or connections on the outlet side or positive pressure side of the power venter shall be sealed with a high temperature sealant to prevent leakage of combustion gases into the building.

5. Power vent systems shall be of sufficient size and design capacity to adequately vent the maximum input capacity (Btu rating) of the oil burning appliance to be vented. It shall also satisfy the draft requirements of the oil burning appliance manufacturer.

6. The air pressure switch shall be wired according the manufacturer’s instructions to prevent the oil burner from operating when the power vent system is not operating properly.

7. The vent system shall terminate at least three feet above any forced air inlet located within ten feet. Exception: This provision shall not apply to the combustion air intake connected directly to the burner.

8. The venting system shall terminate at least four feet below, four feet horizontally from or one foot above any door, window or gravity air inlet of the structure. The outlet of the vent shall terminate at least 24 inches above grade.

9. The power vent system shall not terminate less than three feet from an inside corner of an L shaped structure or in accordance with the manufacturer's instructions.

10. The vent system shall not be mounted directly above or within three feet horizontally from an oil tank.

11. The vent system shall not terminate less than seven feet above normal grade when located next to public walkways.

12. The vent system shall not terminate under outside decks or porches.

13. The vent connector from the oil fired appliance to the power venter shall be installed according to the power vent systems listing and manufacturers installation instructions. In the absence of such listing, the vent connector shall be installed like a chimney connector in 527 CMR 4.04(9)(b).

14. The venting system will be as short as possible and not pass through any floor or ceiling and be pitched with an upward slope of ¼ inch per foot of linear run.

(e) Draft.

1. A chimney shall be capable of producing a draft not less than that for which the appliance connected thereto is listed and as recommended by the manufacturer of the appliance. To conform to this requirement, a draft booster may be used to increase low draft. When a draft booster is used, provision shall be made to shut off the fuel supply to the main burner in the event of failure of the draft booster.

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4.04: continued

2. Two or more oil-burning appliances may be connected to a single chimney provided sufficient draft is available for safe combustion in each appliance and all products of combustion are safely removed to the outdoors.

3. Where chimney-downdraft conditions cause faulty operation, thereby creating a hazard, corrective steps shall be taken.

(f) Draft Regulators.

1. A draft regulator shall be provided for each oil-fired appliance required to be connected to a chimney unless the appliance design, conditions of installation, or combinations thereof, preclude excessive chimney draft, or the appliance is listed for use without one.

2. A draft regulator, when used, shall be installed in the same room or enclosure as the appliance and in such a manner that no difference in pressure between the air in the vicinity external to the regulator and the combustion air supply will be permitted.

3. A manually operated damper shall not be placed in the chimney connector from an oil-fired appliance.

Exception: When two or more oil-fired appliances are connected to a common chimney, manual isolating dampers are allowed. When such dampers are used, they shall be interlocked to prevent burner operation unless the damper is in a safe position.

4. Automatically operated dampers shall be of approved type designed to maintain a safe damper opening at all times and arranged to prevent starting of the burner unless the damper is opened to a safe position.

5. Where the chimney connectors of two or more appliances requiring draft regulators are manifolded together, a draft regulator shall be installed in the connector of each appliance.

6. Fixed baffles may be installed in the appliance flue collar where they are specified by the appliance manufacturer and are securely fastened into position. Such baffles, when in a closed position, shall not block off more than 80% of the chimney connector area.

4.05: Oil Burners, Heavy Fuel Oil Type

(1) General. 527 CMR 4.04 shall apply to power burners or the heavy fuel oil type unless specifically deleted or modified in 527 CMR 4.05.

(2) Oil Pumps.

(a) An oil pump shall be of an approved type, secure against leaks and rigidly fastened in place.

(b) Pumps used in connection with the supply and discharge of outside, aboveground storage tanks shall be located outside of the embankments or dikes surrounding the tanks, and at such points that they will be accessible at all times, even if the oil in the tanks is on fire.

(3) Valves.

(a) Every fuel oil burner shall be equipped with a hand shut-off valve in the main oil supply line at or near the tank where the tank is located inside the building; and when the tank is located outside the building the valve shall be located in the oil supply line inside the building near the wall where such line enters the building.

(b) The hand shut-off valve mentioned in 527 CMR 4.05(3)(a) shall be a lever gate valve.

There shall be a weight attached to the end of the lever by means of a suitable wire, which weight shall be suspended, near the valve, by means of a second wire, which second wire shall be run through suitable pulleys terminating at a point near an outside window or approved glass-covered box, so that access can be made from the outside or the building to said wire for the purpose of closing the valve. Said wire shall have two fusible links one near the valve and one near the window or approved glass-covered box.

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(c) Outside the building, immediately adjacent to said window or approved glass-covered box, there shall be a metal sign bearing the words "oil shut-off".

(d) Where a shut-off valve is installed in the discharge line of an oil pump, an approved pressure relief valve shall be connected into the discharge line between the pump and the shut-off valve and so arranged as to return surplus oil to the storage tank or to by-pass it around the pump.

(e) A control valve shall be of an approved type, which shall be provided with a stuffing box of liberal size, containing a removable cupped gland designed to compress the packing against the valve stem and so arranged as to facilitate removal.

The valve shall be designed to close against the supply, and to prevent withdrawal of the stem by continued operation of the hand-wheel. Packing affected by the oil or heat shall not be used.

(4) Preheating of Oil. Where preheating of the oil is necessary, it shall be by steam, hot water or an approved electric heater. Heaters shall be substantially constructed; and all joints shall be made oil tight. Oil filled thermometers/gauges shall be installed at suitable locations to indicate the temperature of the heated oil.

A low oil temperature cut-off switch shall be provided to electrically interrupt the burner operation.

The temperature setting on this control shall be in accordance with the burner manufacturer's recommendations. Oil which has not been properly preheated shall be by-passed back to the pump supply. An adequate by-pass pressure relief valve shall be provided to prevent abnormal pressure in the system.

(5) Oil Burner Controls.

(a) In a fully automatic system where either steam or air is used for atomizing the oil, an approved pressure supervisory switch shall be installed to interrupt burner operation in event of loss of adequate pressures as recommended by burner manufacturer. An approved low oil pressure supervisory switch and an approved high oil pressure supervisory switch shall be installed in the oil supply line to interrupt burner operation in event of pressures exceeding those recommended by burner manufacturer.

(b) An electric motor driven, manual or semi-automatic oil burner with an integral oil pump, or an electric motor driven pump set for use with a manual or semi-automatic burner not equipped with an integral pump, shall be supplied with an approved motor controller incorporating power failure protection, wired into the power supply to the motor.

(c) A proven igniter or pilot flame must be used on all heavy oil burners.

1. The flame verification control shall prove the presence of an adequately sized and positioned pilot flame to safely and smoothly ignite the main fuel prior to allowing the main fuel valve to open. The time for trial for pilot proving shall be limited to a maximum of ten seconds.

The time for trial for main flame ignition, after pilot proving shall be limited to a maximum of 15 seconds. In the event of a flame failure once combustion is established, the oil supply shall be shut off to the burner within three seconds nominal. Any oil burner designed for compound or proportional firing rates shall be provided with an electrical interlock switch to prove that the burner is in the low fire position prior to allowing the ignition to be energized.

2. The responsible oil burner installer shall certify in writing to the head of the fire department that a pilot turn down test, a hot refractory hold-in test and spark ignition response test have been made prior to approval of installation.

3. The flame verification primary control and flame detectors used on all heavy burners shall incorporate a safe start component check.

In addition the flame verification primary control used on any burner with firing rate of more than 20 gallons per hour shall include provisions for a continuous circuit component check of the flame verification primary circuit and the flame detector throughout the flame proving period.

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4.05: continued

4. An approved combustion air supervisory switch shall be installed on motorized dampers to interrupt burner operation on a loss of adequate combustion air.

5. When used, induced and/or forced draft fans shall be electrically interlocked with motor starters of burner motors to prevent the burner operation when draft fans are not operating.

(d) Every manually-controlled oil burner and every semi-automatic oil burner which is usually lighted and extinguished manually must be equipped with all the safety devices outlined in 527 CMR 4.00.

(6) Electric Wiring and Equipment.

(a) All electric wiring and equipment in connection with fuel oil burners shall conform to 527 CMR 12.00: the *Massachusetts Electric Code*. All protective, control and emergency devices shall be series connected in the ungrounded line conductors.

(b) Electronic flame detector wires shall be of moisture resistance synthetic insulation in accordance with control manufacturer's recommendations. If lead sulfide cell detector is used, the electrical leads must be run in separate approved enclosure per manufacturer's instructions.

(c) An approved device to stop the flow of current through the live side of the line under conditions excessive room temperature shall be installed in the main power line at or adjacent to the heater.

(7) Installation.

(a) A smokepipe for a single boiler shall not be equipped with a manually-operated damper. Where there is more than one boiler equipped with oil burners, any smokepipe damper may be closed manually when said boiler is not in use, provided that said damper be weighted so that it shall normally be open, and provided further that said damper or damper arm be equipped with a mercury type or other approved switch is connected to the control circuit of the oil burner firing said boiler so that said oil burner cannot start until the damper attains an open or nearly open position.

(b) A room or other enclosure in which an oil burner is located shall be provided with an adequate air supply for continuous complete combustion of oil in 527 CMR 4.04(5)

Further, if all the air is drawn from outdoors by means of vertical ducts, each opening shall have a free area of not less than 35 square inches per gallon per hour of the total input rating of all appliances in the enclosure.

If horizontal ducts are used each opening shall have a free area of not less than 70 square inches per gallon per hour of the total input of all appliance in the enclosure.

4.06: Range Oil Burners

(1) General.

(a) The pertinent provisions of 527 CMR 4.03: *General Requirements*, shall apply to the installation of range oil burners.

(b) Only no. 1 Fuel Oil or Kerosene shall be used in a range oil burner.

(c) The use of gasoline or other volatile liquid for priming is prohibited.

(d) The range or stove shall be so elevated above the floor or insulated by a suitable hearth, as to preclude contact with woodwork, or other combustible material.

(e) Where electricity is available and the top of the storage tank is below the level of the oil burner base, oil may be delivered to the burner or burners by means of an approved automatic pump which discharges oil directly to a control chamber from which the oil flows by gravity to the burner or burners.

(f) When a hand pump is used to fill a gravity tank or a fixed vacuum feed type tank, a valve shall be so installed close as to the feed line to the burner so that no increase in pressure of the oil supply at the burner shall result when the pump is in use.

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(2) Tanks.

(a) A supply tank which is fixed in position on or is built into the range shall not have a capacity in excess of three gallons. Such a tank shall be substantially constructed and specifically approved for the purpose intended. Such a tank shall be filled only by means of an approved hand or electric pump equipped with a positive means to prevent overflowing or the tank.

(b) A glass or metal tank of the vacuum feed type shall not have a capacity in excess of three gallons.

A glass vacuum tank which is installed or replaced on or after January 1, 1948 shall be equipped with a substantial approved metal guard for protection against breakage.

A metal vacuum tank which is installed or replaced on or after January 1, 1948 shall be of not less than 24 U.S. gauge prime terne steel plate, with soldered double top and bottom seams and a soldered locked sideseam of material and construction approved as equivalent and shall be tested under not less than three pounds pressure under water before being coated or painted.

(c) The vacuum type tank shall be located at least two feet from the device in which the burner is installed; and shall only be so located that the temperature rise in the oil in such a tank is not excessive when the burner is operated at full capacity. Otherwise, such tanks shall be protected against the effects of heats with non-combustible material of at least one hour fire-resistive material properly supported.

(d) A supply tank shall be securely attached to non-combustible supports. A vacuum feed type supply tank shall be rigidly fastened to the floor or wall in such a manner as to minimize the possibility of mechanical injury due to accidental contact, jarring or vibration. The vacuum feed control unit shall be adjusted to the proper level for the burner and permanently fixed in place by the installer by means of a substantial bolt or rivet extending through both the control unit and the supporting standard, and headed over so as to prevent tampering. Such bolt or rivet shall be independent of and in addition to the set-screw supplied by the manufacturer.

(e) A supply tank shall be provided with a means of determining the oil level which will not involve the possible leakage of oil.

(3) Constant Level Control. An approved anti-flooding device, which is designed to maintain a constant level of oil at the burner and to prevent an abnormal discharge of oil, shall be installed between the supply tank and the burner. The anti-flooding device shall be adjusted to the proper level for the burner and permanently fixed in place by the installer.

(4) Piping and Tubing.

(a) Piping shall be standard wrought iron, steel or brass pipe with approved fittings or approved brass or copper tubing with approved fittings; and it shall be carefully protected against mechanical injury in a manner satisfactory to the head of the fire department. In all piping systems, proper allowance shall be made for expansion, contraction, jarring and vibration.

(b) All piping shall be separated from electrical wiring which is not enclosed in approved conduit, raceway or armor by some continuous and firmly fixed non-conductor which creates a permanent separation.

(c) Brass or copper tubing shall have a wall thickness of not less than 0.032 of an inch.

(d) The supply pipe to the burner shall not be less than ¼ inch iron pipe size unless approved brass or copper tubing is used in which case the tubing shall not be less than 5/16 of an inch outside diameter.

(e) Pipe connections to tanks shall be suitably reinforced and, in the installation of the connecting pipe or tubing, proper allowance shall be made for expansion, contraction, jarring and vibration; and, where necessary, suitable provisions shall be made for protection against mechanical injury.

(f) All connections shall be made perfectly tight with well fitted joints. Connections which are used at the burners shall be of a type to facilitate removal. Joint fittings shall be of an approved type.

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4.06: continued

(5) Valves.
(a) Valves shall be so installed as to be readily accessible.
(b) A shut-off valve shall be installed at the discharge side of an automatic pump and at the discard side of a gravity tank other than a vacuum type gravity tank.

(6) Installation.
(a) A burner shall be accurately leveled and rigidly secured in place within the combustion chamber of the stove or range.
(b) In order to insure positive bottom ventilation and an adequate air supply, the air-regulating device in the front of the stove or range shall be permanently fastened in the open position.
(c) When a range oil burner is placed in a range or stove originally designed for solid fuel, it shall not be installed until the flue passageways have been thoroughly cleaned to assure venting. Before installation, the walls of the combustion chamber of the stove or range shall be thoroughly inspected for cracks or other openings to other portions of the device, and the combustion chamber walls shall be made tight with no opening other than air supply and that leading to chimney uptake.
(d) Stoves and other similar appliances equipped with range oil burners having supply tanks of more that two gallon capacity shall be connected to suitable flues having sufficient draft at all times to assure safe operation of the burner. Manually-operated dampers shall only be used with sleeve-type burners. Such dampers, if used, shall be such that they cannot be closed more than 80% of the internal cross-sectional area of the smokepipe.
The use of manually-operated smokepipe dampers with pot-type burners is prohibited.
(e) A room or other enclosure in which an oil burner is located shall be provided with an adequate air supply for continuous combustion of oil as specified in 527 CMR 4.04(5).

4.07: Room Heaters, Water Heaters and Miscellaneous Oil Burning Equipment

(1) General.
(a) The pertinent provisions of 527 CMR 4.03: *General Requirements*, and 527 CMR 4.04: *Oil Burners, Light Fuel Oil Type*, shall apply to the installation, use and maintenance of such appliances.
(b) Only fuel oil as specified by the manufacturer shall be used in such appliances.
(c) The use of gasoline or other volatile liquid for priming is prohibited.
(d) Whenever such an appliance is placed in operation only the lighting device supplied by the manufacturer or designed for that purpose may be used.

(2) Installation.
(a) Such appliances shall be located in relation to adjacent combustible materials as to prevent scorching, charring or ignition thereof. Such appliances which are not provided with legs or some other means providing adequate base ventilation for the amount of heat generated in the device shall be set on suitable ventilated non-combustible foundations.
Such an appliance which is not provided with an integrally assembled drip pan shall be set upon a tray of sheet metal or other approved non-combustible material which, for a stove provided with an integrally mounted tank, shall extend 12 inches back of and on each side of the tank.
Such appliance shall be so installed or placed that combustible curtains, draperies or other fabric hangings may not come in contact with heated surfaces or other open flame.
Such an appliance shall be carefully leveled in accordance with manufacturer's instructions for installation, and such condition shall be maintained throughout its use.
Such appliances which are designed for use with separately supported supply tanks or which must be connected to suitable flues, shall be securely affixed to floors or otherwise secured in position in order to avoid strains on piping. Such an appliance shall not be located so as to obstruct in any manner a means of egress.

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(b) Any room in which a space heater is installed or located shall be protected by an approved smoke detector which will give adequate warning and be located as directed by the head of the fire department. If electrically operated, this shall be in addition to 527 CMR 4.04(4).

(c) Such appliances with supply tanks of more that two gallon capacity shall be connected to suitable flues having sufficient draft at all times to assure safe operation of the burner. Manually-Operated dampers shall only be used with sleeve-type burners. Such dampers, if used, shall be such that they cannot close more than 80% of the internal cross-section area of the smokepipe.

The use of manually-operated smokepipe dampers with pot-type burners is prohibited. Oil burning heaters commonly called salamanders, used for temporary heating purposes, may be installed without a flue provided such unit has the approval of the state fire marshal and is installed under such conditions as prescribed by the head of the fire department. (*See* 527 CMR 20.00).

4.08: Referenced Publications

Documents or portions thereof that are referenced within 527 CMR 4.00 shall be considered a part of the requirements of 527 CMR 4.00. Refer to 527 CMR 49.00 for a complete listing of all documents referenced in 527 CMR.

REGULATORY AUTHORITY

527 CMR 4.00: M.G.L. c. 148, § 10.

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