

CHAPTER V

INSTALLATION OF APPLIANCES FOR HEATING & COOLING

(Based on A.I.A. Code for Heat Producing Appliances and N.F.P.A. Bulletins)

501.00—LOW PRESSURE BOILERS

Mounting

(a) Low pressure boilers, except as provided in sections 501 (b) through 501 (f) shall be mounted on grade or on floors of fire-resistive construction with non-combustible flooring and 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 beyond the appliance on all sides, and where solid fuel is used, it shall extend not less than 18 inches at the front or side where ashes are removed. For clearances in tabular form see Table 1. Section 305.1 Chapter III.

(b) Low pressure boilers that are approved specially for installation on a floor constructed of combustible material may be mounted in accordance with the conditions of such approval.

(c) Low pressure boilers of the water-base type may be mounted on floors other than as specified in section 501 (a), provided the water chamber extends under the whole of the ash pit and the firebox, or under the whole of the firing chamber if there is no ash pit. If solid fuel is used see section 501 (g).

(d) Low pressure boilers which are set on legs that provide not less than 4 inches open space under the base of the appliance may be mounted on floors other than as specified in section 501.0 (g), provided the appliance is such that flame or hot gases do not come in contact with its base, and further provided the floor under the appliance is protected with asbestos millboard not less than $\frac{1}{4}$ of an inch thick covered with sheet metal of not less than 24 gauge. The above specified floor protection shall extend not less than 6 inches beyond the appliance on all sides, except that where the appliance is approved for a clearance of less than 6 inches to a combustible wall, the specified floor protection shall extend either to the wall or out for a distance of 6 inches whichever is the lesser distance. If solid fuel is used see section 501 (g).

(e) Low pressure boilers may be mounted on floors other than as specified in section 501 (a) provided the appliance is such that flame or hot gases do not come in contact with its base, and further provided the floor under the appliance is protected with hollow masonry not less than 4 inches thick covered with sheet metal of not less than 24 gauge. Such masonry shall be laid with ends unsealed and joints matched in such a way as to provide a free circulation of air from side to side through the masonry. If solid fuel is used see section 501 (g).

(f) Low pressure boilers which are arranged so that flame or hot gases come in contact with the base may be mounted on floors other than as specified in section 501.0 (a), provided the floor under the appliance is protected by two courses of 4-inch hollow masonry with courses laid at right angles and with ends unsealed and joints matched in such a way as to provide a free circulation of air through each masonry course. Such masonry shall be covered with steel plate not less than $\frac{3}{16}$ of an inch thick. If solid fuel is used see section 501 (g).

(g) In all cases where low pressure boilers burning solid fuel are mounted on floors other than as specified in Section 501 (a), the floor for not less than

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18 inches beyond the front of the appliance or side where ashes are removed shall be protected with asbestos millboard not less than $\frac{1}{4}$ of an inch thick covered with sheet metal of not less than 24 gauge, or with protection equivalent thereto.

SECTION 502—CENTRAL FURNACES (Residential Type)

Mounting.

(a) Central furnaces shall comply with the mounting provisions of section 501 except as provided in section 502 (b) and 502 (c). For clearances, see Table 1. Section 305.1 of Chapter III.

(b) Forced warm air furnaces may be mounted on floors other than as specified in section 502(a) provided they are so arranged that the fan chamber occupies the entire area beneath the firing chamber and forms a well ventilated air space between the firing chamber and the floor of not less than 18 inches beyond the front of the appliance or side where ashes are removed and the floor.

(c) Erection and Mounting.

A central heating boiler or furnace shall be erected in accordance with the manufacturer's instructions and shall be installed on a floor of fire-resistive construction with noncombustible flooring and 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 unless listed for installation on a combustible floor, or the floor is protected in an approved manner.

(d) Furnaces Used with Cooling Units.

Combination units in which a refrigeration coil is provided shall have the refrigeration coil located downstream from the heating furnace, unless the heating furnace is specifically approved for installation downstream from the coil, or the coil shall be located parallel to the heating furnace. When the heating furnace is located upstream from the coil, the coil shall be so designed or equipped as to not develop excessive temperatures or pressures. In those cases where the coil is located parallel to the heating furnace, dampers or other means used to control flow of air shall be adequate to prevent chilled air from entering the furnace section. If the dampers are manually operated means shall be provided to prevent operation of either unit unless the damper is in the full heat or cool position. Adequate means shall be provided for disposal of condensate to prevent dripping of condensate on the heating element.

Furnaces (including duct 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.

The capacity of the blower shall be adequate to overcome the external static resistance imposed by the combined heating and cooling units at the air flow required for heating or cooling, whichever is greater.

Furnaces or boilers installed in closets or small equipment rooms shall have top and bottom vent openings with adequate sized duct or louver or grille for outside air if oil or gas fired.

502.1—OUTDOOR INSTALLATIONS.

Central furnaces that have been tested by an approved testing agency for

outdoor installation only shall not be installed inside of a building. (UL, AGA, etc.)

503—ATTIC FURNACES.

Furnaces shall not be installed in attics unless they are of a type approved specifically for such installation.

SECTION 504—FLOOR FURNACES

504.1—INSTALLATION.

Floor furnaces shall not be installed in floors constructed of combustible material unless approved by UL or AGA specifically for such installation and installed in accordance with the conditions of such approval.

504.2—SUPPORT

The floor around the floor 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 grille.

504.3—LOCATION OF THERMOSTAT (For Floor Furnace)

A thermostat controlling a floor furnace shall not be located in a room or space which can be separated from the room or space in which the register of the floor furnace is located.

504.4—UPPER FLOOR INSTALLATION (Floor Furnace)

Floor furnaces shall not be installed in an upper floor of any building except that approved floor furnaces may be installed in upper floors, provided the furnace assembly projects below into a utility room, closet, garage or similar non-habitable space. In upper floor installations the furnace shall be enclosed completely (entirely separated from the non-habitable space) with means for air intake, with access facilities for servicing on the control side, with minimum furnace clearance of 6 inches to all sides and bottom, and with the enclosure constructed of portland cement plaster on metal lath, or material of equal fire resistance.

504.5—FIRST OR GROUND FLOOR INSTALLATION (Floor Furnace)

Approved floor furnaces installed in the first or ground floors of buildings shall be enclosed as specified for upper floor installations and shall project into a non-habitable space when the basements of these buildings have been converted to apartments or sleeping quarters.

504.6—PLACEMENT (Floor Furnace)

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

(b) The grille of the floor furnace with a horizontal warm air outlet shall not be placed closer than 6 inches to the nearest wall. A distance of at least 15 inches from two adjoining sides of the floor grille to walls shall be provided to eliminate the necessity of occupants walking over the warm air discharge from grilles. Wall register models shall not be placed closer than 6 inches to a corner.

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

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SECTION 505—ROOM HEATERS

12-2-78 505.1—MOUNTING

(a) Room heaters, except as provided in section 505.1(b) shall be mounted on floors or on floors of fire-resistive construction with noncombustible flooring and surface finish, 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 6 inches beyond the appliance on all sides, and where solid fuel is used shall extend not less than 18 inches at the front or side where ashes are removed.

(b) Room heaters that are approved specifically for installation on a floor constructed of combustible material may be mounted in accordance with the conditions of such approval.

(c) Room heaters which are set on legs or simulated legs that provide not less than 4 inches open space under the base of the appliance may be mounted on floors other than as specified in section 505.1 (a), provided the floor under the appliance is protected with sheet metal of not less than 24 gauge, or by other approved noncombustible material. Where solid fuel is used, the protection shall extend not less than 18 inches beyond the appliance at the front or side where ashes are removed. With radiating type gas burning room heaters which make use of metal, asbestos or ceramic material to direct radiation to the front of the device, the floor protection shall extend out at the front not less than 36 inches when the heater is not of a type approved for installation on a combustible floor.

(d) Room heaters which are set on legs that provide not less than 18 inches open space under the base of the appliance, or which have no burners within 18 inches of the floor, may be mounted on floors other than as specified in section 505.1 (a) without special floor protection, provided there is at least one sheet metal baffle between the burners and the floor.

(e) Residential type room heaters may be mounted on the floors other than as specified in section 505.1 (a) provided the floor under the appliance is protected with hollow masonry not less than 4 inches thick covered with sheet metal of not less than 25 gauge. Such masonry shall be laid with ends unsealed and joints matched in such a way as to provide a free circulation of air from side to side through the masonry. Where solid fuel is used, the floor for 18 inches beyond the front of the appliance or side where ashes are removed shall be protected with sheet metal of not less than 24 gauge, or with protection equivalent thereto.

505.2—IN SLEEPING QUARTERS AND IN INSTITUTIONAL OCCUPANCIES

(a) Room heaters, except approved electric type, shall be of the vented type, and shall be connected to an effective chimney or vent and equipped with an automatic pilot and equipped with a safety shut-off valve when:

- (1) Installed in sleeping quarters for use of transients, as in hotels, motels and auto courts.
- (2) Installed in institutions such as homes for the aged, sanitariums, convalescent homes and orphanages. (See Vol. I when Room Heaters are permitted.)

506.0—HEATING PANELS

Air chambers having one or more external surfaces designed for use as heating panels shall comply with the following:

Heating panels used with

(a) Automatically fired gas or oil burning forced warm air systems equipped with temperature limit controls that cannot be set above 200 deg. F.

(b) Or, forced warm air systems equipped with heat exchangers utilizing steam which cannot exceed 15 pounds gauge pressure or hot water which cannot exceed a temperature of 250 deg. F.

(c) Electric panels, see Appendix "B".

Connection—Heating panels shall be connected to supply and return air ducts conforming to this standard.

Construction

(a) Where warm air supply is from a warm air furnace, heating panels shall be enclosed on all sides with material which is wholly noncombustible or which possesses a flame spread classification of not over 20 as determined in accordance with the Method of Test of Surface Burning Characteristics of Building Materials, NFPA No. 255, ASTM E84, UL 723. This enclosing material shall be securely attached to the building structure; joints and seams shall be substantially airtight. Braces and hangers inside the chamber shall be noncombustible.

(b) Where warm air supply is from a steam or hot water heat exchanger, heating panels shall either comply with par. above or shall be enclosed on all sides with material not more flammable than 1-inch (nominal) wood boards (Flame spread classification of 200). This enclosing material shall be securely attached to the building structure; joints and seams shall be substantially air tight. No single vertical heating panel shall serve more than one story.

507.0—WATER HEATERS

(a) Water heaters shall be mounted as provided in section 505.1 with clearances indicated if oil, or gas fired.

(b) **Connections.** All water heaters shall be connected in a manner to permit observation, maintenance, and servicing, *with factory installed safety relief valve* of the Pressure-Temperature ASME NB type, dip tube to withstand 400 deg. F to comply with the N.C. State Plumbing Code, and, if over 120 gallon capacity also comply with the N.C. Boiler Code and pass inspection and in an area provided with adequate openings available in floor or foundation wall to remove and replace the water heater.

(c) **Prohibited Installations.** Water heaters, with the exception of electric and those having sealed combustion systems, shall not be installed in bathrooms, bedrooms or any occupied rooms normally kept closed.

Single-faucet automatic instantaneous water heaters, as permitted under 501.2, NFPA 54, in addition to the above, shall not be installed in kitchen sections of light housekeeping rooms or rooms used by transients.

(d) **Location.** (For oil or gas fired)

Water heaters shall be located as close as practicable to the chimney or gas vent.

508.0—DOWN-FLOW SYSTEMS

General—Down-flow heating or air conditioning systems shall employ automatically operated heat pumps or oil, gas, or electric furnaces. Such heat pumps or furnaces shall be designed or equipped so that the outlet air temperature will not exceed 200 deg. F. Equipment shall be designed to prevent unsafe temperature in event of reverse flow. Listed oil, gas and electric

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down-flow furnaces, and down-flow air conditioning units incorporating heating function conform to this requirement. Air conditioning units which do not incorporate heating need not be listed specifically for down-flow application.

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.

Downflow type central furnaces shall not be mounted on floors other than specified in section 501 (a) unless the appliance rests upon hollow masonry not less than 4 inches thick. Such masonry units shall be laid with ends unsealed and joints matched in such a manner as to allow circulation of air through the masonry. Downflow furnaces that are approved specifically for installation on a floor constructed of combustible material may be mounted in accordance with the conditions of such approval. Downflow furnaces 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 space below the floor can travel to the room above.

Furnaces, boilers or other heat-producing appliances shall not be installed in such a supply plenum.

509.0—RESIDENTIAL TYPE INCINERATORS

509.1—MOUNTING

(a) Residential type incinerators, except as provided in sections 305.9(b) through 305.9(c) shall be mounted 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 beyond the incinerator base on all sides, except that at the front or side where ashes are removed.

(b) Residential type incinerators that are specifically approved for installation on a combustible floor may be mounted in accordance with the conditions of such approval.

(c) Residential type incinerators may be mounted on floors other than as specified in section 509 (a) provided the incinerator is so arranged that flame or hot gases do not come with its base, and further provided the floor under the incinerator is protected with hollow masonry not less than 4 inches in thickness, covered with sheet metal of not less than 24 U. S. gauge. Such masonry course shall be laid with ends unsealed and joints matched in such a way as to provide a free circulation of air from side to side through the masonry. The floor for 18 inches beyond the front of the incinerator or side where ashes are removed and 12 in. beyond all other sides of the incinerator shall be protected with not less than ¼-inch asbestos millboard covered with sheet metal of not less than No. 24 gauge or with protection equivalent thereto.

(d) Residential type incinerators which are set on legs that provide not less than 4 inches open space under the base of the appliance may be mounted on floors other than as specified in section 509.1(a) provided the appliance is such that flame or hot gases do not come in contact with its base, and further provided the floor under the appliance is protected with asbestos millboard not less than ¼ of an inch thick covered with sheet metal or not less than 24 U.S. gauge. The above specified floor protection shall extend not less than 18 inches beyond the front of the incinerator or side where ashes are removed and 12 inches beyond all other sides of the incinerator.

509.4—CHIMNEY CONNECTORS

(a) Residential type incinerator chimney connectors, except as provided in section 509.4(b) shall be installed to provide clearance of not less than 18 inches to combustible material.

(b) Residential type incinerator chimney connectors may be installed in rooms, but not in confined spaces such as alcoves, with reduced clearances to combustible material provided the combustible material is protected as described in Table 2.

(c) Residential type incinerator chimney connectors shall not pass through any combustible wall or partition unless protected at the point of passage.

(d) Residential type incinerator chimney connectors shall not pass through any floor or ceiling.

509.5—GAS BURNER CONNECTIONS

Where a gas burner is used, a shut-off cock shall be provided at an accessible location in the gas line to the burner. Incinerators for use with liquefied petroleum gas and those furnished with means for automatic ignition of the gas at the main burner shall be equipped with a device which will automatically shut off the main gas supply in the event the means of ignition becomes inoperative, or the means of keeping the valve of the device open becomes inoperative, or both. Where liquefied petroleum gas is used, the arrangement shall be such as to shut off the gas supply to the pilot burner also.

509.6—REFUSE CHUTES

Refuse chutes shall not feed directly into incinerators.

SECTION 510—RESIDENTIAL TYPE WALL FURNACES

510.1—INSTALLATION

(a) Wall furnaces shall not be installed in or attached to walls, partitions, floors or ceilings constructed of combustible material unless approved specifically for such installation and installed in accordance with the conditions of such approval.

(b) Wall furnaces shall be so located as not to cause a fire hazard to walls, floors, curtains, furniture and doors. The face of a warm air register shall be not less than 36 inches from any wall or combustible surface directly opposite the register. Wall furnaces installed between bathrooms and adjoining rooms shall not circulate air from bathrooms to other parts of the building.

(c) Panels, grilles and access doors which must be removed for normal servicing operations of wall furnaces shall not be attached to the building.

(d) Wall furnaces shall not be provided with duct extensions beyond the vertical and horizontal limits of the casing proper, except that boots not to exceed 10 inches beyond the horizontal limits of the casing for extension through walls of nominal thickness may be permitted. When such boots are provided, they shall be supplied by the manufacturer as an integral part of the appliance.

(e) Adequate air for combustion from the outside and circulating air shall be provided. See Chapter XVI.

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SECTION 511—FACTORY-BUILT FIREPLACES AND FIREPLACE STOVES.

511.1—FACTORY-BUILT FIREPLACES

(a) Factory-built fireplaces shall be approved as a result of tests and listing by a nationally recognized testing laboratory such as UL or AGA. They consist of a fire chamber assembly, one or more chimney sections, a roof assembly and other parts as designated in the listing and on the fireplace label.

(b) Factory-built fireplaces shall be installed in accordance with the conditions of approval and the fire chamber assembly may be installed directly upon and adjacent to combustible building materials.

(c) The chimney sections are to be installed to provide clearance to combustible material not less than that specified with the conditions of approval. Portions of the chimney which extend through spaces used for living quarters or for storage, such as closets, are to be enclosed to avoid personal contact, contact of combustible material, and damage to the chimney.

(d) Hearth extensions for approved factory-built fireplaces shall not be less than 3/8 inch thick asbestos, hollow metal, stone, tile or other approved non-combustible material. Such hearth extensions may be placed on combustible subflooring or finish flooring. The hearth extension shall be readily distinguished from the surrounding floor.

(e) Hearth extensions for approved factory-built fireplaces shall extend not less than 16 inches in front of and at least 8 inches beyond each side of the fireplace opening.

(f) Where an approved factory-built fireplace is elevated or overhangs a floor, combustible floors shall be protected with material meeting the requirements of Section 511.1(d).

511.2—FACTORY-BUILT FIREPLACE STOVES

a. Factory-built fireplace stoves shall be approved as a result of tests and listing by a nationally recognized testing laboratory, AGA or UL.

b. Factory-built fireplace stoves shall be installed in accordance with the conditions of approval and with clearances not less than set forth in the listing.

c. Factory-built fireplace stoves may be installed on floors constructed of combustible material if the floor is protected with a covering meeting the requirements of Section 511.1(d) and extending over an arc at least 16 inches beyond the front and 8 inches beyond each side of the front opening.

SECTION 512—AIR CONDITIONING APPLIANCES AND HEAT PUMPS

**512.1—REFERENCES—See Chapter VI Duct Systems
Chapter XVII Comfort Cooling
Chapter XVIII Absorption Units. . . .
Chapter XIX Refrigeration**

512.2—INSTALLATION

4-11-74 a. Air conditioning shall be ^{installed} ~~insatllled~~ in accordance with sections 501.0 and 305.1 except as provided in sections 512.2.b through 512.2.d.

b. Heat pumps shall not be installed in or attached to walls, partitions, floors or ceilings constructed ^{of} ~~or~~ combustible material unless approved specifically for such installation and installed in accordance with the conditions of such approval.

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c. Equipment involving electric resistance heating shall not be installed in an attic or in a space in the building construction used as a supply or return plenum unless specifically approved for this use. Cooling units or heat pumps shall not be installed in such a supply or return plenum unless specifically approved for such use. Such units or equipment shall be installed in accordance with the conditions of such approval. The use of attic or building construction space shall comply with section 605.0.

When supply or return plenum spaces between a ceiling and a deck, floor or roof are to be heated or cooled with equipment located in the plenum, only equipment and wiring methods specifically listed and approved for this purpose and in harmony with the National Electric Code shall be used; and with approval obtained from the authorities having jurisdiction. No direct fired equipment shall be installed in plenum spaces.

d. Heat pump systems involving units or equipment installed in attics or in a space in the building construction used as a supply or return plenum, shall conform to the appropriate provisions of Section 605.0. *-165°F MAX. Temperature*

e. Central furnaces with cooling units (mechanical) that have been tested by an approved testing agency for outdoor installation only shall not be installed inside of a building, AGA or UL.

512.3—REFRIGERATION COILS WITH CENTRAL FURNACES

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

b. Furnaces shall not be located upstream from cooling units unless the cooling unit is designed or equipped so as not to develop excessive temperature or pressure.

c. Refrigeration coils shall be installed in parallel with or on the downstream side of central furnaces to avoid condensation in the heating element unless the furnace has been specifically listed for downstream installation. With a parallel flow arrangement, the dampers or other means used to control flow of air shall be sufficiently tight to prevent any circulation of cooled air through the furnace.

d. Adequate means shall be provided for disposal of condensate and to prevent dripping of condensate on the heating element.

512.4—COOLING UNITS USED WITH HEATING BOILERS

a. Fired boilers, unless specifically stated when used in conjunction with refrigeration systems, shall be installed so that the chilled medium is piped in parallel with the heating boiler with appropriate valves to prevent the chilled medium from entering the heating boiler.

b. When hot water heating boilers are connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation, such boiler piping systems shall be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

SECTION 513—INDUSTRIAL TYPE LOW HEAT APPLIANCES

513.1—MAINTENANCE

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513.2—MOUNTING

a. Except as provided in sections 513.2.b through 513.2.e, low heat appliances developing temperatures below 600°F. in portions where substances or materials are heated, such as a building heating appliance for heating building spaces having a total volume exceeding 25,000 cubic feet except residential type appliances, a steam boiler operating at not over 50 pounds per square inch gauge pressure, commercial type clothes dryer, pressing machine boiler at any pressure, bake oven, candy furnace, stereotype furnace, and drying and curing appliance. Appliances otherwise classed as medium-heat appliances may be considered as low-heat appliances if not larger than 100 cubic feet in size.

b. Low heat appliances which are approved specifically for installation on a floor constructed of combustible material may be mounted in accordance with the conditions of such approval.

c. Low heat appliances which are set on legs that provide not less than 18 inches open space under the base of the appliance may be mounted on floors other than as specified in section 513.2(a) provided there is at least one sheet metal baffle between any burners and the floor and further provided the appliance is so arranged that flame or hot gases do not come in contact with its base. Where solid fuel is used, see section 513.2(f).

d. Low heat appliances which are set on legs that provide not less than 4 inches open space under the base of the appliance may be mounted on floors other than as specified in section 513.2(a) provided the appliance is so arranged that flame or hot gases do not come in contact with its base, and further provided the floor under the appliance is protected with hollow masonry not less than 4 inches thick covered with sheet metal of not less than 24 gauge. Such masonry shall be laid with ends unsealed and joints matched in such a way to provide a free circulation of air from the side through the masonry. Where solid fuel is used, see section 513.2(f).

e. Low heat appliances may be mounted on floors other than as specified in section 513.2.a, provided the floor under the appliance is protected by two courses of 4-inch hollow masonry that are laid at right angles and with ends unsealed and joints matched in such a way as to provide a free circulation of air through such masonry courses. Such masonry shall be covered with a steel plate not less than 3/16 of an inch thick. Where solid fuel is used, see section 513.2(f).

f. In all cases where low-heat industrial appliances burning solid fuel are mounted on floors other than as specified in section 513.2(a), the floor for 18 inches beyond the front of the appliance or side where ashes are removed shall be protected with asbestos millboard not less than 1/4 of an inch thick covered with sheet metal not less than 24 gauge, or with protection equivalent thereto.

SECTION 514.0—UNIT HEATERS

a. For Definitions, see Chapter III.

b. Suspended type, unit heaters shall be safely and adequately supported with due consideration to their weight and vibration characteristics. Hangers, brackets and other such supports shall be of noncombustible material.

c. Suspended type unit heaters, except as provided in this section (d) and (e) shall be installed to provide a clearance in any direction to combustible material of not less than that shown in Table 1, Section 305.1, Chapter III.

d. Suspended type unit heaters that are approved specifically for installation with lesser clearances than specified in paragraph (c) above, may be installed in accordance with the conditions of such approval.

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e. Suspended type unit heaters and their connectors may be installed with lesser clearances to combustible material, provided the combustible material is protected as described in Table 2, Section 305.1 Chapter III.

f. Suspended type unit heaters shall not be attached to a warm air duct system unless approved specifically for such installation and installed in accordance with the conditions of such approval.

SECTION 515.0—RESTAURANT TYPE COOKING EQUIPMENT

515.1—FOR DEFINITIONS, see Chapter III.

515.2—MOUNTING

a. Floor mounted restaurant type cooking equipment, except as provided in the next paragraphs 515.2(b) through 515.2(g) shall be mounted on floors of fire resistive construction with noncombustible flooring and surface finish and with noncombustible material against the under side thereof or on fire resistive slabs or arches having noncombustible material against the under-side thereof. Such construction shall in all cases extend not less than 12 inches beyond the appliance on all sides.

b. Floor mounted restaurant type cooking equipment that is approved specifically for installation on a floor constructed of combustible material may be mounted in accordance with the conditions of such approval.

c. Gas burning floor mounted restaurant type cooking equipment that is designed and marked "For use only in fire-resistive locations" shall be mounted only in accordance with section 515.2.a.

d. Floor mounted restaurant type cooking equipment which is set on legs that provide not less than 18 inches open space under the base of the appliance, or which has no burners and no portion of any oven or broiler within 18 inches of the floor may be mounted on floors other than as specified in section 515.2.a, provided there is at least one sheet metal baffle between the burners and the floor. If solid fuel is used, see section 515.2.h.

e. Floor mounted restaurant type cooking equipment which is set on legs that provide not less than 4 inches open space under the base of the appliance may be mounted on floors other than as specified in section 515.2.a provided the floor under the appliance is protected with asbestos millboard not less than $\frac{3}{8}$ of an inch thick covered with sheet metal of not less than 24 gauge. The above specified floor protection shall extend not less than 6 inches beyond the appliance on all sides. If solid fuel is used, see section 515.2.h.

f. Floor mounted restaurant type cooking equipment which is set on legs that provide not less than 4 inches open space under the base of the appliance may be mounted on floors other than as specified in section 515.2.a, provided the floor under the appliance is protected with hollow masonry not less than 4 inches thick covered with sheet metal of not less than 24 gauge. Such masonry shall be laid with ends unsealed and joints matched in such a way as to provide a free circulation of air through the masonry. If solid fuel is used, see section 515.2.h.

g. Floor mounted restaurant type cooking equipment may be mounted on floors other than as specified in section 515.2.a, provided the floor under the appliance is protected by two courses of 4-inch hollow masonry with courses laid at right angles and with ends unsealed and joints matched in such a way as to provide a free circulation of air through each masonry course. Such masonry shall be covered with a steel plate not less than $\frac{3}{16}$ of an inch thick. If solid fuel is used, see section 515.2.h.

h. In all cases where restaurant type cooking equipment burning solid fuel is mounted on floors other than specified in section 515.2.a, the floor for

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not less than 18 inches beyond the front of the appliance on the side where ashes are removed shall be protected with asbestos millboard not less than $\frac{1}{4}$ of an inch thick covered with sheet metal not less than 24 gauge, or with protection equivalent thereto.

515.3—CLEARANCES—Floor Mounted Restaurant type Cooking Equipment —See section 305 Chapter III.

515.4—MOUNTING OF COUNTER TYPE GAS BURNING APPLIANCES

a. Counter type appliances, except as provided in section 515.4.b, shall not be set on combustible material unless they have legs which provide not less than 4 inches of open space below the burners, and the combustible surface is protected with asbestos millboard at least $\frac{1}{4}$ of an inch thick covered with sheet metal of not less than 28 gauge, or with equivalent protection.

b. Counter type appliances that are approved specifically for mounting on combustible material shall be set on their own legs or bases and may be mounted in accordance with the conditions of such approval.

515.5—FOR CLEARANCES, See Section 305, Chapter II for counter type gas appliances.

515.6—MOUNTING AND CLEARANCES FOR PORTABLE BAKING AND ROASTING OVENS.

a. Portable baking and roasting ovens shall be mounted in accordance with the requirements for residential type heating and cooking appliances as listed by UL.

b. Portable baking and roasting ovens shall be installed to provide clearances to combustible material in accordance with Chapter III and their listing.

SECTION 516—INDUSTRIAL TYPE MEDIUM-HEAT APPLIANCES

516.1—DEFINITION. See chapter III

516.2—MOUNTING

a. Except as provided in section 516.2.b, medium heat appliances shall be mounted on the ground or on floors of fire-resistive construction with non-combustible flooring and 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 3 feet beyond the appliance on all sides, and where solid fuel is used, it shall extend not less than 8 feet at the front or side where ashes are removed.

b. Medium heat appliances which are set on legs that provide not less than 24 inches open space under the base of the appliance may be mounted on floors other than as specified in section 516.2(a), provided the floor under the appliance is protected with hollow masonry not less than 4 inches thick covered with sheet metal of not less than 24 gauge.

516.3—FOR CLEARANCES, see Section 305.28 Chapter III

516.4—VENTILATION, & COMBUSTION AIR

Rooms containing medium heat appliances shall be provided with means of ventilation adequate to prevent accumulation of hot air over the appliance,

and proper quantities of outside air for combustion. See Ventilation, Chapt. XVI.

SECTION 517—FLUE-FED INCINERATORS (Apartment House Type)

517.1—DEFINITION. See chapter III

517.2—COMBUSTION CHAMBERS

a. Enclosing walls of combustion chambers having a horizontal combined hearth and grate area of 7 square feet or less shall be constructed of clay or shale brickwork not less than 4 inches thick with a lining of fire brick not less than 4½ inches thick, or of construction equivalent thereto.

b. Enclosing walls of combustion chambers having a horizontal combined hearth and grate area exceeding 7 square feet shall be constructed of clay or shale brickwork not less than 8 inches thick and 4½ inches of fire brick as a lining with a space between the clay or shale brickwork and the fire brick lining sufficient to provide for expansion and contraction, or of construction equivalent thereto.

c. Fire brick shall be laid in high temperature cement or fire clay mortar. All common brickwork shall be laid with full, push-filled, cross and bed mortar joints.

d. No metal stays, lintels not part of a door frame casting, or other supports shall be exposed to the interior of the furnace or the products of combustion where auxiliary fuel is provided or where the incinerator is designed for operation at or above 1,000°F.

517.3—SERVICE OPENINGS TO INCINERATORS.

a. The daylight area of each service opening shall be limited to one-third of the cross-sectional area of the flue, except that in one family dwellings, the service opening may be one-half the cross-sectional area of the flue. Where the flue area exceeds 22 by 22 inches, no service opening shall be used that has an area in excess of 160 square inches.

b. All service openings into an incinerator flue shall be provided with a hopper or other charging device constructed of metal of sufficient thickness and durability to prevent cracking, breakage or deformation in normal use. Such hopper or other charging device shall be firmly built into the masonry and shall be so designed and installed that no part will project into the flue and that the opening the the flue interior will be closed off while the service opening (hopper) door is fully open. The hopper or other device shall be counterweighted or otherwise devised so that it will close automatically upon release and be so constructed as to be tightly fitted when in the closed position.

c. No service opening shall be installed in any part of the combustion zone of an incinerator.

517.4—MOUNTING

Flue-fed incinerators shall be set on proper foundations on the ground or on fire-resistive floors with no combustible material on the underside thereof.

517.5—FOR CLEARANCES, See Chapter III Sect. 305

517.6—INCINERATOR ROOMS

a. Incinerators in which the combined hearth and grate area of the combustion chamber exceeds 7 square feet shall be enclosed within a room sepa-

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rated from other parts of the building by walls, and floor and ceiling assemblies constructed of noncombustible material and having a fire resistance rating of not less than 2 hours.

b. Door or other openings in rooms containing incinerators communicating with other areas of the building shall be protected by approved self-closing or automatic fire doors suitable for Class B situations.

c. Ducts extending from an incinerator room through other parts of a building shall be constructed and protected in accordance with Section 602.0 Chapter VI.

517.7—SPARK ARRESTERS, EXPANSION CHAMBERS

All flues shall terminate in a substantially constructed spark arrester with openings not greater than $\frac{1}{2}$ of an inch, or be provided with other suitable means for avoiding discharge of fly particles. Expansion chambers used as a secondary combustion chamber shall be constructed equivalent to that of the incinerator combustion chamber, section 517.2. Expansion chambers that are used only for settling shall be of construction equivalent to that of the upper portion of incinerator flue, and a clearance of not less than 2 inches from the chamber to combustible construction shall be provided. Expansion chambers shall be provided with substantial noncombustible supports. Every expansion chamber shall have a vent of cross-sectional area at least equal to that of the flue.

517.8—PROVISIONS FOR AUXILIARY FUEL

Where a gas burner is used, a shut-off cock shall be provided at an accessible location in the gas line to the burner. Incinerators for use with liquefied petroleum gas, those having an input of more than 50,000 Btu per hour and those furnished with means for automatic ignition of the gas at the main burner shall be equipped with a device which will automatically shut off the main gas supply in the event the means of ignition becomes inoperative, or the means of keeping the valve of the device open becomes inoperative, or both. Where liquefied petroleum gas is used, the arrangement shall be such as to shut off the gas supply to the pilot burner also. (See Chapt. IV for LP Gas and Chapt XIV on Gas Piping)

SECTION 518—COMMERCIAL AND INDUSTRIAL TYPE INCINERATORS

518.1—DEFINITION. See Chapter III

518.2—COMBUSTION CHAMBERS

a. Incinerators shall have the enclosing walls of combustion chambers constructed of clay or shale material not less than 8 inches thick with a lining of fire brick not less than $4\frac{1}{2}$ inches thick, or of construction equivalent in structural strength, in insulating value and in ability to withstand thermal expansion and flame impingement. Provision shall be made for expansion and contraction of fire brick.

b. Enclosing walls of incinerators shall be strongly braced and stayed with structural steel shapes designed to withstand interior thrusts and support door and appurtenant assemblies, except that intermittent duty incinerators not over 85 cubic feet in capacity and burning not over 165 pounds per hour need not have a steel frame if otherwise constructed to conform to section 518.2.a.

c. Fire brick shall be laid in high temperature cement or fire clay mortar. All common brickwork shall be laid with full, push-filled, cross and bed mortar joints.

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d. No metal stays, lintels or other supports shall be exposed to the interior of the combustion area.

e. Cast refractory combustion chambers may be used if installed in accordance with the recommendations of the manufacturer; or UL Listed.

518.3—CLEARANCES (See Chapt. III, Section 305.33)

518.4—INCINERATOR ROOMS.

a. Incinerators in which the combined hearth and grate area of the combustion chamber exceeds 7 square feet shall be enclosed within a room separated from other parts of the building by walls, and floor and ceiling assemblies constructed of noncombustible material and having a fire resistance rating of not less than two hours, with floor or earth or other noncombustible material. Openings to such rooms shall be protected by approved self-closing or automatic fire doors suitable for Class B situations.

b. Ducts extending from an incinerator room through other parts of a building shall be constructed and protected in accordance with section 602.0 Chapt. VI.

c. Incinerator room shall be provided with adequate air from outside for combustion air and ventilation. See Ventilation, Chapt. XVI.

518.5—REFUSE CHUTES, TERMINAL ROOMS OR BINS

a. Rubbish or refuse chutes other than charging chutes shall rest upon substantial noncombustible foundations. Enclosing walls of such chutes shall consist of clay or shale brickwork not less than 8 inches thick or of reinforced concrete not less than 6 inches thick. Such chutes shall extend at least 4 feet above the roof and be covered by a metal skylight glazed with thin plain glass.

b. Rubbish or refuse chutes shall terminate or discharge directly into a room or bin separated from the incinerator room and from other parts of the building by walls and floor and ceiling assemblies having a fire resistance rating equal to that specified for the chute. Openings to such rooms or bins shall be protected by approved self-closing or automatic fire doors suitable for Class B situations.

c. Each service opening in a rubbish or refuse chute shall be protected by an approved self-closing fire door suitable for Class B situations or an approved chute door. Every such service opening shall be enclosed in a room or compartment separated from other parts of the building by walls and floor and ceiling assemblies having a fire resistance rating of not less than one hour with openings to such a room or compartment protected by approved fire doors suitable for Class B situations.

518.6—CHARGING CHUTES AND ENCLOSURES

a. Where the combustion chamber of an incinerator is charged through the floor above such incinerator, the charging chute shall be constructed of not less than 12 gauge steel casing, lined with not less than 4½ inches of fire brick or equivalent refractory. Such charging chute shall not exceed 6 feet in length measured from the floor opening to the outside of the roof of the incinerator combustion chamber, unless approved means are provided to prevent the charging chute from discharging gases resulting from combustion into the charging room. When a top charging extension is provided, it shall be lined with refractory material not less than 4½ inches thick. The charging chute opening shall be protected by a cover extending beyond the edges of the opening for at least 2 inches on all sides, and lined with not less than 2½ inches of refractory material.

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b. Charging chute floor openings shall be located in a room with walls and floor and ceiling assemblies having a fire resistance rating of not less than two hours with openings protected by approved self-closing or automatic fire doors suitable for Class A situations, except that where the room is protected by an approved system of automatic sprinklers, the walls and floor and ceiling assemblies may have a fire resistance rating of not less than one hour and the door may be one approved for Class B situations.

Class A, B and C situations refer to occupancy.

Classifications as follows, and are mercantile occupancy:

Class A—30,000 sq. ft. or more, and 3 floors or more.

Class B—Less than 30,000, more than 3,000 and less than 3 floors.

Class C—3,000 sq. ft. or less, and street floor only.

(As per NFPA 101, Section 12-112, page 134 (1970).

For definition of Class A, B and C situations see NFPA 101, Section 13-112, page 134 (1970).

518.7—CHIMNEY CONNECTORS

a. The chimney connectors or breechings connecting incinerators to chimneys or flues, except as provided in section 518.7.b, shall be constructed of not lighter than 16 gauge steel when they are 12 inches or less in diameter or greatest dimension and of not lighter than 12 gauge steel when they exceed 12 inches in diameter or greatest dimension. In addition, they shall be lined with fire brick not less than 2½ inches thick, laid in high temperature cement or fire clay mortar when they are more than 12 inches but not in excess of 18 inches in diameter or greatest dimension, and with fire brick not less than 4½ inches thick when they are over 18 inches in diameter or greatest dimension. Cast refractory lining may be used.

b. Chimney connectors of incinerators specially constructed to produce low flue gas temperatures, and incinerator chimney connectors not over 10 inches in diameter and not over 8 feet long may be of flue tile properly supported and insulated, or of other suitable construction without fire brick lining where located entirely within the incinerator room.

c. Where incinerator chimney connectors or breechings lead into and combine with chimney connectors or breechings of other appliances such other chimney connectors shall also be lined from this point to the chimney as specified in section 518.7.a for incinerator flue connections, except that lining of this portion may be omitted where the cross-sectional area of such other chimney connector is at least equal to the area of the incinerator chimney connector or breeching and the combined breeching is large enough for full load conditions of both services and will carry flue gases at a temperature not higher than 900 F.

d. Clearance between incinerator chimney connectors or breechings and combustible construction, including plastered constructions having combustible supports, shall be not less than 36 inches. (See Chapt. VIII, section 804.0 and 807.0)

518.8—EXPANSION CHAMBERS AND SPARK ARRESTERS

Incinerators used for the burning of rubbish or other readily combustible solid waste material shall include effective means for arresting sparks and fly particles, such as an expansion chamber, baffle walls, or other effective arrangement, or the chimneys of such incinerators shall be provided with an approved spark arrester having openings not greater than ¾ of an inch.

SECTION 519—INDUSTRIAL TYPE HIGH-HEAT APPLIANCES

519.1—DEFINITION—See Chapter III

519.2—MOUNTING

Industrial type 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. Such floors shall extend not less than 10 feet beyond the appliance on all sides and not less than 30 feet at the front or side where hot products are removed.

519.3—CLEARANCES—(See Chapt. III, Section 305.34)

519.4—VENTILATION

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

SECTION 520—INSTALLATION OF OIL BURNERS AND OIL-FIRED UNITS

520.1—GENERAL REQUIREMENTS

a. Oil burners may be installed in boilers and furnaces. They may also be permitted by authorities having jurisdiction for use in firing ovens, water heaters, ranges, special furnaces and the like.

b. Where oil burners are installed in appliances originally designed for solid fuel, the ash door of the appliance shall be removed or bottom ventilation otherwise provided to prevent the accumulation of vapors in the ash pit, unless the ash pit is used as part of the combustion chamber.

c. Oil-fired appliances shall be installed in rooms that are large compared with the size of the appliances, unless they are specifically listed for installation otherwise. In no case shall an oil-fired unit be installed with less clearance from combustible material than that for which it is listed.

d. A suitable combustion chamber of firebrick, stainless steel, or other material as furnished by the manufacturer or specified in his installation instructions shall be employed.

e. Prior to installation of an oil burner, the furnace, boiler or appliance shall be examined and shown to be in good condition and repair and that the combustion chamber and flue gas passages are tight against leaks.

f. Provide sketches as per NFPA 31 Section 130.

520.2—POSTING OF INSTRUCTIONS

Complete instruction for the care and operation of the central heating appliances as furnished by the manufacturer shall be conspicuously posted near the equipment.

520.3—CONTROLS—See Chapter XII

520.4—CLEARANCES—See Chapt. III.

(6-8-76) Page 5-17—Add new Section 521 as follows:

Section 521—Foundation and Supports. (Heating and Cooling Equipment)

- A. A foundation shall be provided for outside heating and cooling equipment. It shall be of pre-cast or poured concrete, masonry units or approved prefabricated inorganic materials, or elevated structural steel on poured concrete or masonry blocks.
- B. In a crawl space, a minimum of 4" x 8" x 16" block or brick supports shall be installed under equipment. In an attic some other method of protection of combustible material subject to the inspector's approval shall be used. All masonry units shall be held in place with mortar. Below grade installations shall be provided with a natural drain or an automatic lift or sump pump. Formed concrete or approved prefabricated steel units are acceptable.
- C. When a warm air furnace, air conditioning equipment, automatic domestic water heater, steam boiler or water boiler is installed in a crawl space area where excavated, it is required that in order to prevent the crawl space floor from caving in around said equipment, there shall be a retaining wall of masonry units or concrete or the dirt shall be sloped to a 45 deg. angle so as to prevent caving in.
- D. When a warm air furnace or boilers are installed in a residential utility room, they shall be installed using one of the following methods:
 - 1. When using a sheet metal base, it shall be minimum 24 gauge metal properly designed to support the equipment.
 - 2. When using a structural steel base, it shall be of properly sized members to support equipment with riveted, bolted or welding joints.
 - 3. When using a masonry type base, it shall be of formed concrete or masonry units having mortar joints.

Note: Wood supports or base shall not be substituted for methods A, B, or C.
- E. Supports for roof mounted equipment shall be pressure treated lumber, structural steel, masonry or concrete, or approved prefabricated inorganic materials.
- F. Where conditions permit, equipment may be hung to floor system.
- G. Furnaces that are hung shall be supported by pipe, rod or structural steel of sufficient size to carry the load, or other hangers supplied by the manufacturer.