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Standard for

Chimneys, Fireplaces, and Vents

NFPA 211 — 1977

This edition of NFPA No. 211, adopted by the Association in November 1977, supersedes the edition of 1972. This edition represents a complete revision from the 1972 edition.

Origin and Development of NFPA 211

In 1906 the NFPA Committee on Chimneys and Flues presented its first report. In 1914, under the jurisdiction of the then Committee on Field Practice, recommendations on chimneys and flues were prepared as Chapter VII of the Field Practice Manual, presented in 1914 and adopted in 1915. In 1926 the Association adopted the Chimney Construction Ordinance of the National Board of Fire Underwriters. In 1944 the Association adopted Article XI of the 1943 Edition of the Building Code of the National Board of Fire Underwriters to supersede the former chimney ordinance. This action was taken by the Board of Directors in the name of the Association, on recommendation of the Committee on Field Practice.

In 1948 the subject of Chimneys and Flues was transferred to the Committee on Building Construction. In 1950 the Association adopted Article X of the 1949 National Building Code of the National Board of Fire Underwriters, to supersede the 1944 standard, upon recommendation of the Committee on Building Construction and action by the Board of Directors.

In 1955 the subject of chimneys and flues was transferred to the newly appointed Committee on Chimneys and Heating Equipment. The 1957 revision of No. 211 was to make the text consistent with the provisions on the same subject appearing in the National Building Code of the National Board of Fire Underwriters. Standard No. 211 was revised in 1961 and completely revised in 1964. The 1964 edition included requirements for chimney connectors which were previously covered in NFPA No. 212. This latter standard was withdrawn in 1964. Since 1964, revised editions of the standard have been adopted by the Association in 1966, 1968, 1970, 1971 and 1972. In 1969 new text was added to cover the subject of spark arresters which had been covered in NFPA Standard No. 213 but was withdrawn in 1969.

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Standard for
Chimneys, Fireplaces, and Vents

NFPA 211 — 1977

Chapter 1 General

1-1 Scope. This edition of NFPA 211 represents basic standards for chimneys, fireplaces, and venting systems, their safe installation and use. The standard applies to residential as well as commercial, and industrial applications.

1-2 Purpose.

1-2.1 All fuel-burning appliances, including fireplaces, produce products of combustion (waste gases) when in use. These waste gases must be safely and completely expelled to the outside atmosphere. The safe removal of these waste gases, the firesafe construction and installation of chimneys, fireplaces, and venting systems for residential, commercial, and industrial appliances are the primary concern of this standard.

1-2.2 Selection of a chimney or vent is dependent on the type of appliance connected thereto, the fuel used by the appliance and the temperature of the flue gases at the appliance outlet. This standard gives minimum construction and installation requirements for chimneys and vents suitable for use with appliances classified as residential type, building heating, low, medium and high heat appliances. Appendix A covers the selection of a chimney for various appliances. Appendix B covers the selection of a vent for certain appliances listed as suitable for use with such vents.

1-3 Definitions.

1-3.1 Combustible Material. Material made of or surfaced with wood, compressed paper, plant fibers, plastics, or other material that will ignite and burn, whether flameproofed or not, or whether plastered or unplastered.

1-3.2 Noncombustible Material. Material which will not ignite and burn, such materials consisting entirely of steel, iron, brick, tile, concrete, slate, asbestos, glass or plasters, or combination thereof.

1-3.3 Other definitions relating to chimneys, fireplaces, and venting systems are contained in the *Glossary of Terms Relating to Chimneys, Vents, and Heat-Producing Appliances*, NFPA 97M–1972.

Chapter 2 Draft, Termination, Factory-built Chimney Units and Liners

2-1 Draft.

2-1.1 A chimney or vent shall be capable of producing a draft at the appliance not less than that required for safe operation of the appliance(s) connected thereto in accordance with Chapter 26, Chimney, Gas Vent, and Fireplace Systems, of the 1975 Equipment Volume of the ASHRAE *Handbook*.

2-1.2 A mechanical draft system of either forced or induced draft design may be used to increase draft or capacity. When a mechanical draft system is installed, provision shall be made to prevent the flow of fuel to automatically fired appliance(s) when that system is not operating.

2-1.3 Chimneys serving incinerators, or other process equipment where the combustion process cannot be completely stopped by fuel shutoff alone, shall be sized for natural draft conditions. When air pollution control devices, or other devices, in the chimney system require a mechanical draft system, the chimney system shall be so arranged that upon a power failure the natural draft chimney alone can satisfactorily remove the products of combustion until the combustible material is completely consumed.

2-1.4 Forced draft systems and all portions of induced draft systems under positive pressure during operation shall be designed and installed so as to be gastight or as to prevent leakage of combustion products into a building.

2-2 Termination (height).

2-2.1 Chimneys and vents shall terminate above the roof level in accordance with the requirements of this standard. (*See also Appendix D.*)

Exception: As provided in 4-2.1 Exception, 6-3, and 6-6.

2-2.2 Natural draft chimneys and vents shall not terminate at an elevation less than 5 ft. (1.53 m) above the flue collar or highest connected draft hood outlet.

Exception: As provided in 6-6.

2-3 Factory-built Chimneys and Chimney Units.

2-3.1 Factory-built chimneys and chimney units shall be listed, and shall be installed in accordance with the temperature conditions of the listing and the manufacturer's instructions. Flue gas temperatures in the chimney shall not exceed the limits employed during listing tests.

2-3.2 Factory-built chimneys may be used for exhaust systems and ducting from hoods, industrial ovens, furnaces and process equipment of any temperature classification (*see Appendix A*) provided that the system is engineered so that gas temperatures and pressures do not exceed the applicable limit for the type of chimney.

2-3.3 Factory-built chimneys which pass through floors of buildings requiring the protection of vertical openings shall be enclosed with approved walls having a fire resistance rating of not less than 1 hour when such chimneys are located in a building less than 4 stories in height, and not less than 2 hours when such chimneys are located in a building 4 stories or more in height.

2-4 Flue Lining.

2-4.1 Castable or plastic refractories used to line chimneys or connectors shall be the equivalent in resistance to heat and erosion by flue gases to that of the firebrick which would otherwise be specified.

2-4.2 Lining made of castable or plastic refractories shall be secured to the supporting walls by anchors made of corrosion resistant steel capable of supporting the refractory load at 1500°F (816°C).

Chapter 3 Masonry Chimneys

3-1 General Requirements.

3-1.1 Support. Masonry chimneys shall be supported on properly designed foundations of masonry or reinforced portland or refractory cement concrete, or on noncombustible material having a fire resistance rating of not less than 3 hours provided such supports are independent of the building construction and the load is transferred to the ground.

3-1.2 Corbeling.

3-1.2.1 Masonry chimneys shall not be corbeled from a wall more than 6 inches (152 mm).

3-1.2.2 Masonry chimneys shall not be corbeled from a wall which is less than 12 inches (305 mm) in thickness.

Exception: When it projects equally on each side of the wall provided that in the second story of two-story dwellings corbeling of chimneys on the exterior of the enclosing walls may equal the wall thickness.

3-1.2.3 Corbeling shall not exceed one-inch (25.4 mm) projection for each course of brick projected.

3-1.3 Change in Size or Shape at Roof Not Permitted. A change in the size or shape of a chimney flue where the chimney passes through the roof shall not be made within a distance of 6 inches (152 mm) above or below the roof joists or rafters.

3-1.4 Cleanout Openings. Cleanout openings provided in chimneys shall be equipped with ferrous metal doors and frames arranged to remain tightly closed when not in use.

3-1.5 Firestopping. All spaces between chimneys and floors and ceilings through which chimneys pass shall be firestopped with noncombustible material. The firestopping of spaces between chimneys and wood joists, beams, or headers shall be to a depth of one inch (25.4 mm) only placed on strips of metal or metal lath laid across the spaces between combustible material and the chimney.

3-1.6 Smoke Test. Masonry chimneys shall be proved tight by a smoke test after erection and before being put into use.

3-2 Masonry Chimneys for Residential-type Appliances. (*See Appendix A.*)

3-2.1 Construction.

3-2.1.1 Masonry chimneys for residential-type appliances shall be constructed of solid masonry units or reinforced portland or refractory cement concrete with walls not less than 4 inches (102 mm) thick or rubble stone masonry not less than 12 inches (305 mm) thick. Masonry shall be laid with full, push-filled, cross and bed, mortar joints.

3-2.1.2 Masonry chimneys for residential-type appliances shall be lined with fire-clay flue lining (ASTM C315) or the equivalent not less than 5/8 of an inch (16 mm) thick, or with liner of other approved material that will resist corrosion, softening or cracking from flue gases at temperatures up to 1800°F (982°C).

3-2.1.3 Fire-clay flue liner shall be installed ahead of the construction of the chimney as it is carried up, carefully bedded one on the other in refractory mortar (ASTM C105, medium duty) or the equivalent, with close fitting joints left smooth on the inside.

3-2.1.4 Lining shall be separate from the chimney wall and the space between the liner and masonry shall not be filled; only enough mortar shall be used to make a good joint and hold the liners in position.

3-2.1.5 Flue lining shall start from a point not less than 8 inches (203 mm) below the lowest chimney connector entrance. The lining shall extend, as nearly vertically as possible, for the entire height of the chimney.

3-2.1.6 Where two adjoining flues in the same chimney are separated only by flue liners the joints of the adjacent flue liners shall be staggered at least 7 inches (178 mm).

3-2.1.7 Where more than two flues are located in the same chimney, masonry wythes (partitions) at least 4 inches (102 mm) wide and bonded into the masonry walls of the chimney shall be built at such points between adjacent flue linings that there are not more than two flues in any group of adjoining flues without such wythe separation.

3-2.2 Termination (height). Masonry chimneys for residential-type appliances shall extend at least 3 feet (.92 m) above the highest point where they pass through the roof of a building and at least 2 feet (.61 m) higher than any portion of a building within 10 feet (3.1 m). (*See Appendix D.*)

3-2.3 Clearance from Combustible Material.

3-2.3.1 All wood beams, joists and studs shall be trimmed away from chimneys. Headers, beams, joists and studs shall be not

less than 2 inches (51 mm) from the outside face of a chimney or from masonry enclosing a flue.

Exception: Ends of wood girders may be supported on a corbeled shelf of a masonry chimney provided there is not less than 8 inches (203 mm) of solid masonry between the ends and the flue liner.

3-2.3.2 Combustible lathing, furring, or plaster grounds shall not be placed against a chimney at any point more than 1½ inches (38 mm) from the corner of the chimney.

Exception No. 1: This requirement shall not prevent plastering directly on the masonry or on metal lath and metal furring.

Exception No. 2: This requirement shall not prevent placing chimneys for residential-type appliances entirely on the exterior of a building against the sheathing.

3-3 Masonry Chimneys for Low Heat Appliances.

3-3.1 Construction.

3-3.1.1 Masonry chimneys for low heat appliances shall be constructed of solid masonry units or reinforced portland or refractory cement concrete with walls not less than 8 inches (203 mm) thick or rubble stone masonry not less than 12 inches (305 mm) thick. Masonry shall be laid with full, push-filled, cross and bed, mortar joints.

3-3.1.2 Masonry chimneys for low heat appliances shall be lined with fire-clay flue lining (ASTM C315), or the equivalent, not less than ⅝ of an inch (16 mm) thick, or with liner of other approved material that will resist erosion, softening or cracking from flue gases at temperatures up to 1800°F (982°C).

3-3.1.3 Fire-clay flue liners shall be installed ahead of the construction of the chimney as it is carried up, carefully bedded one on the other in refractory mortar (ASTM C105, medium duty) or the equivalent, with close fitting joints left smooth on the inside.

3-3.1.4 Flue liners shall start from a point not less than 8 inches (203 mm) below the lowest chimney connector entrance. The lining shall extend, as nearly vertically as possible, for the entire height of the chimney.

3-3.1.5 Where two adjoining flues in the same chimney are separated only by flue liners, the joints of the adjacent flue liners shall be staggered at least 7 inches (178 mm).

3-3.1.6 Where more than two flues are located in the same chimney, masonry wythes (partitions) at least 4 inches (102 mm) wide and bonded into the masonry walls of the chimney shall be built at such points between adjacent flue linings that there are not more than two flues in any group of adjoining flues without such wythe separation.

3-3.2 Termination (height). Masonry chimneys for low-heat appliances shall extend at least 3 feet (.92 m) above the highest point where they pass through the roof of a building and at least 2 feet (.61 m) higher than any portion of a building within 10 feet (3.1 m). (*See Appendix D.*)

3-3.3 Clearance from Combustible Material.

3-3.3.1 All wood beams, joists and studs shall be trimmed away from chimneys. Headers, beams, joists and studs shall be not less than 2 inches (51 mm) from the outside face of a chimney or from masonry enclosing a flue.

3-3.3.2 Combustible lathing, furring, or plaster grounds shall not be placed against a chimney at any point more than 1½ inches (38 mm) from the corner of the chimney.

Exception No. 1: This requirement shall not prevent plastering directly on the masonry or on metal lath and metal furring.

Exception No. 2: This requirement shall not prevent placing chimneys for low heat appliances entirely on the exterior of a building against the sheathing.

3-4 Masonry Chimneys for Medium Heat Appliances.

3-4.1 Construction.

3-4.1.1 Masonry chimneys for medium heat appliances shall be constructed of solid masonry units or of reinforced portland or refractory cement concrete with walls not less than 8 inches (203 mm) thick or with stone masonry not less than 12 inches (305 mm) thick.

3-4.1.2 Masonry chimneys for medium heat appliances shall be lined with medium-duty fire brick (ASTM C64, Type F) or the equivalent, not less than 4½ inches (114 mm) thick laid on the 4½-inch (114-mm) bed in refractory mortar (ASTM C105, medium duty) or the equivalent.

3-4.1.3 The flue lining shall start 2 feet (.61 m) or more below the lowest chimney connector entrance and shall extend to a height of at least 25 feet (7.63 m) above the highest chimney connector entrance. Chimneys terminating 25 feet (7.63 m) or less above a chimney connector entrance shall be lined to the top.

3-4.2 Termination (height). Masonry chimneys for medium heat appliances shall extend not less than 10 feet (3.1 m) higher than any portion of any building within 25 feet (7.63 m).

3-4.3 Clearance from Combustible Material. A clearance of not less than 4 inches (102 mm) shall be provided between the exterior surfaces of a masonry chimney for medium heat appliances and combustible material.

3-5 Masonry Chimneys for High Heat Appliances.

3-5.1 Construction.

3-5.1.1 Masonry chimneys for high heat appliances shall be constructed with double walls of solid masonry units or reinforced portland or refractory cement concrete, each wall to be not less than 8 inches (203 mm) thick with an air space of not less than 2 inches (51 mm) between them.

3-5.1.2 The inside of the interior wall of masonry chimneys for medium heat appliances shall be lined with high-duty fire brick (ASTM C64, Type A) or the equivalent, not less than 4½ inches (114 mm) thick laid on the 4½-inch (114-mm) bed in refractory mortar (ASTM C105, high duty) or the equivalent.

3-5.1.3 The lining shall start at the base of the chimney and extend continuously to the top.

3-5.2 Termination (height). Masonry chimneys for high heat appliances shall extend not less than 20 feet (6.1 m) higher than any portion of any building within 50 feet (15.3 m).

3-5.3 Clearance from Combustible Material. Masonry chimneys for high heat appliances shall have sufficient clearance from buildings and structures to avoid overheating combustible material, to permit inspection, maintenance operations on the chimney and to avoid danger of burns to persons. Clearances shall be based on good engineering practice and acceptable to the authority having jurisdiction.

3-6 Masonry Chimneys for Incinerators.

3-6.1 Residential. Masonry chimneys for residential-type incinerators shall be constructed in accordance with the requirements for Masonry Chimneys for Residential-type Appliances, Section 3-2.

3-6.2 Chute-fed Incinerators. See *Standard on Incinerators, Waste and Linen Handling Systems and Equipment*, NFPA 82–1977.

3-6.3 Commercial and Industrial-type Incinerators.

3-6.3.1 Construction.

3-6.3.1.1 Masonry chimneys for commercial and industrial incinerators shall be constructed of solid masonry units or reinforced portland or refractory cement concrete with walls not less than 8 inches (203 mm) thick.

3-6.3.1.2 Masonry chimneys for commercial and industrial incinerators shall be lined with medium-duty fire brick (ASTM C64, Type F) or the equivalent, not less than 4½ inches (114 mm) thick laid on the 4½-inch (114-mm) bed in refractory mortar (ASTM C105, medium duty) or the equivalent.

3-6.3.1.3 The lining shall start at the base of the chimney and extend continuously to the top.

3-6.3.1.4 Masonry chimneys for commercial and industrial incinerators shall be supported on properly designed foundations of masonry or reinforced portland or refractory cement concrete or on noncombustible material having a fire resistance rating of not less than 3 hours provided such supports are independent of the building construction and the load is transferred to the ground.

Exception: Chimneys may be supported on incinerator walls if the incinerator foundation and walls are built to support the load thus imposed. They shall be so constructed as not to place excessive stress upon the roof of the combustion chamber.

3-6.3.2 Termination (height).

3-6.3.2.1 Masonry chimneys for commercial and industrial incinerators shall extend not less than 10 feet (3.1 m) higher than any portion of any building within 25 feet (7.63 m).

3-6.3.2.2 The terminus of the chimney flue for the incinerator shall be equipped with an approved spark arrester if the incinerator does not include effective means for arresting sparks and fly ash. (*See NFPA 82–1977.*)

3-6.3.3 Clearances. A clearance of not less than 4 inches (102 mm) shall be provided between the exterior surface of masonry chimneys for commercial and industrial-type incinerators and combustible materials.

Chapter 4 Metal Chimneys (Smokestacks)

4-1 General Requirements.

4-1.1 Single-wall metal chimneys or unlisted metal chimneys shall not be used inside one- and two-family dwellings.

4-1.2 Metal chimneys shall be constructed of steel or cast iron. Sheet steel shall have a thickness not less than that indicated in Table 4-1.2.

Table 4-1.2 Minimum Thickness of Sheet Steel Chimneys

Mfgr. Std. Gage No.	Min. Thickness inch (mm)	Area in^2/m^2	Equiv. Round Diam. inch/mm
16	.054 (1.37)	up to 154/.0994	up to 14/356
14	.069 (1.75)	155/.0999 to 201/.1296	over 14/356 to 16/406
12	.098 (2.49)	202/.1303 to 254/.1638	over 16/406 to 18/457
10	.128 (3.25)	Larger than 254/.1638	over 18/457

NOTE: Regardless of minimums in this table, the thickness of sheet metal shall be adequate to meet the requirements of 4-1.3.

4-1.3 Metal chimneys shall be properly riveted, welded or bolted, securely supported and constructed in accordance with good engineering practice as necessary for the following:

(a) Strength to resist stresses due to steady or gusting wind loads.

(b) Adequate anchoring, bracing, and inherent strength to withstand seismic and wind-induced vibrational stresses.

(c) Proper material thickness for durability considering fuel analysis, gas temperature, and exposure.

(d) Security against leakage of flue gases under positive pressure.

(e) Allowance for thermal expansion of breeching and vertical sections.

4-1.4 Metal chimneys shall not be used inside of ventilating ducts.

Exception: When such ducts are constructed and installed as required by this standard for chimneys and the ventilating ducts are used solely for exhaust of air from the room or space in which the appliance served by the metal chimney is located.

4-1.5 Metal chimneys shall have sufficient clearance from buildings and structures to avoid heating combustible material to a temperature in excess of 180°F (82.2°C) and to permit inspection and maintenance operations on the chimney. They shall be located or shielded to avoid danger of burns to persons.

4-1.6 Metal chimneys shall be supported on properly designed foundations of masonry or reinforced portland or refractory cement concrete or on noncombustible material having a fire resistance rating of not less than 3 hours provided such supports are independent of the building construction and the load is transferred to the ground.

A factory-built chimney, if so listed, and a metal chimney may be supported also at intervals by the building structure, in which case, expansion joints shall be provided at each support level. All joints shall be liquid tight or of a design such that liquid will drain to the interior of the chimney.

4-1.7 Metal chimneys serving residential-type or low heat appliances and producing flue gases having a temperature below 350°F (165.5°C) at the entrance to the chimney at full load or partial load shall be lined with acid and condensate resistant metal or refractory material, or constructed of suitable stainless steel, or otherwise protected so as to minimize or prevent condensation and corrosion damage.

4-2 Metal Chimneys for Residential-type or Low Heat Appliances.

4-2.1 Termination (height). Metal chimneys for residential-type or low heat appliances shall extend at least 3 feet (.92 m) above the highest point where they pass through the roof of a building and at least 2 feet (.61 m) higher than any portion of a building within 10 feet (3.1 m). (*See Appendix D.*)

Exception: The outlet of a metal chimney for residential-type and low heat appliances equipped with an exhauster may terminate at a location not less than 3 feet (.92 m) from an adjacent building or building opening and at least 10 feet (3.1 m) above grade or walkways. In any case, the outlet shall be so arranged that the flue gases are not directed so as to jeopardize people, overheat combustible structures, or enter building openings in the vicinity of the outlet.

4-2.2 Clearances.

4-2.2.1 Exterior.

4-2.2.1.1 Exterior metal chimneys used only for residential-type or low heat appliances as defined in Appendix A shall have a clearance of not less than 6 inches (152.4 mm) from a wall of wood frame construction and from any combustible material.

4-2.2.1.2 Exterior metal chimneys over 18 inches (457 mm) in diameter shall have a clearance of not less than 4 inches (102 mm) from a building wall of other than wood frame construction.

4-2.2.1.3 Exterior metal chimneys 18 inches (457 mm) or less in diameter shall have a clearance of not less than 2 inches (51 mm) from a building wall of other than wood frame construction.

4-2.2.1.4 A metal chimney erected on the exterior of a building shall not be installed nearer than 24 inches (610 mm) to any door or window or to any walkway.

Exception: The distance may be less than 24 inches (610 mm) when the chimney is insulated in an approved manner to avoid danger of burns to persons.

4-2.2.2 Interior.

4-2.2.2.1 Where a metal chimney extends through any story of a building above that in which the appliances connected to the chimney are installed, it shall be enclosed in such upper stories, within a continuous enclosure constructed of noncombustible materials (*see 1-3.2*). The enclosure shall comply with the following:

(a) The enclosure shall extend from the ceiling of the appliance room to or through the roof so as to maintain the integrity of the fire separations required by the applicable building code provisions.

(b) The enclosure walls shall have a fire resistance rating of not less than 1 hour if the building is less than 4 stories in height.

(c) The enclosure walls shall have a fire resistance rating of not less than 2 hours if the building is 4 stories or more in height.

(d) The enclosure shall provide a space on all sides of the chimney sufficient to permit inspection and repair, but in no case shall it be less than 12 inches (305 mm).

(e) The enclosing walls shall be without openings.

Exception: Doorways equipped with approved self-closing fire doors may be installed at various floor levels for inspection purposes.

4-2.2.2.2 Where a metal chimney serving only residential-type or low heat appliances as defined in Appendix A is located in

the same story of a building as that in which the appliances connected thereto are located, it shall have a clearance of not less than 18 inches (457 mm) from a wall of wood frame construction and from any combustible material.

4-2.2.2.3 Interior metal chimneys over 18 inches (457 mm) in diameter shall have a clearance of not less than 4 inches (102 mm) from a building wall of other than wood frame construction.

4-2.2.2.4 Interior metal chimneys 18 inches (457 mm) or less in diameter shall have a clearance of not less than 2 inches (51 mm) from a building wall of other than wood frame construction.

4-2.2.2.5 Where a metal chimney serving only residential-type or low heat appliances as defined in Appendix A passes through a roof constructed of combustible material, it shall be guarded by a ventilating thimble of galvanized steel or approved corrosion resistant metal, extending not less than 9 inches (229 mm) below and 9 inches (229 mm) above the roof construction, and of a size to provide not less than 6 inches (152 mm) clearance on all sides of the chimney.

Exception: In lieu of the above requirement, the combustible material in the roof construction may be cut away so as to provide not less than 18 inches (457 mm) clearance on all sides of the chimney, with any material used to close up such opening entirely noncombustible.

4-3 Metal Chimneys for Medium Heat Appliances.

4-3.1 Construction. Metal chimneys serving medium heat appliances as defined in Appendix A shall be lined with medium-duty fire brick (ASTM C64, Type F) or the equivalent laid in fire-clay mortar (ASTM C105, medium duty), or the equivalent.

4-3.1.1 The lining shall be at least 2½ inches (64 mm) thick for chimneys having a diameter or greatest cross-section dimension of 18 inches (457 mm) or less.

4-3.1.2 The lining shall have a thickness of not less than 4½ inches (114 mm) laid on the 4½-inch (114 mm) bed for chimneys having a diameter or greatest cross-section dimension greater than 18 inches (457 mm).

4-3.1.3 The lining shall start 2 feet (.61 m) or more below the lowest chimney connector entrance and shall extend to a height of at least 25 feet (7.6 m) above the highest chimney connector entrance. Chimneys terminating 25 feet (7.6 m) or less above a chimney connector entrance shall be lined to the top.

4-3.2 Termination (height). Metal chimneys for medium heat appliances shall extend not less than 10 feet (3.1 m) higher than any portion of any building within 25 feet (7.6 m).

4-3.3 Clearances.

4-3.3.1 Exterior.

4-3.3.1.1 Exterior metal chimneys used for medium heat appliances as defined in Appendix A shall have a clearance of not less than 24 inches (610 mm) from a wall of wood frame construction and from any combustible material.

4-3.3.1.2 Exterior metal chimneys over 18 inches (457 mm) in diameter shall have a clearance of not less than 4 inches (102 mm) from a building wall of other than wood frame construction.

4-3.3.1.3 Exterior metal chimneys 18 inches (457 mm) or less in diameter shall have a clearance of not less than 2 inches (51 mm) from a building wall of other than wood frame construction.

4-3.3.1.4 A metal chimney erected on the exterior of a building shall not be installed nearer than 24 inches (610 mm) to any door or window or to any walkway.

Exception: The distance may be less than 24 inches (610 mm) when the chimney is insulated or shielded in an approved manner to avoid danger of burns to persons.

4-3.3.2 Interior.

4-3.3.2.1 Where a metal chimney extends through any story of a building above that in which the appliances connected to the chimney are installed, it shall be enclosed in such upper stories, within a continuous enclosure constructed of noncombustible materials (*see 1-3.2*). The enclosure shall comply with the following:

(a) The enclosure shall extend from the ceiling of the appliance room to or through the roof so as to maintain the integrity of the fire separations required by the applicable building code provisions.

(b) The enclosure walls shall have a fire resistance rating of not less than 1 hour if the building is less than 4 stories in height.

(c) The enclosure walls shall have a fire resistance rating of not less than 2 hours if the building is 4 stories or more in height.

(d) The enclosing walls shall provide a space on all sides of the chimney to permit inspection and repair, but in no case shall it be less than 12 inches (305 mm).

(e) The enclosing walls shall be without openings.

Exception: Doorways equipped with approved self-closing 1½-hour fire doors may be installed at various floor levels for inspection purposes.

4-3.3.2.2 Where a metal chimney serving a medium heat appliance as defined in Appendix A passes through a roof constructed of combustible material, it shall be guarded by a ventilating thimble of galvanized steel or approved corrosion resistant metal, extending not less than 9 inches (229 mm) below and 9 inches (229 mm) above the roof construction, and of a size to provide not less than 18 inches (457 mm) clearance on all sides of the chimney.

4-3.3.2.3 Where a metal chimney serving medium heat appliances as defined in Appendix A is located in the same story of a building as that in which the appliances connected are located, it shall have a clearance of not less than 36 inches (914 mm) from a wall of wood frame construction and from any combustible material.

4-3.3.2.4 Interior metal chimneys over 18 inches (457 mm) in diameter shall have a clearance of not less than 4 inches (102 mm) from a building wall of other than wood frame construction.

4-3.3.2.5 Interior metal chimneys 18 inches (457 mm) or less in diameter shall have a clearance of not less than 2 inches (51 mm) from a building wall of other than wood frame construction.

4-4 Metal Chimneys for High Heat Appliances.

4-4.1 Construction. Metal chimneys for high heat appliances as defined in Appendix A shall be lined with high-duty fire brick (ASTM C64, Type A) or the equivalent, not less than 4½ inches (114 mm) thick laid on the 4½-inch (114 mm) bed in refractory mortar (ASTM C105, high duty) or the equivalent.

4-4.1.1 The lining shall start 2 feet (.61 m) or more below the lowest chimney connector entrance and shall extend to a height of at least 25 feet (7.6 m) above the highest chimney connector entrance. Chimneys terminating 25 feet (7.6 m) or less above a chimney connector entrance shall be lined to the top.

4-4.2 Termination (height). Metal chimneys for high heat appliances shall extend not less than 20 feet (6.1 m) higher than any portion of any building within 50 feet (15.3 m).

4-4.3 Clearance from Combustible Material. Metal chimneys for high heat appliances shall have sufficient clearance from buildings and structures to avoid heating combustible material

to a temperature in excess of 180°F (82.2°C) and to permit inspection, and maintenance operations on the chimney. They shall be located or shielded to avoid danger of burns to persons.

4-5 Metal Chimneys for Incinerators.

4-5.1 Residential-type Incinerators. Galvanized steel pipe not less than No. 20 galvanized-steel gage number or other equivalent noncombustible, fire- and corrosion-resistant material may be used for residential-type incinerators installed in locations such as open sheds, breezeways, or carports. The pipe shall comply with the following requirements.

4-5.1.1 The pipe shall be exposed and readily examinable for its full length.

4-5.1.2 Clearance not less than 18 inches (457 mm) shall be maintained from combustible material.

4-5.1.3 The pipe shall extend at least 3 feet (.92 m) above the highest point where it passes by or through a roof and at least 2 feet (.61 m) higher than any portion of a building within 10 feet (3.1 m).

4-5.1.4 If the pipe passes through a roof constructed of combustible material, it shall be guarded by a ventilating thimble of galvanized steel or approved corrosion resistant, noncombustible material extending not less than 9 inches (229 mm) below and 9 inches (229 mm) above the roof construction, and of a size to provide not less than 6-inch (152 mm) clearance on all sides of the pipe.

Exception: In lieu of the above requirement, the combustible material in the roof construction shall be cut away so as to provide not less than 18-inch (457 mm) clearance on all sides of the pipe, with any material used to close up such opening entirely noncombustible.

4-5.2 Commercial and Industrial-type Incinerators.

4-5.2.1 Construction.

4-5.2.1.1 Metal chimneys for commercial and industrial-type incinerators shall be lined with medium-duty fire brick (ASTM C64, Type F, or the equivalent), not less than 4½ inches (114 mm) thick laid on the 4½-inch (114 mm) bed in refractory mortar (ASTM C105, medium duty), or the equivalent.

4-5.2.1.2 The lining shall start at the base of the chimney and extend continuously to the top.

4-5.2.2 Termination (height).

4-5.2.2.1 Metal chimneys for commercial and industrial incinerators shall extend not less than 10 feet (3.1 m) higher than any portion of any building within 25 feet (7.6 m).

4-5.2.2.2 The terminus of the chimney flue for the incinerator shall be equipped with an approved spark arrester if the incinerator does not include effective means for arresting sparks and fly ash (*see NFPA 82–1977*).

4-5.2.3 Clearance. Metal chimneys for commercial and industrial incinerators shall be installed to provide clearances as specified in 4-3.3 for metal chimneys for medium heat appliances.

Chapter 5 Chimney Connectors and Vent Connectors

5-1 Connectors Required. Connectors shall be used to connect appliances to the vertical chimney or vent unless the chimney or vent is attached directly to the appliance.

5-2 Materials.

5-2.1 Connectors shall be made of noncombustible corrosion resistant material capable of withstanding the flue gas temperatures produced by the appliances and of sufficient thickness to withstand physical damage.

5-2.2 Connectors for residential-type appliances shall conform to the following requirements.

5-2.2.1 Appliances Installed in Attics.

5-2.2.1.1 Connectors for listed gas appliances having draft hoods and for appliances listed for use with Type B gas vents shall be of Type B or Type L vent material.

5-2.2.1.2 Connectors for oil appliances shall be of Type L vent or factory-built chimney material.

5-2.2.1.3 Appliances other than those covered in 5-2.2.1.1 and 5-2.2.1.2 shall have the chimney directly connected to the appliance. Connectors shall not be allowed.

Exception: Listed factory-built chimney material may be used to connect an appliance to the chimney.

5-2.2.2 Appliances Not Installed in Attics.

5-2.2.2.1 Connectors for listed gas appliances and appliances equipped with a listed gas burner and draft hood shall be of Type B or Type L vent material or metal pipe having resistance to corrosion and heat not less than .016-in/0.406 mm (28 gage) galvanized steel.

5-2.2.3 Connectors for oil appliances, solid fuel burning appliances, domestic-type incinerators and gas appliances other than those in 5-2.2.1 and 5-2.2.2 shall be of factory-built chimney material, Type L vent material or steel pipe having resistance to corrosion and heat not less than that of galvanized pipe specified in Table 5-2.2.3.

5-2.3 Connectors for low heat appliances shall be of listed factory-built chimney material or of steel pipe having resistance to corrosion and heat not less than that of galvanized pipe specified in Table 5-2.2.3.

Table 5-2.2.3 Metal Thickness for Galvanized Steel Pipe Connectors

Diameter of Connector, inches/mm	Galvanized Steel Gage No.	Min. Thickness inch (mm)
less than 6/152	26	.019 (.483)
6/152 to less than 10/254	24	.024 (.610)
10/254 to 12/305	22	.030 (.762)
14/356 to 16/406	20	.036 (.914)
16/406	16	.058 (1.473)

5-2.4 Connectors for medium heat appliances and commercial and industrial incinerators shall be constructed of listed medium heat chimney sections or of steel not lighter than that designated for metal chimneys in Table 4-1.2, and shall conform to the following requirements.

5-2.4.1 Connector sections of listed medium heat chimneys shall be joined together using continuous welds, flanges, or couplings.

5-2.4.2 Steel connectors shall be lined with medium-duty fire brick (ASTM C64, Type F) laid in fire-clay mortar (ASTM C105, medium duty), or the equivalent.

5-2.4.2.1 The lining shall be at least 2½ inches (64 mm) thick for connectors having an inside diameter or greatest inside cross-section dimension of 18 inches (457 mm) or less.

5-2.4.2.2 The lining shall be at least 4½ inches (114 mm) thick laid on the 4½-inch (114-mm) bed for connectors having an inside diameter or greatest inside cross-section dimension greater than 18 inches (457 mm).

5-2.5 Metal connectors for high heat appliances shall conform to the following requirements.

5-2.5.1 Metal connectors for high heat appliances shall be made of steel not lighter than that designated for chimneys in Table 4-1.2.

5-2.5.2 The connectors shall be lined with high-duty fire brick (ASTM C64, Type A) or the equivalent having a thickness of not less than 4½ inches (114 mm) laid on the 4½-inch (114-mm) bed in fire-clay mortar (ASTM C105, high duty), or the equivalent.

5-2.6 Masonry connectors or breeching shall be made of refractory material equivalent in resistance to heat and corrosion to high-duty fire brick (ASTM C64, Type A) not less than 4½ inches (114 mm) thick.

5-3 Length. A connector shall be as short and straight as possible. The appliance shall be located as close as practicable to the chimney or vent.

5-3.1 The horizontal run of an uninsulated connector to a natural draft chimney, or vent, serving a single appliance shall be not more than 75 percent of the height of the vertical portion of the chimney or vent above the connector.

Exception: When part of an engineered venting system.

5-3.2 The horizontal run of an insulated connector to a natural draft chimney, or vent, serving a single gas or liquid fuel fired appliance shall be not more than 100 percent of the height of the vertical portion of the chimney or vent above the connector.

Exception: When part of an engineered venting system.

5-3.3 The horizontal length, design, and construction of combined connectors, or connectors to a manifold joining two or more appliances to a chimney or vent, shall be determined in accordance with approved engineering methods.

5-4 Size.

5-4.1 The connector, for its entire length, shall be sized in accordance with approved engineering methods.

5-4.2 As an alternate to 5-4.1, the following requirements may be applied.

5-4.2.1 The effective area of a connector for a single appliance shall be not less than the area of the appliance flue collar.

5-4.2.2 A connector or manifold serving two or more appliances shall have an effective area equivalent to the combined areas of the appliance flue collars or individual connectors.

5-4.2.3 Linings, if used, shall not reduce the required effective area of the connector.

5-5 Clearance.

5-5.1 Clearances from connectors to combustible material shall be in accordance with the following requirements for both unprotected and protected installations.

5-5.1.1 Clearances from connectors to unprotected combustible material shall be in accordance with Table 5-5(a) and Figure 5-5.

Table 5-5(a) Chimney Connector and Vent Connector Clearances from Combustible Materials

Description of Appliance	Minimum Clearance, inches (mm) (See Note 1)
RESIDENTIAL-TYPE APPLIANCES	
Column 1, Appendix A	
Single-Wall Metal Pipe Connectors	
Gas Appliances Without Draft Hoods	18 (457)
Electric, Gas, and Oil Incinerators	18 (457)
Oil and Solid-Fuel Appliances	18 (457)
Unlisted Gas Appliances With Draft Hoods	9 (229)
Boilers and Furnaces Equipped With Listed Gas Burners and With Draft Hoods	9 (229)
Oil Appliances Listed as Suitable For Use With Type L Vents	9 (229)
Listed Gas Appliances With Draft Hoods. (*See Note 3.*)	6 (152)
Type L Vent Piping Connectors	
Gas Appliances Without Draft Hoods	9 (229)
Electric, Gas, and Oil Incinerators	9 (229)
Oil and Solid-Fuel Appliances	9 (229)
Unlisted Gas Appliances With Draft Hoods	6 (152)
Boilers and Furnaces Equipped With Listed Gas Burners and With Draft Hoods	6 (152)
Oil Appliances Listed As Suitable For Use With Type L Vents	(*See Note 2*)
Listed Gas Appliances With Draft Hoods	(*See Note 3*)
Column 1, Appendix B	
Type B Gas Vent Piping Connectors	
Listed Gas Appliances With Draft Hoods	(*See Note 3*)
LOW HEAT APPLIANCES	
Columns 2 & 3, Appendix A	
Single-Wall Metal Pipe Connectors	
Gas, Oil, and Solid-Fuel Boilers, Furnaces, and Water Heaters	18 (457)
Ranges, Restaurant Type	18 (457)
Oil Unit Heaters	18 (457)
Unlisted Gas Unit Heaters	18 (457)
Listed Gas Unit Heaters With Draft Hoods	6 (152)
Other Low-Heat Industrial Appliances	18 (457)
MEDIUM HEAT APPLIANCES	
Column 4, Appendix A	
Single-Wall Metal Pipe Connectors	
All Gas, Oil, and Solid-Fuel Appliances	36 (914)
HIGH HEAT APPLIANCES	
Column 5, Appendix A	
Masonry or Metal Connectors	
All Gas, Oil, and Solid-Fuel Appliances	(*See Note 4*)

(*Notes to Table 5-5(a) on following page.*)

Notes to Table 5-5(a)

Note 1: These clearances apply except if the listing of an appliance specifies different clearance, in which case the listed clearance takes precedence.

Note 2: If listed Type L vent piping is used, the clearance may be in accordance with the vent listing.

Note 3: If listed Type B or Type L vent piping is used, the clearance may be in accordance with the vent listing.

Note 4: Clearances shall be based on good engineering practice and acceptable to the authority having jurisdiction.

The clearances from connectors to combustible materials may be reduced if the combustible material is protected in accordance with Table 5-5(b).

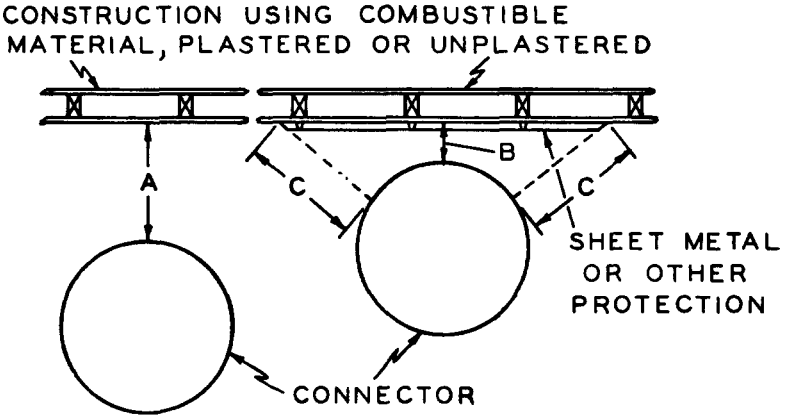

Figure 5-5

A equals the required clearance with no protection specified in Table 5-5(a).

B equals the reduced clearance permitted in accordance with Table 5-5(b).

The protection applied to the construction using combustible material shall extend far enough in each direction to make C equal to A.

5-5.1.2 Clearances from connectors to combustible material may be reduced if the combustible material is protected by an engineered protection system acceptable to the authority having jurisdiction, or by the use of materials or products listed for protection purposes, or in accordance with Table 5-5(b) and Figure 5-5.

5-5.2 Engineered systems installed for protection of combustible materials shall reduce the temperature of such materials to not over 180°F (82°C). System design shall be based upon applicable heat transfer principles taking into account the geometry of the system, the heat loss characteristics of the structure behind the combustible material, and possible abnormal operating conditions of heat producing sources.

Table 5-5(b)
Connector Clearances, Inches, With Specified Forms of Protection[1, 2, 3]

Type of Protection Applied to the combustible material and covering all surfaces within the distance specified as the required clearance with no protection. (*See Fig. 5-5.*) Thicknesses are minimum.	Where the required clearance with no protection is: 36 inches (914 mm) (in./mm)	18 inches (457 mm) (in./mm)	9 inches (229 mm) (in./mm)	6 inches (152 mm) (in./mm)
(a) ¼ in. asbestos millboard spaced out 1 in.	30/762	12/305	6/152	3/ 76
(b) 0.013″/0.330 mm (28 gage) sheet metal on ¼ in. asbestos millboard	24/610	12/305	4/102	2/51
(c) 0.013″/0.330 mm (28 gage) sheet metal spaced out 1 in.	18/457	9/229	4/102	2/51
(d) 0.013″/0.330 mm (28 gage) sheet metal on ⅛ in. asbestos millboard spaced out 1 in.	18/457	9/229	4/102	2/51
(e) ¼ in. asbestos millboard on 1 in. mineral wool bats reinforced with wire mesh or equivalent	18/457	6/152	4/102	2/51
(f) 0.027″/0.686 mm (22 gage) sheet metal on 1 in. mineral wool bats reinforced with wire or equivalent	12/305	3/76	2/51	2/51

Notes to Table 5-5(b)

1. Spacers shall be of noncombustible material.
2. Methods (a), (c) and (d) require ventilation between sheet material and protected combustible material. If ventilation may be impaired use method (b), (e) or (f).
3. Mineral wool bats (blanket or board) shall have a minimum density of 8 lb per ft³ (0.128 g/cc) and a minimum melting point of 1500°F (816°C).

5-5.3 All clearances shall be measured from the outer surface of the connector to the combustible material, disregarding any intervening protection applied to the combustible material but in no case shall the clearance be such as to interfere with the requirement for accessibility.

5-5.4 Materials and products listed for the purpose of reducing clearance to combustibles shall be installed in accordance with the conditions of the listing and the manufacturer's instructions.

5-6 Location. When the connector used for a gas appliance having a draft hood must be located in or pass through a crawl space or other cold area, that portion of the connector shall be of listed Type B or Type L vent material or be provided with equivalent means of insulation.

5-7 Installation.

5-7.1 A connector to a masonry chimney shall extend through the wall to the inner face or liner but not beyond, and shall be firmly cemented to masonry.

Exception: A thimble may be used to facilitate removal of the chimney connector for cleaning, in which case the thimble shall be permanently cemented in place with high-temperature cement.

5-7.2 A chimney connector or vent connector shall not pass through any floor or ceiling, nor through a fire wall or fire partition.

5-7.3 Connectors for listed gas appliances with draft hoods (Appendix B, Column I) and oil appliances listed for Type L vents (Appendix B, Column III) may pass through walls or partitions constructed of combustible material if:

(a) Made of listed Type B or Type L vent material for gas appliances, listed Type L vent material for oil appliances, and installed with not less than listed clearances to combustible material, or

(b) Made of single-wall metal pipe and guarded by a ventilated metal thimble not less than 4 inches (102 mm) larger in diameter than the vent connector.

5-7.4 Connectors for residential-type appliances (Appendix A, Column I) may pass through walls or partitions constructed of combustible material if made of listed factory-built chimney material and installed in accordance with the conditions of the listing and the manufacturer's instructions.

5-7.5 Connectors for residential-type and low heat appliances (Appendix A, Columns I, II and III) may pass through walls or partitions constructed of combustible material if they are guarded at the point of passage by:

(a) Metal ventilated thimbles not less than 12 inches (305 mm) larger in diameter than the connector; or by

(b) Metal or burned fire clay thimbles built in brickwork or other approved fireproofing materials extending not less than 8 inches (203 mm) beyond all sides of the thimble.

5-7.6 In lieu of thimbles all combustible material in the wall or partition shall be cut away from the connector a sufficient distance to provide the clearance required from such connector. Any material used to close up such openings shall be noncombustible insulating material.

5-7.7 A connector for a medium or high heat appliance (Appendix A, Columns IV and V) shall not pass through walls or partitions constructed of combustible material.

5-7.8 Connectors shall maintain a pitch or rise of at least ¼ inch (6.4 mm) to the foot (horizontal length of pipe) from the appliance to the chimney.

5-7.9 Connectors shall be installed so as to avoid sharp turns or other construction features which would create excessive resistance to the flow of flue gases.

5-7.10 A device which will obstruct the free flow of flue gases shall not be installed in a connector, chimney or vent.

Exception: This requirement shall not be construed to prohibit the use of devices specifically listed for installation in a connector, such as heat reclaimers, draft regulators, and safety controls.

5-7.11 Connectors shall be securely supported and joints fastened with sheet-metal screws, rivets, or other approved means.

5-7.12 The entire length of a connector shall be readily accessible for inspection, cleaning, and replacement.

Exception: When listed materials are used and previous approval has been obtained from the authority having jurisdiction.

5-7.13 A vent connector shall not be connected to a chimney flue serving a fireplace.

Exception: When the fireplace opening is sealed or the chimney flue which vents the fireplace is permanently sealed below the connection.

5-8 Interconnection.

5-8.1 Connectors serving appliances operating under natural draft shall not be connected into any portion of a mechanical draft system operating under positive pressure.

5-8.2 Two or more fuel-burning appliances may be connected to a single chimney or vent provided:

(a) Sufficient draft is available for safe combustion in each appliance, and

(b) Sufficient draft is available for removal of all the products of combustion safely to the outdoors, and

(c) Gas and oil appliances so connected shall be equipped with primary safety controls.

5-9 Dampers.

5-9.1 Manually operated dampers shall not be placed in chimneys, vents or connectors of stoker fired, liquid or gas-burning appliances. Fixed baffles on the appliance side of draft hoods and draft regulators shall not be classified as dampers.

5-9.2 Automatically operated dampers shall be of listed type designed to maintain a safe damper position at all times and arranged to prevent the initiation or increase of firing until the damper is opened to a safe position.

5-10 Draft Hoods. For information concerning the use and installation of draft hoods, refer to the *National Fuel Gas Code*, NFPA 54–1974.

5-11 Draft Regulators.[1]

5-11.1 Gas appliances connected to chimneys, other than those required to be installed with draft hoods by the *National Fuel Gas Code*, NFPA 54–1974, may be installed with draft regulators if in accordance with the appliance manufacturer's instructions.

5-11.2 Solid fuel-burning appliances may be installed with draft regulators to reduce draft intensity. Such regulators shall be installed and set in accordance with the instructions furnished with the appliance or the draft regulator.

5-11.3 A barometric draft regulator, if used, shall be installed in the same room or enclosure as the appliance in such a manner that no difference in pressure between the air in the vicinity of the regulator and the combustion air supply will be permitted.

[1]For information concerning the use and installation of draft regulators with oil-burning appliances, refer to the *Standard for the Installation of Oil Burning Equipment*, NFPA 31–1974.

Chapter 6 Vents

6-1 Types and Uses. (*See Appendix B.*)

6-1.1 Type B gas vents shall be used to vent only listed gas appliances with draft hoods and other gas appliances listed for use with Type B gas vents.

Exception: Type B gas vents shall not be used for venting:

(*a*) *Vented wall furnaces listed for use with Type BW gas vents only.*

(*b*) *Incinerators.*

(*c*) *Appliances which may be converted readily to the use of solid or liquid fuels.*

(*d*) *Combination gas-oil burning appliances.*

(*e*) *Appliances listed for use with chimneys only.*

6-1.2 Type BW vents shall be used only with listed vented gas wall furnaces having a capacity not greater than that of the listed Type BW gas vent.

6-1.3 Type L vents shall be used only with appliances listed as suitable for such use and gas appliances listed as suitable for use with Type B gas vents.

6-1.4 Single-wall metal pipe used to vent gas appliances shall conform to the following requirements.

6-1.4.1 Single-wall metal pipe shall not be used to vent incinerators.

Exception: For residential incinerators as provided in 4-5.1.

6-1.4.2 The pipe shall be of sheet copper with a thickness not less than 0.0201"/0.533 mm (24B & S gage) or galvanized steel with a thickness not less than 0.036"/0.914 mm (20 gage).

6-1.4.3 Single-wall metal pipe shall be used only for runs directly from the space in which the appliance is located through the roof or exterior wall to the outer air.

6-1.4.4 Single-wall metal pipe shall not originate in any unoccupied attic or concealed space and shall not pass through any attic, inside wall, concealed space nor through any floor or ceiling.

6-2 Location. Outside vents for appliances used in cold climates shall be insulated.

6-3 Termination.

6-3.1 All vents shall terminate above the roof surface. (*See Appendix D.*)

Exception: As provided in 6-3.5 and 6-6.

6-3.1.1 Vents installed with mechanical exhausters shall terminate not less than 12 inches (305 mm) above the highest point where they pass through the roof surface.

6-3.1.2 Vents installed with listed caps shall terminate in accordance with the terms of the cap's listing.

6-3.1.3 Vents installed without listed caps or mechanical exhausters shall extend 2 feet (.61 m) above the highest point where they pass through the roof surface of a building and at least 2 feet (.61 m) higher than any portion of a building within 10 feet (3.1 m).

6-3.2 Natural draft vents for gas appliances shall terminate at an elevation not less than 5 feet (1.53 m) above the highest connected appliance outlet.

Exception: As provided in 6-3.3 and 6-6.2.

6-3.3 Natural draft gas vents serving vented wall furnaces shall terminate at an elevation not less than 12 feet (3.7 m) above the bottom of the furnace.

6-3.4 Vents passing through roofs shall extend through roof flashing.

6-3.5 Mechanical draft systems need not comply with 6-3.1 and 6-3.3 provided they comply with the following:

(a) The exit terminal of the mechanical draft system shall be located not less than 12 inches (305 mm) from any opening through which combustion products could enter the building nor less than 2 feet (.61 m) from an adjacent building, and not less than 7 feet (2.1 m) above grade when located adjacent to public walkways.

(b) The exit terminal shall be so arranged that flue gases are not directed so as to jeopardize people, overheat combustible structures or enter buildings.

(c) Forced draft systems and all portions of induced draft systems under positive pressure during operation shall be designed and installed so as to be gastight or so as to prevent leakage of combustion products into a building.

6-4 Marking of Gas Vents. In those sections of the country where solid and liquid fuels are used extensively, gas vents shall be plainly and permanently identified by a label reading:

"This gas vent is for appliances which burn gas only. Do not connect to incinerators or solid- or liquid-fuel burning appliances."

6-5 Installation.[1]

6-5.1 Type B, Type BW, and Type L vents shall be installed in full compliance with the terms of their listing.

6-5.2 Vents which pass through floors of buildings requiring the protection of vertical openings shall be enclosed within an approved enclosure.

6-5.2.1 The enclosure walls shall have a fire resistance rating of not less than 1 hour when such vent is located in a building less than 4 stories in height.

6-5.2.2 The enclosure walls shall have a fire resistance rating of not less than 2 hours when such vent is located in a building 4 stories or more in height.

6-5.3 Single-wall metal pipe shall be installed as follows:

6-5.3.1 Single-wall metal pipe shall be installed with minimum clearances from combustible material as follows:

(a) Gas appliances without draft hoods, 18 inches (457 mm).

(b) Unlisted gas appliances equipped with draft hoods, 9 inches (229 mm).

(c) Boilers and furnaces equipped with listed conversion gas burners and with draft hoods, 9 inches (229 mm).

(d) Listed gas appliances with draft hoods, 6 inches (152 mm).

Exception: Residential incinerators.

6-5.3.2 Where a single-wall metal pipe passes through an exterior wall constructed of combustible material, it shall be guarded at the point of passage by a ventilating metal thimble not smaller than the following:

Exception: In lieu of thimble protection, all combustible material in the wall shall be cut away from the pipe a sufficient distance to provide the clearance

[1]Additional requirements for the installation of venting systems serving gas appliances appear in the *National Fuel Gas Code*, NFPA 54–1974.

required by 6-5.3.1 from such pipe to combustible material, with any material used to close up such opening entirely noncombustible.

(a) For listed gas burning appliances with draft hoods 4 inches (102 mm) larger in diameter than the pipe.

Exception No. 1: Residential incinerators.

Exception No. 2: When there is a run of not less than 6 feet (1.8 m) of pipe in the open, between the draft hood outlet and the thimble, the thimble may be 2 inches (51 mm) larger in diameter than the pipe.

(b) For unlisted gas burning appliances with draft hoods 6 inches (152 mm) larger in diameter than the pipe.

(c) For gas appliances without draft hoods 12 inches (305 mm) larger in diameter than the pipe.

6-5.3.3 Where a single-wall metal pipe passes through a roof constructed of combustible material it shall be guarded at the point of passage as follows:

(a) As specified for passage through a combustible exterior wall by 6-5.3.2, or

(b) With listed gas appliances that can be connected to Type B gas vents, by a noncombustible, nonventilating thimble not less than 4 inches (102 mm) larger in diameter than the vent pipe and extending not less than 18 inches (457 mm) above and 6 inches (152 mm) below the roof with the annular space open at the bottom and closed only at the top.

6-6 Special Venting Arrangements.

6-6.1 Direct Vent Appliances (Sealed combustion system appliances). Direct vent appliances (sealed combustion system appliances) shall be listed and shall be installed in accordance with their listing and the manufacturer's instructions.

6-6.2 Ventilating Hoods and Exhaust Systems.

6-6.2.1 When ventilating hoods and exhaust systems serving commercial cooking appliances are used to vent gas-burning appliances installed in commercial applications, the connector from the appliance shall terminate under the hood not less than 18 inches (457 mm) from any grease filter or screen installed in the hood.[1]

[1]For information on ventilation of restaurant cooking equipment see the *Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment*, NFPA 96–1976.

6-6.2.2 When automatically operated appliances, such as water heaters, are vented through natural draft ventilating hoods, dampers shall not be installed in the ventilating system.

6-6.2.3 When automatically operated appliances, such as water heaters, are vented through a ventilating hood or exhaust system equipped with a mechanical exhaust system, the appliance control system shall be interlocked so as to permit appliance operation only when the mechanical exhaust system is in operation [*see 6-3.5(c)*].

6-6.2.4 A ventilating hood shall be installed above an open-top broiler in a residence.

6-6.2.4.1 The hood shall be made with tight joints and shall be constructed of copper with a thickness not less than 0.0201″, 0.533 mm (24B & S gage) or galvanized steel with a thickness not less than 0.016/0.406 mm (28 gage).

6-6.2.4.2 A clearance of not less than ¼ inch (6.4 mm) between the hood and the underside of combustible material or metal cabinets shall be provided.

6-6.2.4.3 The vertical clearance above the broiler to the underside of combustible material or metal cabinet protected by the hood shall be not less than 24 inches (610 mm).

6-6.2.4.4 The width and breadth of the hood shall be not less than that of the open-top broiler unit.

6-6.2.4.5 The hood shall be centered over the unit.

6-6.2.4.6 The hood shall be exhausted directly through an outside wall to the outside or connected to a suitable chimney flue used for no other purpose. The connecting duct shall conform to the following:

(a) Connecting ducts shall be made of galvanized steel not less than 0.016 in./0.406 mm (28 gage).

(b) A clearance of not less than 6 inches (152 mm) shall be provided between the exhaust duct and unprotected combustible material.

Exception: This clearance may be reduced if the combustible material is protected in accordance with Table 5-5(b).

6-6.3 Clothes Dryers.

6-6.3.1 All ducts expelling lint shall be provided with a lint collector.

Exception: When the dryer is so equipped.

6-6.3.2 For Type 1 gas-fired clothes dryer exhaust see the *National Fuel Gas Code*, NFPA 54–1974.

6-6.3.3 Type 2 clothes dryers shall be exhausted to the outside air.

6-6.3.4 Provision for make-up air shall be provided for Type 2 clothes dryers, with a minimum free area of 1 square inch (645.2 mm^2) for each 1000 Btu per hour (1055kJ/hr) total input rating of the dryer(s) installed.

6-6.3.5 A clothes dryer exhaust shall not be connected into any chimney connector, vent connector, chimney or vent.

6-6.3.6 Ducts for exhausting clothes dryers shall not be put together with sheet-metal screws or other fastening means which extend into the duct and which would catch lint and reduce the efficiency of the exhaust.

6-6.3.7 Exhaust ducts for Type 2 clothes dryers shall be constructed of sheet metal or other noncombustible material. Such ducts shall be of adequate strength to meet the conditions of service with minimum thicknesses equivalent to No. 24 galvanized steel gage.

6-6.3.8 Exhaust ducts for Type 2 clothes dryers shall have a clearance of at least 6 inches (152 mm) to combustible material.

Exception: Exhaust ducts for Type 2 clothes dryers may be installed with reduced clearances to combustible material provided the combustible material is protected as described in Table 5-5(b).

6-6.3.9 When ducts pass through walls, floors, or partitions, the space around the duct shall be sealed with noncombustible material.

6-6.3.10 Multiple installations of Type 1 and Type 2 clothes dryers shall be made in a manner to prevent adverse operation due to back pressures that might be created in the exhaust. Common exhaust vents which pass through floors of buildings requiring the protection of vertical openings shall be enclosed with approved walls having a fire resistance rating of not less than 1 hour when such chimneys are located in a building less than 4 stories in height, and not less than 2 hours when such chimneys are located in a building 4 stories or more in height.

Chapter 7 Fireplaces

7-1 Factory-built Fireplaces. Factory-built fireplaces shall be listed and shall be installed in accordance with the conditions of the listing. Hearth extensions shall be provided in accordance with the manufacturer's instructions.

7-2 Factory-built Fireplace Stoves. Factory-built fireplace stoves shall be listed and shall be installed in accordance with the conditions of the listing. Hearth extensions shall be provided in accordance with the manufacturer's instructions.

7-3 Factory-built Solid Fuel Room Heaters. Factory-built solid fuel room heaters shall be listed and shall be installed in accordance with the conditions of the listing. Protection for combustible floors and walls shall be provided in accordance with the manufacturer's instructions.

7-4 Masonry Fireplaces.

7-4.1 Fireplaces shall be constructed of solid masonry or of reinforced portland or refractory cement concrete with back and sides of the thickness specified in 7-4.1.1 or 7-4.1.2.

Exception: As provided in 7-1.

7-4.1.1 Where a lining of low-duty firebrick (ASTM C64, Type G), or the equivalent, at least 2 inches (51 mm) thick laid in fire-clay mortar (ASTM C105, medium duty), or the equivalent, or other approved lining is provided, the total thickness of back and sides, including the lining, shall be not less than 8 inches (203 mm).

7-4.1.2 Where the lining described in 7-4.1.1 is not provided, the thickness of back and sides shall be not less than 12 inches (305 mm).

7-4.2 Steel fireplace units incorporating a firebox liner of not less than ¼-inch (6.4 mm) thick steel and an air chamber shall be installed with masonry to provide a total thickness at the back and sides of not less than 8 inches (203 mm), not less than 4 inches (102 mm) of which shall be solid masonry.

7-4.3 Warm air ducts employed with steel fireplace units of the circulating air type shall be constructed of metal or masonry.

7-4.4 Fireplace hearth extensions shall be provided of approved noncombustible material for all fireplaces.

7-4.4.1 Where the fireplace opening is less than 6 sq. ft. (.56 m^2), the hearth extension shall extend at least 16 inches (406 mm) in front of, and at least 8 inches (203 mm) beyond each side of the fireplace opening.

7-4.4.2 Where the fireplace opening is 6 sq. ft. (.56 m^2) or larger, the hearth extension shall extend at least 20 inches (508 mm) in front of, and at least 12 inches (305 mm) beyond each side of the fireplace opening.

7-4.4.3 Where a fireplace is elevated above or overhangs a floor, the hearth extension shall also extend over the area under the fireplace.

7-4.4.4 Fireplaces constructed of masonry or reinforced portland or refractory cement concrete shall have hearth extensions of brick, concrete, stone, tile or other approved noncombustible material properly supported and with no combustible material against the underside thereof. Wooden forms or centers used during the construction of hearth and hearth extension shall be removed when the construction is completed.

7-4.5 All wood beams, joists and studs shall be trimmed away from fireplaces. Headers supporting trimmer arches at fireplaces shall be not less than 20 inches (508 mm) from the face of the chimney breast. Trimmers shall be not less than 6 inches (152 mm) from the inside face of the nearest flue lining.

7-4.6 Woodwork shall not be placed within 4 inches (102 mm) of the back face of a fireplace.

Exception: This requirement shall not prevent plastering directly on the masonry or on metal lath and metal furring.

7-4.7 Woodwork shall not be placed within 6 inches (152 mm) of a fireplace opening. Woodwork above and projecting more than 1½ inches (38 mm) from a fireplace opening shall not be placed less than 12 inches (305 mm) from the top of a fireplace opening.

Appendices A, B, C, D, and E follow on pages 40-50.

Appendix A

This Appendix is not a part of this NFPA Standard but is included for informational purposes only.

Chimney Selection Chart

Chimneys for Residential Type Appliances	Chimneys for LOW HEAT Appliances		Chimneys for MEDIUM HEAT Appliances[1]	Chimneys for HIGH HEAT Appliances[2]
	Building Heating Appliances	Industrial Type Low Heat Appliances		
1. Factory built. 2. Masonry (residential type).[4]	1. Factory built. 2. Masonry (low heat type).[4] 3. Metal (low heat type).[5]	1. Factory Built (industrial low heat type). 2. Masonry (low heat type).[4] 3. Metal (low heat type).[5]	1. Factory built (industrial medium heat type). 2. Masonry (medium heat type).[4] 3. Metal (medium heat type).[5]	1. Masonry (high heat type).[4] 2. Metal (high heat type).[5]
	TYPES OF APPLIANCES TO BE USED WITH EACH TYPE CHIMNEY			
Column I A. Residential type appliances, such as: 1. Ranges. 2. Warm air furnaces. 3. Water heaters. 4. Hot water heating boilers. 5. Low pressure steam heating boilers. 6. Incinerators. 7. Floor furnaces. 8. Wall furnaces. 9. Room heaters. 10. Fireplace stoves. B. Fireplaces.	**Column II** A. All appliances shown in Column I. B. Nonresidential type building heating appliances for heating a total volume of space exceeding 25,000 cubic feet (708 m³).* C. Steam boilers operating at not over 1000°F (538°C) flue gas temperature; pressing machine boilers.	**Column III** All appliances shown in Columns I and II, and appliances such as: 1. Annealing baths for hard glass (fats, paraffine, salts, or metals). 2. Bake ovens (in bakeries). 3. Boiling vats, for wood fibre, straw, lignin, etc. 4. Candy furnaces. 5. Coffee roasting ovens. 6. Core ovens. 7. Cruller furnaces. 8. Feed drying ovens. 9. Fertilizer drying ovens. 10. Fireplaces, other than residential type. 11. Forge furnaces (solid fuel). 12. Gypsum kilns. 13. Hardening furnaces (below dark red). 14. Hot air engine furnaces. 15. Ladle drying furnaces. 16. Lead melting furnaces.	**Column IV** All appliances shown in Columns I, II and III, and appliances such as: 1. Alabaster gypsum kilns. 2. Annealing furnaces (glass or metal). 3. Charcoal furnaces. 4. Cold stirring furnaces. 5. Feed driers (direct fire heated). 6. Fertilizer driers (direct fire heated). 7. Galvanizing furnaces. 8. Gas producers. 9. Hardening furnaces (cherry to pale red). 10. Incinerators, commercial and industrial type. 11. Lehrs and glory holes. 12. Lime kilns. 13. Linseed oil boiling furnaces. 14. Porcelain biscuit kilns. 15. Pulp driers (direct fire heated).	**Column V** All appliances shown in Columns I, II, III, and IV and appliances[2] such as: 1. Bessemer retorts. 2. Billet and bloom furnaces. 3. Blast furnaces. 4. Bone calcining furnaces. 5. Brass furnaces. 6. Carbon point furnaces. 7. Cement brick and tile kilns. 8. Ceramic kilns. 9. Coal and water gas retorts. 10. Cupolas. 11. Earthenware kilns. 12. Glass blow furnaces. 13. Glass furnaces (smelting). 14. Glass kilns. 15. Open hearth furnaces. 16. Ore roasting furnaces. 17. Porcelain baking and glazing kilns.

		Column III	Column IV	Column V
		17. Nickel plate (drying) furnaces. 18. Paraffine furnaces. 19. Recuperative furnaces (spent materials). 20. Rendering furnaces. 21. Restaurant type cooking appliances using solid or liquid fuel. 22. Rosin melting furnaces. 23. Stereotype furnaces. 24. Sulphur furnaces. 25. Tripoli kilns (clay, coke and gypsum). 26. Type foundry furnaces. 27. Wood drying furnaces. 28. Wood impregnating furnaces. 29. Zinc amalgamating furnaces.	16. Steam boilers operating at over 1000°F (538°C) flue gas temperature. 17. Water-glass kiln. 18. Wood-distilling furnaces. 19. Wood-gas retorts.	18. Pot-arches. 19. Puddling furnaces. 20. Regenerative furnaces. 21. Reverberatory furnaces. 22. Stacks, carburetor or superheating furnaces (in water gas works). 23. Vitreous enameling ovens (ferrous metals). 24. Wood carbonizing furnaces.

*Nonresidential type building heating appliances for heating a total volume of space not to exceed 25,000 cubic feet may be connected to chimneys for residential type appliances.

NOTE 1: Appliances otherwise classed as high heat appliances may be considered as medium heat appliances if not larger than 100 cubic feet (2.83 m^3) in size.

NOTE 2: When such appliances are larger than 100 cubic feet (2.83 m^3) in size, and other furnaces classified as high heat appliances in accordance with nationally recognized good practice.

NOTE 3: Continuous operating equipment of the counter current type may not require the type of chimney indicated by general types of appliances.

NOTE 4: For construction and other provisions for masonry chimney installation see Chapter 3.

NOTE 5: For construction and other provisions for metal chimney installation see Chapter 4.

NOTE 6: Regardless of appliance type classification, factory-built chimneys may be used at temperatures not exceeding 1000° F (538°C) for residential type and building heating appliance chimneys and not exceeding 1800°F (982°C) for medium heat appliance chimneys.