NFPA No.

82

INCINERATORS, RUBBISH HANDLING 1972

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NATIONAL FIRE PROTECTION ASSOCIATION
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Official NFPA Definitions

Adopted Jan. 23, 1964: Revised Dec. 9, 1969. Where variances to these definitions are found, efforts to eliminate such conflicts are in process.

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This material has been developed in the interest of safety to life and property under the published procedures of the National Fire Protection Association. These procedures are designed to assure the appointment of technically competent Committees having balanced representation from those vitally interested and active in the areas with which the Committees are concerned. These procedures provide that all Committee recommendations shall be published prior to action on them by the Association itself and that following this publication these recommendations shall be presented for adoption to the Annual Meeting of the Association where anyone in attendance, member or not, may present his views. While these procedures assure the highest degree of care, neither the National Fire Protection Association, its members, nor those participating in its activities accepts any liability resulting from compliance or noncompliance with the provisions given herein, for any restrictions imposed on materials or processes, or for the completeness of the text.

Standard on

Incinerators and Rubbish Handling

NFPA No. 82 — 1972

This edition of NFPA No. 82 was adopted by the National Fire Protection Association in May, 1972 at the Annual Meeting in Philadelphia, Pa. It supersedes the 1971 edition of NFPA No. 82.

Revisions in this edition from the 1971 edition are in 2022, 3022, 3024a, 5011, 7022, 7023, 7025d, 7031. All material in Article 50 after 5011 was deleted. Section 7011 was deleted; Section 7012 was renumbered to 7011 and revised. New Sections 7012 and 7013 were added.

Origin and Development of No. 82, 82A

This standard was first adopted by the NFPA in 1948 on recommendation of the Committee on Field Practice. In 1953 a completely revised edition of the text on incinerators was prepared by a representative subcommittee and adopted by the NFPA on recommendation of the Committee on Building Construction. The subject of incinerators was turned over to the Committee on Chimneys and Heating Equipment in 1956. Revised editions were adopted in 1955, 1958, 1960, 1969, 1970 and 1971. The original 1948 text covered both rubbish handling and incinerators; the 1953, 1955, 1958 and 1960 revisions covered only incinerators. In the 1960 edition, incinerators and rubbish handling were treated as separate standards, Nos. 82 and 82A respectively, No. 82A on Rubbish Handling being unchanged from the 1948 edition. In the 1969 edition, the subject of Rubbish Handling was included with incinerators and Standard No. 82A was discontinued as a separate standard.

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SCOPE: To prepare fire protection standards on chimneys, fireplaces, heating appliance venting systems, incinerators, and similar heat producing or heat removal devices, including clearances between heat sources and combustible materials.

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Standard on

Incinerators and Rubbish Handling

NFPA No. 82 — 1972

10. General

101. Scope and Purpose

1011. This Standard represents basic requirements primarily concerned with the fire-safe installation and use of incinerators, including those for residential, commercial, and industrial applications, and rubbish chutes and the safe handling and disposal of rubbish.

1012. This Standard does not include design criteria for the purpose of reducing air pollution. For such criteria, consult the authorities having jurisdiction.

102. Classification of Wastes and Incinerators

1021. For the purpose of this Standard, wastes are classified into types with information as to their approximate heating value and moisture content as a guide in the selection of proper equipment to best incinerate a particular waste. Similarly, incinerators are classified by their capacities and by the type of wastes they are intended to incinerate.

1022. Classification of Wastes

TYPE 0 — A mixture of highly combustible waste, such as paper, cardboard, cartons, wood boxes, and combustible floor sweepings, from commercial and industrial activities. The mixtures contain up to 10 percent by weight of plastic bags, coated paper, laminated paper, treated corrugated cardboard, oily rags, and plastic rubber scraps.

This type of waste contains 10 percent moisture, 5 percent noncombustible solids, and has a heating value of 8,500 Btu per pound as fired.

TYPE 1 — A mixture of combustible waste, such as paper, cardboard cartons, wood scrap, foliage, and combustible floor sweepings, from commercial and industrial activities. The mixture contains up to 20 percent by weight of restaurant or cafeteria waste, but contains little or no treated papers, plastic, or rubber wastes.

This type of waste contains 25 percent moisture, 10 percent

noncombustible solids, and has a heating value of 6,500 Btu per pound as fired.

TYPE 2 — Waste consisting of an approximately even mixture of Type 1 waste and garbage, Type 3 waste, by weight.

This type of waste is common to apartment and residential occupancy, consisting of up to 50 percent moisture, 7 percent noncombustible solids, and has a heating value of 4,500 Btu per pound as fired.

TYPE 3 — Garbage, consisting of animal and vegetable wastes from restaurants, cafeterias, hotels, hospitals, markets, and like installations.

This type of waste contains up to 70 percent moisture, up to 5 percent noncombustible solids, and has a heating value of 2,500 Btu per pound as fired.

TYPE 4 — Human and animal remains, consisting of carcasses, organs, and solid organic wastes from hospitals, laboratories, abattoirs, animal pounds, and similar sources consisting of up to 85 percent moisture, 5 percent noncombustible solids, and having a heating value of 1,000 Btu per pound as fired.

TYPE 5 — By-product waste, gaseous liquid, or semiliquid, such as tar, paints, solvents, sludge, fumes, etc., from industrial operations. Btu values must be determined by the individual materials to be destroyed.

TYPE 6 — Solid by-product waste, such as rubber, plastics, wood waste, etc., from industrial operations. Btu values must be determined by the individual materials to be destroyed.

1023. Classification of Incinerators

CLASS I — Portable, packaged, completely assembled, direct-fed incinerators, having not over 5 cu. ft. storage capacity, or 25 lb. per hour burning rate, suitable for Type 2 Waste.

CLASS IA — Portable, packaged or job-assembled, direct-fed incinerators 5 to 15 cu. ft. primary chamber volume; or a burning rate of 25 lb. per hour up to, but not including, 100 lb. per hour of Type 0, Type 1, or Type 2 Waste; or a burning rate of 25 lb. per hour up to, but not including, 75 lb. per hour of Type 3 Waste.

CLASS II — Flue-fed, single-chamber incinerators with more than 2 sq. ft. burning area, suitable for Types 1 and 2 Waste. This type of incinerator is served by one vertical chimney flue functioning both as a chute for charging waste and to carry the products of combustion to atmosphere.

CLASS IIA — Chute-fed, multiple-chamber incinerators, with

more than 2 sq. ft. burning area, suitable for Type 1 or Type 2 Waste. (Not recommended for industrial wastes.) This type of incinerator is served by a vertical chute for charging wastes from two or more floors above the incinerator and a separate chimney flue for carrying the products of combustion to atmosphere.

CLASS III — Direct-fed incinerators with a burning rate of 100 lb. per hour and over, suitable for Type 0, Type 1, or Type 2 Waste.

CLASS IV — Direct-fed incinerators with a burning rate of 75 lb. per hour or over, suitable for Type 3 Waste.

CLASS V — Municipal incinerators suitable for Type 0, Type 1, Type 2, or Type 3 Waste, or a combination of all four wastes, and are rated in tons per hour or tons per 24 hours.

CLASS VI — Crematory and pathological incinerators, suitable for Type 4 Waste.

CLASS VII — Incinerators designed for specific by-product wastes, Type 5 or Type 6.

103. Masonry Construction

1031. Firebrick shall be laid in refractory mortar (ASTM C105 Medium Duty or the equivalent). Liners 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. Common brickwork shall be laid with full, push-filled, cross, and bed-mortar joints.

104. Provision for Auxiliary Fuel

1041. Installation of gas-burning equipment shall be in accordance with the Standard for the Installation of Gas Appliances and Gas Piping, NFPA No. 54. Oil-burning installations shall comply with the Standard for the Installation of Oil Burning Equipment, NFPA No. 31. Fuel burners of unlisted incinerators shall be equipped with safety controls which will automatically shut off the fuel supply to the burner in the event the burner fails to ignite or its flame becomes extinguished.*

105. Electrical Supply

1051. The electrical supply to an incinerator shall be installed in accordance with the National Electrical Code, NFPA No. 70.

*Listed incinerators are deemed to conform to this requirement.

106. Incinerator Rooms

1061. Incinerators in which the combined hearth and grate area of the combustion chamber is 7 sq. ft. or less shall be enclosed within a room separated from other parts of the building by walls and ceiling having a fire resistance of not less than 1 hour, and used for no other purpose except storage of containers of waste materials to be burned, and building heating equipment. In private dwellings occupied by not more than two families, a residential-type incinerator need not be in a separate room provided minimum clearances prescribed for residential-type incinerators, see 204, are provided.

1062. Incinerators in which the combined hearth and grate area of the combustion chamber exceeds 7 sq. ft. 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 2 hours and used for no other purpose except storage containers of waste material to be burned and building heating equipment.

1063. 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 openings.

1064. Automatic sprinklers and a short length of hand hose connected to a suitable water supply are recommended in the incinerator room.

107. Air for Combustion and Ventilation

1071. Provision shall be made for an adequate supply of air for combustion and ventilation to enter the room in which an incinerator is located.

1072. If a residential type of incinerator is installed in an open area, such as an undivided basement without storm windows and without unusually tight fitting doors, in buildings of conventional construction, adequate air supply may usually be obtained through normal air infiltration. If the incinerator is located in a confined space or an area separated by tight fitting partitions and doors, adequate air shall be provided by means of an opening communicating with other areas of the building having adequate infiltration or with the outdoors. See NFPA No. 31.

1073. Rooms in which incinerators other than residential types are installed shall be furnished air for combustion and ventilation by one of the following means:

a. A screened or louvered ventilator opening or other suitable air intake. If communicating to other parts of the building, the opening shall be protected by an approved fire damper.

b. A duct leading from the incinerator room to the outdoors.

c. A duct leading to a boiler or furnace room cut off as prescribed (see 106) and provided with sufficient air supply for both rooms.

1074. The opening or duct specified in 1073 shall have a free area of not less than 0.5 sq. ft. per 1,000,000 Btu per hour incinerator burning rate.

1075. Air ducts extending from an incinerator room through other parts of a building shall be constructed and protected in accordance with the Standard for the Installation of Air Conditioning and Ventilating Systems, NFPA No. 90A.

108. Spark Arresters

1081. The net free area of the arrester shall be not less than four times the net free area of the outlet of the chimney flue it serves.

1082. Arresters shall have a vertical height of not less than 1.3 times the minimum diameter of the chimney flue or the minimum horizontal dimension of rectangular chimney flue.

1083. Arresters, including bolts, rivets, screws and supporting members, shall be made of stainless steel (ASTM A167, Type 316, or ASTM A478, Type 316, or the equivalent).

1084. Openings shall not permit the passage of spheres having a diameter larger than one-half inch, nor block the passage of spheres having a diameter of less than three-eights inch.

1085. Means shall be provided for securely attaching the spark arresters to chimneys to provide adequate support and prevent movement of the arrester.

20. Residential-Type Incinerators

201. Description

2011. A residential-type incinerator is for the burning of ordinary combustible waste material and garbage (Type 2 Waste) incidental to residential occupancy and having a firebox or charging compartment of not over 5 cu. ft. in capacity. Residential-type incinerators may be self-contained, factory-made units not requiring field construction, or may be of the built-in type designed to be encased in masonry or installed in a masonry wall or chimney.

202. Design and Construction

2021. The design shall be such that in service the incinerator will not crack, warp, or otherwise fail structurally so as to permit flame passage or emission of combustion gases or sparks into the building.

2022. Explosion relief shall be provided. The area of explosion relief shall be not less than one square foot of relief area for every 100 cubic feet of primary combustion chamber volume. Where the exhaust chimney will not serve the above purpose, a door or panel shall be provided and arranged to allow the door or panel to return to a closed position promptly after pressure has been released.

2023. Self-contained, residential-type incinerators, if used, shall be approved types.

2024. The enclosing walls for combustion chambers of built-in incinerators, except as provided in 2025 below, shall be constructed of clay or shale brickwork not less than 4 in. thick with a lining of 4½ in. of firebrick.

2025. Other constructions may be used, if equivalent to the constructions outlined in the preceding paragraphs, in structural strength, insulating value, and ability to withstand thermal expansion and flame impingement.

203. Placement

2031. Except as otherwise provided in 2032, 2033, and 2034, incinerators shall be placed on the ground or on floors of fire-resistive construction with noncombustible flooring or surface finish and with no combustible material against the underside thereof, or on noncombustible slabs or arches having no combustible material against the underside thereof. Such construction shall extend not less than 12 in. beyond the incinerator base on all sides except at the front or side where ashes are removed where it shall extend not less than 18 in. beyond the incinerator.

2032. An incinerator which is listed specifically for placement on combustible floors may be installed in accordance with the terms of such listing and the manufacturer's instructions.

2033. An incinerator may be placed on floors other than as specified in 2031, provided the incinerator is so arranged that flame or hot gases do not come in contact with its base and, further, provided the floor under the incinerator is protected with hollow masonry not less than 4 in. in thickness, covered with sheet metal of not lighter than No. 24 gage. 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 in. 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 in. asbestos millboard covered with sheet metal of not lighter than No. 24 gage or with protection equivalent thereto.

2034. An incinerator which is set on legs that provide not less than 4 in. open space under the base of the incinerator may be placed on floors other than as specified in 2031, provided the incinerator 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 in. thick covered with sheet metal not lighter than No. 24 gage. The above specified floor protection shall extend not less than 18 in. beyond the front of the incinerator or side where ashes are removed and 12 in. beyond all other sides of the incinerator.

204. Clearances

2041. The clearances above a charging door to combustible material shall be not less than 48 in. The clearance may be reduced to 24 in. provided the combustible material is protected with sheet metal not lighter than No. 28 gage spaced out 1 in. on noncombustible spacers, or equivalent protection. Such protection shall extend 18 in. beyond all sides of the charging door opening.

2042. Except as otherwise provided in 2043 and 2044, an incinerator shall be installed to provide clearances between it and combustible material of not less than 36 in. at the sides, rear, and top and not less than 48 in. at the front.

2043. Incinerators which are listed specifically for installation at lesser clearances than specified in 2042 may be installed in accordance with the terms of such listing and the manufacturer's instructions, provided that, in any case, the clearances shall be sufficient to afford ready accessibility for firing, cleanout, and any necessary servicing, but in no case shall the clearance to any material be less than 3 in.

2044. When an incinerator is encased in common brick not less than 4 in. in thickness and is constructed with a fire-clay lining or a lining of insulating material either between the firebox and metal casing or exterior thereto, or a combination of such lining and insulation, affording an equivalent degree of heat resistance, the clearances may be reduced to 6 in. at the sides and rear, and the clearance at the top may be reduced to 24 in.

205. Chimneys

2051. Residential-type incinerators shall be connected to chimneys, except as otherwise provided in 2052 and 2053. Chimneys shall conform to the Standard for Chimneys, Fireplaces, and Venting Systems, NFPA No. 211.

2052. Galvanized steel pipe not less than No. 20 galvanized-sheet 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 provided the pipe is exposed and readily examinable for its full length and clearance not less than 18 in. is maintained from combustible material. The pipe shall extend at least 3 ft. above the highest point where it passes by or through a roof and at least 2 ft. higher than any portion of a building within 10 ft. 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 in. below and 9 in. above the roof construction, and of a size to provide not less than 6 in. clearance on all sides of the pipe; or the combustible material in the roof construction shall be cut away so as to provide not less than 18 in. clearance on all sides of the pipe, with any material used to close up such opening entirely noncombustible.

2053. An incinerator installed outdoors shall be listed for outdoor installation and shall be equipped with the vent furnished by the manufacturer with the incinerator.

2054. An incinerator with integral vent shall be listed and shall be installed in accordance with the terms of the listing and the manufacturer's instructions.

2055. An automatic draft control, if furnished with the incinerator, shall be installed in accordance with the instructions furnished with the incinerator.

206. Chimney Connector

2061. The clearance between a single-wall, metal pipe connector and unprotected combustible material shall be not less than 18 in. The clearance between a connector made of Type L venting-system piping and unprotected combustible material shall be not less than 9 in. These clearances may be reduced if the combustible material is protected in accordance with the Standard for Chimneys, Fireplaces, and Venting Systems, NFPA No. 211.

2062. A chimney connector shall not be enclosed. The connector throughout its entire length shall be readily accessible for inspection and replacement.

2063. A chimney connector or vent connector shall not pass through any floor or ceiling.

2064. A connector shall not pass through a wall or partition constructed of combustible material unless it is guarded at the point of passage by:

a. Metal-ventilated thimble not less than 12 in. larger in diameter than the connector.

b. Metal or burned fire-clay thimble built in brickwork or other approved fireproofing materials extending not less than 8 in. beyond all sides of the thimble.

c. In lieu of a thimble, 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 opening shall be noncombustible insulating material.

207. Rubbish Chutes

2071. A rubbish chute shall not feed directly into a residential-type incinerator.

208. Instructions

2081. Instructions shall be posted in a permanent manner on the charging door of residential-type incinerators warning against the introduction of loose dusty materials, flammable liquids or compounds, and closed containers and aerosol cans (empty or otherwise).

30. Commercial-Industrial Type Incinerators (Class III, IV, VI, and VII)

301. Description

3011. A commercial-industrial type incinerator is one having a charging capacity in excess of 5 cu. ft. suitable for a variety of wastes as shown below.

Incinerator Class	Waste Types
Class III	Type 0, Type 1, or Type 2
Class IV	Type 3
Class V	Not covered in this Standard
Class VI	Type 4
Class VII	Specific by-product, Type 5 or Type 6

302. Design and Construction

3021. The design shall be such that in service the incinerator will not crack, warp, or otherwise fail structurally so as to permit flame passage or emission of combustion gases or sparks into the building.

3022. Explosion relief shall be provided. The area of explosion relief shall be not less than one square foot of relief area for every 100 cubic feet of primary combustion chamber volume. Where the exhaust chimney will not serve the above purpose, a door or panel shall be provided and arranged to allow the door or panel to return to a closed position promptly after pressure has been released.

3023. Self-contained commercial-industrial type incinerators shall be approved.

3024. Field-erected incinerators shall be built in accordance with the following requirements:

a. The combustion chamber inner walls, roofs, bridge walls, and curtain walls shall be constructed of high-duty firebrick (ASTM C106, Type A, or the equivalent) or of castable refractory (ASTM C401, Class C, or the equivalent) not less than 4½ inches thick for incinerators having a burning rate of less than 500 pounds per hour and not less than 9 inches for incinerators having a burning rate of 500 pounds per hour or more. Metal stays, lintels, or other supports shall not be exposed to the interior of the combustion chamber.

b. Exterior masonry walls of the combustion chamber shall be of clay or shale brickwork not less than 8 in. thick with an air space of at least 1 in. between the refractory inner wall and the exterior wall.

c. Exterior metal casing shall be of steel not lighter than No. 12 gage with not less than 2½ in. of high-temperature block insulation (ASTM C392, Type 3 or the equivalent) between the metal casing and the refractory inner wall.

d. An exterior masonry casing shall be reinforced with structural steel framework and an exterior steel casing shall be reinforced with structural steel members, such that the casing will withstand interior thrusts from arches and be capable of supporting all doors and burner equipment. The steel casing or framework shall be erected and set plumb before any brickwork is done. Cylindrical outer casings made of steel not less than ¼ in. thick need not be reinforced.

e. Unless the chimney is to be equipped with an approved spark arrester, the incinerator shall include effective means for arresting sparks and fly ash, see 108.

f. Construction other than specified above may be used, if equivalent in structural strength, insulating value and thermal expansion, and flame impingement to that specified.

303. Placement

3031. Commercial-industrial incinerators shall be placed on properly designed foundations of masonry or reinforced concrete or on noncombustible material having a fire-resistance rating of not less than 3 hours provided such support is independent of the building construction and the load is transferred to the ground.

304. Clearance

3041. Except as otherwise provided in 3042, commercial and industrial incinerators shall be installed to provide a clearance to combustible material of not less than 36 in. at the sides and rear, and not less than 48 in. above, and not less than 8 ft. at the front of the incinerator provided that for a commercial and industrial incinerator encased in brick the clearance above may be 36 in. and at the sides and rear it may be 18 in. A clearance of not less than 12 in. shall be provided from the incinerator to walls or ceilings of noncombustible construction which have or may have combustible material placed on the outer or upper side thereof. A clearance of not less than 3 in. shall be provided from commercial and industrial incinerators to walls or ceilings of noncombustible construction. Under no circumstances shall the walls of the incinerator be used as a part of the structural walls of the building.

3042. Incinerators which are listed specifically for installation at lesser clearances than specified in 3041 may be installed in accordance with the conditions of such listing, provided that in any case, the clearances shall be sufficient to afford ready accessibility for firing, cleanout, and any necessary servicing but, in no case, shall the clearance to any material be less than 3 in.

305. Charging Hopper

3051. The combustion chamber of a commercial-industrial type incinerator may be charged through the floor immediately above such incinerator. The charging hopper shall be constructed of not less than No. 12 gage steel casing, lined with not less than 4½ in. of firebrick (ASTM C106, Type F, medium duty, or the equivalent). Such charging hopper shall not exceed 6 ft. 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 hopper from discharging gases resulting from combustion into the charging room. The charging

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hopper opening shall be protected by a cover extending beyond the edges of the opening for at least 2 in. on all sides, and lined with not less than 2½ in. of refractory material.

3052. The charging hopper floor opening shall be located in a room with walls, and floor and ceiling assemblies having a fire-resistance rating of not less than 2 hours, with openings protected by approved self-closing or automatic fire doors suitable for Class A openings, 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 1 hour and the door may be one approved for Class B openings. Such doors shall be kept closed during the charging operation; also at other times except when delivering waste material to the room.

306. Chimneys

3061. The chimney flue for a commercial-industrial incinerator shall serve the incinerator only. It shall be designed and proportioned to provide adequate draft for proper operation of the incinerator. Chimneys shall be supported on properly designed foundations of masonry or reinforced portland or refractory cement concrete. They shall be so constructed as not to place excessive stress upon the roof of the combustion chamber. Chimneys may be supported on incinerator walls if the incinerator foundation and walls are built to support the load thus imposed. Masonry chimneys may be supported on noncombustible material having a fire resistance rating of not less than 3 hrs. where such supports are independent of the building construction and the load is transferred to the ground.

3062. A factory built chimney, if so listed, and a metal chimney may be supported additionally 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.

3063. Masonry chimneys shall be constructed of solid masonry units or reinforced concrete with walls not less than 8 inches thick. Such walls shall be lined with medium duty firebrick (ASTM C106, Type F or the equivalent), not less than 4½ inches thick, laid on the 4½ in. bed in refractory mortar (ASTM C105, medium duty or the equivalent). The lining shall start at the base of the chimney and extend continuously to the top.

3064.

a. Metal chimneys shall be lined with medium duty firebrick (ASTM C106, Type F) or the equivalent, not less than 4½ inches

thick laid on the 4½-in. bed in refractory mortar (ASTM C105 medium duty) or the equivalent. The lining shall start at the base and extend continuously to the top. If such chimney extends through any story of a building above that in which the connected incinerator is located, it shall be enclosed in such upper stories within a continuous enclosure constructed of materials which are not combustible, such as masonry (see Appendix), and extending from the ceiling of the incinerator room to or through the roof so as to retain the integrity of the fire separations as required by applicable building code provisions. The enclosure shall have a fire-resistance rating of not less than 1 hour if the building is less than 4 stories in height, and not less than 2 hours if the building is 4 or more stories in height. Any opening in the enclosing walls shall be equipped with a self-closing fire door approved for Class B openings.

b. 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.

c. The enclosing walls shall be without openings, except doorways equipped with approved self-closing fire doors at various floor levels for inspection purposes.

3065. Listed medium-heat appliance chimneys may be used and shall be installed in accordance with the conditions of the listing and the manufacturer's instructions. If such chimney extends through any story of a building above that in which the connected incinerator is located, it shall be enclosed in accordance with 3064.

3066. Clearances

a. Masonry Chimneys

1. A clearance of not less than 4 inches shall be provided between the exterior surface of masonry chimneys and combustible material.

b. Exterior Metal Chimneys

1. Exterior metal chimneys shall have a clearance of not less than 24 inches from a wall of wood frame construction and from any combustible material.

2. Exterior metal chimneys over 18 inches in diameter shall have a clearance of not less than 4 inches, and those 18 inches or less in diameter a clearance of not less than 2 inches from a building wall of other than wood frame construction.

3. An exterior metal chimney shall be installed with a minimum clearance of 24 inches to any door or window or to any walkway, unless insulated or shielded in any approved manner to avoid burning a person who might touch the chimney.

c. Interior Metal Chimneys

1. Within the same story of a building as that in which the incinerator is located, a metal chimney shall have a clearance of not less than 36 inches from a wall of wood frame construction and from any combustible material. Such interior metal chimneys over 18 inches in outside diameter shall have a clearance of not less than 4 inches, and those 18 inches or less in outside diameter a clearance of not less than 2 inches from a building wall of other than wood frame construction.

2. If a metal chimney passes through a roof constructed of combustible material, it shall be guarded by a ventilating thimble of galvanized iron or approved corrosion resistant metal, extending not less than 9 inches below and 9 inches above the roof construction, and of a size to provide not less than 18 inches clearance on all sides of the chimney.

3067. Chimneys shall extend not less than 10 feet higher than any portion of any building within 25 feet.

3068. 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 Section 108.

3069. Chimneys for incinerators of special design to produce low flue-gas temperatures shall adhere to the construction specified above. For further explanation, see 3072.

307. Chimney Connector or Breeching

3071. A chimney connector or breeching connecting a commercial-industrial type incinerator to a chimney shall be constructed of not lighter than No. 16 gage steel if it is 12 in. or less in diameter or greatest cross-section dimension and of not lighter than No. 12 gage steel if it exceeds 12 in. in diameter or greatest cross-section dimension. In addition, it shall be lined with not less than 2½ in. of firebrick (ASTM C106, Type A, high duty, or the equivalent) if it is not in excess of 18 in. in diameter or greatest cross-section dimension and with not less than 4½ in. of firebrick if the diameter or greatest cross-section dimension is over 18 in. Equivalent linings

may also be used. Breechings may also utilize listed medium-heat chimney sections if these sections are joined together with continuous welds, flanges, or couplings. The net internal free area of the connector shall be not less than the free area of the flue collar of the incinerator.

3072. Chimney connectors or breechings of all commercial-industrial type incinerators, including those of special design to produce low flue-gas temperatures, shall conform with 3071.

NOTE: This requirement has been initiated to avoid the serious corrosion problems inherent with low-temperature incinerator flue gases. It also provides the high-temperature protection necessary when the special equipment is bypassed for any purpose, including power failure. In those cases where the bypass is such that the breeching is also bypassed, then the breeching need not be high-temperature protected but it shall be protected by an acid-resistant coating suitable for the operating conditions.

3073. A chimney connector shall not be enclosed. The connector throughout its entire length shall be readily accessible for inspection and replacement.

3074. If a gas washer or scrubber is used or if other arrangements are such that the natural draft is insufficient for proper operation of the incinerator, a draft inducer may be used. In this event, the chimney shall be sized for natural-draft operation and a bypass installed around the gas washer or scrubber or other unit that requires the draft induction. Suitable normally open dampers shall be installed in the bypass to allow venting of combustion products in the event of power failure.

40. Chute-Fed Incinerators (Class IIA)

401. Description

4011. A chute-fed incinerator is designed specifically to be fed refuse from one or more floors above the incinerator directly into the incinerator by a separate chute constructed with a positive means to avoid penetration by smoke or fumes and connected directly over the primary combustion chamber. The incinerator is built with a primary and secondary combustion chamber and a settling chamber. It may include a flue-gas washer or scrubber. A separate chimney serves to convey the combustion gases to the outdoors.

4012. This class of incinerator is suitable for Type 1 and Type 2 wastes. They are generally used in residential and institutional buildings, including apartments, clubs, dormitories, churches, schools, and other occupancies where Type 1 and Type 2 wastes are to be incinerated.

402. Design and Construction

4021. The design and construction of a chute-fed incinerator, including secondary combustion chambers and settling chambers, shall conform with 302.

403. Foundation

4031. Chute-fed incinerators shall be supported on properly designed foundations of masonry or reinforced concrete or on noncombustible material having a fire-resistance rating of not less than 3 hours, provided such support is independent of the building floor construction and the load is transferred to the ground.

404. Clearances

4041. Except as otherwise provided in 4042, chute-fed incinerators shall be installed to provide a clearance to combustible material of not less than 36 in. at the sides and rear, and not less than 48 in. above, and not less than 8 ft. at the front of the incinerator provided that for an incinerator encased in brick, the clearance above may be 36 in. and at the sides and rear it may be 18 in. A clearance of not less than 12 in. shall be provided from a chute-fed incinerator to wall or ceilings of noncombustible construction which have or may have combustible material placed on the outer or upper sides thereof. A clearance of not less than 3 in. shall be provided from incinerators to walls or ceilings of noncombustible construction. Under no circumstances shall the walls of the incinerator be used as a part of the structural walls of the building.

4042. Incinerators which are listed specifically for installation at lesser clearances than specified in 4041 may be installed in accordance with the conditions of such listing and the manufacturer's instructions, provided that, in any case, the clearances shall be sufficient to afford ready accessibility for firing, cleanout, and any necessary servicing but, in no case, shall the clearance of any material be less than 3 in.

405. Charging Chute

4051. The charging chute of a chute-fed incinerator shall serve the incinerator only. It shall be constructed straight and plumb with no offset below the uppermost service opening and be smooth on the inside.

4052. A charging chute shall be so constructed as not to place excessive stress upon the roof of the incinerator combustion chamber.

It shall rest upon substantial noncombustible foundation having a fire-resistance rating of at least 3 hours. The chute may be supported on the incinerator walls if the incinerator walls and foundation are built to support the load thus imposed.

4053. The size of the charging chute shall be in accordance with the following:

a. If not more than six service openings are provided or the chute is not more than six stories in height, the size of the chute shall be not less than 22½ by 22½ in. or 24-in. diameter, inside measurement.

b. If seven or more service openings are provided or the chute is more than six stories in height, the size of the chute shall be not less than 27 by 27 in. or 30-in. diameter, inside measurements.

4054. Masonry charging chutes shall be constructed of clay or shale brickwork not less than 8 in. thick or of reinforced portland or refractory cement concrete not less than 6 in. thick. Such chutes shall be lined with firebrick (ASTM C106, Type G, low duty or the equivalent) not less than 4½ in. thick.

a. Chutes may be made of steel not lighter than No. 12 gage lined with firebrick (ASTM C106, Type G, low duty, or the equivalent) not less than 4½ in. thick or of listed medium-heat chimney sections approved for this use. Such chutes shall be enclosed within a continuous enclosure constructed of materials which are not combustible, such as masonry (see Appendix), and extending from the ceiling of the incinerator room to or through the roof so as to retain the integrity of the fire separations as required by applicable building code provisions. The enclosure shall have a fire-resistance rating of not less than 1 hour if the building is less than 4 stories in height, and not less than 2 hours if the building is 4 or more stories in height. Any opening in the enclosing walls shall be equipped with a self-closing fire door approved for Class B openings.

b. The enclosure shall provide a space on all sides of the chimney sufficient to permit inspection and repair.

c. The enclosing walls shall be without openings, except doorways equipped with approved self-closing fire doors at various floor levels for inspection purposes.

4055. Sprinklers shall not be installed in the charging chute of a chute-fed incinerator.

4056. A charging chute shall extend (full size) at least 4 ft. above the roof of the building. The chute shall be open to the atmosphere.

406. Service Openings

4061. All service openings into a charging chute shall be provided with a self-closing, self-latching, bottom-hinged hopper-type door approved for Class B openings and having a rating of not less than 1 hour with "Temperature rise: 30 min.-250°F max." The door frame shall be firmly built into the chute and the design and installation shall be such that no part of the frame or door will project into the chute, and that the opening to the chute interior will be closed off while the hopper door is fully open.

4062. The area of each service opening shall be limited to one-third of the cross-sectional area of the chute but, in no case, shall a service opening have an area in excess of 160 sq. in.

4063. Service openings shall not be installed in any part of the combustion zone of an incinerator.

4064. Instructions shall be posted at each service opening stating that waste is to be deposited only in bags or similar wrappings and warning against introduction of loose dusty materials, flammable liquids or compounds, closed containers and aerosol cans (empty or otherwise), or bulky or unwieldy articles into the chute opening.

4065. Every 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 1 hour with openings to such room or compartment protected by approved fire doors suitable for Class B openings.

407. Chimney

4071. The chimney flue for a chute-fed incinerator shall serve the incinerator only. It shall be designed and proportioned to provide adequate draft for proper operation of the incinerator.

4072. 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. 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.

4073. A factory-built chimney, if so listed, and a metal chimney may be supported additionally at intervals by the building

structure, in which case expansion joints shall be provided at each support level. All joints shall be liquidtight or of a design such that liquid will drain to the interior of the chimney.

4074. A masonry chimney serving a chute-fed incinerator shall conform with 5054, 5055, and 5056.

4075. A metal chimney serving a chute-fed incinerator shall conform with 3064 and 3066.

4076. Chimneys serving chute-fed incinerators having a horizontal combined hearth and grate area of 7 sq. ft. or less shall extend at least 3 ft. above the highest point where they pass through the roof of a building and at least 2 ft. higher than any portion of a building within 10 ft. Chimneys serving chute-fed incinerators having a horizontal combined hearth and grate area of more than 7 sq. ft. shall extend not less than 10 ft. higher than any portion of any building within 25 ft. The terminus of the chimney flue for the incinerator shall be equipped with an approved spark arrester if the incinerator does not include means for arresting sparks and fly ash (see 108).

408. Chimney Connector or Breeching

4081. A chimney connector or breeching for a chute-fed incinerator shall conform with 307.

50. Flue-Fed Incinerators (Class II)

501. Description

5011. This class of incinerators has certain inherent hazards which cannot be overcome, therefore, they are no longer covered by this standard.

60. Outdoor Incinerators

601. Introduction

6011. The burning of rubbish outdoors is generally unsafe in built-up areas. Sparks and flying brands from outdoor rubbish burning may carry the fire long distances. Burning rubbish outdoors in an incinerator reduces the fire danger but it is important that the incinerator be properly built to prevent release of sparks and brands. Spark arresters usually are required.

602. Small Outdoor Types

6021. An approved residential-type incinerator suitable for outdoor use should be provided. Such incinerators shall be installed in accordance with the terms of the listing and the manufacturer's instructions. A waste burner having a firebox or charging capacity of not over ten bushels or approximately 12 cu. ft. in capacity, and constructed and used in accordance with 6022 through 6027, may be used for outdoor burning of residential waste.

6022. Outdoor waste burners should be constructed to withstand internal temperatures of at least 1200 F in intermittent operation and to provide resistance to alternate heating and cooling and to weather. The design shall be such that during normal usage, structural parts will not warp, crack, corrode, or otherwise fail in a manner so that doors or covers do not fit tightly or that masonry cracks or other openings are produced through which flying brands or sparks may pass.

6023. Explosion relief shall be provided. The area of the explosion relief shall be not less than the ratio of 1 sq. ft. of relief area for every 15 cu. ft. of combustion chamber volume. A door or panel provided for this purpose shall be arranged to allow the door or panel to return to its closed position promptly after the pressure has been released.

6024. Outdoor waste burners shall be provided with a chimney extending not less than 12 ft. above grade and equipped with an approved spark arrester, see 108.

6025. Outdoor waste burners shall not be located within 15 ft. of any building or structure and generally should be so positioned that there is no direct exposure to buildings, wood fences, or piled combustible materials in the event of failure of the spark arresters. Outdoor waste burners shall not be located so as to create a nuisance by reason of their smoke.

6026. Outdoor waste burners which are cracked, corroded, or warped so as to permit the passage of sparks larger than those which the spark arrester is designed to restrain shall not be operated.

6027. Outdoor waste burners shall not be operated so as to create a nuisance or, in wooded areas, so as to interfere with fire-spotting operations of forest wardens.

NOTE: In many jurisdictions, a permit from the fire department or forest warden is required for bonfires and waste burners. Some fire departments or fire prevention agencies and some fire wardens in wooded sections may restrict the operation of outdoor waste burners to certain hours of the day or to certain days.

603. Commercial and Industrial Types

6031. Outdoor commercial and industrial-type incinerators shall conform with Section 30 insofar as applicable and, in addition, shall conform with 6032 and 6033.

6032. Incinerators shall be so located as not to introduce any direct exposure to adjacent buildings, structures, or outside storages of combustible stock or material in process due to handling or stoking of refuse or in the event of failure of spark arresters.

6033. Where substantial amounts of rubbish or similar combustible refuse is involved, a bin or enclosure of noncombustible construction shall be provided to confine waste material to designated areas prior to burning.

70. Rubbish Chutes

701. General

7011. Rubbish chutes are usually employed where there is a relatively large area on each floor from which rubbish is collected. This makes a chute a convenience in handling rubbish in many manufacturing plants, apartment houses, office buildings, and institutions. The procedure is to bring the collected rubbish from each floor to the opening in the chute. The chute then conveys the refuse to its disposition point. A rubbish chute shall serve no other purpose.

7012. There are three types of rubbish chute systems, each with separate fire safety criteria.

a. General Access Gravity Type Rubbish Chute.

b. Limited Access Gravity Type Rubbish Chute.

c. Pneumatic Rubbish Chute.

7013. Definitions.

a. General Access Gravity Type: A rubbish chute of this type is an enclosed vertical passageway in a building to a storage or compacting room where the rubbish is transferred by gravity only. All occupants of the building are free to use the chute at any time.

b. Limited Access Gravity Type: A rubbish chute of this type is an enclosed vertical passageway in a building to a storage or compacting room where the rubbish is transferred by gravity only. Authorized personnel only may use the chute, gaining entry by key to a locked chute door.

c. Pneumatic Rubbish Chute: A rubbish chute of this type has limited access. It may be a vertical, horizontal, or inclined enclosed passageway and having sufficient mechanically applied airflow to convey refuse without clogging to point of disposition.

702. Construction

7021. A steel or steel-jacketed refractory chute may be supported at intervals by the building structure, in which case expansion joints shall be provided at each support level. Other kinds of chutes shall rest upon a substantial noncombustible foundation having a fire-resistance rating of at least 3 hours.

7022. Gravity chutes should be constructed straight and plumb with no offsets whenever possible. If offsets are required they shall deviate not more than 15° from the vertical, and shall be properly reinforced. All chute interiors shall be smooth and without projections.

7023. The size of a refuse chute shall be in accordance with the following:

a. Gravity Type Chutes: The size of the chute shall not be less than 22½ by 22½ inches or 24 inches in diameter inside measurement.

b. Pneumatic Conveyor: The size of the chute shall not be less than 16 inches diameter, inside measurement.

7024. Masonry rubbish chutes shall be constructed of clay or shale brickwork not less than 8 in. thick or of reinforced concrete not less than 6 in. thick. Such chutes shall be lined with firebrick (ASTM Type G, low duty, or the equivalent) not less than 4½ in. thick.

7025.

a. Metal rubbish chutes shall be made of stainless steel or galvanized or aluminum-coated steel with no screws, rivets, or other projections on the interior surface of the chute. Laps or joints shall be of a design so that liquid will drain to the interior of the chute. The steel shall not be lighter than as indicated below:

1. For chutes handling Type 2 or Type 3 wastes, or a combination of both, the portion of a chute located not more than 6 stories below the roof of a building shall be made of steel not lighter than No. 18 gage and any other portion shall be made of steel not lighter than No. 16 gage.

2. Chutes handling wastes other than Type 2 or Type 3 shall be made of steel not lighter than No. 14 gage.

b. Metal chutes may be lined with firebrick (ASTM Type G, low duty or the equivalent) not less than 2½ inches thick. Unlined steel chutes shall be equipped with automatic sprinklers installed in accordance with NFPA Standard No. 13, Section 4310 and other applicable provisions, and the outlet of the chute shall be equipped with a self-closing steel door held open by a fusible link.

c. Rubbish chutes may be made of listed medium-heat appliance chimney sections approved for this use.

d. Rubbish chutes, other than masonry chutes conforming to 7024 or constructed of masonry walls having a fire resistance rating not less than specified below, shall be enclosed in all stories above the storage or compacting room within a continuous enclosure constructed of materials which are not combustible, such as masonry (see Appendix), and extending from the ceiling of the storage or compacting room to or through the roof so as to retain the integrity of the fire separation as required by applicable building code provisions. The walls of the enclosure or the walls of the masonry chute shall have a fire resistance rating of not less than 1 hour if the building is less than 4 stories in height and not less than 2 hours if the building is 4 or more stories in height. Any opening in the enclosing walls shall be equipped with self-closing fire doors approved for Class B openings.

7026. A rubbish chute shall extend (full size) at least 4 ft. above the roof of the building. The chute shall be open to the atmosphere.

703. Service Openings

7031. Service openings shall be provided in accordance with the following criteria:

a. General Access Gravity Type Chutes: All service openings into a rubbish chute shall be provided with a self-closing, self-latching, bottom-hinged hopper-type door approved for Class B openings and having a rating of not less than 1 hour with "Temperature rise: 30 min.-250° F max." The door frame shall be firmly built into the chute and the design and installation shall be such that no part of the frame or door will project into the chute.