CHAPTER 5  
EXHAUST SYSTEMS

SECTION 501  
GENERAL

501.1 Scope. This chapter shall govern the design, construction and installation of mechanical exhaust systems, including dust, stock and refuse conveyor systems and exhaust systems serving commercial food heat-processing appliances.

501.2 Independent system required. Single or combined mechanical exhaust systems from bath, toilet, urinal, locker, service sink closets and similar rooms shall be independent of other exhaust systems. Kitchen exhaust shall be an independent system and shall be constructed in accordance with Section 505 for domestic equipment and Sections 506 through 509 for commercial equipment.

501.3 Outdoor discharge. The air removed by every mechanical exhaust system shall be discharged outdoors at a point where it will not cause a nuisance and from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic or crawl space.

Exception: Whole-house ventilation-type attic fans that discharge into the attic space of dwelling units having private attics shall not be prohibited.

501.4 Pressure equalization. Mechanical exhaust systems shall be sized to remove the quantity of air required by this chapter to be exhausted. The system shall operate when air is required to be exhausted. Where mechanical exhaust is required in a room or space in other than occupancies in Use Group R-3, such space shall be maintained with a neutral or negative pressure. If a greater quantity of air is supplied by a mechanical ventilating supply system than is removed by a mechanical exhaust system for a room, adequate means shall be provided for the natural exit of the excess air supplied. If only a mechanical exhaust system is installed for a room or if a greater quantity of air is removed by a mechanical exhaust system than is supplied by a mechanical ventilating supply system for a room, adequate means shall be provided for the natural supply of the deficiency in the air supplied.

501.5 Ducts. Exhaust ducts shall be of metal and such construction shall comply with Chapter 6.

SECTION 502  
REQUIRED SYSTEMS

502.1 General. An exhaust system shall be provided, maintained and operated for all occupied areas where machines, vats, tanks, furnaces, forges, salamanders and other appliances, equipment and processes in such areas produce or throw off dust or particles sufficiently light to float in the air, or which emit heat, odors, fumes, spray, gas or smoke, in such quantities so as to be irritating or injurious to health or safety. Such exhaust system shall mechanically discharge the exhaust to the outside of the building. The total outdoor makeup air supplied shall be equal in volume to that removed.

502.2 Exhaust location. The inlet to the exhaust system shall be located in the area of heaviest concentration of contaminants.

502.2.1 Fuel dispensing areas. The bottom of the air inlet or exhaust opening in fuel dispensing areas shall be located not more than 18 inches (457 mm) above the floor.

502.3 Equipment, appliances and service rooms. All equipment, appliances and system service rooms that house sources of odors, fumes, noxious gases, smoke, steam, dust, spray or other contaminants, shall be designed and constructed so as to prevent spreading of such contaminants to other occupied parts of the building.

502.4 Spray-painting and dipping rooms. Rooms or booths utilized for spray painting or dipping shall have a mechanical exhaust system that complies with the Florida Fire Prevention Code and NFPA 33 for spray painting or NFPA 34 for dipping. The exhaust system shall have automatic controls to ensure its operation while spray painting or dipping is being conducted.

502.5 Motion picture projectors. Motion picture projectors shall be exhausted in accordance with Section 502.5.1 or 502.5.2.

502.5.1 Projectors with an exhaust discharge. Projectors equipped with an exhaust discharge shall be directly connected to a mechanical exhaust system. The exhaust system shall operate at an exhaust rate as indicated by the manufacturer's installation instructions.

502.5.2 Projectors without exhaust connection. Projectors without an exhaust connection shall have contaminants exhausted through a mechanical exhaust system. The exhaust rate for electric arc projectors shall be a minimum of 200 cubic feet per minute (cfm) (0.09 m³/s) per lamp. The exhaust rate for xenon projectors shall be a minimum of 300 cfm (0.14 m³/s) per lamp. The xenon projector exhaust shall be at a rate such that the exterior temperature of the lamp housing shall not exceed 130°F (54°C). The lamp and projection room exhaust systems, if combined or independent, shall not be interconnected with any other exhaust or return system within the building.

502.6 Dry-cleaning appliances. The exhaust system for Type I and Type II systems shall provide a complete and continuous air change not less than once every 3 minutes in dry-cleaning and dry-dyeing rooms. The system shall be provided
502.7 LP-gas distribution facilities. LP-gas distribution facilities shall be ventilated in accordance with NFPA 58.

502.8 Hazardous materials. All structures in which hazardous materials are stored shall be provided with a mechanical exhaust system where required by the Florida Fire Prevention Code. The mechanical exhaust ventilation rate shall not be less than 1 cfm (0.00047 m³/s) per square foot of floor area utilized for storage, and not less than 150 cfm (0.071 m³/s) total.

502.8.1 Design. The mechanical exhaust system shall be designed with consideration for the potential fumes or vapors released. Where fumes and vapors are heavier than air, the inlet to the exhaust shall be taken from a point within 12 inches (305 mm) above the floor. The exhaust and supply air openings shall be located to provide uniform air movement across all portions of the floor, room or space. The mechanical exhaust system shall be designed with controls to ensure continuous operation.

502.8.2 Controls. A manual shutoff control shall be provided outside the hazardous material storage room adjacent to the access door into the room or in an approved remote location. The shutoff control shall be of the break-glass type and shall be identified by the words “Ventilation System Emergency Shutoff.”

502.9 Hazardous exhaust. The mechanical exhaust of high concentrations of dust or hazardous vapors shall conform to the requirements of Section 510.

502.10 Public garages. Mechanical exhaust systems for public garages, as required in Chapter 4, shall operate continuously or in accordance with Section 403.4.

502.11 Motor vehicle operation. In areas where motor vehicles operate, mechanical ventilation shall be provided in accordance with Section 403. Additionally, areas in which stationary motor vehicles are operated shall be provided with a source capture system that connects directly to the motor vehicle exhaust systems.

Exceptions:

1. This section shall not apply where the motor vehicles being operated or repaired are electrically powered.
2. This section shall not apply to one- and two-family dwellings.

3. This section shall not apply to motor vehicle service areas where engines are operated inside the building only for the duration necessary to move the motor vehicles in and out of the building.

502.12 Tire rebuilding or recapping. Each room where rubber cement is used or mixed, or where flammable or combustible solvents are applied, shall be ventilated in accordance with the applicable provisions of NFPA 91.

502.12.1 Buffing machines. Each buffing machine shall be connected to a dust-collecting system that prevents the accumulation of the dust produced by the buffing process.

502.13 Specific rooms. Specific rooms, including bathrooms, locker rooms, smoking lounges and toilet rooms, shall be exhausted in accordance with the ventilation requirements of Chapter 4.

SECTION 503
MOTORS AND FANS

503.1 General. Motors and fans shall be sized to provide the required air movement. Motors in areas that contain flammable vapors or dusts shall be of a type approved for such environments. A manually operated remote control installed at an approved location shall be provided to shut off fans or blowers in flammable vapor or dust systems. Electrical equipment and appliances used in operations that generate explosive or flammable vapors, fumes or dusts shall be interlocked with the ventilation system so that the equipment and appliances cannot be operated unless the ventilation fans are in operation. Motors for fans used to convey flammable vapors or dusts shall be located outside the duct or shall be protected with approved shields and dustproofing. Motors and fans shall be provided with a means of access for servicing and maintenance.

503.2 Fans. Parts of fans in contact with explosive or flammable vapors, fumes or dusts shall be of nonferrous or nonsparking materials, or their casing shall be lined or constructed of such material. When the size and hardness of materials passing through a fan is capable of producing a spark, both the fan and the casing shall be of nonsparking materials. When fans are required to be spark resistant, their bearings shall not be within the airstream, and all parts of the fan shall be grounded. Fans in systems-handling materials that are capable of clogging the blades, and fans in buffing or woodworking exhaust systems, shall be of the radial-blade or tube-axial type.

503.3 Equipment and appliances identification plate. Equipment and appliances used to exhaust explosive or flammable vapors, fumes or dusts shall bear an identification plate stating the ventilation rate for which the system was designed.
503.4 Corrosion-resistant fans. Fans located in systems conveying corrosives shall be of materials that are resistant to the corrosive or shall be coated with corrosion-resistant materials.

SECTION 504
CLOTHES DRYER EXHAUST

504.1 Installation. Clothes dryers shall be exhausted in accordance with the manufacturer's instructions. Dryer exhaust systems shall be independent of all other systems and shall convey the moisture and any products of combustion to the outside of the building.

504.2 Exhaust penetrations. Ducts that exhaust clothes dryers shall not penetrate or be located within any fireblocking, draftstopping or any wall, floor/ceiling or other assembly required by the building code to be fire-resistance rated, unless such duct is constructed of galvanized steel or aluminum of the thickness specified in Section 603.3 and the fire-resistance rating is maintained in accordance with the Florida Building Code, Building.

504.3 Cleanout. Each vertical riser shall be provided with a means for cleanout.

504.4 Exhaust installation. Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building and shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the flow. Clothes dryer exhaust ducts shall not be connected to a gas vent connector, gas vent or chimney. Clothes dryer exhaust ducts shall not extend into or through ducts or plenums.

504.5 Makeup air. Installations exhausting more than 200 cfm (0.09 m³/s) shall be provided with makeup air. Where a closet is designed for the installation of a clothes dryer, an opening having an area of not less than 100 square inches (0.0645 m²) shall be provided in the closet enclosure.

504.6 Domestic clothes dryer ducts. Exhaust ducts for domestic clothes dryers shall have a smooth interior finish and the maximum developed length shall not exceed 25 feet (7620 mm) from the dryer location to the outlet terminal. The maximum length of the duct shall be reduced 2 1/2 feet (762 mm) for each 45-degree (0.79 rad) bend and 5 feet (1524 mm) for each 90-degree (1.6 rad) bend. The exhaust duct shall be a minimum nominal size of 4 inches (102 mm) in diameter. The entire exhaust system shall be supported and secured in place. The male end of the duct at overlapped duct joints shall extend in the direction of airflow. Clothes dryer transition ducts used to connect the appliance to the exhaust duct system shall be limited to single lengths not to exceed 8 feet (2438 mm) in length and shall be listed and labeled for the application. Transition ducts shall not be concealed within construction. Developed duct lengths longer than 25 feet (7620 mm) shall be allowed for specific dryer installations where the dryer manufacturer's installation instructions specify the allowable developed length of an engineered system.

504.6.1 Rough-in required. When a compartment or space for a domestic clothes dryer is provided, an exhaust duct of approved material and size shall be installed.

504.7 Commercial clothes dryers. The installation of dryer exhaust ducts serving Type 2 clothes dryers shall comply with the appliance manufacturer's installation instructions. Exhaust fan motors installed in exhaust systems shall be located outside of the airstream. In multiple installations, the fan shall operate continuously or be interlocked to operate when any individual unit is operating. Ducts shall have a minimum clearance of 6 inches (152 mm) to combustible materials. Clothes dryer transition ducts used to connect the appliance to the exhaust duct system shall be limited to single lengths not to exceed 8 feet (2438 mm) in length and shall be listed and labeled for the application. Transition ducts shall not be concealed within construction.

SECTION 505
DOMESTIC KITCHEN EXHAUST EQUIPMENT

505.1 Domestic systems. Where domestic range hoods and domestic appliances equipped with down draft exhaust are located within dwelling units, such hoods and appliances shall discharge to the outdoors through ducts constructed of galvanized steel, stainless steel or copper. Such ducts shall have smooth inner walls and shall be air tight and equipped with a backdraft damper.

Exception: Where installed in accordance with the manufacturer's installation instructions, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.

SECTION 506
COMMERCIAL KITCHEN GREASE DUCTS AND EXHAUST EQUIPMENT

506.1 General. Commercial kitchen grease ducts and exhaust equipment shall comply with the requirements of this section. Commercial kitchen grease ducts shall be designed for the type of cooking appliance and hood served. Unless otherwise specified in this chapter, grease hoods and grease hood duct systems shall conform to NFPA 96.

506.2 Corrosion protection. Ducts exposed to the outside atmosphere or subject to a corrosive environment shall be protected against corrosion in an approved manner.
506.3 Ducts serving Type I hoods. Commercial kitchen exhaust systems serving Type I hoods shall be designed, constructed and installed in accordance with Sections 506.3.1 through 506.3.14.2.

506.3.1 Exhaust fans. Exhaust fan housings serving a Type I hood shall be constructed of steel.

**Exception:** Fans listed and labeled as power roof ventilators for restaurant cooking appliances.

506.3.2 Grease diverter. Where a centrifugal fan with horizontal discharge is located outside the building, such fan shall be provided with a duct or duct fitting connected to the fan outlet that diverts the discharge from the grease exhaust duct system in an upward direction. Such diverter duct or fitting shall comply with the following:

1. The duct or duct fitting shall be constructed of metal as set forth in Chapter 6.
2. The maximum total developed length of the duct or duct fitting measured along the centerline shall not exceed three times the vertical dimension of the fan outlet.
3. The duct or duct fitting shall be provided with openings at the lowest point to permit drainage of grease to an approved collection device.

506.3.3 Grease duct materials. Grease ducts serving a Type I hood shall be constructed of steel not less than 0.055 inch (1.4 mm) (No. 16 Gage) in thickness or stainless steel not less than 0.044 inch (1.1 mm) (No. 18 Gage) in thickness or shall be listed and labeled factory-built commercial kitchen grease ducts installed in accordance with Section 304.1.

506.3.4 Joints, seams and penetrations of grease ducts. Joints, seams and penetrations of grease ducts shall be made with a continuous liquid-tight weld made on the external surface of the duct system.

**Exceptions:**

1. Penetrations shall not be required to be welded where sealed by devices that are listed for the application.
2. Internal welding shall not be prohibited provided that the joint is formed or ground smooth and is provided with ready access for inspection.
3. Listed and labeled factory-built commercial kitchen grease ducts installed in accordance with Section 304.1.

506.3.4.1 Duct joint types. Duct joints shall be butt joints or overlapping duct joints of either the telescoping or bell type. Overlapping joints shall be installed to prevent ledges and obstructions from collecting grease or interfering with gravity drainage to the intended collection point. The difference between the inside cross-sectional dimensions of overlapping sections of duct shall not exceed 1/4 inch (6 mm). The length of overlap for overlapping duct joints shall not exceed 2 inches (51 mm).

506.3.4.2 Duct to hood joints. Duct to hood joints shall be made with continuous internal or external liquid-tight welded joints. Such joints shall be smooth, accessible for inspection, and without grease traps.

**Exceptions:** This section shall not apply to:

1. A vertical duct to hood collar connection made in the top plane of the hood in accordance with all of the following:
   1.1 The hood duct opening shall have a 1-inch (25.4 mm) deep, full perimeter, welded flange turned down into the hood interior at an angle of 90 degrees from the plane of the opening.
   1.2 The duct shall have a 1-inch (25.4 mm) deep flange made by a 1-inch by 1-inch (25.4 mm by 25.4 mm) angle iron welded to the full perimeter of the duct not less than 1 inch (25.4 mm) above the bottom end of the duct.
   1.3 A gasket rated for use at not less than 1,500°F (815°C) is installed between the duct flange and the top of the hood.
   1.4 The duct to hood joint shall be secured by stud bolts not less than 1/4-inch (6.4 mm) in diameter welded to the hood with a spacing not greater than 4 inches (102 mm) on center for the full perimeter of the opening. All bolts and nuts are to be secured with lockwashers.
2. Listed and labeled duct to hood collar connections installed in accordance with Section 304.1.

506.3.4.3 Duct to exhaust fan connections. Duct to exhaust fan connections shall be flanged and gasketed at the base of the fan for listed and labeled vertical discharge fans; shall be flanged, gasketed, and bolted to the inlet of the fan for side inlet utility fans; and shall be flanged, gasketed, and bolted to the inlet and outlet of the fan for in-line fans.
506.3.4.4 Vibration isolation. A vibration isolation connector for connection of a duct to a fan inlet or outlet connection shall consist of noncombustible packing in a metal sleeve joint of approved design.

506.3.5 Grease duct supports. Grease duct bracing and supports shall be of noncombustible material securely attached to the structure and designed to carry gravity and seismic loads within the stress limitations of the building code. Bolts, screws, rivets and other mechanical fasteners shall not penetrate duct walls.

506.3.6 Air velocity. Grease duct systems serving a Type I hood shall be designed and installed so as to provide an air velocity within the duct system of not less than 1,500 feet per minute (7.6 m/s) and not greater than 2,500 feet per minute (13 m/s).

Exception: The velocity limitations shall not apply within duct transitions utilized to connect ducts to differently sized or shaped openings in hoods and fans, provided that such transitions do not exceed 3 feet (914 mm) in length and are designed to prevent the trapping of grease.

506.3.7 Separation of grease duct system. A separate grease duct system shall be provided for each Type I hood. A separate grease duct system is not required where all of the following conditions are met:

1. All interconnected hoods are located within the same story;
2. All interconnected hoods are located within the same room or in adjoining rooms; and
3. Interconnecting ducts do not penetrate assemblies required to be fire-resistance rated.

506.3.8 Clearances. Grease duct systems serving a Type I hood shall have a clearance to combustible construction of not less than 18 inches (457 mm).

Exception: Listed and labeled factory-built commercial kitchen grease ducts installed in accordance with Section 304.1.

506.3.9 Prevention of grease accumulation. Duct systems serving a Type I hood shall be constructed and installed so that grease cannot collect in any portion thereof, and the system shall slope not less than one-fourth unit vertical in 12 units horizontal (2-percent slope) toward the hood or toward an approved grease reservoir. Where horizontal ducts exceed 75 feet (22 860 mm) in length, the slope shall be not less than one unit vertical in 12 units horizontal (8.3-percent slope). Where a centrifugal fan is utilized, it shall be positioned so that the discharge will not impinge on the roof, other equipment or appliances or parts of the structure. A vertical discharge fan shall be manufactured with an approved drain outlet at the bottom of the housing to permit drainage of grease to an approved grease reservoir.

506.3.10 Cleanouts and other openings. Grease duct systems shall not have openings therein other than those required for proper operation and maintenance of the system. Any portion of such system having sections not provided with access from the duct entry or discharge shall be provided with cleanout openings. Cleanout openings shall be equipped with tight-fitting doors constructed of steel having a thickness not less than that required for the duct. Doors shall be equipped with a substantial method of latching, sufficient to hold the door tightly closed. Doors shall be designed so that they are operable without the use of a tool. Door assemblies, including any frames and gasketing, shall be approved for the purpose, and shall not have fasteners that penetrate the duct. Listed and labeled access door assemblies shall be installed in accordance with the terms of the listing. A sign shall be placed on all access panels stating: ACCESS PANEL—DO NOT OBSTRUCT in letters at least 1 inch high.

506.3.11 Horizontal cleanouts. Cleanouts located on horizontal sections of ducts shall be spaced not more than 20 feet (6096 mm) apart. The cleanouts shall be located on the side of the duct with the opening not less than 1 1/2 inches (38 mm) above the bottom of the duct, and not less than 1 inch (25.4 mm) below the top of the duct. The opening minimum dimensions shall be 12 inches (305 mm) on each side. Where the dimensions of the side of the duct prohibit the cleanout installation prescribed herein, the openings shall be on the top of the duct or the bottom of the duct. Where located on the top of the duct, the opening edges shall be a minimum of 1 inch (25.4 mm) from the edges of the duct. Where located in the bottom of the duct, cleanout openings shall be designed to provide internal damming around the opening, shall be provided with gasketing to preclude grease leakage, shall provide for drainage of grease down the duct around the dam, and shall be approved for the application.

506.3.12 Duct enclosure. A grease duct serving a Type I hood that penetrates a ceiling, wall or floor shall be enclosed from the point of penetration to the outlet terminal. A duct shall only penetrate exterior walls at locations where unprotected openings are permitted by the building code. Ducts shall be enclosed in accordance with the building code requirements for shaft construction.
duct enclosure shall be sealed around the duct at the point of penetration and vented to the outside of the building through the use of weather-protected openings. The enclosure shall be separated from the duct by a minimum of 6 inches (152 mm) and a maximum of 12 inches (305 mm) and shall serve a single grease exhaust duct system.

Exception: The shaft enclosure provisions of Section 506.3.12 shall not be required where a duct penetration is protected with a through-penetration firestop system classified in accordance with ASTM E 814 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated and where the surface of the duct is continuously covered on all sides from the point at which the duct penetrates a ceiling wall or floor to the outlet terminal with a classified and labeled material, system, method of construction or product specifically evaluated for such purpose, in accordance with a nationally recognized standard for such enclosure materials.

506.3.13 Fire-resistive access opening. Where cleanout openings are located in ducts within a fire-resistance-rated enclosure, access openings shall be provided in the enclosure at each cleanout point. Access openings shall be equipped with tight-fitting sliding or hinged doors that are equal in fire-resistive protection to that of the shaft or enclosure. An approved sign shall be placed on access opening panels with wording as follows: "ACCESS PANEL. DO NOT OBSTRUCT."

506.3.14 Type I exhaust outlets. Exhaust outlets for grease ducts serving commercial food heat-processing appliances shall conform to the requirements of Sections 506.3.14.1 through 506.3.14.2.

506.3.14.1 Termination above the roof. Exhaust outlets that terminate above the roof shall have the discharge of the grease hood duct system, located not less than 2 feet (610 mm) above the roof surface. The air flow from exhaust outlets conveying grease-laden vapors shall be in a vertical direction away from the roof surface.

506.3.14.2 Termination through an exterior wall. Where approved by the code official, exhaust outlets shall be permitted to terminate through noncombustible exterior walls. Such terminations shall not be located where protected openings are required by the building code. Other exterior openings shall not be located within 3 feet (914 mm) of such terminations.

506.3.14.3 Termination location. Exhaust outlets shall be located not less than 10 feet (3048 mm) horizontally from parts of the same or contiguous build-ings, adjacent property lines and air intake openings into any building and shall be located not less than 10 feet (3048 mm) above the adjoining grade level.

Exceptions:
1. Exhaust outlets shall terminate not less than 5 feet (1524 mm) from an adjacent building, adjacent property line and air intake openings into a building where air from the exhaust outlet discharges away from such locations.
2. The minimum horizontal distance between vertical discharge fans and parapet-type building structures shall be 2 feet (610 mm) provided that such structures are not higher than the top of the fan discharge opening.

506.4 Ducts serving Type II hoods. Commercial kitchen exhaust systems serving Type II hoods shall comply with Sections 506.4.1 and 506.4.2.

506.4.1 Type II exhaust outlets. Exhaust outlets for ducts serving Type II hoods shall comply with Sections 401.5 and 401.5.2. Such outlets shall be protected against local weather conditions and shall meet the provisions for exterior wall opening protectives in accordance with the Florida Building Code, Building.

506.4.2 Ducts. Ducts and plenums serving Type II hoods shall be constructed of rigid metallic materials as set forth in Chapter 6. Duct bracing and supports shall comply with Chapter 6. Ducts subject to positive pressure shall be adequately sealed.

SECTION 507
COMMERCIAL KITCHEN HOODS

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be designed for the type of cooking appliance served and shall be designed to confine cooking vapors and residues within the hood.

Exception: Factory-built commercial exhaust hoods which are tested in accordance with UL 710, listed, labeled and installed in accordance with Section 304.1 shall not be required to comply with Sections 507.4, 507.5, 507.7, 507.12, 507.13, 507.15 and 507.16.

507.2 Where required. A Type I or Type II hood shall be installed at or above all commercial food heat-processing appliances.

Exception: Food heat-processing appliances installed within a dwelling unit.

507.2.1 Type I and Type II hoods. A Type I hood shall be installed at or above all commercial food heat-processing appliances that produce grease vapors or smoke. A Type I
or Type II hood shall be installed at or above all commercial food heat-processing appliances that produce fumes, steam, odor or heat.

507.2.2 Domestic cooking appliances used for commercial purposes. Domestic cooking appliances utilized for commercial purposes shall be provided with Type I or II hoods as required for the type of appliances and processes in accordance with Sections 507.2 and 507.2.1.

507.2.3 Solid fuel. Type I hoods for use over solid fuel-burning cooking appliances shall discharge to an exhaust system that is independent of other exhaust systems.

507.3 Fuel-burning appliances. Where vented fuel-burning appliances are located in the same room or space as the hood, provisions shall be made to prevent the hood system from interfering with normal operation of the appliance vents.

507.4 Type I materials. Type I hoods shall be constructed of steel not less than 0.043 inch (1.09 mm) (No. 18 MSG) in thickness, or stainless steel not less than 0.037 inch (0.94 mm) (No. 20 MSG) in thickness.

507.5 Type II hood materials. Type II hoods shall be constructed of steel not less than 0.030 inch (0.76 mm) (No. 22 gage) in thickness, stainless steel not less than 0.024 inch (0.61 mm) (No. 24 gage) in thickness, copper sheets weighing not less than 24 ounces per square foot (7.3 kg/m²), or of other approved material and gage.

507.6 Supports. Hoods shall be secured in place by non-combustible supports.

507.7 Hood joints, seams and penetrations. External hood joints, seams and penetrations shall be made with a continuous external liquid-tight weld to the lowest outermost perimeter of the hood. Internal hood joints, seams, penetrations, filter support frames, and other appendages attached inside the hood shall not be required to be welded but shall be otherwise sealed to be grease tight.

Exceptions:
1. Penetrations shall not be required to be welded where sealed by devices that are listed for the application.
2. Internal welding of seams, joints, and penetrations of the hood shall not be prohibited provided that the joint is formed smooth or ground so as to not trap grease and is readily cleanable.
3. External hood joints and seams tested and listed in accordance with the requirements of UL 710 shall not be required to be welded.

507.8 Cleaning and grease gutters. A hood shall be designed to provide for thorough cleaning of the entire hood. Grease gutters shall drain to an approved collection receptacle that is fabricated, designed and installed to allow access for cleaning.

507.9 Clearances for Type I hood. A Type I hood shall be installed with a clearance to combustibles of not less than 18 inches (457 mm).

Exception: Clearance shall not be required from gypsum wallboard provided that a smooth, cleanable, nonabsorbent and noncombustible material is installed between the hood and the gypsum wallboard over an area extending not less than 18 inches (457 mm) in all directions from the hood.

507.10 Hoods penetrating a ceiling. Type I hoods or portions thereof penetrating a ceiling, wall or furred space shall comply with all the requirements of Section 506.3.12.

507.11 Grease filters. Type I hoods shall be equipped with listed grease filters designed for the specific purpose. Grease-collecting equipment shall be provided with access for cleaning. The lowest edge of a grease filter located above the cooking surface shall be not less than the height specified in Table 507.11.

**TABLE 507.11**

<table>
<thead>
<tr>
<th>TYPE OF COOKING APPLIANCE</th>
<th>HEIGHT ABOVE COOKING SURFACE (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without exposed flame</td>
<td>1/2</td>
</tr>
<tr>
<td>Exposed flame and burners</td>
<td>2</td>
</tr>
<tr>
<td>Exposed charcoal and charbroil type</td>
<td>4</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

507.11.1 Criteria. Filters shall be of such size, type and arrangement as will permit the required quantity of air to pass through such units at rates not exceeding those for which the filter or unit was designed or approved. Filter units shall be installed in frames or holders so as to be readily removable without the use of separate tools, unless designed and installed to be cleaned in place and the system is equipped for such cleaning in place. Removable filter units shall be of a size that will allow them to be cleaned in a dishwashing machine or pot sink. Filter units shall be arranged in place or provided with drip-intercepting devices to prevent grease or other condensate from dripping into food or on food preparation surfaces. Listed grease filters shall conform to the requirements of UL 1046.

507.11.2 Mounting position. Filters shall be installed at an angle of not less than 45 degrees (0.79 rad) from the horizontal and shall be equipped with a drip tray beneath the lower edge of the filters.
507.12 Canopy size and location. The inside edge of canopy-type commercial cooking hoods shall overhang or extend a horizontal distance of not less than 6 inches (152 mm) beyond the edge of the cooking surface, on all open sides. The vertical distance between the lip of the hood and the cooking surface shall not exceed 4 feet (1219 mm).

507.13 Capacity of hoods. Canopy-type commercial cooking hoods shall exhaust a minimum quantity of air determined in accordance with this section and Sections 507.13.1 through 507.13.4.

where:

\[ A = \text{The horizontal surface area of the hood, in square feet \(m^2\).} \]

\[ D = \text{Distance in feet \(mm\) between the lower lip of the hood and the cooking surface.} \]

\[ P = \text{That part of the perimeter of the hood that is open, in feet \(mm\).} \]

\[ Q = \text{Quantity of air, in cubic feet per minute \(L/s\).} \]

507.13.1 Solid fuel-burning cooking appliances. The minimum airflow for Type I hoods used for solid fuel-burning cooking appliances, grease-burning charbroilers and similar appliances shall be:

<table>
<thead>
<tr>
<th>Number of exposed sides</th>
<th>Formula</th>
<th>For SI:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (island or central hood)</td>
<td>( Q = 300A )</td>
<td>( Q = 0.46A )</td>
</tr>
<tr>
<td>3 or less</td>
<td>( Q = 200A )</td>
<td>( Q = 0.31A )</td>
</tr>
<tr>
<td>Alternate formula</td>
<td>( Q = 100PD )</td>
<td>( Q = 0.16PD )</td>
</tr>
</tbody>
</table>

507.13.2 High temperature. The minimum airflow for Type I hoods used for high-temperature appliances such as deep-fat fryers shall be determined as follows:

<table>
<thead>
<tr>
<th>Number of exposed sides</th>
<th>Formula</th>
<th>For SI:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (island or central hood)</td>
<td>( Q = 150A )</td>
<td>( Q = 0.23A )</td>
</tr>
<tr>
<td>3 or less</td>
<td>( Q = 100A )</td>
<td>( Q = 0.16A )</td>
</tr>
<tr>
<td>Alternate formula</td>
<td>( Q = 50PD )</td>
<td>( Q = 0.08PD )</td>
</tr>
</tbody>
</table>

507.13.3 Medium temperature. The minimum airflow for Type I hoods used for medium-temperature appliances such as rotisseries, grills and ranges shall be determined as follows:

<table>
<thead>
<tr>
<th>Number of exposed sides</th>
<th>Formula</th>
<th>For SI:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (island or central hood)</td>
<td>( Q = 150A )</td>
<td>( Q = 0.16A )</td>
</tr>
<tr>
<td>3 or less</td>
<td>( Q = 175A )</td>
<td>( Q = 0.12A )</td>
</tr>
<tr>
<td>Alternate formula</td>
<td>( Q = 50PD )</td>
<td>( Q = 0.08PD )</td>
</tr>
</tbody>
</table>

507.13.4 Low temperature. The minimum airflow for Type I hoods used for low-temperature appliances such as medium-to-low-temperature ranges, roasters, roasting ovens, pastry ovens and appliances approved for use under a Type II hood, such as pizza ovens, shall be determined as follows:

<table>
<thead>
<tr>
<th>Number of exposed sides</th>
<th>Formula</th>
<th>For SI:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (island or central hood)</td>
<td>( Q = 75A )</td>
<td>( Q = 0.12A )</td>
</tr>
<tr>
<td>3 or less</td>
<td>( Q = 50A )</td>
<td>( Q = 0.08A )</td>
</tr>
<tr>
<td>Alternate formula</td>
<td>( Q = 50PD )</td>
<td>( Q = 0.08PD )</td>
</tr>
</tbody>
</table>

507.14 Noncanopy size and location. Noncanopy-type hoods shall be located a maximum of 3 feet (914 mm) above the cooking surface. The edge of the hood shall be set back a maximum of 1 foot (305 mm) from the edge of the cooking surface.

507.15 Capacity for noncanopy hoods. In addition to all other requirements for hoods specified in this section, the volume of air exhausting through a noncanopy-type hood to the duct system shall be not less than 300 cfm per linear foot [0.5 \(m^3/(s \text{m})\)] of the cooking appliances.

507.16 Exhaust outlets. Exhaust outlets located within the hood shall be located so as to optimize the capture of particulate matter. Each outlet shall serve not more than a 12-foot (3658 mm) section of hood.

507.17 Performance test. A performance test shall be conducted upon completion and before final approval of the installation of a ventilation system serving commercial food heat-processing appliances. The test shall verify the rate of airflow and proper operation as specified in this chapter. The permit holder shall furnish the necessary test equipment and devices required to perform the tests.

SECTION 508
COMMERCIAL KITCHEN MAKEUP AIR

508.1 Makeup air. Makeup air shall be supplied during the operation of commercial kitchen exhaust systems that are provided for commercial food heat-processing appliances. The amount of makeup air supplied shall be approximately equal to the amount of exhaust air. The makeup air shall not reduce the effectiveness of the exhaust system. Makeup air shall be provided by gravity or mechanical means or both.

Exception: This section shall not apply to dwelling units.

508.1.1 Makeup air temperature. The temperature differential between the makeup air and the air in the conditioned space shall not exceed 10°F (6°C).

Exceptions:
1. Makeup air that is part of the air-conditioning system.
2. Makeup air that does not decrease the comfort conditions of the occupied space.
SECTION 509
FIRE SUPPRESSION SYSTEMS

509.1 Where required. Commercial food heat-processing appliances required by Section 507.2.1 to have a Type I hood shall be provided with an approved automatic fire suppression system.

509.2 Design. The automatic fire suppression system shall be designed to protect the surface of the commercial food heat-processing appliances and the exhaust system serving such appliances. The automatic fire suppression system shall be designed to protect the commercial exhaust hoods, commercial kitchen ducts and the enclosed plenum space within the hood above the filters.

509.3 Type of system. The automatic fire suppression system shall be of a type recognized for protection of commercial cooking appliance and exhaust systems of the type and arrangement protected. Preengineered automatic dry- and wet-chemical fire suppression system shall be tested in accordance with UL 300. Automatic fire suppression systems, including preengineered and engineered dry- and wet-chemical fire-suppression systems, shall be listed and labeled for specific use as protection for commercial cooking operations and shall be installed in accordance with Section 304.1.

Automatic fire suppression systems of the following types shall be installed in accordance with the referenced standard indicated:

1. Carbon-dioxide extinguishing system, NFPA 12.
3. Foam-water sprinkler system or foam-water spray systems, NFPA 16.
4. Dry-chemical extinguishing systems, NFPA 17.
5. Wet-chemical extinguishing systems, NFPA 17A.

509.4 System actuation. Each automatic fire suppression system shall have both automatic and manual actuation means. A manual actuation device shall be located at or near a means of egress from the cooking area, a minimum of 10 feet (3048 mm) and a maximum of 20 feet (6096 mm) from the kitchen exhaust system. The manual actuation device shall be located a minimum of 4½ feet (1372 mm) and a maximum of 5 feet (1524 mm) above the floor. The manual actuation device shall require a maximum force of 40 pounds (178 N) and a maximum movement of 14 inches (356 mm) to actuate the fire suppression system.

Exception: Automatic sprinkler systems shall not be required to be equipped with manual actuation means.

509.5 System interconnection. The actuation of the automatic fire suppression system shall automatically shut down the fuel or electrical power supply to the cooking appliances. The fuel and electrical power supply reset shall be manual.

509.6 Nozzles. Access shall be provided to all nozzles or sprinklers in the automatic fire suppression system for the purposes of inspection and maintenance.

509.7 System test and inspection. The automatic fire suppression system shall be acceptance-tested in accordance with the Florida Fire Prevention Code and installation standard listed in Section 509.3, and with the manufacturer’s instructions.

SECTION 510
HAZARDOUS EXHAUST SYSTEMS

510.1 General. This section shall govern the design and construction of duct systems for hazardous exhaust and shall determine where such systems are required. Hazardous exhaust systems are systems designed to capture and control hazardous emissions generated from product handling or processes, and convey those emissions to the outdoors. Hazardous emissions include flammable vapors, gases, fumes, mists or dusts, and volatile or airborne materials posing a health hazard, such as toxic or corrosive materials. For the purposes of this section, the health-hazard rating of materials shall be as specified in NFPA 704.

510.2 Where required. A hazardous exhaust system shall be required wherever operations involving the handling or processing of hazardous materials, in the absence of such exhaust systems and under normal operating conditions, have the potential to create one of the following conditions:

1. A flammable vapor, gas, fume, mist or dust is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature.
2. A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration.
3. A vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2 or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.

510.3 Design and operation. The design and operation of the exhaust system shall be such that flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust flow below 25 percent of the contaminant’s lower flammability limit.

510.4 Independent system. Hazardous exhaust systems shall be independent of other types of exhaust systems. Incompatible materials, as defined in the Florida Fire Prevention Code, shall not be exhausted through the same hazardous exhaust system. Hazardous exhaust systems shall not share common shafts with other duct systems, except where such systems are hazardous exhaust systems originating in the same fire area.

Contaminated air shall not be recirculated to occupied areas unless the contaminants have been removed. Air contaminat-
5.10 FLORIDA BUILDING CODE — MECHANICAL

510.5 Design. Systems for removal of vapors, gases and smoke shall be designed by the constant velocity or equal friction methods. Systems conveying particulate matter shall be designed employing the constant velocity method.

510.5.1 Balancing. Systems conveying explosive or radioactive materials shall be prebalanced by duct sizing. Other systems shall be balanced by duct sizing with balancing devices, such as dampers. Dampers provided to balance airflow shall be provided with securely fixed minimum-position blocking devices to prevent restricting flow below the required volume or velocity.

510.5.2 Emission control. The design of the system shall be such that the emissions are confined to the area in which they are generated by air currents, hoods or enclosures and shall be exhausted by a duct system to a safe location or treated by removing contaminants.

510.5.3 Hoods required. Hoods or enclosures shall be used where contaminants originate in a limited area of a space. The design of the hood or enclosure shall be such that air currents created by the exhaust systems will capture the contaminants and transport them directly to the exhaust duct.

510.5.4 Contaminant capture and dilution. The velocity and circulation of air in work areas shall be such that contaminants are captured by an airstream at the area where the emissions are generated and conveyed into a product-conveying duct system. Contaminated air from work areas where hazardous contaminants are generated shall be diluted below the thresholds specified in Section 510.2 with air that does not contain other hazardous contaminants.

510.5.5 Makeup air. Makeup air shall be provided at a rate approximately equal to the rate that air is exhausted by the hazardous exhaust system. Makeup-air intakes shall be located so as to avoid recirculation of contaminated air.

510.5.6 Clearances. The minimum clearance between hoods and combustible construction shall be the clearance required by the duct system.

510.5.7 Ducts. Hazardous exhaust duct systems shall extend directly to the exterior of the building and shall not extend into or through ducts and plenums.

510.6 Penetrations. Penetrations of structural elements by a hazardous exhaust system shall conform to Sections 510.6.1 through 510.6.4.

510.6.1 Floors. Hazardous exhaust systems that penetrate a floor/ceiling assembly shall be enclosed in a fire-resistance-rated shaft constructed in accordance with the Florida Building Code, Building.

510.6.2 Wall assemblies. Hazardous exhaust duct systems that penetrate fire-resistance-rated wall assemblies shall be enclosed in fire-resistance-rated construction from the point of penetration to the outlet terminal, except where the interior of the duct is equipped with an approved automatic fire suppression system. Ducts shall be enclosed in accordance with the Florida Building Code, Building requirements for shaft construction and such enclosure shall have a minimum fire-resistance-rating of not less than the highest fire-resistance-rated wall assembly penetrated.

510.6.3 Fire walls. Ducts shall not penetrate a fire wall.

510.6.4 Fire dampers. Fire dampers are not required at penetrations of fire-resistance-rated assemblies.

510.7 Suppression required. Ducts shall be protected with an approved automatic fire suppression system installed in accordance with the Florida Building Code, Building.

Exception: An approved automatic fire suppression system shall not be required in ducts conveying materials, fumes, mists and vapors that are nonflammable and noncombustible.

510.8 Duct construction. Ducts utilized to convey hazardous exhaust shall be constructed of approved G90 galvanized sheet steel, with a minimum nominal thickness as specified in Table 510.8.

Nonmetallic ducts utilized in systems exhausting nonflammable corrosive fumes or vapors shall be listed and labeled. Nonmetallic duct shall have a flame spread index of 25 or less and a smoke-developed index of 50 or less, when tested in accordance with ASTM E 84. Ducts shall be approved for installation in such an exhaust system.

Where the products being exhausted are detrimental to the duct material, the ducts shall be constructed of alternative materials that are compatible with the exhaust.

<table>
<thead>
<tr>
<th>DIA METER OF DUCT OR MAXIMUM SIDE DIMENSION</th>
<th>MINIMUM NOMINAL THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nonabrasive materials</td>
</tr>
<tr>
<td>0.8 inches</td>
<td>0.028 inch (No. 24 Gage)</td>
</tr>
<tr>
<td>9-18 inches</td>
<td>0.034 inch (No. 22 Gage)</td>
</tr>
<tr>
<td>19-30</td>
<td>0.040 inch (No. 20 Gage)</td>
</tr>
<tr>
<td>Over 30 inches</td>
<td>0.052 inch (No. 18 Gage)</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm.
510.8.1 Duct joints. Ducts shall be made tight with the male end of the duct overlapped a minimum of 1 inch (25 mm) with duct joints extending in the direction of air flow.

510.8.2 Clearance to combustibles. Ducts shall have a clearance to combustibles in accordance with Table 510.8.2. Exhaust gases having temperatures in excess of 600°F (316°C) shall be exhausted to a chimney in accordance with Section 511.2.

<table>
<thead>
<tr>
<th>TYPE OF EXHAUST OR TEMPERATURE OF EXHAUST (°F)</th>
<th>CLEARANCE TO COMBUSTIBLES (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100</td>
<td>1</td>
</tr>
<tr>
<td>100-600</td>
<td>12</td>
</tr>
<tr>
<td>Flammable vapors</td>
<td>6</td>
</tr>
</tbody>
</table>

For SI: °C = [(°F) - 32] / 1.8, 1 inch = 25.4 mm.

510.8.3 Explosion relief. Systems exhausting potentially explosive mixtures shall be protected with an approved explosion relief system or by an approved explosion prevention system designed and installed in accordance with NFPA 69. An explosion relief system shall be designed to minimize the structural and mechanical damage resulting from an explosion or deflagration within the exhaust system. An explosion prevention system shall be designed to prevent an explosion or deflagration from occurring.

510.9 Supports. Ducts shall be supported at intervals not exceeding 10 feet (3048 mm). Supports shall be constructed of noncombustible material.

SECTION 511
DUST, STOCK AND REFUSE CONVEYING SYSTEMS

511.1 Dust, stock and refuse conveying systems. Dust, stock and refuse conveying systems shall comply with the provisions of Sections 511.1.1 through 511.3 Unless otherwise specified in this section, dust, stock and refuse conveying systems shall also comply with Section 510 and NFPA 91.

511.1.1 Collectors and separators. Cyclone collectors and separators and associated supports shall be constructed of noncombustible materials and shall be located on the exterior of the building or structure. A collector or separator shall not be located nearer than 10 feet (3048 mm) to combustible construction or to an unprotected wall or floor opening, unless the collector is provided with a metal vent pipe that extends above the highest part of any roof within a distance of 30 feet (9144 mm).

511.1.2 Discharge pipe. Discharge piping shall conform to the requirements for ducts, including clearances required for high-heat appliances, as contained in this code. A delivery pipe from a cyclone collector shall not convey refuse directly into the firebox of a boiler, furnace, dutch oven, refuse burner, incinerator or other appliance.

511.1.3 Conveying system exhaust discharge. An exhaust system shall discharge to the outside of the building either directly by flue, or indirectly through the separator, bin or vault into which the system discharges.

511.1.4 Spark protection. The outlet of an open-air exhaust terminal shall be protected with an approved metal or other noncombustible screen to prevent the entry of sparks.

511.1.5 Explosion relief vents. A safety or explosion relief vent shall be provided on all systems that convey combustible refuse or stock of an explosive nature, in accordance with the requirements of the Florida Building Code, Building.

511.1.5.1 Screens. Where a screen is installed in a safety relief vent, the screen shall be attached so as to permit ready release under the explosion pressure.

511.1.5.2 Hoods. The relief vent shall be provided with an approved noncombustible cowl or hood, or with a counterbalanced relief valve or cover arranged to prevent the escape of hazardous materials, gases or liquids.

511.2 Exhaust outlets. Outlets for exhaust that exceed 600°F (315°C) shall be designed as a chimney in accordance with Table 511.2.

The termination point for exhaust ducts discharging to the atmosphere shall not be less than the following:

1. Ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property line; 10 feet (3048 mm) from openings into the building; 6 feet (1829 mm) from exterior walls or roofs; 30 feet (9144 mm) from combustible walls or openings into the building which are in the direction of the exhaust discharge; and 10 feet (3048 mm) above adjoining grade.

2. Other product-conveying outlets: 10 feet (3048 mm) from property line; 3 feet (914 mm) from exterior wall or roof; 10 feet (3048 mm) from openings into the building; and 10 feet (3048 mm) above adjoining grade.

3. Environmental air duct exhaust: 3 feet (914 mm) from property line; and 3 feet (914 mm) from openings into the building.

FLORIDA BUILDING CODE — MECHANICAL

5.11
## TABLE 511.2
CONSTRUCTION, CLEARANCE AND TERMINATION REQUIREMENTS FOR SINGLE-WALL METAL CHIMNEYS

<table>
<thead>
<tr>
<th>CHIMNEYS SERVING</th>
<th>MINIMUM THICKNESS</th>
<th>TERMINATION</th>
<th>CLEARANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wall</td>
<td>Lining</td>
<td>Above roof opening (feet)</td>
</tr>
<tr>
<td>Low-heat appliances (1,000°F operating-1,400°F temp. maximum)</td>
<td>0.127&quot; (No. 10 MSG)</td>
<td>None</td>
<td>3</td>
</tr>
<tr>
<td>Medium-heat appliances (2,000°F maximum) a</td>
<td>0.127&quot; (No. 10 MSG)</td>
<td>Up to 18&quot; dia. 2 1/2&quot;</td>
<td>—</td>
</tr>
<tr>
<td>High-heat appliances (Over 3,000°F) b</td>
<td>0.127&quot; (No. 10 MSG)</td>
<td>4 1/2&quot; laid on 4 1/2&quot; bed</td>
<td>20</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, °C = (°F-32)/1.8.

- Lining shall extend from bottom to top of outlet.
- Lining shall extend from 24 inches below connector to 24 feet above.
- Clearance shall be as specified by the design engineer and shall have the sufficient clearance from buildings and structures to avoid overheating combustible materials (maximum 160°F).

### 511.3 Clearance to Combustibles

#### 511.3.1 Ambient Temperature Noncombustible Materials

Ducts conveying ambient temperature noncombustible materials shall have a minimum clearance of 1/2 inch from combustible construction and a minimum of 6 inch clearance to store combustible materials.

Exception No. 1: Clearance may be reduced to 6 inches from combustible materials and to 1/2 inch from combustible construction if the duct system is provided for the specific hazard.

Exception No. 2: Clearances from ducts to combustible material may be reduced if the combustible material is protected in accordance with Table 308.6.

#### 511.3.2 Ambient Temperature Combustible Materials

Ducts conveying ambient temperature combustible materials shall have a minimum clearance of 18 inches from combustible construction or combustible materials.

### 511.4 Wood Processing and Woodworking Facilities

Wood processing facilities that produce or utilize finely divided wood particles or wood fibers shall conform with NFPA 664.

Exception: Facilities with an area of 2000 ft² (185.8 m²) or less and have a dust collection flow rate of 1500 ft³/min (2548.6 m³/sec) or less.
SECTION 512
SUBSLAB SOIL EXHAUST SYSTEMS

512.1 General. When a subslab soil exhaust system is provided, the duct shall conform to the requirements of this section.

512.2 Materials. Subslab soil exhaust system duct material shall be air duct material listed and labeled to the requirements of UL 181 for Class O air ducts, or any of the following piping materials that comply with the plumbing code as building sanitary drainage and vent pipe: cast iron; galvanized steel; brass or copper pipe; copper tube of a weight not less than that of copper drainage tube, Type DWV; plastic piping.

512.3 Grade. Exhaust system ducts shall not be trapped and shall have a minimum slope of one-eighth unit vertical in 12 units horizontal (1-percent slope).

512.4 Termination. Subslab soil exhaust system ducts shall extend through the roof and terminate at least 6 inches (152 mm) above the roof and at least 10 feet (3048 mm) from any operable openings or air intake.

512.5 Identification. Subslab soil exhaust ducts shall be permanently identified within each floor level by means of a tag, stencil or other approved marking.

SECTION 513
MAUSOLEUM RELIEF VENT

513.1 General. A pressure relief vent shall be provided for each crypt. Niches shall not require pressure relief systems.

513.2 Materials. The pressure relief vent pipe and fittings shall conform to one of the standards listed in Table 513.2A and Table 513.2B.

Table 513.2B
CRYPT PRESSURE RELIEF PIPE

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylonitrile butadiene styrene (ABS) plastic pipe</td>
<td>ASTM D 3311 CSA B181.1</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC) plastic pipe (Type DWV)</td>
<td>ASTM D 2949 ASTM F 891</td>
</tr>
<tr>
<td>Plastic, general</td>
<td>ASTM F 409</td>
</tr>
</tbody>
</table>

513.3 Pressure relief vent. Each crypt shall have a pressure relief vent from the crypt to the roof of the mausoleum. The minimum nominal pipe size shall be 1 inch (25.4 mm). The system shall have a minimum of one-eighth unit vertical to 12 units horizontal (1-percent slope). The piping shall not be trapped or installed to trap water or condensate.

513.4 Termination. Crypt pressure relief system shall extend through the roof and terminate at least 6 inches (152 mm) above the roof and at least 10 feet (3048 mm) from any operable opening, air intake, or property line. The termination of the relief system pipe shall be done by a roof and vent cap compatible with the relief pressure pipe. The roof and vent cap shall be proof.

Table 513.2A
CRYPT PRESSURE RELIEF PIPE

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylonitrile butadiene styrene (ABS) plastic pipe</td>
<td>ASTM D 2661 ASTM F 628 CSA B181.1</td>
</tr>
<tr>
<td>Polyolefin pipe</td>
<td>CSA CAN/CSA - B181.3</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC) plastic pipe (Type DWV)</td>
<td>ASTM D 2665 ASTM D 2949 ASTM F 891</td>
</tr>
</tbody>
</table>