

Airside Products Sales, Inc.

Presents:

Dampers for Fire and Smoke Barriers

(Information based on the NYC Building Code)

Dampers for Fire Barrier and Smoke Applications

GENERAL

This category covers fire dampers, smoke dampers (leakage-rated dampers) , combination fire and smoke dampers (fire and leakage-rated dampers) , and corridor dampers.

Installation — All dampers covered under this category are intended to be installed in accordance with the installation instructions provided with the dampers. Authorities Having Jurisdiction should be consulted before installation. Unless otherwise indicated in the installation instructions, the annular space between the sleeves of fire dampers, combination fire and smoke dampers, or corridor dampers and the wall opening should not be filled with firestop materials such as fill, void or cavity materials.

Air Flow and Pressure Ratings — Fire dampers for use in dynamic systems, smoke dampers, combination fire and smoke dampers, and corridor dampers are marked with the maximum air flow and static pressure HVAC system conditions for which the damper has been investigated. The air flow (velocity) ratings are established in increments of 1000 CFM/ft² of damper area (FPM), with the minimum being 2000 CFM/ft². The air flow ratings are established based on test conditions with the damper in the full open position. The static pressure ratings are established in increments of 2 in.WG, with the minimum being 4 in.WG. The static pressure ratings are established based on test conditions with the damper in the full closed position.

Sizes — The maximum sizes expressed in inches representing the maximum width and maximum height are shown in the individual Classifications for each fire damper model, for both single sections and multiple section assemblies.

Abbreviations — The following abbreviations are used in the individual Classifications:

Fire-resistance Rating

- HR Class — Hourly Classification

Damper-mounting Position

- V — Vertical
- H — Horizontal
- V, H — Vertical & Horizontal

Maximum Damper Size

- W — Width
- H — Height

FIRE DAMPERS

Fire dampers are intended for installation where air ducts penetrate or terminate at openings in walls or partitions; in air transfer openings in partitions; and where air ducts extend through floors as specified in ANSI/NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems." Fire dampers are prescribed for use by codes such as the "International Building Code" (IBC) and "International Mechanical Code" (IMC).

Fire dampers have been investigated for fire-resistance ratings of 1-1/2 or 3 h as indicated in the individual Classifications.

Fire Dampers for Use in Dynamic Systems — Fire dampers for use in dynamic systems are intended for use in dynamic HVAC systems that remain operational during a fire, and may also be employed in static systems.

Fire Dampers for Use in Static Systems — Fire dampers for use in static systems are intended for use only in static HVAC systems that are automatically shut down in the event of a fire.

SMOKE DAMPERS

Smoke dampers (leakage-rated dampers) are intended for the protection of openings in smoke barriers, or in engineered smoke control systems as specified in ANSI/NFPA 90A. Smoke dampers are prescribed for use by codes such as the IBC and IMC.

Leakage ratings for smoke dampers are identified as Class Designation I, II or III as shown in the following table. Leakage ratings of the dampers are established at a minimum differential pressure of 4 in. water gauge (WG), across the closed damper. Leakage rates may also be established at higher differential pressures, in increments of 2 in. water gauge.

Maximum Leakage (CFM/ft²)

Class	4 In. WG	6 In. WG	8 In. WG	10 In. WG	12 In. WG
I	8.0	9.5	11.0	12.5	14.0
II	20.0	24.0	28.0	31.5	35.0
III	80.0	96.0	112.0	125.0	140.0

Leakage ratings for smoke dampers are determined at elevated temperatures. The elevated temperatures are in increments of 100°F with the minimum temperature being 250°F. Leakage ratings of smoke dampers are established based on test conditions using heated air.

Classified dampers are marked with respect to the Leakage Class at elevated test temperature.

COMBINATION FIRE AND SMOKE DAMPERS

Combination fire and smoke dampers (fire and leakage-rated dampers) are intended for use in locations that are designated as both fire barriers and smoke barriers. These products can also be described as combination fire/smoke dampers as defined by the IBC. Combination fire and smoke dampers have been investigated for both a fire-resistance rating of 1-1/2 or 3 h, and a leakage rating as defined under **SMOKE DAMPERS**. Leakage ratings of combination fire and smoke dampers are determined at an elevated temperature 250°F or 350°F. Leakage ratings of combination fire and smoke dampers are established based on test conditions using heated air.

CORRIDOR DAMPERS

Corridor dampers are intended for use where air ducts penetrate or terminate at horizontal openings in the ceilings of interior corridors, as defined in the "City of Los Angeles Uniform Building Code," the "Uniform Building Code," or where permitted by the Authority Having Jurisdiction.

Corridor dampers have been investigated for, and are intended for, installation only in specific corridor ceiling constructions as defined in the installation instructions provided with each damper.

Corridor dampers have been investigated for both a fire-resistance rating of 1 h, and a Class I or II leakage rating as defined under **SMOKE DAMPERS**. Leakage ratings of corridor dampers are determined at an elevated temperature 250°F or 350°F. Leakage ratings of corridor dampers are established based on test conditions using air. Corridor dampers have also demonstrated acceptable closure performance when subjected to 150 fpm velocity across the face of the damper during fire exposure.

MAINTENANCE

Fire dampers, smoke dampers, and combination fire and smoke dampers may require periodic maintenance to ensure continued proper operation. The level of maintenance required is dependent on several factors including the product manufacturer's and system designer's recommendations, code requirements, and the complexity of the system in which the damper is installed.

It is recommended that periodic maintenance of dampers include at least the following:

- Removal of debris buildup from the damper and surrounding area
- Manual cycling of dampers released by fusible links
- Cycling of damper and actuator assemblies

Additional information on periodic testing can be found in ANSI/NFPA 92A, "Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences."

RELATED PRODUCTS

For dampers intended for installation in air handling openings penetrating fire resistive membrane ceilings, see Ceiling Dampers ([CABS](#)).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment ([AAHC](#)) and Fire Resistance Ratings ([BXRH](#)).

REQUIREMENTS

The basic standard used to investigate fire dampers for use in dynamic systems and fire dampers for use in static systems in this category is [ANSI/UL 555](#), "Fire Dampers."

The basic standard used to investigate smoke dampers in this category is [ANSI/UL 555S](#), "Smoke Dampers."

Combination fire and smoke dampers, and corridor dampers are investigated to the applicable requirements of both [ANSI/UL 555](#) and [ANSI/UL 555S](#).

Code Requirements

NYC CODE

Definitions:

DAMPER. A manually or automatically controlled device to regulate draft or the rate of flow of air or combustion gases.

SMOKE DAMPER. A listed device that is designed to resist the passage of air and smoke. The device is arranged to operate automatically, controlled by a smoke detection system, and when required, is capable of being positioned manually from a remote command station.

CODE QUOTATIONS AND LOCATIONS:

106.8 Air conditioning and ventilating systems. Construction documents for air conditioning and ventilating systems shall contain plans that include the following data and information:

1. The location and sizes of all ducts; the location of all fire and smoke dampers, motors, fans, and filters; the type, air capacity, and size of all equipment; and where not shown on accompanying structural plans, the operating weight and manner of support of equipment.

401.5 Opening location. Outside air exhaust and intake openings shall be located a minimum of 10 feet (3048 mm) from lot lines or buildings on the same lot. Where openings front on a street or public way, the distance shall be measured to the centerline of the street or public way. Outdoor intakes for high-rise office buildings having occupied floors located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access serving spaces above the second story and serving spaces greater than 10, 000 square feet (929 square meters) of floor area shall be located at least 20 feet (6096 mm) above ground level, at least 30 feet (9144 mm) from exhaust outlets and other exhaust discharges, and at least 20 feet (6096 mm) from areas that may collect vehicular exhaust, such as off street loading bays.

Exception: Group R-3.

401.5.1 Intake openings. Mechanical and gravity outside air intake openings, shall be located a minimum of 20 feet (6096 mm) from any hazardous or noxious contaminant such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as otherwise specified in this code. Where a source of contaminant is located within 20 feet (6096 mm) of an intake opening, such opening shall be located a minimum of 2 feet (610 mm) below the contaminant source.

An outdoor air intake opening with gross area of more than 144 square inches ($.0929 \text{ m}^2$) shall be provided with fire dampers and smoke dampers, or combined fire and smoke dampers when such opening is located as follows:

1. Less than 30 feet (9144 mm) above grade.
2. Less than 30 feet (9144 mm) in any direction from any opening in another building.
3. Less than 15 feet (4572 mm) from a lot line.
4. Less than 50 feet (15 240 mm) above and less than 50 feet (15 240 mm) in any direction from a roof constructed of combustibile material or a building in which the exterior walls are constructed wholly or partly of wood.

Exceptions:

1. Smoke dampers shall not be required for outdoor air intake openings installed in any construction required to have a fire resistance rating that is less than two hours.
2. Smoke dampers shall not be required for outdoor air intake openings of systems greater than 15,000 cfm (7.1 m³/s) which are provided with smoke dampers in accordance with Chapter 6 of this code and arranged so as to not introduce smoke into the building or space in which the equipment is located.

SECTION MC 405

SYSTEMS CONTROL

405.1 General. Mechanical ventilation systems shall be provided with manual or automatic controls that will operate such systems whenever the spaces are occupied. Air-conditioning systems that supply required ventilation air shall be provided with controls designed to automatically maintain the required outdoor air supply rate during occupancy.

405.2 Manual control. Each air distribution system shall be provided with not less than one manual control to stop the operation of the supply, return, and exhaust fans(s) in an emergency. The manual control shall be provided at an approved location.

405.2.1 Office buildings. Any building where the main use or dominant occupancy is classified in occupancy group B having occupied floors located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, where a system serves a floor or floors other than the floor on which the equipment is located, shall be provided with the following controls, in addition to the controls required by this chapter:

1. Manual controls for operating individually each air supply and each exhaust or return fan in the system located as follows:
 - 1.1. At the Fire Command Center, and
 - 1.2. In the room containing the affected air-handling fans.
2. Manual controls for operating individually or in groups each remote control reversible fire shutter, when such shutters are provided in accordance with the provisions of the *New York City Building Code*, or each smoke damper provided in accordance with the provisions of the *New York City Building Code*. Such controls shall be located at the Fire Command Center.

502.10 Hazardous production materials (HPM). Exhaust ventilation systems and materials for ducts utilized for the exhaust of HPM shall comply with this section, other applicable provisions of this code, the *New York City Building Code* and the *New York City Fire Code*.

502.10.1 Where required. Exhaust ventilation systems shall be provided in the following locations in accordance with the requirements of this section and the *New York City Building Code*:

502.10.2 Penetrations. Exhaust ducts penetrating fire barrier assemblies shall be contained in a shaft of equivalent fire-resistive construction. Exhaust ducts shall not penetrate building separation fire walls. Fire dampers shall not be installed in exhaust ducts.

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 *New York City Building Code* to be fire-resistance rated, unless such duct is constructed of galvanized steel or aluminum of the thickness specified in Section 603.4 and the fire-resistance rating is maintained in accordance with the *New York City Building Code*. Fire dampers, combination fire/smoke dampers and any similar devices that will obstruct the exhaust flow, shall be prohibited in clothes dryer exhaust ducts.

506.3.5 Separation of grease duct system. A separate grease duct system shall be provided for each Type I hood.

2. Branch ducts from other equipment in the same kitchen area, for which hoods and filters are not required or from registers exhausting the kitchen space in general, may be connected to the main hood exhaust duct if the following requirements are complied with:

2.1. A fusible link fire damper of the same gage as the hood exhaust duct shall be added at the point of connection of the branch duct to the exhaust duct.

2.5. All registers in these branches shall have fusible link actuated dampers.

513.5.2 Opening protection. Openings in smoke barriers shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by door assemblies complying with the requirements of the *New York Building Code* for doors in smoke barriers.

Exceptions:

1. Passive smoke control systems with automatic-closing devices actuated by spot-type smoke detectors listed for releasing service installed in accordance with the *New York City Building Code*.

2. Fixed openings between smoke zones which are protected utilizing the airflow method.

3. In Group I-2 where such doors are installed across corridors, a pair of opposite swinging doors without a center mullion shall be installed having vision panels with approved fire-rated glazing materials in approved fire-rated frames, the area of which shall not exceed that tested. The doors shall be close-fitting within operational tolerances, and shall not have undercuts, louvers or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges and automatic-closing devices. Positive latching devices are not required.

4. Group I-3.

5. Openings between smoke zones with clear ceiling heights of 14 feet (4267 mm) or greater and bank down capacity of greater than 20 minutes as determined by the design fire size.

513.5.2.1 Ducts and air transfer openings. Ducts and air transfer openings are required to be protected with a minimum Class II, 250°F (121°C) smoke damper complying with the *New York City Building Code*.

513.10.4 Automatic dampers. Automatic dampers, regardless of the purpose for which they are installed within the smoke control system, shall be listed and conform to the requirements of approved recognized standards.

604.8 Lining installation. Linings shall be interrupted at the area of operation of a fire damper and at a minimum of 6 inches (152 mm) upstream of and 6 inches (152 mm) downstream of electric-resistance and fuel-burning heaters in a duct system. Metal nosings or sleeves shall be installed over exposed duct liner edges that face opposite the direction of airflow.

SECTION MC 607

DUCTS AND AIR TRANSFER OPENINGS

607.1 General. The provisions of this section shall govern the protection of duct penetrations and air transfer openings in fire-resistance-rated assemblies.

607.1.1 Ducts and air transfer openings without dampers. Ducts and air transfer openings that penetrate fire-resistance-rated assemblies and are not required to have dampers by this section shall comply with the requirements of Section 712 of the *New York City Building Code*.

607.2 Installation. Fire dampers, smoke dampers, combination fire/smoke dampers and ceiling dampers located within air distribution and smoke control systems shall be installed in accordance with the requirements of this section, and the manufacturer's installation instructions and listing.

607.2.1 Smoke control system. Where the installation of a fire damper will interfere with the operation of a required smoke control system in accordance with Section 513, approved alternative protection shall be utilized.

607.2.1.1 Remote operation. Combination fire and smoke dampers shall be operable by remote controls where necessary for smoke removal. Such dampers shall have provisions that allow them to re-close automatically upon reaching the damper's maximum degradation test temperature in accordance with UL 555S.

607.2.2 Hazardous exhaust ducts. Fire dampers for hazardous exhaust duct systems shall comply with Section 510.

607.2.3 Supply air systems. Smoke dampers listed for use in air distribution systems shall be installed both upstream and downstream of filters and ahead of any branch connections in supply air-handling apparatus and systems having a capacity equal to or greater than 15,000 cfm ($7.1 \text{ m}^3/\text{s}$).

Exceptions:

1. Where the air-handling unit is located on the floor that it serves and serves only that floor.
2. Where the air-handling unit is located on the roof and serves only the floor immediately below the roof.
3. Existing buildings using only UL 90D Class 1 filters shall be exempt from this subdivision provided the control system is arranged to shut down the fresh air intake, return air, and exhaust air dampers, and fan shutdown and smoke detection is provided in accordance with Section 606.

607.3 Damper testing and ratings. Dampers shall be listed and bear the label of an approved testing agency indicating compliance with the standards in this section. Fire dampers shall comply with the requirements of UL 555. Only fire dampers labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire. Smoke dampers shall comply with the requirements of UL 555S. Combination fire/smoke dampers shall comply with the requirements of both UL 555 and UL 555S. Ceiling radiation dampers shall comply with the requirements of UL 555C.

607.3.1 Fire protection rating. Fire dampers shall have the minimum fire protection rating specified in Table 607.3.1 for the type of penetration.

**TABLE 607.3.1
FIRE DAMPER RATING**

TYPE OF PENETRATION	MINIMUM DAMPER RATING (hour)
Less than 3-hour fire-resistance-rated assemblies	1½
3-hour or greater fire-resistance-rated assemblies	3

607.3.1.1 Fire damper actuating device. The fire damper actuating device shall meet one of the following requirements:

1. The operating temperature shall be approximately 50°F (27.8°C) above the normal temperature within the duct system, but not less than 160°F (71°C).
2. The operating temperature shall be not more than 286°F (141°C) where located in a smoke control system complying with Section 513.
3. Where a combination fire/smoke damper is located in a smoke control system complying with Section 513, the operating temperature rating shall be approximately 50°F (27.8°C) above the maximum smoke control system designed operating temperature, or a maximum temperature of 350°F (177°C). The temperature shall not exceed the UL 555S degradation test temperature rating for a combination fire/smoke damper.

607.3.2 Smoke damper ratings. Smoke damper leakage ratings shall not be less than Class II. Elevated temperature ratings shall be not less than 250°F (121°C).

607.3.2.1 Smoke damper actuation methods. The smoke damper shall close upon actuation of a listed smoke detector or detectors installed in accordance with Section 606 of this code and Sections 907.10 and 907.11 of the *New York City Building Code* and one of the following methods, as applicable:

1. Where a damper is installed within a duct, a smoke detector shall be installed in the duct within 5 feet (1524 mm) of the damper with no air outlets or inlets between the detector and the damper. The detector shall be listed for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, dampers shall be closed upon fan shutdown where local smoke detectors require a minimum velocity to operate.
2. Where a damper is installed above smoke barrier doors in a smoke barrier, a spot-type detector listed for releasing service shall be installed on either side of the smoke barrier door opening.

3. Where a damper is installed within an unducted opening in a wall, a spot-type detector listed for releasing service shall be installed within 5 feet (1524 mm) horizontally of the damper.
4. Where a damper is installed in a corridor wall, the damper shall be permitted to be controlled by a smoke detection system installed in the corridor.
5. Where a total-coverage smoke detector system is provided within areas served by an HVAC system, dampers shall be permitted to be controlled by the smoke detection system.
6. Smoke dampers that are part of an engineered smoke control system shall be capable of being positioned manually from a command station. Such positioning devices shall be provided for supply and return/exhaust dampers grouped by floor and by type. Damper switch positions shall indicate whether the related dampers are commanded to be either open or closed. Smoke damper positioning switches shall be located at the Fire Command Station, or in a Mechanical Control Center in buildings without a Fire Command Station.

607.4 Access and identification. Fire and smoke dampers shall be provided with an approved means of access, large enough to permit inspection and maintenance of the damper and its operating parts. The access shall not affect the integrity of fire-resistance-rated assemblies. The access openings shall not reduce the fire-resistance rating of the assembly. Access points shall be permanently identified on the exterior by a label having letters not less than 0.5 inch (12.7 mm) in height reading: SMOKE DAMPER or FIRE DAMPER, followed by an identification marking that is unique to the damper accessed. Access doors in ducts shall be tight fitting and suitable for the required duct construction.

607.5 Where required. Fire dampers, smoke dampers, combination fire/smoke dampers and ceiling radiation dampers shall be provided at the locations prescribed in this section. Where an assembly is required to have both fire dampers and smoke dampers, combination fire/smoke dampers or a fire damper and a smoke damper shall be required.

Exceptions:

1. Smoke dampers shall not be required on air systems other than where necessary for the proper function of that system where the system is designed specifically to:
 - 1.1. Function as an engineered smoke-control system, including the provision of continuous air movement with the air-handling system; or
 - 1.2. Provide air to other areas of the building during a fire emergency; or
 - 1.3. Provide pressure differentials during a fire emergency.
2. Smoke dampers shall not be required to be located within a prescribed distance of a fire rated enclosure where isolation smoke dampers are used in air-handling equipment (Refer to Section 607.2.3).
3. Smoke dampers shall not be required in ducts where the air continues to move and the air-handling system installed is arranged to prevent recirculation of exhaust or return air under fire emergency conditions.

607.5.1 Fire walls. Ducts and air transfer openings permitted in firewalls in accordance with Section 705.11 of the *New York City Building Code* shall be protected with approved fire dampers and smoke dampers installed in accordance with their listing.

607.5.2 Fire barriers. Duct penetrations and air transfer openings in fire barriers shall be protected with approved fire dampers installed in accordance with their listing. In addition,

smoke dampers shall be installed in penetrations of public corridor walls in accordance with Section 607.5.2.1.

Exceptions: Fire dampers are not required at penetrations of fire barriers where any of the following apply:

1. Penetrations are tested in accordance with ASTM E 119 as part of the fire-resistance-rated assembly.
2. Where permitted under Section 513 and ducts are part of an engineered smoke control system.
3. Such walls are penetrated by ducted HVAC systems, have a required fire resistance rating of 1 hour or less, are in areas of other than Group H and are in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *New York City Building Code*. For the purposes of this exception, a ducted HVAC system shall be a duct system for the structure's HVAC system. Such a duct system shall be constructed of sheet metal not less than 26-Gage (0.0217-inch) [0.55-mm] thickness and shall be continuous from the air-handling appliance or equipment to the air outlet and inlet terminals.

607.5.2.1 Public corridors. A listed smoke damper designed to resist the passage of smoke shall be provided at each point a duct or air transfer opening penetrates a public corridor wall constructed as a fire barrier.

Exceptions:

1. Smoke dampers are not required where the building is equipped throughout with an approved smoke control system in accordance with Section 909, and smoke dampers are not necessary for the operation and control of the system.
2. Smoke dampers are not required in corridor penetrations where the duct is constructed of steel not less than 0.019-inch (0.48 mm) in thickness and there are no openings serving the corridor.
3. Smoke dampers are not required in corridor penetrations in Group R-2 buildings and spaces.

607.5.3 Fire partitions. Duct penetrations in fire partitions shall be protected with approved fire dampers installed in accordance with their listing.

Exceptions: In occupancies other than Group H, fire dampers are not required where any of the following apply:

1. The partitions are tenant separation and corridor walls in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *New York City Building Code* and the duct is protected as a through penetration in accordance with the *New York City Building Code*.
2. The duct system is constructed of approved materials in accordance with this code and the duct penetrating the wall meets all of the following minimum requirements.
 - 2.1. The duct shall not exceed 100 square inches (0.06 m²).
 - 2.2. The duct shall be constructed of steel a minimum of 0.0217-inch (0.55 mm) in thickness.
 - 2.3. The duct shall not have openings that communicate the corridor with adjacent spaces or rooms.

- 2.4. The duct shall be installed above a ceiling.
- 2.5. The duct shall not terminate at a wall register in the fire-resistance-rated wall.
- 2.6. A minimum 12-inch-long (304.8 mm) by 0.060-inch-thick (1.52 mm) steel sleeve shall be centered in each duct opening. The sleeve shall be secured to both sides of the wall and all four sides of the sleeve with minimum 1½-inch by 1½-inch by 0.060-inch (38 mm by 38 mm by 1.52 mm) steel retaining angles. The retaining angles shall be secured to the sleeve and the wall with No. 10 (M5) screws. The annular space between the steel sleeve and the wall opening shall be filled with rock (mineral) wool batting or approved equivalent on all sides.

607.5.4 Smoke barriers. A listed smoke damper designed to resist the passage of smoke shall be provided at each point where a duct or an air transfer opening penetrates a smoke barrier wall enclosure required to have smoke and draft control doors in accordance with the *New York City Building Code*. Smoke dampers and smoke damper actuation methods shall comply with Section 607.5.4.1.

Exception: Smoke dampers are not required in smoke barrier penetrations where the openings in ducts are limited to a single smoke compartment and the ducts are constructed of steel.

607.5.4.1 Smoke damper.

The smoke damper shall close upon actuation of a listed smoke detector or detectors installed in accordance with the *New York City Building Code* and Section 607.3.2.1.

607.5.5 Shaft enclosures. Ducts and air transfer openings shall not penetrate a shaft serving as an exit enclosure except as permitted by Section 1019.1.2 of the *New York City Building Code*.

607.5.5.1 Penetrations of shaft enclosures. Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with approved fire and smoke dampers installed in accordance with their listing.

Exceptions:

1. Fire dampers are not required at penetrations of shafts where:
 - 1.1. Steel exhaust subducts extend at least 22 inches (559 mm) vertically in exhaust shafts provided there is a continuous airflow upward to the outside, or
 - 1.2. Penetrations are tested in accordance with ASTM E 119 as part of the fire-resistance-rated assembly, or
 - 1.3. Ducts are used as part of an approved smoke control system designed and installed in accordance with Section 513 of this code, and where the fire damper will interfere with the operation of the smoke control system, or
 - 1.4. The penetrations are in parking garage exhaust or supply shafts that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.
2. In Group B occupancies, equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *New York City Building Code*, smoke dampers are not required at penetrations of shafts where:
 - 2.1. Bathroom and toilet room exhaust openings with steel exhaust subducts, having a wall thickness of at least 0.019 inch (0.48 mm) extend at least 22 inches (559 mm) vertically and where the exhaust fan at the upper terminus is powered continuously in accordance with the provisions of

- Section 909.11 of the *New York City Building Code*, and maintains airflow upward to the outside, or
- 2.2. Ducts are used as part of an approved smoke control system designed and installed in accordance with Section 909 of the *New York City Building Code*, and where the smoke damper will interfere with the operation of the smoke control system.
 3. Smoke dampers are not required at penetration of exhaust or supply shafts in parking garages that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.
 4. Fire dampers and/or smoke dampers shall not be required at a shaft where the shaft is acting as an extension of the mechanical equipment room that it serves and the shaft and mechanical equipment room maintain fire and smoke separation required by the greater of the two spaces from the occupied portions of the building and meet the requirements of Section 707.11 of the *New York City Building Code*.
 5. Smoke dampers shall not be required to be located within a prescribed distance of a fire rated enclosure where isolation smoke dampers are used in air-handling equipment.
 6. Smoke dampers shall not be required in ducts where the air continues to move and the air-handling system installed is arranged to prevent recirculation of exhaust or return air under fire emergency conditions.

607.5.5.2 Limitations. Shafts that constitute air ducts or that enclose air ducts used for the movement of environmental air shall not enclose:

1. Exhaust ducts used for the removal of smoke and grease-laden vapors from cooking equipment;
2. Ducts used for removal of flammable vapors;
3. Ducts used for moving, conveying, or transporting stock, vapor or dust;
4. Ducts used for the removal of nonflammable corrosive fumes and vapors;
5. Refuse and linen chutes; or
6. Piping.

Exception: Shafts that constitute air ducts or that enclose air ducts used for the movement of environmental air may enclose noncombustible piping conveying water or other nonhazardous or nontoxic materials.

607.6 Horizontal assemblies.

Penetrations by air ducts of a floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly shall be protected by a shaft enclosure that complies with the *New York City Building Code* or shall comply with this section.

607.6.1 Through penetrations.

In occupancies other than Groups I-2 and I-3, a duct and air transfer opening system constructed of approved materials in accordance with this code that penetrates a fire-resistance-rated floor/ceiling assembly that connects not more than two stories is permitted without shaft enclosure protection provided a fire damper is installed at the floor line and the penetration is firestopped.

Exception: A duct serving a dwelling unit is permitted to penetrate three floors or less without a fire damper at each floor provided it meets all of the following requirements.

1. The duct shall be contained and located within the cavity of a wall and shall be constructed of steel not less than 0.019 inch (0.48 mm) (26 gauge) in thickness.

2. The duct shall open into only one dwelling unit and the duct system shall be continuous from the unit to the exterior of the building.

3. The duct shall not exceed 5-inch (127 mm) nominal diameter and the total area of such ducts shall not exceed 100 square inches (64 516 mm²) for any 100 square feet (9.3 m²) of the floor area.

4. The annular space around the duct is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E 119 time-temperature conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

5. Grille openings located in a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with a ceiling radiation damper in accordance with Section 607.6.2.

607.6.2 Membrane penetrations.

Where duct systems constructed of approved materials in accordance with this code penetrate a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly, shaft enclosure protection is not required provided an approved ceiling radiation damper and firestopping is installed at the ceiling line.

Where a duct is not attached to a diffuser that penetrates a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly, shaft enclosure protection is not required provided an approved ceiling radiation damper and firestopping is installed at the ceiling line.

Ceiling radiation dampers shall be installed in accordance with UL 555C and constructed in accordance with the details listed in a fire-resistance-rated assembly or shall be labeled to function as a heat barrier for air-handling outlet/inlet penetrations in the ceiling of a fire-resistance-rated assembly. Ceiling radiation dampers shall not be required where ASTM E 119 fire tests have shown that ceiling radiation dampers are not necessary in order to maintain the fire-resistance rating of the assembly.

Ceiling radiation damper shall not be required where exhaust duct penetrations are protected in accordance with Section 712.4.2 of the *New York City Building Code* and the exhaust ducts are located within the cavity of a wall, and do not pass through another dwelling unit or tenant space.

607.6.3 Nonfire-resistance-rated assemblies.

Duct systems constructed of approved materials in accordance with this code that penetrate nonfire-resistance-rated floor assemblies that connect not more than two stories are permitted without shaft enclosure protection provided that the annular space between the assembly and the penetrating duct is filled with an approved noncombustible material to resist the free passage of flame and the products of combustion.

Duct systems constructed of approved materials in accordance with this code that penetrate nonrated floor assemblies that connect not more than three stories are permitted without shaft enclosure protection provided that the annular space between the assembly and the penetrating duct is filled with an approved noncombustible material to resist the free passage of flame and the products of combustion, and a fire damper is installed at each floor line.

Exception: Fire dampers are not required in ducts within individual residential dwelling units.

SECTION MC 709

OPENING OBSTRUCTIONS

709.2 Dampered openings. Where the combustion air openings are provided with volume, smoke or fire dampers, the dampers shall be electrically interlocked with the firing cycle of the appliances served, so as to prevent operation of any appliance that draws combustion and dilution air from the room when any of the dampers are closed. Manually operated dampers shall not be installed in combustion air openings.