

ORDINANCE NO. 20130606-090

**AN ORDINANCE REPEALING AND REPLACING ARTICLE 5 OF
CHAPTER 25-12 TO ADOPT THE 2012 UNIFORM MECHANICAL CODE
AND LOCAL AMENDMENTS.**

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF AUSTIN:

PART 1. City Code Chapter 25-12 is amended to repeal Article 5 (*Mechanical Code*) and replace it with a new Article 5 to read as follows:

ARTICLE 5. MECHANICAL CODE.

§ 25-12-131 MECHANICAL CODE.

(A) The Uniform Mechanical Code, 2012 edition, published by the International Association of Plumbing and Mechanical Officials (2012 Mechanical Code) is adopted and incorporated into this section, including all appendices, with deletions and amendments in Subsection (B) of this section and Section 25-12-133 (*Local Amendments to the Mechanical Code*).

(B) The following provisions of the 2012 Mechanical Code are deleted. All subsections contained within a deleted section are also deleted, even if not specifically listed below.

Section 108.0	Section 111.0.	Section 113.4
Section 114.1	Table 114.1	Section 114.2
Section 114.3	Section 303.9.3	Section 304.2.1.1
Section 310.0	Section 312.1	Section 312.2
Section 312.3	Section 312.4	Section 314.2
Table 402.1	Section 402.4	Section 504.1
Section 603.4	Section 604.0	Section 605.0
Section 1109.4	Section 1111.8	Chapter 13
Section 1403.0		

(C) The city clerk shall file a copy of the 2012 Mechanical Code with the official ordinances of the City.

§ 25-12-132 CITATIONS TO THE MECHANICAL CODE.

In the City Code, “Mechanical Code” means the 2012 Mechanical Code adopted by Section 25-12-131 (*Mechanical Code*) of the City Code as amended by Section 25-12-133 (*Local Amendments to the Mechanical Code*).

§ 25-12-133 LOCAL AMENDMENTS TO THE MECHANICAL CODE.

- (A) The following provisions are local amendments to the 2012 Mechanical Code. Each provision in this section is a substitute for the identically numbered provision deleted by Section 25-12-131(B) (*Mechanical Code*) or is an addition to the 2012 Mechanical Code.
- (B) The following provisions of the local amendments are adopted from the International Mechanical Code, 2012 edition, published by the International Code Council, Inc., with modifications: Sections 312.0, 314.2, 314.2.1, 314.2.2, 402.4, 405.0, Table 402.7, 518.0, 605.0, and Chapter 18.
- (C) The following provisions of the local amendments are adopted from the International Building Code 2012 edition, published by the International Code Council, Inc., with modifications: Sections 303.9.3, 304.2.1.1 and 1502.0.

108.0 Appeals. A person aggrieved by an order, decision, or determination of the building official relating to the application or interpretation of the Mechanical Code may appeal the order, decision, or determination to the Mechanical, Solar, and Plumbing Board in accordance with Chapter 25-1, Article 7, Division 1 (*Appeals*). The Mechanical, Solar, and Plumbing Board is established in Section 2-1-161 (*Mechanical, Plumbing, and Solar Board*).

111.0 Permits.

111.1 Permit Required. Except as provided in Sections 111.2(*Exempt Work*), 111.5(*Homestead Permit*), and 119.0 (*Registered Industrial Plant Program*), a person shall obtain a mechanical permit before the person installs, alters, repairs, replaces, or remodels or causes to be installed, altered, repaired, replaced, or remodeled a mechanical system regulated by the Mechanical Code. A separate mechanical permit is required for each separate building or structure.

111.2 Exempt Work. A mechanical permit shall not be required for the following:

111.2.1 A portable heating appliance, portable ventilating equipment, a portable cooling unit, or a portable evaporative cooler.

111.2.2 A closed system of steam, hot, or chilled water piping within heating or cooling equipment regulated by this code.

111.2.3 Replacement of any component part or assembly of an appliance that does not alter its original approval and complies with other applicable requirements of this code.

111.2.4 Refrigerating equipment that is part of the equipment for which a permit has been issued pursuant to the requirements of this code.

111.2.5 Exemption from the permit requirements of this code shall not be deemed to grant authorization for work to be done in violation of the provisions of this code or other laws or ordinances of this jurisdiction.

111.3 Offense. A person who violates Section 111.1(*Permits Required*) commits an offense. An offense under this section is a class C misdemeanor. Each day a person commits an offense or remains in violation of Section 111.1(*Permits Required*) is a separate occurrence. Proof of a culpable mental state is not required for conviction of an offense under this section.

111.4 Persons Authorized to Obtain Permits. An air conditioning and refrigeration contractor licensed by the State of Texas to perform mechanical work and registered with the City may obtain permits required by the Mechanical Code.

111.5 Homestead Permit. A person who is not licensed to perform mechanical work may perform mechanical work within a residence owned by the person if all of the requirements of this subsection are met.

- (1) The residence is the person's homestead.
- (2) The work does not include mechanical work that involves reclaiming and charging a ducted heating and air-conditioning system containing refrigerant.
- (3) The residence is the person's principal residence.
- (4) The person has not secured a homestead permit for another residence within the prior 12 month period.
- (5) The person must have owned and occupied the property as of January 1 of the tax year in which the person applies for a homestead permit.
- (6) A person must obtain a homestead permit and pay required permit fees before beginning any mechanical work. A person must apply for a homestead permit in person and must file an affidavit stating that the location at which the work is to be done is the person's homestead.
- (7) A person who has obtained a homestead permit may not allow or cause any other person to perform mechanical work under the permit.
- (8) A person may not transfer a permit to another person.

- (9) A person performing mechanical work under a homestead permit shall present a picture identification to verify that the person is authorized to perform work under the homestead permit, when requested by the building official or his designee.
- (10) A homestead permit shall not be issued for mechanical work on a mobile, modular or manufactured home unless the homeowner owns the land on which the mobile, modular, or manufactured home is located. A homestead permit shall not be issued if the mobile, modular, or manufactured home is located in a mobile home park, mobile home community, or other commercial premises.

111.6 Registration of Air Conditioning and Refrigeration Contractor. An air conditioning and refrigeration contractor shall register with the City before performing work regulated by the Mechanical Code. A contractor shall pay a registration fee, established by separate ordinance, for initial registration, registration after a license suspension, and registration after a license expiration. A new registration fee is not required for renewal of an unexpired license.

113.1.1 The registration shall contain the name of the air conditioning and refrigeration contractor who is licensed by the State of Texas and registered with the City to perform the work.

114.2 Permit Fees and Plan Review Fees. Permit fees and plan review fees shall be established under a separate ordinance by the City Council.

114.3 Payment of Plan Review Fees. An applicant shall pay plan review fees when plans and specifications are submitted to the building official for review.

114.4.1 Time Limitation on Application; Permit Expiration and Reactivation. Time limits on permit applications and requirements for permit expiration and reactivation, including a review fee for expired permits, are set forth in Chapter 25-12, Article 13 (*Administration of Technical Codes*).

114.4.2 Continuance of work inspection. Where structural or other conditions exist that do not allow for inspections to be performed at intervals less than 180 days, the permit holder may schedule a continuance of work inspection. If it is determined by the inspector, that work has been performed, the expiration date will automatically extend 180 days. If it is determined by the inspector that no work has begun or continued, the permit will expire and the permit holder will be required to submit for a new plan review and or new permit.

116.3 Testing of Equipment. Refrigeration equipment regulated by this code shall be tested and approved as required by section 1124.0 of the 2012 Uniform Mechanical Code.

Steam and hot-water boilers and piping shall be tested and approved as required by Sections 1021.0, 1203.2 and 1207.0 of the 2012 Uniform Mechanical Code.

Fuel gas piping shall be tested and approved as required by the Adopted Plumbing Code.

119.0 Registered Industrial Plant Program.

119.1 Program. A licensed air conditioning and refrigeration contractor may perform the following mechanical installations in a Registered Industrial Plant, as defined by this code and the building code without obtaining a permit required by Section 111.1 (*Permits Required*):

- (1) replacement, modification, or relocation of existing ductwork, fan coil units, VAV boxes volume dampers, environmental make-up air systems and related equipment; and
- (2) modification of existing hazardous production material (HPM) supply systems, HPM drain systems and HPM exhaust systems in H occupancy areas, as defined in the Building Code, and in exterior areas to accommodate the installation or relocation of equipment.

119.2 Fees. Plan review fees and permit fees are not required if records are maintained in accordance with Section 119.0 (*Registered Industrial Plant*) of the Building Code.

120.0 Qualified Inspectors. An inspector who performs inspections under this Code must meet the following qualifications:

120.1 Plumbing/Mechanical Inspection Supervisor.

- (1) The plumbing/mechanical inspection supervisor must:
 - (a) be an employee of the City of Austin;
 - (b) maintain a current plumbing inspector license issued by the Texas State Board of Plumbing and the Texas State Board of Examiners;
 - (c) maintain a current certification as a mechanical and plumbing inspector under the certification program established by the International Code Council or International Association of Plumbing and Mechanical Officials; and maintain a current certification in the International Energy Conservation Code (both residential and commercial) established by the International Code Council; and

- (d) have at least ten years of experience as a licensed master plumber or equivalent experience as a state licensed air conditioning and refrigeration contractor, at least three years of which must be in a responsible supervisory capacity.
- (2) Five years of inspection experience may be substituted for five years of craft experience required in Subsection 1(d) above.

120.2 Commercial Mechanical Inspector. A commercial mechanical inspector must:

- (1) be an employee of the City of Austin;
- (2) maintain a current certification as a mechanical inspector under the certification program established by the International Code Council or the International Association of Plumbing and Mechanical Officials and maintain a current certification in the International Energy Conservation Code (both residential and commercial) established by the International Code Council.
- (3) have at least five years of inspection experience, one year of which must be in a responsible supervisory capacity.

120.2.1 Certification Requirement. A person hired by the City as a commercial mechanical inspector after the effective date of this Code must become certified through the certification program established by the International Code Council or the International Association of Plumbing and Mechanical Officials not later than one year after the date of employment and must become certified in the International Energy Conservation Code through the certification program established by the International Code Council not later than two years after the date of employment.

303.9.3 Roof Drainage and Rails. Equipment shall be installed on a well-drained surface of the roof. Guards shall be provided where appliances, equipment, fans or other components require service and are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or walking surface is located 30 inches above the grade below. Rigidly fixed rails or guards not less than 42 inches (1067 mm) in height shall be provided on the exposed side. The guard shall be constructed so as to prevent the passage of a sphere 21 inches (533 mm) in diameter. The Guard shall extend not less than 30 inches (762 mm) beyond each end of such appliance, equipment, fan or component. Where parapets or other building structures are utilized in lieu of guards or rails, they shall be not less than 42 inches (1067 mm) in height.

304.1.1 Access to Appliances. Appliances which are capable of being inspected, serviced, repaired, and replaced by removing a dropped grid system ceiling shall be considered to have adequate access. A grid system ceiling shall not be considered permanent construction for this purpose.

304.2.1.1 Door or Scuttle. The inside means of access shall be a permanent or foldaway inside stairway or ladder, terminating in an enclosure, scuttle, or trap door. Such scuttles or trap doors shall be not less than 22 inches by 24 inches (559 mm by 610 mm) in size, shall open easily and safely under all conditions, especially snow, and shall be constructed so as to permit access on the inside. Not less than 10 feet (1829 mm) of clearance shall be between the access opening and the edge of the roof or similar hazard, and such edge or walking surface is located 30 inches above the grade below. If the access opening is located 30 inches above the grade below, then rigidly fixed rails or guards not less than 42 inches (1067 mm) in height shall be provided on the exposed side. The guard shall be constructed so as to prevent the passage of a sphere 21 inches (533 mm) in diameter. Where parapets or other building structures are utilized in lieu of guards or rails, they shall be not less than 42 inches (1067 mm) in height.

304.2.4 Access. Access to equipment on roofs shall not require climbing over obstructions greater than 30 inches high or walking on roofs having a slope greater than 4 units vertical in 12 units horizontal (33-percent slope).

304.2.5 Permanent ladders for equipment access on roofs shall be provided at parapet walls exceeding 30 inches in height.

308.2.3 Gas and Oil-Fired Furnaces. A heating system using a gas or oil-fired furnace shall have a float-operated automatic control valve installed in the fuel supply line that shall be set to operate when floodwaters reach an elevation equal to the floor level of the space where furnace equipment is installed. A manually operated gas valve that can be operated from a location above the RFD shall be provided in the fuel supply line to serve as a supplementary safety provision for fuel cutoff.

310.0 Electrical Connections. Equipment regulated by this code including rooftop units, rooftop air units, condensing units, heat pumps, exhaust fans, supply fans, and indoor equipment such as air handling units, fan-coil units, vav boxes, and fan-powered boxes requiring electrical connections of more than fifty volts shall have a positive means of disconnect adjacent to and in sight from the equipment served. (This does not apply to plumbing equipment or components, or items such as packaged condensate pumps for steam condensate or cooling coil condensate, or water recovery condensate packaged pumps.) A factory supplied switch or breaker that is an integral part of the mechanical equipment shall satisfy the requirement for a positive means of disconnect within sight of the equipment. A 120 volt receptacle shall be located within twenty-five feet of the equipment for service and maintenance purposes. The receptacle need not be located on the same level as the equipment. Low-voltage wiring of fifty volts or less within a structure shall be installed in a manner to prevent physical damage. Equipment containing a refrigeration circuit shall be provided with a 120 volt ground fault circuit interrupter receptacle within twenty five feet of the equipment for service and maintenance purposes.

312.0 Condensate Disposal

312.1 Fuel-burning appliances. Liquid *combustion* by-products of condensing appliances shall be collected and discharged to an *approved* plumbing fixture or disposal area in accordance with the manufacturer's installation instructions. Condensate piping shall be of *approved* corrosion-resistant material and shall not be smaller than the drain connection on the appliance. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope).

312.2 Evaporators and cooling coils. Condensate drain systems shall be provided for *equipment* and appliances containing evaporators or cooling coils. Condensate drain systems shall be designed, constructed and installed in accordance with Sections 312.3 through 312.9.

312.3 Condensate disposal. Condensate from all cooling coils and evaporators shall be conveyed from the drain pan outlet to an *approved* place of disposal. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope). Condensate shall not discharge into a street, alley or other areas so as to cause a nuisance.

312.4 Drain pipe materials and sizes. Components of the condensate disposal system shall be cast iron, galvanized steel, copper, cross-linked polyethylene, polybutylene, polyethylene, ABS, CPVC or PVC pipe or tubing. All components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 7 of the *Plumbing Code* relative to the material type. Condensate waste and drain line size shall be not less than 3/4-inch (19 mm) internal diameter and shall not decrease in size from the drain pan connection to the place of condensate disposal. Condensate pipe or tubing shall be sized in accordance with Table 312.3.

312.6.1 Traps. Condensate drains shall be trapped as required by the *equipment* or *appliance* manufacturer.

312.8 Auxiliary and secondary drain systems. In addition to the requirements of Sections 312.1 and 312.2, where damage to any building components could occur as a result of overflow from the *equipment* primary condensate removal system, one of the following auxiliary protection methods shall be provided for each cooling coil or fuel-fired *appliance* that produces condensate:

1. An auxiliary drain pan with a separate drain shall be provided under the coils on which condensation will occur. The auxiliary pan drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The pan shall have a minimum depth of 1 1/2 inches (38 mm), shall not be less than 3 inches (76 mm) larger than the unit or the coil dimensions in width and length and shall be

constructed of corrosion-resistant material. Galvanized sheet steel pans shall have a minimum thickness of not less than 0.0236 inch (0.6010 mm) (No. 24 gage). Nonmetallic pans shall have a minimum thickness of not less than 0.0625 inch (1.6 mm).

2. A separate overflow drain line shall be connected to the drain pan provided with the *equipment*. Such overflow drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain line shall connect to the drain pan at a higher level than the primary drain connection.

3. An auxiliary drain pan without a separate drain line shall be provided under the coils on which condensate will occur. Such pan shall be equipped with a water-level detection device conforming to UL 508 that will shut off the equipment served prior to overflow of the pan. The auxiliary drain pan shall be constructed in accordance with Item 1 of this section.

4. A water-level detection device conforming to UL 508 shall be provided that will shut off the *equipment* served in the event that the primary drain is blocked. The device shall be installed in the secondary drain line, the overflow drain line, or in the equipment-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan. **Exception:** Fuel-fired appliances that automatically shut down operation in the event of a stoppage in the condensate drainage system.

312.8.1 Water-level monitoring devices. On down-flow units and all other coils that do not have a secondary drain or provisions to install a secondary or auxiliary drain pan, a water-level monitoring device shall be installed inside the primary drain pan. This device shall shut off the *equipment* served in the event that the primary drain becomes restricted.

312.9 Appliance, equipment and insulation in pans. Where appliances, *equipment* or insulation are subject to water damage when auxiliary drain pans fill, that portion of the *appliance*, *equipment* and insulation shall be installed above the rim of the pan. Supports located inside of the pan to support the *appliance* or *equipment* shall be water resistant and *approved*.

314.2 Air Filter Heating and air-conditioning systems of the central type shall be provided with approved air filters. Filters shall be installed in the return air system, upstream from any heat exchanger or coil, in an approved convenient location. Liquid adhesive coatings used on filters shall have a flash point not lower than 325°F (163°C).

314.2.1 Approval. Media-type and electrostatic-type air filters shall be listed and labeled. Media-type air filters shall comply with UL 900. High efficiency particulate air filters shall comply with UL 586. Electrostatic-type air filters shall comply with UL 867. Air filters utilized within dwelling units shall be designed for the intended application and shall not be required to be listed and labeled.

314.2.2 Airflow over the filter. Ducts shall be constructed to allow an even distribution of air over the entire filter.

319.2 Identification of a Potable and nonpotable Water System. In buildings where potable water and nonpotable water systems are installed, each system shall be clearly identified in accordance with Section 319.3 through Section 319.5.

319.3 Potable Water. Potable water shall be identified with a colored pipe or band and coded with paints, wraps, and materials compatible with the piping. Potable water shall have a green background with white uppercase lettering with the words “POTABLE WATER.”

319.4 Color and information. Each system shall be identified with a colored pipe or band and coded with paints, wraps, and materials compatible with the piping. Nonpotablewater systems shall have a yellow background with black uppercase lettering, with the words “CAUTION: NONPOTABLE WATER, DO NOT DRINK.”

Each nonpotable system shall be identified to designate the liquid being conveyed, and the direction of normal flow shall be clearly shown. The minimum size of the letters and length of the color field shall comply with Table 319.4. The background color and required information shall be indicated every 20 feet (6096 mm) but not less than once per room, and shall be visible from the floor level.

Table 319.4

MINIMUM LENGTH OF COLOR FIELD AND SIZE OF LETTERS

OUTSIDE DIAMETER OF PIPE OR COVERING (Inches)	MINIMUM LENGTH OF COLOR FIELD (Inches)	MINIMUM SIZE OF LETTERS (Inches)
½ to 1¼	8	½
1½ to 2	8	¾
2½ to 6	12	1¼
8 to 10	24	2½
Over 10	32	3½

For SI units: 1 inch = 25.4 mm

319.5 outlets. Each outlet on the nonpotable water line that is used for special purposes shall be posted with black uppercase lettering as follows: “CAUTION: NONPOTABLE WATER, DO NOT DRINK.”

323.0 Compliance with the Energy Code. Replacement electrical equipment shall comply with the Energy Code. New heating, ventilating, and air-conditioning systems of all structures shall be designed and installed for efficient utilization of energy in accordance with the current adopted energy code.

324.0 Requirements for Flood Plain Areas.

324.1 Definitions.

(1) Regulatory Flood Datum (RFD) means an established plane of reference from which elevations and depth of flooding may be determined for specific locations of the flood plain in accordance with the Building Code.

(2) W-1 spaces means spaces that must remain completely dry during flooding to the RFD. Walls must be impermeable to water and water vapor in accordance with the Building Code.

(3) W-2 spaces means spaces that remain essentially dry during flooding to the RFD. Walls must be impermeable to water, but may pass some water vapor or seep slightly in accordance with the Building Code.

325.0 Establishment of flood hazard areas. Flood hazard areas are established to include the following:

- (1) The flood hazard areas identified by the Federal Emergency Management Agency in a scientific and engineering report entitled, “ The Flood Insurance Study for Austin, Texas,” dated September 26, 2008, with accompanying Flood Insurance Rate Maps and Flood Boundary-Floodway Maps (FIRM and FBFM) and related supporting data along with any amendments or revisions thereto are hereby adopted by reference and declared to be a part of this section.
- (2) The 100-year and 25-year floodplains based on projected full development as specified in the Austin City Code and Drainage Criteria Manual are adopted by reference and declared to be part of this section.

402.1.3 When required. Ventilation shall be provided during the periods that the room or space is occupied.

402.3.1 Intake opening location. Air intake openings shall comply with all of the following:

1. Intake openings shall be located a minimum of 10 feet (3048 mm) from lot lines or buildings on the same lot.
2. Mechanical and gravity outdoor air intake openings shall be located not less than 10 feet (3048 mm) horizontally from any hazardous or noxious contaminant source, such as vents, streets, alleys, parking lots and loading docks, except as specified in Item 3. Outdoor air intake openings shall be permitted to be located less than 10 feet (3048 mm) horizontally from streets, alleys, parking lots and loading docks provided that the openings are located not less than 25 feet (7620 mm) vertically above such locations. Where openings front on a street or public way, the distance shall be measured from the closest edge of the street or public way.
3. Intake openings shall be located not less than 3 feet (914 mm) below contaminant sources where such sources are located within 10 feet (3048 mm) of the opening.

4. Intake openings on structures in flood hazard areas shall be at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment.

402.4 Intake opening protection. Air intake openings that terminate outdoors shall be protected with corrosion-resistant screens, louvers or grilles. Openings in louvers, grilles and screens shall be sized in accordance with Table 402.7, and shall be protected against local weather conditions. Louvers that protect air intake openings in structures located in hurricane-prone regions, as defined in the *International Building Code*, shall comply with AMCA 550. Outdoor air intake openings located in exterior walls shall meet the provisions for exterior wall opening protectives in accordance with the *International Building Code*.

SECTION 405.0

ENCLOSED PARKING GARAGES

405.1 Enclosed parking garages. Mechanical ventilation systems for enclosed parking garages shall be permitted to operate intermittently in accordance with Item 1, Item 2 or both.

1. The system shall be arranged to operate automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices.
2. The system shall be arranged to operate automatically by means of carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors. Such detectors shall be installed in accordance with their manufacturers' recommendations.

405.2 Minimum ventilation. Automatic operation of the system shall not reduce the ventilation airflow rate below 0.05 cfm per square foot (0.00025 m³/s • m²) of the floor area and the system shall be capable of producing a ventilation airflow rate of 0.75 cfm per square foot (0.0038 m³/s • m²) of floor area.

405.3 Occupied spaces accessory to public garages. Connecting offices, waiting rooms, ticket booths and similar uses that are accessory to a public garage shall be maintained at a positive pressure and shall be provided with ventilation in accordance with Section 405.2.

TABLE 402.1 REQUIRED OUTDOOR VENTILATION AIR		
OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET ^a	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED ^c
Correctional facilities		
Cells		
without plumbing fixtures	20	20
with plumbing fixtures ^d	20	20
Dining Halls	100	15

Guard Stations	40	15
Dry Cleaners, laundries		
Coin-operated dry cleaner	20	15
Coin-operated laundries	20	15
Commercial dry cleaner	30	30
Commercial laundry	10	25
Storage, pick up	30	35
Education		
Auditorium	150	15
Classrooms	50	15
Corridors	--	0.10 cfm/ft ²
Laboratories	30	20
Libraries	20	15
Locker rooms f	--	0.50 cfm/ft ²
Music rooms	50	15
Smoking lounges	70	60
Training shops	30	20
Food and beverage service		
Bars, cocktail lounges	100	30
Cafeteria, fast food	100	20
Dining rooms	70	20
Kitchen (cooking) e	20	15
Hospitals, nursing and convalescent homes h		
Autopsy rooms	--	0.50 cfm/ft ²
Medical procedure rooms	20	15
Operating rooms	20	30
Patient rooms	10	25
Physical therapy	20	15
Recovery and ICU	20	15
Hotels, motels, resorts and dormitories		
Assembly rooms	120	15
Bathrooms f	--	35
Bedrooms	--	30 cfm per room
Conference rooms	50	20
Dormitory sleeping areas	20	15
Gambling casinos	120	30
Living rooms	--	30 cfm per room
Lobbies	30	15
Offices		
Conference rooms	50	20
Office spaces	7	20
Reception areas	60	15
Telecommunication centers and data entry	60	20

**TABLE 402.1-continued
REQUIRED OUTDOOR VENTILATION AIR**

OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET^a	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED^e
Private Dwellings, single and multiple		
Garages, common for Multiple units	--	1.5 cfm/ft ²
Garages, separate for each dwelling	--	
Kitchens	--	100 cfm per car
Living areas b	--	100 cfm intermittent or 25 cfm continuous

Toilet rooms and bathrooms ^f	Based upon number of bedrooms, first bedroom: 2; each additional bedroom: 1 --	.035 air changes per hour ^a or 15cfm per person, whichever is greater Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous
Public spaces Corridors and utilities Elevators car Locker rooms ^f Shower rooms (per shower head) ^f Smoking lounges ^f Toilet rooms ^f	 -- 70	 0.05 cfm/ft ² 1.00 cfm/ft ² 0.5 cfm/ft ² 50 cfm Intermittent or 20 cfm continuous 60 75 cfm per water closet or urinal
Retail stores, sales floor and showroom floors Basement and street Dressing rooms Malls and arcades Shipping and receiving Smoking lounges Storage rooms Upper floors Warehouses	 -- -- -- -- 70 -- -- --	 0.30 cfm/ft ² 0.20 cfm/ft ² 0.20 cfm/ft ² 0.15 cfm/ft ² 60 0.15 cfm/ft ² 0.20 cfm/ft ² 0.05 cfm/ft ²
Specialty shops Automotive motor-fuel dispensing stations Barber Beauty Clothiers, furniture Embalming room Florists Hardware, drugs, fabrics Nail salon ^g Pet shops Reducing salons Supermarkets	 -- 25 25 -- -- 8 8 -- 20 8	 1.5 cfm/ft ² 15 25 0.30 cfm/ft ² 2.0 cfm/ft ² 15 15 50 cfm intermittent or 20 cfm continuous per station 1.0 cfm.ft ² 15 15

**TABLE 402.1-continued
REQUIRED OUTDOOR VENTILATION AIR**

OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET^a	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED^e
Sports and amusement Ballrooms and discos Bowling alleys (seating areas) Game rooms Ice arenas Playing floors (gymnasiums) Spectator areas Swimming pools (pool and deck area)	 100 70 70 -- 30 150 --	 25 25 25 0.50 cfm/ft ² 20 15 0.50 cfm/ft ²
Storage Repair garages, enclosed parking garages ^c Warehouses	 -- --	 1.5 cfm/ft ² 0.05 cfm/ft ²

Theaters		
Auditorium	150	15
Lobbies	150	20
Stages, studios	70	15
Ticket booths	60	20
Transportation		
Platforms	100	15
Vehicles	150	15
Ticket booths	100	15
Workrooms		
Bank vaults	5	15
Darkrooms	--	0.50 cfm/ft ²
Duplicating, printing	--	0.50 cfm/ft ²
Meat processing b	10	15
Pharmacy	20	15
Photo studios	10	15

For SI: 1 cubic foot per minute = 0.0004719 m³/s, 1 ton = 908 kg.

1 cubic foot per minute per square foot = 0.00508 m³/(s.m²).

°C = [(°F)-32]/1.8, 1 square foot = 0.0929 m².

- a. Based upon net floor area, unless actual occupant load is known.
- b. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.
- c. Ventilation systems in enclosed parking garages shall comply with Section 405.1
- d. Where the ventilation rate is expressed in cfm/ft², such rate is based upon cubic feet per minute per square foot of the floor area being ventilated.
- e. The sum of the outdoor and transfer air from adjacent spaces shall be sufficient to provide an exhaust rate of not less than 1.5 cfm/ft².
- f. Mechanical exhaust is required and recirculation is prohibited except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces.
- g. The required exhaust system shall capture the contaminants and odors at their source.
- h. The State of Texas has minimum outside air requirements for this occupancy. If the State of Texas requirements are greater than the amount required from Table 402.1 then the State of Texas requirements shall be utilized.

Table 402.7
Opening Sizes In Louvers, Grilles And Screens Protecting Outdoor
Exhaust And Air Intake Openings

Outdoor Opening Type	Minimum And Maximum Opening Sizes In Louvers, Grilles And Screens Measured In Any direction
Intake openings in residential Occupancies	Not < ¼ inch and not > ½ inch

Intake openings in other than Residential occupancies	Not < ¼ inch and not > 1 inch
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504.1 Makeup-and Exhaust-Air Ducts. Environmental air ducts not regulated by other provisions of the Mechanical Code shall comply with this section. Ducts shall be substantially airtight and shall comply with the provisions of Chapter 6 (*Duct Systems*). Exhaust ducts shall not extend into or through ducts or plenums. Environmental air ducts that have an alternate function as a part of an approved smoke-control system do not require design as Class 1 product-conveying ducts. Exhaust ducts shall be equipped with back draft dampers. Exhaust ducts shall terminate at the exterior of a building, in locations such as exterior walls and roofs, or with a minimum of three feet from property lines and openings into the building. Exhaust ducts serving domestic clothes dryers shall not terminate over a covered walkway unless the duct is extended to the outer edge of the covered walkway. Exhaust ducts serving domestic ranges and bathroom exhaust fans shall not terminate over a covered walkway unless there are two sides open for dilution air movement. When adequate dilution air cannot be provided, exhaust ducts serving a domestic range or a bathroom exhaust fan shall be extended to the outer edge of the covered walkway. Environmental air ducts may terminate over a private use balcony if the balcony serves the same space as the duct and required clearances from openings are maintained.

Exception: A duct under positive or negative pressure may be routed through a plenum when a longitudinal and traverse joint are sealed with listed materials for that use in accordance with acceptable methods. Hazardous fumes may not be run through a plenum under positive pressure unless the plenum is sealed and encased in another air tight enclosure, chase, or metal sleeve complete to connection and to point of discharge.

518.8 Hazardous materials—general requirements. Exhaust ventilation systems for structures containing hazardous materials shall be provided as required in Sections 518.8.1 through 518.8.7.

518.8.1 Storage in excess of the maximum allowable quantities. Indoor storage areas and storage buildings for hazardous materials in amounts exceeding the maximum allowable quantity per control area shall be provided with mechanical exhaust ventilation or *natural ventilation* where *natural ventilation* can be shown to be acceptable for the materials **as stored:**

Exceptions:

1. Storage areas for flammable solids complying with Section 5904 of the *International Fire Code*.

2. Storage areas and storage buildings for fireworks and explosives complying with Chapter 56 of the *International Fire Code*.

518.8.1.1 System requirements. Exhaust ventilation systems shall comply with all of the following:

1. The installation shall be in accordance with this code.
2. Mechanical ventilation shall be provided at a rate of not less than 1 cfm per square foot [0.00508 m³/(s • m²)] of floor area over the storage area.
3. The systems shall operate continuously unless alternate designs are *approved*.
4. A manual shutoff control shall be provided outside of the room in a position adjacent to the access door to the room or in another *approved* location. The switch shall be a break-glass or other *approved* type and shall be *labeled*: VENTILATION SYSTEM EMERGENCY SHUTOFF.
5. The exhaust ventilation shall be designed to consider the density of the potential fumes or vapors released. For fumes or vapors that are heavier than air, exhaust shall be taken from a point within 12 inches (305 mm) of the floor. For fumes or vapors that are lighter than air, exhaust shall be taken from a point within 12 inches (305 mm) of the highest point of the room.
6. The location of both the exhaust and inlet air openings shall be designed to provide air movement across all portions of the floor or room to prevent the accumulation of vapors.
7. The *exhaust air* shall not be recirculated to occupied areas if the materials stored are capable of emitting hazardous vapors and contaminants have not been removed. Air contaminated with explosive or flammable vapors, fumes or dusts; flammable, highly toxic or toxic gases; or radioactive materials shall not be recirculated.

518.8.2 Gas rooms, exhausted enclosures and gas cabinets. The ventilation system for gas rooms, exhausted enclosures and gas cabinets for any quantity of hazardous material shall be designed to operate at a negative pressure in relation to the surrounding area. Highly toxic and toxic gases shall also comply with Sections 518.9.7.1, 518.9.7.2 and 518.9.8.4.

518.8.3 Indoor dispensing and use. Indoor dispensing and use areas for hazardous materials in amounts exceeding the maximum allowable quantity per control area shall be provided with exhaust ventilation in accordance with Section 518.8.1.

Exception: Ventilation is not required for dispensing and use of flammable solids other than finely divided particles.

518.8.4 Indoor dispensing and use—point sources. Where gases, liquids or solids in amounts exceeding the maximum allowable quantity per control area and having a hazard ranking of 3 or 4 in accordance with NFPA 704 are dispensed or used, mechanical

exhaust ventilation shall be provided to capture gases, fumes, mists or vapors at the point of generation.

Exception: Where it can be demonstrated that the gases, liquids or solids do not create harmful gases, fumes, mists or vapors.

518.8.5 Closed systems. Where closed systems for the use of hazardous materials in amounts exceeding the maximum allowable quantity per control area are designed to be opened as part of normal operations, ventilation shall be provided in accordance with Section 518.8.4.

518.9 Hazardous materials—requirements for specific materials. Exhaust ventilation systems for specific hazardous materials shall be provided as required in Section 518.8 and Sections 518.9.1 through 518.9.11.

518.9.1 Compressed gases—medical gas systems. Rooms for the storage of compressed medical gases in amounts exceeding the permit amounts for compressed gases in the *International Fire Code*, and that do not have an exterior wall, shall be exhausted through a duct to the exterior of the building. Both separate airstreams shall be enclosed in a 1-hour-rated shaft enclosure from the room to the exterior. *Approved* mechanical ventilation shall be provided at a minimum rate of 1 cfm/ft² [0.00508 m³/(s • m²)] of the area of the room. Gas cabinets for the storage of compressed medical gases in amounts exceeding the permit amounts for compressed gases in the *International Fire Code* shall be connected to an exhaust system. The average velocity of ventilation at the face of access ports or windows shall be not less than 200 feet per minute (1.02 m/s) with a minimum velocity of 150 feet per minute (0.76 m/s) at any point at the access port or window.

518.9.2 Corrosives. Where corrosive materials in amounts exceeding the maximum allowable quantity per control area are dispensed or used, mechanical exhaust ventilation in accordance with Section 518.8.4 shall be provided.

518.9.3 Cryogenics. Storage areas for stationary or portable containers of cryogenic fluids in any quantity shall be ventilated. Indoor areas where cryogenic fluids in any quantity are dispensed shall be ventilated in accordance with the requirements of Section 518.8.4 in a manner that captures any vapor at the point of generation.

Exception: Ventilation for indoor dispensing areas is not required where it can be demonstrated that the cryogenic fluids do not create harmful vapors.

518.9.4 Explosives. Squirrel cage blowers shall not be used for exhausting hazardous fumes, vapors or gases in operating buildings and rooms for the manufacture, assembly or testing of explosives. Only nonferrous fan blades shall be used for fans located within the ductwork and through which hazardous materials are exhausted. Motors shall be located outside the duct.

518.9.5 Flammable and combustible liquids. Exhaust ventilation systems shall be provided as required by Sections 518.9.5.1 through 518.9.5.5 for the storage, use, dispensing, mixing and handling of flammable and combustible liquids. Unless otherwise specified, this section shall apply to any quantity of flammable and combustible liquids.

Exception: This section shall not apply to flammable and combustible liquids that are exempt from the *International Fire Code*.

518.9.5.1 Vaults. Vaults that contain tanks of Class I liquids shall be provided with continuous ventilation at a rate of not less than 1 cfm/ft² of floor area [$0.00508 \text{ m}^3/(\text{s} \cdot \text{m}^2)$], but not less than 150 cfm (4 m³/min). Failure of the exhaust airflow shall automatically shut down the dispensing system. The exhaust system shall be designed to provide air movement across all parts of the vault floor. Supply and exhaust ducts shall extend to a point not greater than 12 inches (305 mm) and not less than 3 inches (76 mm) above the floor. The exhaust system shall be installed in accordance with the provisions of NFPA 91. Means shall be provided to automatically detect any flammable vapors and to automatically shut down the dispensing system upon detection of such flammable vapors in the exhaust duct at a concentration of 25 percent of the LFL.

518.9.5.2 Storage rooms and warehouses. Liquid storage rooms and liquid storage warehouses for quantities of liquids exceeding those specified in the *International Fire Code* shall be ventilated in accordance with Section 518.8.1.

518.9.5.3 Cleaning machines. Areas containing machines used for parts cleaning in accordance with the *International Fire Code* shall be adequately ventilated to prevent accumulation of vapors.

518.9.5.4 Use, dispensing and mixing. Continuous mechanical ventilation shall be provided for the use, dispensing and mixing of flammable and combustible liquids in open or closed systems in amounts exceeding the maximum allowable quantity per control area and for bulk transfer and process transfer operations. The ventilation rate shall be not less than 1 cfm/ft² [$0.00508 \text{ m}^3/(\text{s} \cdot \text{m}^2)$] of floor area over the design area. Provisions shall be made for the introduction of makeup air in a manner that will include all floor areas or pits where vapors can collect. Local or spot ventilation shall be provided where needed to prevent the accumulation of hazardous vapors.

Exception: Where *natural ventilation* can be shown to be effective for the materials used, dispensed or mixed.

518.9.5.5 Bulk plants or terminals. Ventilation shall be provided for portions of properties where flammable and combustible liquids are received by tank vessels, pipelines, tank cars or tank vehicles and which are stored or blended in bulk for the purpose of distributing such liquids by tank vessels, pipelines, tank cars, tank vehicles or containers as required by Sections 518.9.5.5.1 through 518.9.5.5.3.

518.9.5.5.1 General. Ventilation shall be provided for rooms, buildings and enclosures in which Class I liquids are pumped, used or transferred. Design of ventilation systems shall consider the relatively high specific gravity of the vapors. Where *natural ventilation* is used, adequate openings in outside walls at floor level, unobstructed except by louvers or coarse screens, shall be provided. Where *natural ventilation* is inadequate, mechanical ventilation shall be provided.

518.9.5.5.2 Basements and pits. Class I liquids shall not be stored or used within a building having a basement or pit into which flammable vapors can travel, unless such area is provided with ventilation designed to prevent the accumulation of flammable vapors therein.

518.9.5.5.3 Dispensing of Class I liquids. Containers of Class I liquids shall not be drawn from or filled within buildings unless a provision is made to prevent the accumulation of flammable vapors in hazardous concentrations. Where mechanical ventilation is required, it shall be kept in operation while flammable vapors could be present.

518.9.6 Highly toxic and toxic liquids. Ventilation exhaust shall be provided for highly toxic and toxic liquids as required by Sections 518.9.6.1 and 518.9.6.2.

518.9.6.1 Treatment system. This provision shall apply to indoor and outdoor storage and use of highly toxic and toxic liquids in amounts exceeding the maximum allowable quantities per control area. Exhaust scrubbers or other systems for processing vapors of highly toxic liquids shall be provided where a spill or accidental release of such liquids can be expected to release highly toxic vapors at normal temperature and pressure.

518.9.6.2 Open and closed systems. Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in open systems in accordance with Section 518.8. Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in closed systems in accordance with Section 518.8.5.

Exception: Liquids or solids that do not generate highly toxic or toxic fumes, mists or vapors.

518.9.7 Highly toxic and toxic compressed gases— any quantity. Ventilation exhaust shall be provided for highly toxic and toxic compressed gases in any quantity as required by Sections 518.9.7.1 and 518.9.7.2.

518.9.7.1 Gas cabinets. Gas cabinets containing highly toxic or toxic compressed gases in any quantity shall comply with Section 518.8.2 and the following requirements:

1. The average ventilation velocity at the face of gas cabinet access ports or windows shall be not less than 200 feet per minute (1.02 m/s) with a minimum velocity of 150 feet per minute (0.76 m/s) at any point at the access port or window.
2. Gas cabinets shall be connected to an exhaust system.

3. Gas cabinets shall not be used as the sole means of exhaust for any room or area.

518.9.7.2 Exhausted enclosures. Exhausted enclosures containing highly toxic or toxic compressed gases in any quantity shall comply with Section 518.8.2 and the following requirements:

1. The average ventilation velocity at the face of the enclosure shall be not less than 200 feet per minute (1.02 m/s) with a minimum velocity of 150 feet per minute (0.76 m/s).

2. Exhausted enclosures shall be connected to an exhaust system.

3. Exhausted enclosures shall not be used as the sole means of exhaust for any room or area.

518.9.8 Highly toxic and toxic compressed gases—quantities exceeding the maximum allowable quantity per control area. Ventilation exhaust shall be provided for highly toxic and toxic compressed gases in amounts exceeding the maximum allowable quantities per control area as required by Sections 518.9.8.1 through 518.9.8.6.

518.9.8.1 Ventilated areas. The room or area in which indoor gas cabinets or exhausted enclosures are located shall be provided with exhaust ventilation. Gas cabinets or exhausted enclosures shall not be used as the sole means of exhaust for any room or area.

518.9.8.2 Local exhaust for portable tanks. A means of local exhaust shall be provided to capture leakage from indoor and outdoor portable tanks. The local exhaust shall consist of portable ducts or collection systems designed to be applied to the site of a leak in a valve or fitting on the tank. The local exhaust system shall be located in a gas room. Exhaust shall be directed to a treatment system where required by the *International Fire Code*.

518.9.8.3 Piping and controls—stationary tanks. Filling or dispensing connections on indoor stationary tanks shall be provided with a means of local exhaust. Such exhaust shall be designed to capture fumes and vapors. The exhaust shall be directed to a treatment system where required by the *International Fire Code*.

518.9.8.4 Gas rooms. The ventilation system for gas rooms shall be designed to operate at a negative pressure in relation to the surrounding area. The exhaust ventilation from gas rooms shall be directed to an exhaust system.

518.9.8.5 Treatment system. The exhaust ventilation from gas cabinets, exhausted enclosures and gas rooms, and local exhaust systems required in Sections 518.9.8.2 and 518.9.8.3 shall be directed to a treatment system where required by the *International Fire Code*.

518.9.8.6 Process equipment. Effluent from indoor and outdoor process *equipment* containing highly toxic or toxic compressed gases which could be discharged to the

atmosphere shall be processed through an exhaust scrubber or other processing system. Such systems shall be in accordance with the *International Fire Code*.

518.9.9 Ozone gas generators. Ozone cabinets and ozone gas-generator rooms for systems having a maximum ozone-generating capacity of 1/2 pound (0.23 kg) or more over a 24-hour period shall be mechanically ventilated at a rate of not less than six air changes per hour. For cabinets, the average velocity of ventilation at *makeup air* openings with cabinet doors closed shall be not less than 200 feet per minute (1.02 m/s).

519.0 Hazardous Exhaust Ducts. Fire dampers shall comply with Section 605.0 of this Code.

520.0 Listed Recirculating Hoods. Listed recirculation hoods are subject to approval by the administrative authority having jurisdiction.

521.0 Smoke Control Systems. Smoke control systems shall be designed and installed as specified in Section 909 of the Building Code as amended.

603.7 Attachment of Ducts.

603.7.1 A duct shall be cut flush with the top sides of ceiling materials or with the back side of wall materials and held in place with a metal angle assembly of one inch by one inch 26 gauge steel attached to the duct on all four sides. A grill assembly shall be attached to the angle assembly in accordance with product listing and shall be airtight.

603.7.2 A flexible duct shall be attached to an approved adapter bucket in accordance with the product listing. Each bucket shall be firmly attached to a joist, stud, or grid with one inch by one inch 26 gauge steel angles on at least two sides of the bucket

604.0 Insulation of Ducts.

604.1 Insulation of ducts shall be designed and installed as specified in Section C403.2.7 of the International Energy Conservation Code.

604.2 Approved materials shall be installed within ducts and plenums for insulating, sound deadening, or other purposes. Materials shall have a mold, humidity, and erosion-resistant surface that meets the requirements of the referenced standard for air ducts in Chapter 17. Duct liners in systems operating with air velocities exceeding 2000 feet per minute (10.16 m/s) shall be fastened with both adhesive and mechanical fasteners, and exposed edges shall have approved treatment to withstand the operating velocity. Insulation applied to the surface of ducts, including duct coverings, linings, tapes, and adhesives, located in buildings shall have a flame-spread index not to exceed 25 and a smoke developed index not to exceed 50, where tested in accordance with ASTM E 84 or UL 723. The specimen preparation and mounting procedures of ASTM E 2231 shall be used. Air duct coverings and linings shall not flame, glow, smolder, or smoke where tested in accordance with ASTM C 411 at the temperature to which they are exposed in

service. In no case shall the test temperature be less than 250°F (121°C). Factory-made air ducts and faced insulations intended for installation on the exterior of ducts shall be legibly printed with the name of the manufacturer, the thermal resistance (R) value at installed thickness, and the flame-spread index and smoke developed index of the composite material.

604.3 Conflicts between codes. When the requirements within the jurisdiction of this Mechanical Code conflict with the requirements of the *International Energy Conservation Code*, the most restrictive requirement will apply.

604.4 Protection of Ducts. Ducts installed in locations where they are exposed to mechanical damage by vehicles or from other causes shall be protected by approved barriers.

Exception: A nonmetallic plenum, when protected from the weather, shall be attached to a coil or furnace with a hard cast system. A nonmetallic plenum, when exposed to the weather, shall be attached to a coil for furnace with a waterproof hard cast system or its equivalent.

SECTION 605.0

DUCT AND TRANSFER OPENINGS

605.1 General. The provisions of this section shall govern the protection of duct penetrations and air transfer openings in assemblies required to be protected.

605.1.1 Ducts that penetrate fire-resistance-rated assemblies without dampers.

Ducts that penetrate fire resistance- rated assemblies and are not required by this section to have dampers shall comply with the requirements of Sections 714.2 through 714.3.3 of the *International Building Code*. Ducts that penetrate horizontal assemblies not required to be contained within a shaft and not required by this section to have dampers shall comply with the requirements of Sections 714.4 through 714.4.2.2 of the *International Building Code*.

605.1.1.1 Ducts that penetrate nonfire-resistance rated assemblies. The space around a duct penetrating a nonfire-resistance-rated floor assembly shall comply with Section 717.6.3 of the *International Building Code*.

605.2 Installation. Fire dampers, smoke dampers, combination fire/smoke dampers and ceiling radiation 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.

605.2.1 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 909 of the *International Building Code*, approved alternative protection shall be used. Where

mechanical systems including ducts and dampers used for normal building ventilation serve as part of the smoke control system, the expected performance of these systems in smoke control mode shall be addressed in the rational analysis required by Section 909.4 of the *International Building Code*.

605.2.2 Hazardous exhaust ducts. Fire dampers for hazardous exhaust duct systems shall comply with Section 510.0.

605.3 Damper testing, ratings and actuation. Damper testing, ratings and actuation shall be in accordance with Sections 605.3.1 through 605.3.3.

605.3.1 Damper testing. Dampers shall be listed and labeled in accordance 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 or shall be tested as part of a fire-resistance-rated floor/ceiling or roof/ceiling assembly in accordance with ASTM E119 or UL 263.

605.3.2 Damper rating. Damper ratings shall be in accordance with Sections 605.3.1 through 605.3.3.

605.3.2.1 Fire damper ratings. Fire dampers shall have the minimum fire protection rating specified in Table 605.3.2.1 for the type of penetration.

**TABLE 605.3.2.1
FIRE DAMPER RATING**

TYPE OF PENETRATION (hour)	MINIMUM DAMPER RATING
Less than 3-hour fire-resistance-rated assemblies	1 1/2
3-hour or greater fire-resistance-rated assemblies	3

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

605.3.2.3 Combination fire/smoke damper ratings. Combination fire/smoke dampers shall have the minimum fire protection rating specified for fire dampers in Table 717.3.2.1 of the *International Building Code* for the type of penetration and shall also have a minimum smoke damper rating as specified in Section 717.3.2.2 of the *International Building Code*.

605.3.3 Damper actuation. Damper actuation shall be in accordance with Sections 605.3.3.1 through 65.3.3.4 as applicable.

605.3.3.1 Fire damper actuation device. The fire damper actuation device shall meet one of the following requirements:

1. The operating temperature shall be approximately 50°F (28°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 350°F (177°C) where located in a smoke control system complying with Section 909 of the *International Building Code*.

605.3.3.2 Smoke damper actuation. The smoke damper shall close upon actuation of a *listed* smoke detector or detectors installed in accordance with Section 907.3 of the *International Building Code* and one of the following methods, as applicable:

1. Where a smoke 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 smoke 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 smoke 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 smoke damper is installed in a corridor wall or ceiling, 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 a heating, ventilation and air-conditioning (HVAC) system, smoke dampers shall be permitted to be controlled by the smoke detection system.

605.3.3.3 Combination fire/smoke damper actuation. Combination fire/smoke damper actuation shall be in accordance with Sections 605.3.3.1 and 605.3.3.2. Combination fire/smoke dampers installed in smoke control system shaft penetrations shall not be activated by local area smoke detection unless it is secondary to the smoke management system controls.

605.3.3.4 Ceiling radiation damper actuation. The operating temperature of a ceiling radiation damper actuation device shall be 50°F (28°C) above the normal temperature within the duct system, but not less than 160°F 71°C).

605.4 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: FIRE/SMOKE DAMPER, SMOKE DAMPER or FIRE DAMPER. Access doors in ducts shall be tight fitting and suitable for the required duct construction.

605.5 Where required. Fire dampers, smoke dampers and combination fire/smoke dampers shall be provided at the locations prescribed in Sections 605.5.1 through 605.5.7. Where an assembly is required to have both fire dampers and smoke dampers, combination fire/smoke dampers or a fire damper and smoke damper shall be required.

605.5.1 Fire walls. Ducts and air transfer openings permitted in fire walls in accordance with Section 706.11 of the *International Building Code* shall be protected with *listed* fire dampers installed in accordance with their listing.

605.5.1.1 Horizontal exits. A *listed smoke damper* designed to resist the passage of smoke shall be provided at each point that a duct or air transfer opening penetrates a *fire wall* that serves as a horizontal *exit*.

605.5.2 Fire barriers. Ducts and air transfer openings that penetrate fire barriers shall be protected with *listed* fire dampers installed in accordance with their listing. Ducts and air transfer openings shall not penetrate exit enclosures and exit passageways except as permitted by Sections 1022.5 and 1023.6, respectively, of the *International Building Code*.

Exception: 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 or UL 263 as part of the fire-resistance rated assembly.
2. Ducts are used as part of an *approved* smoke control system and where the fire damper would interfere with the operation of the 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 *International 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 steel 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.

605.5.2.1 Horizontal exits. A *listed smoke damper* designed to resist the passage of smoke shall be provided at each point that a duct or air transfer opening penetrates a *fire barrier* that serves as a horizontal *exit*.

605.5.3 Fire partitions. Ducts and air transfer openings that penetrate fire partitions shall be protected with *listed* fire dampers installed in accordance with their listing.

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

1. 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 *International Building Code* and the duct is protected as a through penetration in accordance with Section 714 of the *International Building Code*.

2. The partitions are tenant partitions in covered and open mall buildings where the walls are not required by provisions elsewhere in the *International Building Code* to extend to the underside of the floor or roof sheathing, slab or deck above.

3. The duct system is constructed of *approved* materials in accordance with Section 603 and the duct penetrating the wall complies with all of the following requirements:

3.1. The duct shall not exceed 100 square inches (0.06 m²).

3.2. The duct shall be constructed of steel a minimum of 0.0217 inch (0.55 mm) in thickness.

3.3 The duct shall not have openings that communicate the corridor with adjacent spaces or rooms.

3.4. The duct shall be installed above a ceiling.

3.5. The duct shall not terminate at a wall register in the fire-resistance-rated wall.

3.6 A minimum 12-inch-long (305mm) by 0.060-inch-thick (1.52mm) 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 1 1/2-inch by 1 1/2-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 on all sides.

4. Such walls are penetrated by ducted HVAC systems, have a required fire-resistance rating of 1 hour or less, and 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 *International Building Code*. For the purposes of this exception, a ducted HVAC system shall be a duct system for conveying supply, return or exhaust air as part of the structure's HVAC system. Such a duct system shall be

constructed of sheet steel not less than 26 gage in thickness and shall be continuous from the air-handling appliance or equipment to the air outlet and inlet terminals.

605.5.4 Corridors/smoke barriers. 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 smoke barrier wall or a corridor enclosure required to have smoke and draft control doors in accordance with the *International Building Code*. Smoke dampers and smoke damper actuation methods shall comply with Section 605.5.4.1.

Exceptions:

1. Smoke dampers are not required in corridor penetrations where the building is equipped throughout with an *approved* smoke control system in accordance with Section 513 and smoke dampers are not necessary for the operation and control of the system.
2. 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.
3. 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.

605.5.4.1 Smoke damper. The smoke damper shall close upon actuation of a *listed* smoke detector or detectors installed in accordance with the *International 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.
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 all areas served by an HVAC system, dampers shall be permitted to be controlled by the smoke detection system.

605.5.5 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 that there is a continuous airflow upward to the outdoors; or
 - 1.2. Penetrations are tested in accordance with ASTM E 119 or UL 263 as part of the fire-resistance-rated assembly; or
 - 1.3. Ducts are used as part of an *approved* smoke control system in accordance with Section 909 of the *International Building 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 and R occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code*, smoke dampers are not required at penetrations of shafts where kitchen, clothes dryer, bathroom and toilet room exhaust openings with steel exhaust subducts, having a minimum thickness of 0.0187 inch (0.4712 mm) (No. 26 gage), extend at least 22 inches (559 mm) vertically and the exhaust fan at the upper terminus is powered continuously in accordance with the provisions of Section 909.11 of the *International Building Code*, and maintains airflow upward to the outdoors.
3. Smoke dampers are not required at penetrations 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. Smoke dampers are not required at penetrations of shafts where ducts are used as part of an *approved* mechanical smoke control system designed in accordance with Section 909 of the *International Building Code* and where the smoke damper will interfere with the operation of the smoke control system.
5. Fire dampers and combination fire/smoke dampers are not required in kitchen and clothes dryer exhaust systems installed in accordance with this code.

605.5.5.1 Enclosure at the bottom. Shaft enclosures that do not extend to the bottom of the building or structure shall be protected in accordance with Section 713.11 of the *International Building Code*.

605.5.6 Exterior walls. Ducts and air transfer openings in fire-resistance-rated exterior walls required to have protected openings in accordance with Section 705.10 of the

International Building Code shall be protected with *listed* fire dampers installed in accordance with their listing.

605.5.7 Smoke partitions. A *listed* smoke damper designed to resist the passage of smoke shall be provided at each point where an air transfer opening penetrates a smoke partition. Smoke dampers and smoke damper actuation methods shall comply with Section 605.3.3.2.

Exception: Where the installation of a smoke damper will interfere with the operation of a required smoke control system in accordance with Section 513, *approved* alternate protection shall be used.

605.6 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 Section 713 and Sections 717.6.1 through 717.6.3 of the *International Building Code* or shall comply with Sections 605.6.1 through 605.6.3.

605.6.1 Through penetrations. In occupancies other than Groups I-2 and I-3, a duct constructed of *approved* materials in accordance with Section 603 that penetrates a fire resistance-rated floor/ceiling assembly that connects not more than two stories is permitted without shaft enclosure protection provided that a *listed* fire damper is installed at the floor line or the duct is protected in accordance with Section 714.4 of the *International Building Code*. For air transfer openings, see Exception 7, Section 712.1.8 of the *International Building Code*.

Exception: A duct 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 having a minimum thickness of 0.0187 inch (0.4712 mm) (No. 26 gage).
2. The duct shall open into only one *dwelling unit* or *sleeping unit* and the duct system shall be continuous from the unit to the exterior of the building.
3. The duct shall not exceed 4-inch (102 mm) nominal diameter and the total area of such ducts shall not exceed 100 square inches for any 100 square feet (64 516 mm² per 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 when subjected to ASTM E 119 or UL 263 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 *listed* ceiling radiation damper installed in accordance with Section 605.6.2.1.

605.6.2 Membrane penetrations. Ducts and air transfer openings constructed of *approved* materials, in accordance with Section 603, that penetrate the ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with one of the following:

1. A shaft enclosure in accordance with Section 713 of the *International Building Code*.
2. A *listed* ceiling radiation damper installed at the ceiling line where a duct penetrates the ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly.
3. A *listed* ceiling radiation damper installed at the ceiling line where a diffuser with no duct attached penetrates the ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly.

605.6.2.1 Ceiling radiation dampers. *Ceiling radiation dampers* shall be tested in accordance with Section 605.3.1. *Ceiling radiation dampers* shall be installed in accordance with the details *listed* in the fire-resistance rated assembly and the manufacturer's installation instructions and the listing. *Ceiling radiation dampers* are not required where either of the following applies:

1. Tests in accordance with ASTM E 119 or UL 263 have shown that ceiling radiation dampers are not necessary to maintain the fire-resistance rating of the assembly.
2. Where exhaust duct penetrations are protected in accordance with Section 714.4.1.2 of the *International Building Code*, are located within the cavity of a wall and do not pass through another *dwelling unit* or tenant space.

605.6.3 Nonfire-resistance-rated floor assemblies. Duct systems constructed of *approved* materials in accordance with Section 603 that penetrate nonfire-resistance-rated floor assemblies shall be protected by any of the following methods:

1. A shaft enclosure in accordance with Section 713 of the *International Building Code*.
2. The duct connects not more than two stories, and the annular space around the penetrating duct is protected with an *approved* noncombustible material that resists the free passage of flame and the products of *combustion*.
3. The duct connects not more than three stories, and the annular space around the penetrating duct is protected with an *approved* noncombustible material that resists the free passage of flame and the products of *combustion*, and a *listed* fire damper is installed at each floor line.

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

605.7 Flexible ducts and air connectors. Flexible ducts and air connectors shall not pass through any fire-resistance-rated assembly.

608.0 Automatic Shutoffs

608.1 General

Exceptions:

(6) Automatic Shutoffs for Fan Powered Terminal Units shall comply with Section 608.3.

608.2 Common supply and return air systems. Where multiple air-handling systems share common supply or return air ducts or plenums with a combined design capacity greater than 2,000 cfm (0.9 m³/s), the supply air system shall be provided with smoke detectors in accordance with Section 608.1.

608.3 Individual smoke detectors shall not be required for each new or relocated fan-powered terminal unit, provided that such units do not have an individual design capacity greater than 2,000 cfm (0.9 m³/s) and will be shut down by activation of one of the following:

1. Smoke detectors required by Sections 608.1
2. Where an air-handling unit is located within a space or area and is interconnected with the FPTU's, the duct smoke detector shall be located in supply side of the main air-handler served by that system.
3. An area smoke detector system as prescribed in the exceptions of 608.1.

608.3.1 Shutdown Control of Fan-Powered Terminal Units by the Fire Alarm System. When a fire alarm is initiated by a smoke detector located in air handling equipment on a floor or in air handling equipment in an independent smoke zone, the air handling equipment on that floor or in that independent smoke zone shall be de-energized, including all new or relocated fan-powered terminal units (FPTU's).

Each new or relocated FPTU shall have a fire alarm relay installed within three feet (3') of each new or relocated FPTU. All of these fire alarm relays shall be controlled only by the fire alarm system. For each new or relocated FPTU, the control wiring for the FPTU fan shall be wired through its associated fire alarm shut down relay such that each FPTU shall be de-energized by a signal from the fire alarm system. The FPTU fan shall remain off until the FPTU fire alarm relay is reset through the fire alarm system. It shall not be possible to override the fire alarm relay and its "off" control of the FPTU fan through the building automation system or any other control system.

In the event that any aspects of the requirements described above are in conflict with interpretations by the City of Austin, then the interpretations by the City of Austin shall govern.

608.4 Return air risers. Where return air risers serve two or more stories and serve any portion of a return air system having a design capacity greater than 15,000 cfm (7.1 m³/s), smoke detectors shall be installed at each story. Such smoke detectors shall be located upstream of the connection between the return air riser and any air ducts or plenums.

608.5 Installation. The required smoke detectors shall be installed to monitor the entire airflow conveyed by the supply or return air system. Access shall be provided to smoke detectors for inspection and maintenance.

608.6 Controls operation. Upon activation, the smoke detectors shall shut down all operational capabilities of the air distribution system in accordance with the listing and labeling of appliances used in the system. Air distribution systems that are part of a smoke control system shall switch to the smoke control mode upon activation of a detector.

608.6.1 Supervision. The duct smoke detectors shall be connected to a fire alarm system where a fire alarm system is required by Section 907.2 of the *International Fire Code*. The actuation of a duct smoke detector shall activate a visible and audible supervisory signal at a constantly attended location.

Exceptions:

1. The supervisory signal at a constantly attended location is not required where the duct smoke detector activates the building's alarm-indicating appliances.
2. In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and audible signal in an *approved* location. Duct smoke detector trouble conditions shall activate a visible or audible signal in an *approved* location and shall be identified as air duct detector.

1024.2 Licensing Requirements for Steam and Hot-Water Boilers and Piping. Steam and hot-water boilers and piping shall be installed and maintained according to applicable regulations of the Texas Department of Licensing and Regulations.

1109.4 Emergency Control. A clearly identified switch of the break-glass type or with an approved tamper-resistant cover shall be provided immediately adjacent to and outside of the principal refrigeration machinery room exit. The switch shall provide off-only control of refrigerant compressors, refrigerant pumps, and normally closed, automatic refrigerant valves located in the machinery room. The switch shall be automatically shutoff where the refrigerant vapor concentration in the machinery room exceeds the vapor detector's upper detection limit or 25 percent of the LFL, whichever is lower.

Exception: In machinery rooms where only nonflammable refrigerants are used, only compressors are required to be stopped by vapor detection or the cut-off switch.

1111.8 Piping shall meet the reference standard for identification in Chapter 17 (*Referenced Standards*).

1403.0 Plans Required.

1403.1 General. Plans, engineering calculations, diagrams, and other data shall be submitted in one or more sets with each application for a permit. The authority having jurisdiction may require plans, and specifications to be prepared and designed by an engineer licensed by the state. Permit fees and plan review fees shall be established under a separate ordinance by the City Council.

Chapter 15. Solar Systems

[B] 1502.0. Guards. Guards shall be provided where appliances, *equipment*, solar systems and appurtenances require service and are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of such appliances, *equipment*, Solar systems and appurtenances and the top of the guard shall be located not less than 42 inches (1067 mm) above the elevated surface adjacent to the guard. The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*. Where parapets or other building structures are utilized in lieu of guards or rails, they shall be not less than 42 inches (1067 mm) in height.

Chapter 18 Specific Appliances, Fireplaces and Solid Fuel-Burning Equipment

1801.0 General.

1801.1 Scope. This chapter shall govern the approval, design, installation, construction, maintenance, alteration and repair of the appliances and equipment specifically identified herein and factory-built fireplaces. The *Uniform Plumbing Code* shall regulate the installation of natural gas in relationship to gas-fired appliances.

1801.2 General. The requirements of this chapter shall apply to the mechanical equipment and appliances regulated by this chapter, in addition to the other requirements of this Code.

1801.3 Hazardous locations. Fireplaces and solid fuel burning appliances shall not be installed in hazardous locations.

1801.4 Fireplace accessories. Listed and labeled fireplace accessories shall be installed in accordance with the conditions of the listing and the manufacturer's instructions. Fireplace accessories shall comply with UL 907.

1802.0 Masonry Fireplaces. Masonry fireplaces shall be constructed in accordance with the *International Building Code*.

1803.0 Factory-Built Fireplaces.

1803.1 General. Factory-built fireplaces shall be listed and labeled and shall be installed in accordance with the conditions of the listing. Factory-built fireplaces shall be tested in accordance with UL 127.

1803.2 Hearth extensions.. Hearth extensions of approved factory- built fireplaces shall be installed in accordance with the listing of the fireplace. The hearth extension shall be readily distinguishable from the surrounding floor area. Listed and labeled hearth extensions shall comply with UL 1618.

1803.3 Unvented gas log heaters. An unvented gas log heater shall not be installed in a factory-built fireplace unless the fireplace system has been specifically tested, listed and labeled for such use in accordance with UL 127.

1804.0 Pellet Fuel-Burning Appliances.

1804.1 General Pellet fuel-burning appliances shall be *listed* and *labeled* in accordance with ASTM E 1509 and shall be installed in accordance with the terms of the listing.

1805.0 Fireplaces Stoves and Room Heaters.

1805.1 General. Fireplace stoves and solid-fuel-type room heaters shall be listed and labeled and shall be installed in accordance with the conditions of the listing. Fireplace stoves shall be tested in accordance with UL 737. Solid-fuel-type room heaters shall be tested in accordance with UL 1482. Fireplace inserts intended for installation in fireplaces shall be listed and labeled in accordance with the requirements of UL 1482 and shall be installed in accordance with the manufacturer's installation instructions.

1805.2 Connection to fireplace. The connection of solid fuel appliances to chimney flues serving fireplaces shall comply with Chapter 8 (*Chimneys and Vents*).

1806.0 Sauna Heaters.

1806.1 Location and protection. Sauna heaters shall be located so as to minimize the possibility of accidental contact by a person in the room.

1806.2 Guards. Sauna heaters shall be protected from accidental contact by an approved guard or barrier of material having a low coefficient of thermal conductivity. The guard shall not substantially affect the transfer of heat from the heater to the room.

1806.3 Installation. .Sauna heaters shall be *listed* and *labeled* in accordance with UL 875 and shall be installed in accordance with their listing and the manufacturer's installation instructions.

1806.4 Access. Panels, grilles and access doors that are required to be removed for normal servicing operations shall not be attached to the building.

1806.5 Heat and time controls. Sauna heaters shall be equipped with a thermostat that will limit room temperature to 194°F (90°C). If the thermostat is not an integral part of the sauna heater, the heat-sensing element shall be located within 6 inches (152 mm) of the ceiling. If the heat-sensing element is a capillary tube and bulb, the assembly shall be attached to the wall or other support, and shall be protected against physical damage.

1806.6 Timers. A timer, if provided to control main burner operation, shall have a maximum operating time of 1 hour. The control for the timer shall be located outside the sauna room.

1806.7 Sauna room. A ventilation opening into the sauna room shall be provided. The opening shall be not less than 4 inches by 8 inches (102 mm by 203 mm) located near the top of the door into the sauna room.

1806.8 Warning notice. The following permanent notice, constructed of approved material, shall be mechanically attached to the sauna room on the outside:

WARNING: DO NOT EXCEED 30 MINUTES IN SAUNA. EXCESSIVE EXPOSURE CAN BE HARMFUL TO HEALTH. ANY PERSON WITH POOR HEALTH SHOULD CONSULT A PHYSICIAN BEFORE USING SAUNA.

The words shall contrast with the background and the wording shall be in letters not less than 0.25-inch (6.4 mm) high.

Exception: This section shall not apply to one-and two-family dwellings.

1807.0 Forced Air Furnaces

1807.1 Forced-air furnaces. Oil-fired furnaces shall be tested in accordance with UL 727. Electric furnaces shall be tested in accordance with UL 1995. Solid fuel furnaces shall be tested in accordance with UL 391. Forced-air furnaces shall be installed in accordance with the listings and the manufacturer's installation instructions.

1807.2 Minimum duct sizes. The minimum unobstructed total area of the outside and return air ducts or openings to a forced-air warm-air furnace shall be not less than 2 square inches per 1,000 Btu/h (4402 mm²/kW) output rating capacity of the furnace and not less than that specified in the furnace manufacturer's installation instructions. The minimum unobstructed total area of supply ducts from a forced-air warm-air furnace shall not be less than 2 square inches for each 1,000 Btu/h (4402 mm²/kW) output rating capacity of the furnace and not less than that specified in the furnace manufacturer's installation instructions.

Exception: The total area of the supply air ducts and outside and return air ducts shall not be required to be larger than the minimum size required by the furnace manufacturer's installation instructions.

1807.3 Heat pumps. The minimum unobstructed total area of the outdoor and return air ducts or openings to a heat pump shall be not less than 6 square inches per 1,000 Btu/h (13,208 mm²/kW) output rating or as indicated by the conditions of listing of the heat pump. Electric heat pumps shall be tested in accordance with UL 1995.

1807.4 Dampers. Volume dampers shall not be placed in the air inlet to a furnace in a manner that will reduce the required air to the furnace.

1807.5 Circulating air ducts for forced-air warm-air furnaces. Circulating air for fuel-burning, forced-air-type, warm-air furnaces shall be conducted into the blower housing from outside the furnace enclosure by continuous airtight ducts.

1808.0 Kerosene and Oil-Fired Stoves.

1808.1 General. Kerosene and oil-fired stoves shall be listed and labeled and shall be installed in accordance with the conditions of the listing and the manufacturer's installation instructions. Kerosene and oil-fired stoves shall comply with NFPA 31. Oil fired stoves shall be tested in accordance with UL 896.

1809.0 Masonry Heaters.

1809.1 General. Masonry heaters shall be constructed in accordance with the *International Building Code*.

PART 2. This ordinance takes effect on September 16, 2013.

PASSED AND APPROVED

<p>_____ June 6, 2013</p>	<p>§ § § _____ Lee Leffingwell Mayor</p>
<p>APPROVED: _____ Karen M. Kennard City Attorney</p>	<p>ATTEST: _____ Jannette S. Goodall City Clerk</p>