ORDINANCE NO. 20051215-107

AN ORDINANCE REPEALING AND REPLACING ARTICLE 5 OF CHAPTER 25-12 OF THE CITY CODE (MECHANICAL CODE) TO ADOPT THE 2003 UNIFORM MECHANICAL CODE AND LOCAL AMENDMENTS.

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

PART 1. Article 5 of Chapter 25-12 (*Uniform Mechanical Code*) is repealed and replaced to read:

ARTICLE 5. UNIFORM MECHANICAL CODE.

§ 25-12-131 MECHANICAL CODE.

(A) The Uniform Mechanical Code, 2003 edition, published by the International Association of Plumbing and Mechanical Officials (2003 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 2003 Mechanical Code are deleted:

Table 1-1	Table 6-6 B
Section 110.0	Section 604.3
Section 112.0	Section 605.0
Section 115.1	Section 606.5
Section 115.2	Section 701.1
Section 115.3	Section 1111.8
Section 310.2	Chapter 13
Section 504.1	Section 1403.0
Table 6-6 A	Section 1404

(C) The city clerk shall file a copy of the 2003 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 2003 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 2003 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 2003 Mechanical Code.

(B) The following provisions of the local amendments are adopted from the Uniform Building Code, 1997 edition, published by the International Conference of Building Officials, with modifications: Sections 407.0 (*General Ventilation Requirements*), 408.0 (*Ventilation of Repair Garages, Enclosed Garages, and Aircraft Hangars*), and 409.0 (*Projection Room Ventilation*) and Table A-12 (*Outdoor Air Requirements for Ventilation Interior Environment Ventilation Rates*)

(C) The following provisions of the local amendments are adopted from the International Mechanical Code, 2003 edition, published by the International Code Council, Inc., with modifications: Sections 410.0 (*Projection Room Ventilation*), 411.0 (*Projection Booth*), and 504.1 (*Makeup-and Exhaust-Air Ducts*), 506.5.1.1, 518.0 and Chapter 18.

101.0 Title.

These regulations shall be known as the *Uniform Mechanical Code*, may be cited as such, and will be referred to herein as this code."

110.0 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 *(General Requirements and Procedures)*. The Mechanical, Solar, and Plumbing Board is established in Chapter 2-1, Article 35 *(Mechanical, Plumbing, and Solar Board)*.

112.0 Permits.

112.1 Permit Required. Except as provided in Sections 112.4 *(Exempt Work)*, 112.5 *(Homestead Permit)*, 119.0 *(Booklet Program)*, and 120.0 *(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.

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

112.3 Offense. A person who violates Section 112.1 *(Permit 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 112.1 *(Permit Required)* is a separate occurrence. Proof of a culpable mental state is not required for conviction of an offense under this section.

112.4 Exempt Work.

112.4.1 A mechanical permit is not required for the following:

(a) a portable heating appliance, portable cooling unit, portable evaporative cooler, or portable ventilating equipment;

(b) a closed system of steam or hot or chilled water piping within heating or cooling equipment regulated by the Mechanical Code;

(c) replacement of a component part or assembly of an appliance that does not alter the original installation approval and complies with other applicable requirements of the Mechanical Code;

(d) refrigerating equipment that is part of the equipment for which a permit has been issued in accordance with the Mechanical Code.

112.4.2 An exemption from the permit requirements of the Mechanical Code is not authorization for the work to be done in violation of the Mechanical Code or other laws or ordinances of the City.

112.5 Homestead Permit. A person who is not licensed to perform mechanical work may perform mechanical work within a dwelling premise owned by the person if the person has filed an affidavit with the building official stating that the location at which the work is to be done is the affiant's homestead. Before beginning any mechanical work, the unlicensed person shall obtain from the building official a permit to do the

work and shall pay required permit fees. The building official may not issue a homestead permit to a person for a certain location if the person has received a homestead permit for a different location within the preceding 2 months. A person who has obtained a homestead permit may not allow or cause any other person to perform mechanical work under the permit. The building official may suspend or revoke a homestead permit under which mechanical work has been performed by anyone other than the person who obtained the permit.

112.6 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.

113.1.7 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.

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

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

119.0 Booklet Program.

119.1 Permitting. As an alternative to the permitting requirement of Section 112.1 *(Permit Required)*, a licensed air conditioning and refrigeration contractor may secure permits under the booklet program for the replacement of HVAC equipment.

119.2 Requirements.

119.2.1 The following applies to work performed under a booklet program permit.

(a) The valuation of labor and material for modification of duct work may not exceed $300.00.

(b) The HVAC equipment to be replaced may not exceed five tons.

(c) Equipment may only be replaced with equipment of the same rating.

119.2.2 To participate in the program, the contractor must:

(a) register to participate in the program and pay the annual registration fee; and

(b) agree to authorize or to obtain appropriate authorization for the building official to enter a site to inspect work completed under the program.

119.2.3 The following applies to the use of a booklet program permit.

(a) A permit may not be used for work that requires a permit for another trade or from another City department.

(b) A contractor must complete all sections of the permit job ticket and post the ticket on the job site before beginning work.

(c) A contractor must use a permit booklet in the order in which it is issued.

(d) A contractor must return a completed booklet to the Permit Center of the Watershed Protection and Development Review Department before the contractor may be purchase another booklet.

(e) A contractor who violates this section must obtain a standard permit under Section 112.1 *(Permits Required)* at the investigation fee price.

(f) A contractor who violates this section three times within a 12-month period shall be suspended from the program for a period of 12 months from the date a letter is mailed to the contractor notifying him of the suspension. A contractor who is suspended from the program must return all remaining booklet permits in the contractor's possession to the Permit Center of the Watershed Protection and Development Review Department.

(g) A booklet permit not used before the 181st day after purchase shall automatically expire and must be returned to the Permit Center of the Watershed Protection and Development Review Department.

(h) The City shall inspect the work done under at least one permit in each booklet. If the work fails the inspection, the inspection must be rescheduled and a reinspection fee must be paid.

120.0 Registered Industrial Plant Program.

120.1 Program. A licensed air conditioning and refrigeration contractor may perform the following mechanical installations in a Registered Industrial Plant, as defined in Section 1705 *(Registered Industrial Plant)* of the Building Code, without obtaining a permit required by Section 112.1 *(Permit Required)*:

(a) replacement, modification, or relocation of existing ductwork, fan coil units, VAV boxes volume dampers, environmental make-up air systems and related equipment; and

(b) 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.

120.2 Fees. Plan review fees and permit fees are not be required if records are maintained in accordance with Section 1705 *(Registered Industrial Plant)* of the Building Code.

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

121.1 Chief Plumbing/Mechanical Inspector.

1. The chief plumbing/mechanical inspector must:

   (a) be an employee of the City;

   (b) maintain a current plumbing inspector license issued by the State Board of Plumbing, Examiners;

   (c) maintain a current certification as a mechanical and plumbing inspector under the certification program established by the International Code Conference or International Association of Plumbing and Mechanical Officials; 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.

121.2 A commercial mechanical inspector must :

   (a) be an employee of the City;

   (b) maintain a current certification as a mechanical inspector under the certification program established by the International Code Conference or the International Association of Plumbing and Mechanical Officials; and

   (c) have at least five years of inspection experience, one year of which must be in a responsible supervisory capacity.

121.2.1 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 Conference or the International Association of Plumbing and Mechanical Officials not later than one year after the date of employment.

310.2 Condensate Control. If damage may result to a building component from condensate overflow, an additional water-tight pan of corrosion-resistant metal shall be installed beneath the cooling coil or unit top to catch the overflow condensate caused by a clogged primary condensate drain, or one pan with a standing overflow and a separate secondary drain may be provided in lieu of the secondary drain pan. The additional pan shall have a depth of 1 ½ inches (38 mm) and shall not be less than 3 inches (76 mm) larger in width and length. Drain piping shall be a minimum of ¾ inch (19.1 mm) nominal pipe size, discharging at a point that can be readily observed.

Exception: A float switch designed to automatically disconnect electrical power to cooling equipment may be installed instead of a secondary drain. The float switch shall be located in a secondary drain pan.

313.0 Compliance with the Energy Code. Heating, ventilating, and cooling equipment installed after January 14, 1990, in sites served by Austin Electric shall comply with International Energy Conservation Code. Replacement electrical equipment shall comply with the Energy Code.

Exception: An original electric heater installed before March 1, 1985 may be replaced with an electric heater of the same amperage or less.

314.0 Requirements for Flood Plain Areas.

314.1 Definitions

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.

W-1 space means a space 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.

W-2 space means a space that remains 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.

314.2 Heating, air conditioning, and ventilation equipment shall be installed in an area above the RFD. The equipment may be located in a W-1 or W-2 space with direct access from a location above the RFD when approved as a modification by the building official.

314.3 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.

314.4 The heating equipment and fuel storage tanks shall be securely anchored to a foundation pad of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel line supply. As an alternative means of protection, elevation of the heating equipment and fuel storage tanks above the RFD is permitted. A fuel line shall be attached to a furnace by means of flexible swing-type couplings. A heating equipment and fuel storage tank shall be vented to an elevation of at least three feet above the RFD and the air supply for combustion shall be furnished, if required, for a system installed in a W-1 or W-2 space at a height of at least three feet above the RFD.

314.5 Ductwork for a warm air heating system located below the RFD shall be provided with an emergency opening for internal flooding and drainage of ducts. An opening shall have a cover with a gravity operator for closure during normal operation. Ductwork passing through a watertight wall or floor below the RFD shall be provided with a shutoff valve to isolate the piping system in the event of a flood. An electric heating system, when used in a flood hazard area, shall be installed in accordance with the Electrical Code.

314.6 An air conditioning and ventilation system located below the RFD shall be installed in a W-1 or W-2 space. Installation, piping, ductwork connections, and safety features shall be the same as for a heating system.

314.7 A fuel supply line that originates outside a W-1 or W-2 space or passes through an area that floods shall be equipped with an automatic shutoff valve to prevent loss of fuel. The wall opening shall be flood-proofed by using an embedded collar, sleeve, water stop, or other means approved by the building official.

313.0 Once Through Cooling. The use of potable water for once through cooling of commercial equipment including but not limited to refrigerators, coolers, freezers, air conditioning equipment and condensers for dry cleaning equipment shall be prohibited

unless 100% of potable water is returned for non potable uses as cooling tower make up, or other approved uses for any new installation.

407.0 General Ventilation Requirements

407.1 Scope. Buildings and structures enclosing spaces for human occupancy shall be provided with ventilation in accordance with this section.

407.2 General. Enclosed portions of buildings and structures in occupancies, other than the locations specified in Sections 407.3 (*Register Velocity*) through 407.8 (*Group H, Division 5 Occupancies*), shall be provided with natural ventilation by means of openable exterior openings with an area of not less than 1/20 the total floor area of such portions, or shall be provided with a mechanically operated ventilating system. The mechanically operated ventilating system shall be capable of supplying ventilation air in accordance with Table A-12 during such time as the building or space is occupied.

407.3 Register Velocity. In assembly, educational and institutional occupancies when the velocity of the air at the register exceeds 10 feet per second (3.048 m/s), the register shall be placed more than 8 feet (2438 mm) above the floor directly beneath.

407.4 Toilet Rooms. Toilet rooms shall be provided with a fully openable exterior window at least 3 square feet (0.27 m^2) in area; a vertical duct not less than 100 square inches (0.064516 m^2) in area for the first toilet facility, with 50 additional square inches (0.032 m^2) for each additional facility; or a mechanically operated exhaust system capable of exhausting 50 cubic feet of air per minute (23.6 L/s) for each water closet or urinal installed in the toilet room. Such systems shall be connected directly to the outside, and the point of discharge shall be at least 3 feet (914 mm) from any openable window.

407.5 Ventilation in Hazardous Locations. Rooms, areas or spaces in which explosive, corrosive, combustible, flammable or highly toxic dusts, mists, fumes, vapors or gases are or may be emitted due to the processing, use, handling or storage of materials shall be mechanically ventilated as required by the Fire Code and the Mechanical Code.

Emissions generated at work stations shall be confined to the area in which they are generated as specified in the Fire Code and the Mechanical Code. Supply and exhaust openings shall be in accordance with the Mechanical Code. Exhaust air contaminated by highly toxic material shall be treated in accordance with the Mechanical Code.

A manual shutoff control for ventilation equipment shall be provided outside the room adjacent to the principal access door to the room. The switch shall be of the break-glass type and shall be labeled "Ventilation System Emergency Shutoff."

407.6 Groups B, F, M and S Occupancies. In Groups B, F, M and S Occupancies, or portions thereof, where Class I, II or III-A liquids are used, mechanical exhaust shall be provided sufficient to produce six air changes per hour. Such mechanical exhaust shall be taken from a point at or near the floor level.

407.7 Group S, Division 1 Occupancies. In buildings used for the repair or handling of motor vehicles operating under their own power, mechanical ventilation shall be provided capable of exhausting a minimum of 1.5 cfm per square foot (7.62 L/s/m^2) of floor area. Each engine repair stall shall be equipped with an exhaust pipe extension duct, extending to the outside of the building, that, if over 10 feet (3048 mm) in length, shall mechanically exhaust 300 cfm (141.6 L/s). Connecting offices and waiting rooms shall be supplied with conditioned air under positive pressure.

Exception: In repair garages and aircraft hangars, the building official may authorize the omission of such ventilating equipment when, in his or her opinion, the building is supplied with unobstructed openings to the outer air that are well distributed and sufficient in size to provide the necessary ventilation.

407.8 Group H, Division 5 Occupancies. In Group H, Division 5 Occupancies, mechanical exhaust ventilation shall be provided thoughout the fabrication area at a rate of not less that 1 cubic foot per minute per square foot (0.44L/s/m^2) of floor area. The exhaust air duct system of one fabrication area shall not connect to another duct system outside that fabrication area within the building.

Ventilation systems shall comply with the Mechanical Code, except that automatic shutoffs need not be installed on air moving equipment. However, smoke detectors shall be installed in the circulating air stream and shall initiate a signal at the emergency control station.

Except for exhaust systems, at least one manually operated remote control switch that will shut down the fabrication ventilation system shall be installed at an approved location outside the fabrication area.

The ventilation system shall be provided to capture and exhaust fumes and vapors at work stations. Two or more operations shall not be connected to the same exhaust system when either one or the combination of the substances removed could constitute a fire, explosion or hazardous chemical reaction within the exhaust duct system.

Exhaust ducts penetrating occupancy separations shall be contained in a shaft of equivalent fire-resistive construction. Exhaust ducts shall not penetrate area separation walls. Fire dampers shall not be installed in exhaust ducts.

Outdoor Air Requirements for Ventilation - Interior Environment Ventilation Rates Table A-12	
Occupancies	**Outdoor Ventilation Air** (cfm per square foot of area unless noted) x 0.472 for L/s per m2
Group A Occupancies	
Applications Similar to:	
Food and Beverage Service	
Bars, cocktail lounges	3.00
Cafeteria, fast food	2.00
Dining Rooms	1.40
Kitchens (cooking) 3	0.30
Sports and Amusement	
Assembly rooms	1.80
Ballrooms and discos	2.50
Bowling Alleys	1.75
Conference rooms	1.00
Gambling Casinos	3.60
Game Rooms	1.75
Ice arenas	.50
Playing floors (gymnasium)	0.60
Spectator areas	2.25
Swimming pools (pools and deck area)	0.50
Theaters	
Auditoriums	2.25
Lobbies	3.00
Stages, studios	1.05
Ticket booths	1.20
Transportation	
Platforms	1.50
Waiting rooms	1.50
Group B Occupancies	
Applications Similar to:	
Offices	
Bank Vaults	.08
Conference Rooms	1.00
Corridors and utilities	0.05
Darkrooms	0.05
Duplicating and printing areas	0.05
Elevators	1.00 4
Lockers and dressing rooms	0.05
Meat-processing areas	0.15
Office spaces	0.14
Pharmacies	0.30

Photo studios	0.15
Public restrooms (per water closet or urinal)	50 cfm/water closet of urinal 4
Reception areas	0.90
Smoking lounges	4.20 4
Telecommunication centers and data entry spaces	1.20
Group E Occupancies	
Applications Similar to:	
Education	
Auditoriums	2.25
Classrooms	0.75
Corridors	0.00
Laboratories	0.60
Libraries	0.30
Locker rooms	0.50
Music rooms	0.75
Smoking lounges	4.20 4
Training shops	0.60
Group F Occupancies	
Applications Similar to:	
Dry Cleaners, Laundries	
Coin-operated dry cleaners	0.30
Coin-operated laundries	0.30
Commercial dry cleaners	0.90
Commercial laundries	0.25
Storage, pick-up areas	1.05
Group I Occupancies	
Applications Similar to:	
Hospitals, Nursing and Convalescent Homes	
Autopsy rooms	0.50 4
Medical procedure rooms	0.30
Operating rooms	0.60
Patient rooms	0.25
Physical therapy rooms	0.30
Recovery and ICU rooms	0.30
Correctional facilities	
Cells	0.40
Dining halls	1.50
Guard stations	0.60
Public restrooms	50 cfm/water closet of urinal 4
Group M Occupancies	
Applications Similar to:	
Stores, Sales Floors and Showroom Floors	
Basement and street levels	0.30

Dressing rooms	0.20
Malls and arcades	0.30
Shipping and receiving areas	0.15
Smoking lounges	4.20 4
Storage rooms	0.15
Upper levels	0.20
Warehouse	0.05
Specialty Shops	
Barber Shops	0.38
Beauty shops	0.63
Clothiers	0.30
Drug Stores	0.12
Fabric Stores	0.12
Florists	0.12
Food stores	0.12
Furniture stores	0.30
Hardware stores	0.12
Pet shops	1.00
Reducing salons	0.30
Group R Occupancies	
Division 1	
Hotels, motes, resorts, dormitories	
Assembly Rooms	1.80
Bedrooms	30 cfm/room 5
Conference rooms	1.00
Dormitory sleeping rooms	0.30
Living rooms	30 cfm/room 5
Lobbies	0.45
Private bathrooms (intermittent exhaust)	35 cfm/room 5
Division 1 Apartment Houses and Division 3 Dwellings and Lodging	
Individual Dwelling Units, Lodging Houses	
Bathrooms (intermittent exhaust) or (continuous exhaust)	50 cfm/room 4 5 20 cfm/room 4 5
Kitchens (intermittent exhaust) or (continuous exhaust)	100 cfm/room 4 5 25 cfm/room 4 5
Living areas	0.35 ACH 6
Group S Occupancies	
Applications Similar to:	
Division 3	
Enclosed parking garages	1.50

1. Applications may not be unique to a single occupancy group. Where specific use is not listed, judgment as to similarity shall be by the building official.
2. Based on net occupiable space. The minimum amount of outdoor air supplied during occupancy shall be permitted to be based the rate per square foot (m2) of floor area indicated in this table or

cubic feet per minute (L/s) per person in accordance with nationally recognized standards. Controls shall be permitted to adjust outdoor are ventilation rates to provide rates per person under different conditions of occupancy.

3. The sum of the outdoor and transfer are from adjacent spaces shall be sufficient to provide an exhaust rate not less than 1.5 cubic feet per minute (7.08 L/s) per person.
4. Normally supplied by transfer air with local mechanical exhaust with no recirculation.
5. Independent of room size.
6. Air changes per hour, but not less that 15 cubic feet per minute (7.08 L/s) per person Occupancy shall be based on the number of bedrooms: first bedroom, two persons each additional bedroom, on person.

408.0 Ventilation of Repair Garages, Enclosed Garages and Aircraft Hangars.

408.1 Group S Repair and Storage Garages and Aircraft Hangars. In Group S repair garages, storage garages, and aircraft hangars, the mechanical ventilating system required by Table A-12 may be omitted when in the opinion of the building official, the building is supplied with unobstructed openings to the outer air that are sufficient to provide the necessary ventilation.

408.2 Group S Parking Garages. In Group S parking garages, other than open parking garages, used for storing or handling automobiles operating under their own power and on loading platforms in bus terminals, ventilation shall be provided capable of exhausting a minimum of 1.5 cubic feet per minute (cfm) per square foot (0.71 L/s/m^2) of gross floor area. The building official may approve an alternate ventilation system designed to exhaust a minimum of 14,000 cfm (6608 L/s) for each operating vehicle. Such system shall be based on the anticipated instantaneous movement rate of vehicles, but not less than 2.5 percent (or one vehicle) of the garage capacity. Automatic carbon monoxide sensing devices may be employed to modulate the ventilation system to maintain a maximum average concentration of carbon monoxide of 50 parts per million during any eight-hour period, with a maximum concentration not greater than 200 parts per million for a period not exceeding one hour. Connecting offices, waiting rooms, ticket booths and similar uses shall be supplied with conditioned air under positive pressure.

Exceptions:

1. Mechanical ventilation need not be provided within a Group S parking garage when openings for natural ventilation comply with the following:

   a) the exterior side of the structure have uniformly distributed openings on two or more sides;

   b) the area of the openings in exterior walls on a tier are at least 20 percent of the total perimeter wall area of each tier;

c) the aggregate length of the openings considered to be providing natural ventilation are a minimum of 40 percent of the perimeter of the tier; and

d) interior wall lines and column lines are at least 20 percent open with uniformly distributed openings.

2. In Group S repair garages and motor vehicle fuel-dispensing stations without lubrication pits, storage garages, and aircraft hangars such ventilating system may be omitted when, in the building official's opinion, the building is supplied with unobstructed openings to the outer air that are sufficient to provide the necessary ventilation.

409.0 Projection Room Ventilation.

409.1 Projection Booth. Ventilation shall be provided in accordance with the provisions of this section.

409.2 Supply Air. Each projection room shall be provided with adequate air-supply inlets so arranged as to provide well- distributed air throughout the room. Air-inlet ducts shall provide an amount of air equivalent to the amount of air being exhausted by projection equipment. Air may be taken from the outside, from adjacent spaces within the building, provided the volume and in- filtration rate is sufficient, or from the building air-conditioning system, provided it is so arranged as to provide sufficient air when other systems are not in operation.

409.3 Exhaust Air. Projection booths may be exhausted through the lamp exhaust system. The lamp exhaust system shall be positively interconnected with the lamp so that the lamp will not operate unless there is the airflow required for the lamp. Exhaust air ducts shall terminate at the exterior of the building in such a location that the exhaust air cannot be readily recirculated into any air-supply system. The projection room ventilation system may also serve appurtenant rooms such as the generator room and the rewind room.

Each projection machine shall be provided with an exhaust duct that will draw air from each lamp and exhaust it directly to the outside of the building. The lamp exhaust may serve to exhaust air from the projection room to provide room air circulation. Such ducts shall be of rigid materials, except for a flexible connector approved for the purpose. The projection lamp or projection room exhaust system or both may be combined, but shall not be interconnected with any other exhaust or return system, or both, within the building.

410.0 Projection Equipment Ventilation.

410.1 General. Each projection machine shall be provided with an exhaust duct that will draw air from each lamp and exhaust it directly to the outside of the building in such a fashion that it will not be picked up by supply inlets. Such a duct shall be of rigid materials, except for a continuous flexible connector approved for the purpose. The lamp exhaust system shall not be interconnected with any other system.

410.2 Electric Arc Projection Equipment. The exhaust capacity shall be 200 cubic feet per minute for each lamp connected to the lamp exhaust system, or as recommended by the equipment manufacturer. Auxiliary air may be introduced into the system through a screened opening to stabilize the arc.

410.3 Xenon Projection Equipment. The lamp exhaust system shall exhaust not less than 300 cubic feet per minute per lamp or not less than that exhaust volume required or recommended by the equipment manufacturer, whichever is the greater. The external temperature of the lamp housing shall not exceed 130°F (54.4°C) when operating.

411.0 Projection Booth.

411.1 Supply air. Each projection room shall be provided with adequate air-supply inlets so arranged as to provide well-distributed air throughout the room. Air-inlet ducts shall provide an amount of air equivalent to the amount of air being exhausted by projection equipment. Air may be taken from the outside; from adjacent spaces within the building, provided the volume and infiltration rate is sufficient; or from the building air-conditioning system, provided it is so arranged as to provide sufficient air when other systems are not in operation.

411.2 Exhaust air. Projection booths may be exhausted through the lamp exhaust system. The lamp exhaust system shall be positively interconnected with the lamp so that the lamp will not operate unless there is the airflow required for the lamp. Exhaust air ducts shall terminate at the exterior of the building in such a location that the exhaust air cannot be readily recalculated into any air-supply system. The projection room ventilation system may also serve appurtenant rooms such as the generator room and the rewind room.

Each projection machine shall be provided with an exhaust duct that will draw air from each lamp and exhaust it directly to the outside of the building. The lamp exhaust may serve to exhaust air from the projection room to provide room air circulation. Such ducts shall be of rigid materials, except for a flexible connector approved for the purpose. The projection lamp or projection room exhaust system or both may be combined but shall

not be interconnected with any other exhaust or return system, or both, within the building.

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. Exhaust ducts shall terminate outside the building and shall be equipped with back-draft dampers. 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.

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.

506.5.1.1 A duct shall be supported as required by Chapter 6 (*Duct Systems*).

518.0 Storage and Handling of Flammable and Combustible Liquids.

518.1 Hazardous materials.

518.1.1 General requirements. Exhaust ventilation systems for structures containing hazardous materials shall comply with Sections 518.1.2 (*Storage in excess of the maximum allowable quantities*) through 518.1.7 (*Closed systems*).

518.1.2 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.

Exception: Storage areas for flammable solids complying with the Fire Code.

518.1.3 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/ft^2 [0.00508 m^3/(s·m^2)] 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 of the break-glass type and shall be labeled: VENTILATION SYSTEM EMERGENCY SHUTOFF.

5. The exhaust ventilation system 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 (304 mm) of the floor.

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 ventilation shall not be recirculated within the room or building if the materials stored are capable of emitting hazardous vapors.

518.1.4 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 518.2.7.1 (Gas cabinets), 518.2.7.2 (*Exhausted enclosures*) and 518.2.8.4 (*Gas rooms*).

518.1.5 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 518.1.8 (*Ventilation during construction*).

518.1.6 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 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 fumes, mists or vapors.

518.1.7 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 518.1.6 (*Indoor dispensing and use -- points sources*).

518.1.8 Ventilation during construction. Ventilation shall be provided for operations involving the application of materials containing flammable solvents in the course of construction, alteration or demolition of a structure.

518.2 Hazardous materials -- requirements for specific hazardous materials. Exhaust ventilation systems for specific hazardous materials shall be provided as required in Section 518.1.1 (*General Requirements*) and Sections 518.2.1 (*Compressed gases medical gas systems*) through 518.2.8 (*Highly toxic and toxic compressed gases – quantities exceeding the maximum allowable per control area*).

518.2.1 Compressed gases medical gas systems. Rooms for the storage of compressed medical gases in amounts exceeding the maximum allowable exempt quantity per control area, and which 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/ft^2 [0.00508 m^3/(s·m^2)] of the area of the room. Gas cabinets for the storage of compressed medical gases in amounts exceeding the maximum allowable quantity per control area 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 (0.76m/s) at any point at the access port or window.

Exception: All ventilation requirements of the latest edition of the NFPA 99C "Medical Gas and Vacuum Systems" and the Fire Code shall be adhered to.

518.2.2 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 518.1.6 (*Indoor dispensing and use -- point sources*) shall be provided.

518.2.3 Cryogenics. Storage areas for stationary or portable containers of cryogenic fluids in any quantity shall be ventilated in accordance with Section 518.1.1 (*Hazardous materials*). Indoor areas where cryogenic fluids in any quantity are dispensed shall be ventilated in accordance with the requirements of Section 518.1.6 (*Indoor dispensing and use -- point sources*) in a manner that captures any vapor at the point of generation.

Exception: All ventilation requirements of the latest edition of the NFPA 99C "Medical Gas and Vacuum Systems" shall be adhered to.

518.2.4 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.

518.2.5 Flammable and combustible liquids. Exhaust ventilation systems shall be provided as required by Sections 518.2.5.1 (Vaults) through 518.2.5.5 (*Bulk plants of terminals*) 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 Fire Code.

518.2.5.1 Vaults. Vaults that contain tanks of Class I liquids shall be provided with continuous ventilation at a rate of not less than 1 cfm/ft^2 of floor area [0.00508 m^3/(s·m^2)], but not less than 150 cfm (4m^3/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.

518.2.5.2 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 518.1.2 (*Storage in excess if the maximum allowable quantities*).

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

518.2.5.4 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/ft^2 [0.00508m^3/(s·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.

518.2.5.5 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 this section.

518.2.5.5.1 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.

518.2.5.5.2 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.

518.2.5.5.3 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.

518.2.6 Highly toxic and toxic liquids. Ventilation exhaust shall be provided for highly toxic and toxic liquids as required by this section.

518.2.6.1 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.

518.2.6.2 Open and closed systems. Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in open systems in accordance with Section 518.1.6 (*Indoor dispensing and use -- point sources*). Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in closed systems in accordance with Section 518.1.6 (*Closed systems*).

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

518.2.7 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 this section.

518.2.7.1 Gas cabinets. Gas cabinets containing highly toxic or toxic compressed gases in any quantity shall comply with Section 518.1.4 (*Gas rooms exhausted enclosures and gas cabinets*) 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.

518.2.7.2 Exhausted enclosures. Exhausted enclosures containing highly toxic or toxic compressed gases in any quantity shall comply with Section 518.1.4 (*Gas rooms exhausted enclosures and gas cabinets*) 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.

518.2.8 Highly toxic and toxic compressed gases -- quantities exceeding the maximum allowable 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 this section.

518.2.8.1 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.

518.2.8.2 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 Fire Code.

518.2.8.3 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 Fire Code.

518.2.8.4 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.

518.2.8.5 Treatment system. The exhaust ventilation from gas cabinets, exhausted enclosures and gas rooms, and local exhaust systems required in Sections 518.2.8.2 (*Local exhaust for portable tanks*) and 518.2.8.3 (*Piping and controls – stationary tanks*) shall be directed to a treatment system where required by the Fire Code.

518.2.8.6 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 Fire Code.

519 Hazardous Exhaust Ducts. Fire dampers shall comply with Section 606.0 of this Code.

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

604.3 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.

604.5 Attachment of Ducts.

604.5.1 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.

604.5.2 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.

605.0 Installation of Ducts. 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 meet the requirements of the referenced standard for air ducts in Chapter 17, Part II. 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 adequate treatment to withstand the operating velocity.

Insulation applied to the surface of ducts, including duct coverings and linings, located in buildings shall have, when tested as a composite installation in the form in which they are used, a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, when tested in accordance with NFPA 255-2000, Standard Method of Test of Surface Burning Characteristics of Building Materials, or in accordance with ASTM E 84-2000a, Standard Test Method for Surface Burning Characteristics of Building Materials, or in accordance with the provisions of UL 723-96, Standard for Test of Surface Burning Characteristics of Building Materials. Where these products are to be applied with adhesives, they shall be tested with such adhesives applied.

Air duct coverings and linings shall not flame, glow, smolder, or smoke when tested in accordance with ASTM C 411-97, Standard Test Method for Hot- Surface Performance of High-Temperature Thermal Insulation, at the temperature to which they are exposed in service. In no case shall the test temperature be below 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.

606.5 Access and Identification. A damper 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 may not impair fire-resistive construction. Access may not require the use of a tools, key, or special knowledge. An access point shall be permanently identified on the exterior by a label with letters not less than a half inch (12.7 mm) in height that reads "SMOKE DAMPER" or 'FIRE DAMPER". An access door in a duct shall be tight fitting and suitable for the required duct construction. A removable access panel approved by the building official may be installed instead of the access door when the fire damper is located within 24 inches of the access opening.

701.1 General.

(A) Air for combustion, ventilation, and dilution of flue gases for gas utilization equipment installed in buildings shall be obtained by application of one of the methods covered in Section 701.2.1 (*Standard Method*) through 701.7 (*Mechanical Combustion-Air Supply*). Gas utilization equipment of other than natural draft and Category I vented appliances shall be provided with combustion, ventilation, and dilution air in accordance with the equipment manufacturer's instructions. Where infiltration does not provide the necessary air, outdoor air shall be introduced in accordance with methods covered in Sections 701.4.2 (*One Permanent Opening method*), 701.5.3 (*Outdoor Opening(s) Size*), 701.6 (*Engineered Installations*), and 701.8.3.

Exceptions:

1) This provision shall not apply to direct-vent appliances.

2) Type 1 clothes dryers that are provided with makeup air in accordance with Section 504.3.2 (Domestic Clothes Dryers).

3) Outside air may not be obtained by a means that violates the Energy Code.

(B) Gas appliances of other than natural draft design and other than Category I vented appliances shall be provided with combustion, ventilation, and dilution air in accordance with the appliance manufacturer's instructions.

(C) Where used, a draft hood or a barometric draft regulator shall be installed in the same room or enclosure as the equipment served so as to prevent any difference in pressure between the hood or regulator and the combustion-air supply.

(D) Makeup air requirements for the operation of exhaust fans, kitchen ventilation systems, clothes dryers, and fireplaces shall be considered in determining the adequacy of a space to provide combustion-air requirements.

908.4 Attic Furnaces.

908.4.1 An upright furnace may be installed in an attic or furred space more than 5 feet (1524 mm) in height if the required listing and furnace and duct clearances are observed. The clearance of a warm-air attic furnace from combustibles shall comply with Section 304.1 *(Listed Appliances)* of the Mechanical Code.

908.4.2 An attic or furred space in which a warm-air furnace is installed shall be accessible by an opening and passageway as large as the largest piece of the furnace and in no case less than 30 inches by 30 inches (762 mm x 762 mm) continuous from the opening to the furnace and its controls.

Exception: The access opening into the space may be 22 inches by 30 inches (559 mm x 762 mm) provided the largest piece of equipment can be removed through the opening. A disappearing stairway that is located under this section and that is large enough to permit removal of the largest piece of equipment for which the stair provides access shall be in compliance with this section. A permanent electric outlet and lighting fixture shall be provided within five feet of the appliance and shall be controlled by a switch located at the required passageway opening.

908.4.3 The distance from the passageway access to furnace may not exceed 20 feet (6096 mm) measured along the centerline of the passageway. The passageway shall be unobstructed and shall have continuous solid flooring not less than 24 inches (610 mm) wide from the entrance opening to the furnace.

908.4.4 A level-working platform not less than 30 inches (762 mm) in depth and width shall be provided in front of the entire firebox side of the warm-air furnace. If the furnace temperature-limit control, air filter, fuel-control valve, vent collar or air-handling unit is not serviceable from the firebox side of the furnace, a continuous floor not less than 24 inches (610 mm) in width shall be provided from the platform in front of the firebox side of the furnace to and in front of the equipment.

Exception: A working platform is not required when the furnace can be serviced from the required access opening.

908.4.5 A permanent electric outlet and lighting fixture controlled by a switch located at the required passageway opening shall be provided at or near the furnace.

1026.0.1 Steam and hot-water boilers and piping shall be installed and maintained according to applicable regulations of the Texas Department of Licensing and Regulations.

1111.8 Piping shall meet the reference standard for identification in Chapter 17, Part II (*Referenced Standards*). The type of refrigerant, function, and pressure shall be indicated.

Exception: Individual split systems being used for human-comfort refrigerant piping need not be identified.

A steam and hot-water boiler and piping shall be installed and maintained according to applicable regulations promulgated by the Texas Department of Licensing and Regulations.

1404.0 Plans Required. 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, computations, and specifications to be prepared and designed by an engineer licensed by the state to practice as such. Permit fees and plan review fees shall be established under a separate ordinance by the City Council.

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

1801 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 fireplace accessories shall be installed in accordance with the conditions of the listing and the manufacturer's installation instructions.

1802 Masonry Fireplaces

1802.1 General. Masonry fireplaces shall be constructed in accordance with the Building Code.

1803 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 and fireplace stoves shall be installed in accordance with the listing of the fireplace. The hearth extension shall be readily distinguishable from the surrounding floor area.

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 Pellet Fuel-Burning Appliances

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

1805 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 Factory-Built Barbecue Appliances

1806.1 General. Factory-built barbecue appliances shall be of an approved type and shall be installed in accordance with the manufacturer's installation instructions and this chapter.

1807 Incinerators and Crematories

1807.1 General. Incinerators and crematories shall be listed and labeled in accordance with UL 791 and shall be installed in accordance with the manufacturer's installation instructions.

1808 Cooling Towers, Evaporative Condensers and Fluid Coolers

1808.1 General. A cooling tower used in conjunction with an air-conditioning appliance shall be installed in accordance with the manufacturer's installation instructions.

1808.2 Access. Cooling towers, evaporative condensers and fluid coolers shall be provided with ready access.

1808.3 Location. Cooling towers, evaporative condensers and fluid coolers shall be located to prevent the discharge vapor plumes from entering occupied spaces. Plume discharges shall be not less than 5 feet (1524 mm) above or 20 feet (6096 mm) away from any ventilation inlet to a building. Location on the property shall be as required for buildings in accordance with the Building Code.

1808.4 Support and anchorage. Supports for cooling towers, evaporative condensers and fluid coolers shall be designed in accordance with the Building Code. Seismic restraints shall be as required by the Building Code.

1808.5 Water supply. Water supplies and protection shall be as required by the Plumbing Code.

1808.6 Drainage. Drains, overflows and blow-down provisions shall be indirectly connected to an approved disposal location Discharge of chemical waste shall be approved by the appropriate regulatory authority.

1808.7 Refrigerants and hazardous fluids. Heat exchange equipment that contains a refrigerant and that is part of a closed refrigeration system shall comply with Chapter 11 (*Refrigeration*) Heat exchange equipment containing heat transfer fluids, which are flammable, combustible or hazardous, shall comply with the Fire Code.

1809 Vented Wall Furnaces

1809.1 General. Vented wall furnaces shall be installed in accordance with their listing and the manufacturer's installation instructions. Oil-fired furnaces shall be tested in accordance with UL 730.

1809.2 Location. Vented wall furnaces shall be located so as not to cause a fire hazard to walls, floors, combustible furnishings or doors. Vented wall furnaces installed between bathrooms and adjoining rooms shall not circulate air from bathrooms to other parts of the building.

1809.3 Door swing. Vented wall furnaces shall be located so that a door cannot swing within 12 inches (305mm) of an air inlet or air outlet of such furnace measured at right angles to the opening. Doorstops or door closers shall not be installed to obtain this clearance.

1809.4 Ducts prohibited. Ducts shall not be attached to wall furnaces. Casing extension boots shall not be installed unless listed as part of the appliance.

1809.5 Manual shutoff valve. A manual shutoff valve shall be installed ahead of all controls.

1809.6 Access. Vented wall furnaces shall be provided with access for cleaning of heating surfaces, removal of burners, replacement of sections, motors, controls, filters and other working parts, and for adjustments and lubrication of parts requiring such attention. Panels, grilles and access doors that must be removed for normal servicing operations shall not be attached to the building construction.

1810 Floor Furnaces

1810.1 General. Floor furnaces shall be installed in accordance with their listing and the manufacturer's installation instructions. Oil-fired furnaces shall be tested in accordance with UL729.

1810.2 Placement. Floor furnaces shall not be installed in the floor of any aisle or passageway of any auditorium, public hall, place of assembly, or in any egress element from any such room or space. With the exception of wall register models, a floor furnace shall not be placed closer than 6 inches (152 mm) to the nearest wall, and wall register models shall not be placed closer than 6 inches (152 mm) to a corner. The furnace shall be placed such that a drapery or similar combustible object will not be nearer than 12 inches (305 mm) to any portion of the register of the furnace. Floor furnaces shall not be installed in concrete floor construction built on grade. The controlling thermostat for a floor furnace shall be located within the same room or space as the floor furnace or shall be located in an adjacent room or space that is permanently open to the room or space containing the floor furnace.

1810.3 Bracing. The floor around the furnace shall be braced and headed with a support framework design in accordance with the Building Code.

1810.4 Clearance. The lowest portion of the floor furnace shall have not less than a 6-inch (152 mm) clearance from the grade level; except where the lower 6-inch (152 mm) portion of the floor furnace is sealed by the manufacturer to prevent entrance of water, the minimum clearance shall be reduced to not less than 2 inches (51 mm). Where these clearances are not present, the ground below and to the sides shall be excavated to form a pit under the furnace so that the required clearance is provided beneath the lowest portion of the furnace. A 12-inch (305 mm) minimum clearance shall be provided on all sides except the control side, which shall have an 18-inch (457 mm) minimum clearance.

1811 Duct Furnaces

1811.1 General. Duct furnaces shall be installed in accordance with the manufacturer's installation instructions. Electric furnaces shall be tested in accordance with UL 1995.

1812 Infrared Radiant Heaters

1812.1 Support. Infrared radiant heaters shall be safely and adequately fixed in an approved position independent of fuel and electric supply lines. Hangers and brackets shall be noncombustible material.

1812.2 Clearances. Heaters shall be installed with clearances from combustible material in accordance with the manufacturer's installation instructions.

1813 Clothes Dryers

1813.1 General. Clothes dryers shall be installed in accordance with the manufacturer's installation instructions. Electric residential clothes dryers shall be tested in accordance with an approved test standard. Electric commercial clothes dryers shall be tested in accordance with UL 1240. Electric coin-operated clothes dryers shall be tested in accordance with UL 2158.

1813.2 Exhaust required. Clothes dryers shall be exhausted in accordance with Chapter 5 (*Exhaust Systems*).

1813.3 Clearances. Clothes dryers shall be installed with clearance to combustibles in accordance with the manufacturer's instructions.

1814 Sauna Heaters

1814.1 Location and protection. Sauna heaters shall be located so as to minimize the possibility of accidental contact by a person in the room.

1814.1.1 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.

1814.2 Installation. Sauna heaters shall be listed and labeled and shall be installed in accordance with their listing and the manufacturer's installation instructions.

1814.3 Access. Panels, grilles and access doors that is required to be removed for normal servicing operations shall not be attached to the building.

1814.4 Heat and time controls. Sauna heaters shall be equipped with a thermostat that will limit room temperature to 194EF (90EC). 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.

1814.4.1 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.

1814.5 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.

1814.5.1 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.

1815 Engine and Gas Turbine-Powered Equipment and Appliances

1815.1 General. The installation of liquid-fueled stationary internal combustion engines and gas turbines, including fuel storage and piping, shall meet the requirements of NFPA 37.

1815.2 Powered equipment and appliances. Permanently installed equipment and appliances powered by internal combustion engines and turbines shall be installed in accordance with the manufacturer's installation instructions and NFPA 37.

1816 Pool and Spa Heaters

1816.1 General. Pool and spa heaters shall be installed in accordance with the manufacturer's installation instructions. Oil-fired pool and spa heaters shall be tested in accordance with UL726. Electric pool and spa heaters shall be tested in accordance with UL 1261.

1817 Cooking Appliances

1817.1 Cooking appliances. Cooking appliances that are designed for permanent installation, including ranges, ovens, stoves, broilers, grills, fryers, griddles and barbecues, shall be listed, labeled and installed in accordance with the manufacturer's installation instructions. Oil-burning stoves shall be tested in accordance with UL 896. Solid fuel-fired ovens shall be tested in accordance with UL 2162.

1817.2 Prohibited location. Cooking appliances designed, tested, listed and labeled for use in commercial occupancies shall not be installed within dwelling units or within any area where domestic cooking operations occur.

1817.3 Domestic appliances. Cooking appliances installed within dwelling units and within areas where domestic cooking operations occur shall be listed and labeled as household-type appliances for domestic use

1818 Forced Air Furnaces

1818.1 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.

1818.2 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 mm^2/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 mm^2/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.

1818.3 Heat pumps. The minimum unobstructed total area of the outside 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 mm^2/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.

1818.4 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.

1818.5 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.

1818.6 Prohibited sources. Outside or return air for a forced-air heating system shall not be taken from the following locations:

1. Closer than 10 feet (3048 mm) from an appliance vent outlet, a vent opening from a plumbing drainage system or the discharge outlet of an exhaust fan, unless the outlet is 3 feet (914 mm) above the outside air inlet.

2. Where there is the presence of objectionable odors, fumes or flammable vapors; or where located less than 10 feet (3048 mm) above the surface of any abutting public way or driveway; or where located at grade level by a sidewalk, street, alley or driveway.

3. A hazardous or in sanitary location or a refrigeration machinery room as defined in this Code.

4. A room or space, the volume of which is less than 25 percent of the entire volume served by such system. Where connected by a permanent opening having an area sized in accordance with Sections 1818.2 (*Minimum ducts sizes*) and 1818.3 (*Heat pumps*), adjoining rooms or spaces shall be considered as a single room or space for the purpose of determining the volume of such rooms or spaces.

5. A closet, bathroom, toilet room, kitchen, garage, mechanical room, boiler room or furnace room.

6. A room or space containing a fuel-burning appliance where such room or space serves as the sole source of return air.

Exceptions:

1. The minimum volume requirement shall not apply where the amount of return air taken from a room or space is less than or equal to the amount of supply air delivered to such room or space.

2. This shall not apply where the fuel-burning appliance is a direct-vent appliance.

3. This shall not apply where the room or space complies with the following requirements:

   a. the return air shall be taken from a room or space having a volume exceeding 1 cubic foot for each 10 Btu/h (9.6 L/W) of combined input rating of all fuel-burning appliances therein;

   b. the volume of supply air discharged back into the same space shall be approximately equal to the volume of return air taken from the space; and

   c. return-air inlets shall not be located within 10 feet (3048 mm) of any appliance firebox or draft hood in the same room or space.

4. This shall not apply to rooms or spaces containing solid fuel-burning appliances, provided that return-air inlets are located not less than 10 feet (3048 mm) from the firebox of such appliances.

1818.7 Outside opening protection. Outdoor air intake openings shall be protected with corrosive-resistant screens, louvers or grilles.

1818.8 Return-air limitation. Return air from one dwelling unit shall not be discharged into another dwelling unit.

1819 Conversion Burners

1819.1 Conversion burners. The installation of conversion burners shall conform to ANSI Z21.8.

1820 Unit Heaters

1820.1 General. Unit heaters shall be installed in accordance with the listing and the manufacturer's installation instructions. Oil-fired unit heaters shall be tested in accordance with UL 731.

1820.2 Support. Suspended-type unit heaters shall be supported by elements that are designed and constructed to accommodate the weight and dynamic loads. Hangers and brackets shall be of noncombustible material. Suspended-type oil-fired unit heaters shall be installed in accordance with NFPA 31.

1820.3 Ductwork. A unit heater shall not be attached to a warm-air duct system unless listed for such installation.

1820 Venter Room Heaters

1821.1 General. Vented room heaters shall be listed and labeled and shall be installed in accordance with the conditions of the listing and the manufacturer's instructions.

1822 Kerosene and Oil-Fired Stoves

1822.1 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.

1823 Small Ceramic Kilns

1823.1 General. The provisions of this section shall apply to kilns that are used for ceramics, have a maximum interior volume of 20 cubic feet (0.566 m^3) and are used for hobby and noncommercial purposes.

1823.1.1 Installation. Kilns shall be installed in accordance with the manufacturer's installation instructions and the provisions of this Code.

1824 Stationary Fuel Cell Power Plants

1824.1 General. Stationary fuel cell power plants having a power output not exceeding 1,000 kw, shall be tested in accordance with ANSI Z21.83 and shall be installed in accordance with the manufacturer's installation instructions and NFPA 853.

Masonry Heaters

1825.1 General. Masonry heaters shall be constructed in accordance with the Building Code.

PART 2. This ordinance takes effect on December 31, 2005, at 11:59 p.m.

PASSED AND APPROVED

December 15, 2005

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§
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Will Wynn
Mayor

APPROVED:

David Allan Smith
City Attorney

ATTEST:

Shirley A. Gentry
City Clerk