ORDINANCE NO. 20170608-056

AN ORDINANCE REPEALING ARTICLE 8 OF THE CITY CODE; AMENDING CHAPTER 2-1 RELATING TO THE MECHANICAL, PLUMBING, AND SOLAR BOARD AND ELECTRIC BOARD; REPEALING AND REPLACING ARTICLE 5 OF CITY CODE CHAPTER 25-12 TO ADOPT THE 2015 UNIFORM MECHANICAL CODE AND LOCAL AMENDMENTS; AND CREATING OFFENSES.

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

PART 1. City Code Chapter 25-12 is amended to repeal Article 8 (*Solar Energy Code*).

PART 2. City Code Section 2-1-161 (*Mechanical, Plumbing, and Solar Board*) is repealed and replaced with a new Section 2-1-161 to read as follows:

§ 2-1-161 MECHANICAL AND PLUMBING BOARD.

(A) The Mechanical and Plumbing Board should include members who are qualified by experience and training to consider matters pertaining to the installation and design of mechanical and plumbing systems, including the following individuals:

(1) a licensed air conditioning contractor;

(2) a licensed master plumber;

(3) a representative of a natural gas utility;

(4) a professional engineer; or

(5) a citizen of the City.

(B) A City employee may not be a member of the board.

(C) The board shall hear and decide appeals of orders, decisions, or determinations made by the building official relating to the application and interpretation of Chapter 25-12, Article 5 (*Mechanical Code*) and Article 6 (*Plumbing Code*).

(D) The board may not waive a requirement of the Mechanical Code or the Plumbing Code.

(E) The board shall render all decisions and findings in writing to the appellant.

(F) The building official shall retain a copy of each written decision and findings.

(G) An interested party aggrieved by the board's decision may appeal the decision to the city council consistent with the appeal procedures set forth in Chapter 25-1 (*General Requirements and Procedures*).

(H) In addition to the information required to file an appeal under Chapter 25-1 (*General Requirements and Procedures*), a notice of appeal filed under this subsection must include a statement containing facts which show that the decision that forms the basis of the appeal was incorrect because it was inconsistent with a City ordinance or state law or because a finding of fact by the board was clearly contrary to the evidence before the board.

(I) The board shall conduct public hearings and take public comment before recommending city council adopt a model code.

PART 3. City Code Section 2-1-142 (*Electric Board*) is amended to amend Subsection (B) to read as follows:

(B) The board shall hear and decide appeals of orders, decisions, or determinations made by the building official relating to the application and interpretation of Chapter 25-12, Article 4 (*Electrical Code*), including solar installations [~~the Electrical Code~~]. The board may not waive the requirements of the Electrical Code.

PART 4. 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 UNIFORM MECHANICAL CODE.

(A) The Uniform Mechanical Code, 2015 Edition ("2015 Uniform Mechanical Code"), published by the International Association of Plumbing and Mechanical Officials, and all appendices are adopted and incorporated by reference into this section with the deletions in Subsection (B) and amendments in Section 25-12-133 (*Local Amendments to the Uniform Mechanical Code*).

(B) The following provisions of the 2015 Uniform Mechanical Code are deleted. All subsections contained within a deleted section are also deleted, even if not specifically listed below.

Section 104.1	Section 104.2	Section 104.3
Section 104.4.3	Section 104.4.4	Section 104.5

Table 104.5	Section 107.0	Section 301.4
Section 303.8.4	Section 303.8.5	Section 304.3.1.1
Section 310.3	Section 401.1	Section 402.4
Table 403.7	Section 504.4.2.1	Section 504.6
Section 605	Section 1126.0	Chapter 13
Section 1403.0		

(C) The city clerk shall retain a copy of the 2015 Uniform Mechanical Code with the official ordinances of the City of Austin.

§ 25-12-132 CITATIONS TO THE 2015 UNIFORM MECHANICAL CODE.

In the City Code, "Mechanical Code" means the 2015 Uniform Mechanical Code adopted by Section 25-12-131 (*Mechanical Code*), as amended by Section 25-12-133 (*Local Amendments to the Uniform Mechanical Code*).

§ 25-12-133 LOCAL AMENDMENTS TO THE 2015 UNIFORM MECHANICAL CODE.

The following provisions are local amendments to the 2015 Uniform Mechanical Code. Each provision of this section is a substitute for any identically numbered provision of the 2015 Uniform Mechanical Code deleted by Section 25-12-131(B) (*Uniform Mechanical Code*) or is an addition to the 2015 Uniform Mechanical Code.

Sections 504.8.4, 510, and 607 of the International Mechanical Code, 2015 Edition, published by the International Code Council, Inc., as modified by the Mechanical Code.

104.1 Permit Required. Except as provided in Sections 104.2 (*Exempt Work*) and 108.0 (*Registered Industrial Plan Program*), a person must obtain a mechanical permit before the person installs, alters, repairs, replaces, or remodels; or causes another to install, alter, repair, replace, or remodel a mechanical system regulated by the Mechanical Code. A separate mechanical permit is required for each separate building or structure.

104.1.1 Special Inspections Program for Timed Inspections. The building official may establish, by rule, an inspection program for commercial mechanical components identified in this section for buildings not covered under the Residential Code or a Special Inspections Program authorized in other technical or building codes. The buildings must be located within the zoning jurisdiction of the City, outside of the zoning jurisdiction under agreement with a municipal utility district, or where the City provides electrical service. The program applies to replacing roof top equipment; refrigeration equipment; and heating, ventilation and air conditioning (HVAC) equipment.

104.2 Exempt Work. A mechanical permit is not required for the work described in this provision. Work exempt from a permit must still comply with the Mechanical Code, all other applicable laws, and City Code requirements.

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

2. Replacing a component part or assembling an appliance that does not alter the original approval and complies with other applicable requirements of the Mechanical Code.

3. Refrigerating equipment that is part of equipment subject to a permit issued under the Mechanical Code.

104.3 Offense. A person commits an offense if the person fails to comply with Section 104.1 (*Permits Required*).

104.6 Registration of Air Conditioning and Refrigeration Contractors. An air conditioning and refrigeration contractor must register with the City before performing work regulated by the Mechanical Code. A contractor must provide his or her name and State of Texas license number. A contractor must pay a registration fee, established by separate ordinance, for an initial registration, registration after a license suspension, and registration after the license expires. A new registration fee is not required to renew a license that is not suspended or expired.

104.7 Permit Fees and Plan Review Fees. Permit and plan review fees are set by separate ordinance.

104.8 Payment of Plan Review Fees. An applicant must pay plan review fees at the time plans and specifications are submitted to the building official for review.

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

104.10 Continuance of Work Inspection. When structural or other conditions exist that do not allow for inspection at intervals less than 180 days, the permit holder may schedule a continuance of work inspection. If the inspector determines that work has been performed, the permit's expiration date is extended 180 days. If the inspector determines that work has not begun or was not continued, the permit expires and the permit holder must submit a new application for a permit or request a new plan review.

104.11 Persons authorized to obtain permits. Except as otherwise provided in Section 104.5 (*Homestead Permit*), only an air conditioning and refrigeration contractor licensed by the State of Texas to perform mechanical work and registered with the City may obtain a permit required by the Mechanical Code.

107.0 Appeals. A person aggrieved by an order, decision, or determination of the building official related to an application or interpretation of the Mechanical Code may appeal the order, decision, or determination consistent with the procedures set forth in Chapter 25-1, Article 7, Division 1 (*Appeals*). The Mechanical, Solar, and Plumbing Board, established in Section 2-1-161 (*Mechanical, Solar, and Plumbing Board*), is the body that hears an appeal authorized by this section.

301.4 Electrical Connections. Equipment regulated by the Mechanical Code that requires electrical connections that exceed 50 volts must include a positive means of disconnect. A disconnect must be installed consistent with NFPA 70 and the Electrical Code. A 120 volt receptacle must be located within 25 feet (7620 mm) of the equipment for service and maintenance purposes. The receptacle is not required to be located on the same level as the equipment. Low voltage wiring of 50 volts or less must be installed in a manner that prevents physical damage. Electrical wiring, controls, and connections to equipment and appliances regulated by the Mechanical Code must comply with NFPA 70 and the Electrical Code.

303.8.4 Roof Drainage and Rails. Equipment must be installed on a well-drained surface of the roof. Guards must be provided where an appliance, equipment, fan, 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 the edge or walking surface is located 30 inches above the grade below. Rigid fixed rails or guards at least 42 inches (1067 mm) in height must be provided on the exposed side. The guard must be constructed to prevent a 21-inch-diameter (533 mm) sphere from passing through and must extend at least 30 inches (762 mm) beyond each end of the appliance, equipment, fan, or component. If a parapet or other building structure is used in lieu of a guard, it must be at least 42 inches (1067 mm) in height.

303.8.5 Electrical power. Equipment or appliances that require an external source of electrical power to operate must include the following:

1. a readily accessible electrical disconnect that will completely de-energize the appliance or equipment that is installed within sight of the appliance or equipment and consistent with NFPA 70 and the Electrical Code; and

2. a 12-VAC grounding-type receptacle outlet installed on the roof adjacent to the appliance or equipment and located within 25 feet of the appliance or equipment for service and maintenance purposes.

304.1.1 Access to appliances. An appliance has adequate access if the appliance can be inspected, serviced, repaired, and replaced by removing a dropped grid system ceiling.

304.3.1.1 Door or scuttle. The inside means of access to equipment or appliances must be a permanent or foldaway staircase or ladder that terminates in an enclosure, scuttle, or trap door. A scuttle or trap door must be at least 22 inches by 24 inches (559 mm by 610 mm) in size, must open easily and safely under all conditions, including snow, and must be constructed to allow access to the inside.

304.3.3 Ladders. Permanent ladders to access equipment located on a roof must be provided at parapet walls that exceed 30 inches in height.

305.2.3 Gas and oil-fired furnaces. A float-operated automatic control valve must be installed in the fuel supply line for a heating system that uses a gas or oil-fired furnace. The automatic control valve must operate when floodwaters reach an elevation equal to the floor level of the spaces where the furnace equipment is installed. A manually operated gas valve that can be operated from a location above the regulatory flood datum (RFD) must be provided in the fuel supply line to act as a supplementary safety provision for fuel cutoff.

310.3 Drain pipe material and size. A component of the condensate disposal system must 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. A joint or connection must be made in accordance with the applicable provisions of Chapter 7 of the Plumbing Code relative to the material type. The internal diameter of a condensate waste and drain line size must be at least ¾ inch (19mm) without decreasing in size from the drain pan connection to the place of condensate disposal. Condensate pipe and tubing must be sized in accordance with Table 310.3. Condensate drain sizing for other slopes and other conditions must be approved by the authority having jurisdiction.

> **310.3.1 Clean outs.** A condensate drain line must designed and installed with a clean-out that allows blockages to be cleared and that can be accessed for maintenance without cutting the drain-line.

310.8 Traps. A condensate drain must be trapped as required by the equipment or the appliance manufacturer.

310.9 Water-level monitoring devices. On down-flow units and coils without a secondary drain or provisions to install a secondary or auxiliary drain pan, a water-level monitoring device must be installed inside in the primary drain pan. In the event the primary drain becomes restricted, the water-level monitoring device must shut off the equipment served.

310.10 Standards for air condition condensate recovery systems for new development. Commercial and multi-family facilities constructed after December 31, 2016, with an air conditioning system with a combined cooling capacity equal to or greater than 200 tons must use a single and independent condensate wastewater line to collect and use the condensate wastewater for authorized beneficial purposes. For purposes of this section, authorized beneficial purposes includes using condensate wastewater to process water; to make up cooling tower water; to flush indoor toilets; to irrigate landscape; or other approved non-potable water uses. Except as provided in the Mechanical Code, condensate wastewater generated by an air condition system described in this section may not be discharged. Potable water may be used for cooling tower make-up water if the condensate wastewater generated is insufficient to meet the cooling tower's make-up water needs.

> **Exception.** Condensate wastewater may be discharged, consistent with the requirements in Section 310.1, if the amount of condensate wastewater exceeds existing irrigation, cooling tower make-up, or other non-potable water needs at the facility.

318.0 Protection of Openings. A duct opening, such as an exhaust or outdoor air intake, which terminates outdoors must be protected with corrosion-resistant screens, louvers, or grilles. Openings in louvers, grilles, and screens must be sized consistent with Table 402.4, and must be protected against local weather conditions. Duct openings located in exterior walls must comply with International Building Code requirements for exterior wall opening protectives.

319.0 Compliance with the Energy Code. New and replacement electrical equipment must be designed and installed to efficiently utilize energy and must comply with the current adopted Energy Code.

320 REQUIREMENTS FOR FLOOD PLAIN AREAS.

320.1 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 floodplain. It is the water level of the design flood plus a freeboard factor of one foot. Design flood plus freeboard equals Regulatory Flood Datum.
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> **W-1 SPACE** means a space, constructed with walls that are impermeable to water and water vapor as set forth in the Building Code, which must remain completely dry during flooding to the RFD.

W-2 SPACE means a space, constructed with walls that are impermeable to water but may pass some water vapor or seep slightly as set forth in the Building Code, which must remain essentially dry during flooding to the RFD.

320.2 Establishment of flood hazard areas. A flood hazard area is:

1. a flood hazard area identified by the Federal Emergency Management Agency (FEMA) in a certain scientific and engineering report entitled "The Flood Insurance Study for Austin, Texas," dated September 26, 2008, with accompanying Flood Insurance Risk Maps and Flood Boundary-Floodway Maps (FIRM and FBFM), related supporting data, and any amendments or revisions; or

2. a 100-year or 25-year floodplain based on projected full development as specified in the City Code and Drainage Criteria Manual.

401 VENTILATION.

401.1 Applicability. This chapter applies to the ventilation air supply, exhaust, and makeup air in occupiable spaces within a building.

Exception. Ventilation for acceptable indoor air quality may be designed consistent with the current ASHRAE 62.1 standard.

401.2 When required. Ventilation is required when a room or space is occupied.

402.3.1 Intake Opening Location. An air intake opening must comply with Table 402.3.1 and

1. must be located at least 10 feet (3048 mm) from lot lines or buildings on the same lot;

2. except as provided below or in Table 402.3.1, a mechanical or gravity outdoor air intake must be located at least 10 feet (3048 mm), measured horizontally, from any hazardous or noxious contaminant source, including vents, streets, alleys, parking lots and loading docks;

3. an outdoor air intake opening may be located within 10 feet (3048 mm), measured horizontally, from streets, alleys, parking lots, and loading docks if the openings are located at least 25 feet (7620 mm) vertically above those locations;

4. an intake opening must be located at least three feet (914 mm) below contaminant sources or as set forth in Table 402.3.1 when the sources are located within 10 feet (3048 mm) of the opening;

5. an intake opening on a structure located within a flood hazard area must be at or above elevation required by Section 1612 of the International Building Code for utilities and attendant equipment.

When measuring distance, an opening that fronts a street or public right of way is measured from the closest edge of the street or public right of way.

Table 402.3.1
Air Intake Minimum Separation Distance [ASHRAE 62.1: Table 5.5.1]

Object	Minimum Distance
Class 2 air exhaust/relief outlet (note 1): air with moderate contamination concentrations, mild sensory-irritation, or mildly offense odors; and includes air that is inappropriate for transfer or recirculation to spaces used for different purposes.	10 feet
Class 3 air exhaust/relief outlet (note 1): air with significant contamination concentration, significant sensory-irritation intensity, or offensive odor.	15 feet
Class 4 air exhaust/relief outlet (note 2): air with highly objectionable fumes or gases, or with potentially dangerous particles, bioaerosols, or gases, at concentrations high enough to be considered harmful.	30 feet
Plumbing vents that terminate less than three feet above the level of the outdoor air intake.	10 feet
Plumbing vents that terminate more than three feet above the level of the outdoor air intake.	3 feet
Vents, chimneys, and flues from combustion appliances and equipment (note 3).	15 feet
Garage entry, automobile loading area, or drive in queue (note 4).	15 feet
Truck loading area or dock, bus parking/idling area (note 4).	25 feet
Driveway, street, or parking place (note 4).	10 feet
Thoroughfare with high traffic volume.	25 feet
Roof, landscape grade, or other surface directly below intake (note 5).	1 foot

Garage storage or pick-up area, dumpsters	15 feet
Cooling tower intake or basin	15 feet
Cooling tower exhaust	25 feet

Note 1: Applies to the distance from the outdoor air intakes for one ventilation system to the exhaust/relief outlets for any other ventilation system.

Note 2: Does not apply to laboratory fume hood exhaust air outlets. A laboratory fume hood exhaust air outlet must comply with NFPA 45 and ANSI/AIHA Z9.5. Information on separation criteria for industrial environments must comply with the ACGIH Industrial Ventilation Manuel and the ASHRAW Handbook–HVAC Applications.

Note 3: Shorter separation distance is permitted for fuel gas burning appliances and equipment when based on ANSI Z 223.1/NFPA 54; for oil burning appliances and equipment when based on NFPA 31; and other combustion appliances and equipment when based on NFPA 211.

Note 4: Distance is measured to the closest place that a vehicle exhaust will likely be located.

Note 5: Shorter separation distance is permitted when outdoor surfaces are sloped more than 45 degrees from horizontal or are less than one inch wide.

402.4 Air Intake opening protection. An air intake opening that terminates outdoors must be protected with corrosion-resistant screens, louvers, or grilles. Openings in louvers, grilles, and screens must be sized consistent with Table 402.4, and must be protected against local weather conditions. Outdoor air intake openings located in exterior walls must comply with International Building Code requirements for exterior wall opening protectives.

403.7.3 Occupied Spaces Accessory to Public Garages. Connecting offices, waiting rooms, ticket booths, and similar uses accessory to a public garage must be maintained at a positive pressure and must include ventilation consistent with Section 405.2.

Table 402.4
Opening Sizes for Louvers, Grilles, and Screens Used to Protect Exhaust and Outdoor Air Intake Openings.

Outdoor Opening Type	Minimum and Maximum Opening Sizes Measured in any direction
Residential Occupancies	Not < ¼ inch and not > ½ inch
Non-residential Occupancies	Not < ¼ inch and not > 1 inch

Table 403.7
Minimum Exhaust Rates [ASHRAE 62.1: Table 6.5]

Occupancy Category (Note 8)	Exhaust Rate (cfm/unit)	Exhaust Rate (cfm/ft2)	Air Class
Arenas (note 2)	--	.50	1
Auto repair rooms (note 1)	--	1.50	2
Art classrooms	--	.70	2
Barber shops	--	.50	2
Beauty and nail salons (note 9)	--	.60	2
Cells with toilets	--	1.00	2
Copy, printing rooms	--	.50	2
Darkrooms	--	1.00	2
Educational Science Laboratory	--	1.00	2
Janitor closets, trash rooms, recycling	--	1.00	3
Kitchens – Commercial	--	.70	2
Kitchenettes	--	.30	2
Locker Rooms	--	.50	2
Locker/Dressing Room	--	.25	2
Paint Spray Booth	--	--	4

Parking Garage (note 3)	--	.75	2
Pet Shop (animal area)	--	.90	2
Refrigeration Machinery Room (note 6)	--	--	3
Residential Kitchen (note 7)	50/100	--	2
Soiled laundry storage room	--	1.00	3
Storage room, chemical	--	1.50	4
Toilets – private (note 5)	25/50	--	2
Toilets – public (note 4)	50/70	--	2
Woodwork shop/classroom	--	.50	2

Note 1: A stand where an engine runs must be equipped with an exhaust system that connects to the engine exhaust to prevent the fumes from escaping.

Note 2: When combustion equipment will be used on the playing surface, additional dilution ventilation, source control, or both must be provided.

Note 3: An exhaust rate is not required for an open parking garage as defined in the Building Code.

Note 4: Rate is per water closet, urinal, or both. If there will be heavy periods of use, e.g., toilets in theaters, schools, and sports facilities, then the higher rate applies. The lower rate is authorized in other situations.

Note 5: Rate is for a toilet room intended to be occupied by one person at a time. If continuous system operation will occur during normal hours of use, then the lower rate applies. The higher rate is required in all other situations.

Note 6: Must comply with Chapter 11.

Note 7: If continuous system operation will occur during normal hours of use, then the lower rate applies. The higher rate is required in all other situations.

Note 8: Unlisted occupancies must comply with the rate that is most similar in terms of occupant density and occupancy type.

Note 9: Each manicure and pedicure station in a nail salon must include a source capture

system capable of exhausting not less than 50 cfm per station. Exhaust inlets must be located at floor level or within the floor itself. If one or more source capture systems operate continuously when occupied, then the exhaust rate must comply with the exhaust flow rate required by Table 403.7 for the nail salon.

504.1.2 Environmental Exhaust Ducts and Termination. An exhaust duct may not extend into or through a duct or plenum; must be equipped with back draft dampers; must terminate at the exterior of a building in an exterior wall or roof that is three or more feet from the property lines and openings into the building. An exhaust duct serving a domestic clothes dryer may not terminate over a covered walkway unless the duct is extended to the outer edge of the covered walkway. An exhaust duct serving a domestic range or bathroom exhaust fan may not terminate over a covered walkway unless three sides are open for dilution air movement. If adequate dilution air cannot be provided, an exhaust serving a domestic range or bathroom exhaust fan must be extended to the outer edge of the covered walkway. An environmental air duct may terminate over a private use balcony if the balcony serves as the same space for the duct and required clearances from openings are maintained. A duct under positive or negative pressure may be routed through a plenum when a longitudinal and traverse joint is sealed with materials designed for that use and is sealed consistent with acceptable methods. A hazardous fume may not be run through a plenum under positive pressure unless the plenum is sealed and encased in another tight enclosure, chase, or metal sleeve complete to connection and to point of discharge.

504.4.2.1 Length limitation. One of the methods described in 504.4.2.1 thru 504.4.2.1.3 determines the maximum allowable exhaust duct length.

504.4.2.1.1 Specified length. From the connection to the transition duct from the dryer to the outlet terminal, the maximum length of the exhaust duct is 35 feet. If fittings are used, the maximum length must be reduced as set forth in Table 504.4.2.1.1.

Table 504.4.2.1.1
Dyer Exhaust Duct Fitting Equivalent Length
[International Mechanical Code 2015]

Dryer Exhaust Duct Fitting Type	Equivalent Length
4" radius mitered 45-degree elbow	2 feet, 6 inches
4" radius mitered 90-degree elbow	5 feet
6" radius smooth 45-degree elbow	1 foot
6" radius smooth 90-degree elbow	1 foot, 9 inches
8" radius smooth 45-degree elbow	1 foot
8" radius smooth 90-degree elbow	1 foot, 7 inches

10" radius smooth 45-degree elbow	9 inches
10" radius smooth 90-degree elbow	1 foot, 6 inches

504.4.2.1.2 Manufacturer's Installation Instructions. The maximum length of an exhaust duct is determined by the dryer manufacturer's installation instructions. The authority having jurisdiction shall be provided with a copy of the installation instructions for the make and model of the dryer. If the exhaust duct will be concealed, the installation instructions must be provided to the authority having jurisdiction before a concealment inspection. If the dryer manufacturer does not provide fitting equivalent length, Table 504.4.2.1.1 applies.

504.4.2.1.2.1 Length Identification. If the exhaust duct is concealed within the building construction, the equivalent length of the exhaust duct must be identified on a permanent label or tag that is located within six feet (1829 mm) of the exhaust duct connection.

504.4.2.1.3 Alternate Engineered Systems. If the dryer duct system is designed by a professional engineer, the system must comply with ANSI Z21.5.1/CSA 7.1. The design professional must provide calculations and design criteria on plans submitted under Section 104.0 of the Mechanical Code; and must demonstrate dryer vent equivalent to the Mechanical Code.

519.8 Hazardous materials – general requirements. A structure containing hazardous material must include exhaust ventilation systems that comply with Sections 519.8.1 through 519.8.7.

519.8.1 Storage in excess of the maximum allowable quantities. When hazardous materials are stored within an indoor storage area or building and the quantity of hazardous materials exceeds the maximum allowed per control area, mechanical exhaust ventilation or natural ventilation (if acceptable based on the materials stored) is required.

Exceptions.

1. A storage area for flammable solids that complies with Section 5904 of the International Fire Code.

2. A storage area or building for fireworks and explosives that complies with Chapter 56 of the International Fire Code.

519.8.1.1 System requirements. An exhaust ventilation system must be installed consistent with the Mechanical Code and:

1. provide mechanical ventilation at a rate of at least 1 cfm per square foot [0.00508 $m^3/(s*m^2)$] of floor area over the storage area;

2. unless an alternate design is approved, operate continuously;

3. unless a different location is approved, include a manual shutoff control with a break-glass or other approved switch that is labeled "VENTILATION SYSTEM EMERGENCY SHUTOFF" and is located outside of the room in a position adjacent to the access door to the room;

4. for fumes or vapors that are heavier than air, takes exhaust from a point no more than 12 inches (305 mm) from the floor;

5. for fumes or vapors that are lighter than air, takes exhaust from a point no more than 12 inches (305 mm) from the highest point in the room;

6. prevent vapors from accumulating by locating both the exhaust and inlet air openings in a manner that provides air movement across all portions of the floor or room;

7. cannot recirculate air to occupied areas if the materials stored are capable of emitting hazardous vapors or the contaminants are not removed; and

8. cannot recirculate air contaminated with explosive or flammable vapors, fumes or dusts; flammable, highly toxic or toxic gases; and radioactive materials.

519.8.2 Gas rooms, exhausted enclosures, and gas cabinets. A ventilation system for a gas room, exhausted enclosure, or gas cabinet used for any quantity of hazardous material must be designed to and operate at a negative pressure in relation to the surrounding area. A gas room, exhausted enclosure, or gas cabinet used for highly toxic and toxic gases must also comply with Sections 519.9.7.1, 519.9.7.2, and 519.9.8.4.

519.8.3 Indoor Dispensing and Use. An indoor dispensing and use area with a quantity of hazardous materials that exceeds the maximum allowed per control area must include exhaust ventilation consistent with 519.8.1.

Exception. Ventilation is not required to dispense or use flammable solids that are not finely divided particles.

519.8.4 Indoor Dispensing and Use – Point Sources. A mechanical exhaust ventilation system is required to capture gases, fumes, mists, or vapors at the point of generation when dispensing or using a quantity of gases, liquids, or solids with a hazard ranking of 3 or 4 per NFPA 704 that exceeds the maximum allowable quantity per control area.

Exception. When it is demonstrated that the gases, liquids, or solids do not create harmful gases, fumes, mists, or vapors, a mechanical exhaust ventilation system is not required.

519.8.5 Closed Systems. When a closed system for the use of hazardous materials in amounts exceeding the maximum allowable quantity per control area is designed to be opened as part of normal operations, ventilation is required consistent with 519.8.4.

519.9 Hazardous material – requirements for specific materials. An exhaust ventilation system for a specific material must be provided as set forth in Sections 519.8 and 519.9.1 through 519.9.11.

519.9.1 Compressed gases – medical gas systems. A room used to store compressed medical gas in an amount that exceeds the permit amount for compressed gases in the International Fire Code, and that does not have an exterior wall, must be exhausted through a duct to the exterior building. Both separate airstreams shall be enclosed in a 1-hour-rated shaft enclosure from the room to the exterior. Approved mechanical ventilation must provide a minimum rate of 1 cfm/ft2 [0.00508 m3/(s*m2)] of the area of the room. A gas cabinet used to store compressed medical gas in an amount that exceeds the permit amounts for compressed gases in the International Fire Code must be connected to an exhaust system. The average velocity of ventilation at the face of access ports or windows must be at least 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.

519.9.2 Corrosives. When using or dispensing corrosive materials in an amount that exceeds the maximum allowable quality per control area, a mechanical exhaust ventilation system consistent with 519.8.4 is required.

519.9.3 Cryogenics. A storage room with any quantity of stationary or portable containers of cryogenic fluids must be ventilated. An indoor area where cryogenics fluids are dispensed in any quantity must be ventilated in a manner to capture any vapor at the point of generation and consistent with Section 519.8.4.

Exception. When it is demonstrated that cryogenic fluids do not create harmful vapors, ventilation is not required for indoor dispensing areas.

519.9.4 Explosives. A squirrel cage blower cannot be used to exhaust hazardous fumes, vapors, or gases in an operating building or room used to manufacture, assemble, or test explosives. A nonferrous fan blade must be used on a fan located within the ductwork that is used to exhaust hazardous materials. A motor must be located outside the duct.

519.9.5 Flammable and combustible liquids. An exhaust ventilation system that complies with Sections 519.9.5.1 through 519.9.5.5 is required for the storage, use, dispensing, mixing, and handling of flammable and combustible liquids. Unless specified otherwise, this section applies to any quantity of flammable and combustible liquids.

> **Exception.** A flammable and combustible liquid that is exempt from the International Fire Code.

519.9.5.1 Vaults. A vault that contains a tank of Class I liquid must be equipped with continuous ventilation at a rate that is equal to or greater than 1 cfm/ft^2 of floor area [0.00508 m^3/(s•m^2)] but less than 150 cfm (4 m^3/min). The dispensing system must shut down automatically if the exhaust airflow fails. The exhaust system must be designed to provide air movement across all parts of the vault floor. Supply and exhaust ducts must extend to a point that is at least 3 inches (76 mm) but less than 12 inches (305 mm) above the floor. The exhaust system must be installed consistent with the requirements of NFPA 91. When flammable vapors in the exhaust duct reach a concentration of 25 percent of the LFL, the dispensing must shut down automatically. The vault must be equipped with a mechanism capable of detecting any flammable vapors automatically.

519.9.5.2 Storage rooms and warehouses. A liquid storage room or liquid storage warehouse that stores quantities of liquids that exceed amounts specified in the International Fire Code shall be ventilated consistent with Section 519.8.1.

519.9.5.3 Cleaning machines. An area that contains a machine used to clean parts and that complies with the International Fire Code must be ventilated to prevent accumulation of vapors.

519.9.5.4 Use, dispensing, and mixing. Continuous mechanical ventilation is required when using, dispensing, or mixing flammable and combustible liquids in open or closed systems in amounts that exceed the maximum allowable quantity per control area and for bulk transfer and process transfer operations. The minimum ventilation rate is 1 cfm/ft^2 [0.00508 m^3/(s•m^2)] of floor area over the design area. Makeup air that includes all floor areas or

pits where vapors can collect must be available. Local or spot ventilation is required in areas to prevent the accumulation of hazardous vapors.

Exception. Natural ventilation may be used if shown to be effective based on the materials used, dispensed, or mixed.

519.9.5.5 Bulk plants or terminals. Ventilation is required for a portion of property that receives flammable and combustible liquids from tank vessels, pipelines, tank cars, or tank vehicles. Ventilation is required for a portion of property that stores or blends in bulk flammable and combustible liquids to distribute the liquids to tank vessels, pipelines, tank cars, tank vehicles, or containers. Ventilation required by this section must comply with Sections 519.9.5.5.1 through 519.9.5.5.3.

519.9.5.5.1 General. Ventilation is required for rooms, buildings, and enclosures where Class I liquids are pumped, used, or transferred. Ventilation systems must be designed based on the relatively high specific gravity of the vapors. If natural ventilation is used, adequate openings that are not obstructed by something other than louvers or coarse screens are required in outside walls at floor level. Mechanical ventilation is required when natural ventilation is inadequate.

519.9.5.5.2 Basements and pits. Unless a building's basement or pit is designed to prevent flammable vapors from accumulating, a Class I liquid may not be stored or used in a building with a basement or pit.

519.9.5.5.3 Dispensing Class I liquids. Unless a building is equipped to prevent hazardous concentrations of flammable vapors, a container of Class I liquid may not be drawn from or filled in a building. Mechanical ventilation must operate when flammable vapors may occur.

519.9.6 Highly toxic and toxic liquids. A ventilation system that complies with Sections 519.9.6.1 and 519.9.6.2 is required for highly toxic and toxic liquids.

519.9.6.1 Treatment system. An indoor or outdoor storage area must comply with this section when highly toxic and toxic liquids are used in amounts that exceed the maximum allowable quantities per control area. An exhaust scrubber or other system that processes vapors associated with highly toxic liquids is required when a spill or accidental release of a highly toxic liquid can be expected to release highly toxic vapors at normal temperature and pressure.

519.9.6.2 Open and closed systems. Mechanical exhaust ventilation that complies with Section 518.8 is required for highly toxic and toxic liquids used in an open system. Mechanical exhaust ventilation that complies with Section 519.8.5 is required for highly toxic and toxic liquids used in a closed system.

Exception. A liquid or solid that does not generate highly toxic or toxic fumes, mists, or vapors.

519.9.7 Highly toxic and toxic compressed gases – any quantity. Ventilation exhaust is required and must comply with Sections 519.9.7.1 and 519.9.7.2.

519.9.7.1 Gas cabinets. A gas cabinet that contains any quantity of highly toxic or toxic compressed gas must comply with Section 519.8.2 and the following:

1. the average ventilation velocity at the face of the gas cabinet access port or window must be at least 200 feet per minute (1.02 m/s) with a minimum velocity of at least 150 feet per minute (0.76 m/s) at any point at the access port or window;

2. the gas cabinet is connected to an exhaust system; and

3. the gas cabinet is not the sole means of exhaust in the room or area.

519.9.7.2 Exhausted enclosures. An exhausted enclosure that contains any quantity of highly toxic or toxic compressed gas must comply with Section 519.8.2 and the following:

1. the average ventilation velocity at the face of the enclosure must be at least 200 feet per minute (1.02 m/s) with a minimum velocity of at least 150 feet per minute (0.76 m/s);

2. the exhausted enclosure is connected to an exhaust system; and

3. the exhausted enclosure is not the sole means of exhaust in the room or area.

519.9.8 Highly toxic and toxic compressed gases – quantities exceed the maximum allowable quantity per control area. Ventilation exhaust is required and must comply with Sections 519.9.8.1 through 519.9.8.6.

519.9.8.1 Ventilated areas. A room or area that includes an indoor gas cabinet or exhausted enclosure must be equipped with exhaust ventilation.

The gas cabinet or exhausted enclosure cannot be the sole exhaust for the room or area.

519.9.8.2 Local exhaust for portable tanks. Local exhaust system that captures leakage from indoor and outdoor portable tanks is required. The local exhaust system must consist of portable ducts or collection systems that are designed to be applied to the site of a leak in a valve or fitting on the tank. The local exhaust system must be located in a gas room. Exhaust must be directed to a treatment system as required in the International Fire Code.

519.9.8.3 Piping and controls – stationary tanks. A local exhaust system is required for filling or dispensing connections on indoor stationary tanks. The system must be designed to capture fumes and vapors. Exhaust must be directed to a treatment system as required in the International Fire Code.

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

519.9.8.5 Treatment system. Exhaust ventilation from gas cabinets, exhausted enclosures, and gas rooms must be directed to a treatment system as required by the International Fire Code. A local exhaust system required in Sections 519.9.8.2 and 519.9.8.3 must be directed to a treatment system as required by the International Fire Code.

519.9.8.6 Process equipment. Effluent from indoor and outdoor process equipment that contains highly toxic or toxic compressed gases that can be discharged to the atmosphere must be processed through an exhaust scrubber or other processing system that complies with the International Fire Code.

520 HAZARDOUS EXHAUST SYSTEMS.

520.1 General. These sections govern the design and construction of duct systems for hazardous exhaust and when the systems are required. A hazardous exhaust system must be designed to capture and control hazardous emissions generated from product handling or processes and to convey the emissions outdoors. A hazardous emission is a flammable vapor, gas, fume, mist, or dust; and volatile or airborne materials that pose a health hazard, such as toxic or corrosive materials. For these sections, NFPA 704 establishes the health hazard rating of materials. For these sections, laboratory means a facility where the use of chemicals is related to testing, analyzing, teaching, researching, or other developmental activities that use or synthesize chemicals on a nonproduction basis rather than in a manufacturing process.

520.2 Where required. A hazardous exhaust system is required when operations involve handling or processing hazardous materials that, in the absence of an exhaust system and under normal operating conditions, have the potential to create one of the following conditions:

1. a flammable vapor, gas, fume, mist, or dust is present in a concentration that exceeds 25 percent of the lower flammability limit of the substance for the expected room temperature;

2. a vapor, gas, fume, mist, or dust with a health-hazard rating of 4 is present in any concentration; or

3. a vapor, gas, fume, mist, or dust with a health-hazard rating of 1, 2, or 3 is present in a concentration that exceeds one percent of the median lethal concentration for the substance for acute inhalation toxicity.

> **Exception.** A laboratory unless the concentration exceeds 25 percent or a vapor, gas, fume, mist, or dust with a health-hazard rating of 1, 2, 3, or 4 is present in a concentration that exceeds one percent of the median lethal concentration of the substance for acute inhalation toxicity.

520.2.1 Lumber yards and woodworking facilities. Equipment or machinery that generates or emits combustible dust and is located inside a building at a lumber yard or woodworking facility must be equipped with an approved dust-collection and exhaust system installed consistent with this section and the International Fire Code. Equipment or systems that collect, process, or convey combustible dusts must be equipped with an approved explosion-control system.

520.2.2 Combustible fibers. Equipment or machinery that generates or emits combustible fibers and is located inside a building must be equipped with an approved dust-collection and exhaust system that complies with the Mechanical Code and the International Fire Code.

520.3 Design and operation. The exhaust system must be designed and operated to dilute flammable contaminants in non-contaminated air to maintain concentrations below 25 percent of the contaminant's lower flammability limit in the exhaust flow.

520.4 Independent system. A hazardous exhaust system must be independent of another type of exhaust system.

520.5 Incompatible materials and common shafts. Materials that are not compatible must not be exhausted through the same hazardous exhaust system. Whether materials are incompatible is based on the International Fire Code. Unless the duct system is a

hazardous exhaust system that originates in the same fire area, a hazardous exhaust system cannot share a common shaft with another duct system.

Exception. The requirements in 520.5 do not apply to a laboratory exhaust system if the following conditions apply:

1. all hazardous exhaust ductwork and other laboratory exhaust systems within the occupied space and the shafts are under negative pressure while operating;

2. the hazardous exhaust ductwork manifold together within the occupied space originates within the same fire area;

3. the hazardous exhaust ductwork manifold together in a common shaft but originate in different fire areas and comply with Section 717.5.3, Exception 1, Item 1.1 of the International Building Code;

4. each control branch is equipped with a flow regulating device;

5. perchloric acid hoods and connected exhaust cannot manifold;

6. radioisotope hoods are equipped with filtration or carbon beds as required by a registered design professional;

7. biological safety cabinets are filtered; and

8. each hazardous exhaust duct system is served by redundant exhaust fans that:

   a. operate simultaneously in parallel and each fan is capable of individually providing the required exhaust rate; or

   b. are controlled to operate when another fan fails or is shut down for servicing.

520.6 Design. A system that removes vapors, gases, or smoke must be designed using the constant velocity or equal friction method. A system that conveys particulate matter must be designed using the constant velocity method.

520.6.1 Balancing. A system that conveys explosive or radioactive materials must be pre-balanced by duct sizing. Other systems must be balanced by duct sizing with balancing devices, such as dampers. A damper used to balance airflow must be equipped with securely fixed minimum-position blocking devices to prevent restricting flow below the required volume or velocity.

520.6.2 Emission control. A system must be designed to confine emissions to the area where the emission is generated by air currents, hoods, or enclosures. The system must be exhausted by a duct system to a safe location or treated to remove contaminants.

520.6.3 Hoods required. A hood or enclosure must be used when contaminants originate in a limited area of a space. The hood or enclosure must be designed to allow the air currents created by the exhaust system to capture the contaminants and transport the contaminants directly to the exhaust duct.

520.6.4 Contaminant capture and dilution. The velocity and circulation of air in a work area must capture contaminants using an airstream at the area where the emissions are generated and conveyed into a product conveying duct system. Contaminated air from a work area where hazardous contaminants are generated must be diluted below the thresholds specified in Section 520.2 with air that does not contain other hazardous contaminants.

520.6.5 Makeup air. Makeup air must be provided at a rate approximately equal to the rate that air is exhausted by the hazardous exhaust system. A makeup air intake must be located as required in Chapter 4.

520.6.6 Clearances. The minimum clearance between a hood and combustible construction is the clearance the clearance required by the duct system.

520.6.7 Ducts. A hazardous exhaust duct system must extend directly to the exterior of the building and cannot extend into or through a duct or plenum.

520.7 Penetrations. A hazardous exhaust system that penetrates a structural element must comply with Sections 520.7.1 through 520.7.4.

> **Exception.** If allowed by the International Building Code, Sections 520.7.1 through 520.7.4 do not apply to a penetrating duct in a H-5 Occupancy.

520.7.1 Fire and Smoke Dampers. A fire or smoke damper is prohibited in a hazardous exhaust duct.

> **520.7.1.1 Shaft penetrations.** A hazardous exhaust duct that penetrates a fire-resistance-rated shaft must comply with International Building Code Section 714.3.1 or Section 714.3.1.2.

520.7.2 Floors. A hazardous exhaust system that penetrates a floor or ceiling assembly must be enclosed in a fire-resistance-rated shaft constructed consistent with the International Building Code.

520.7.3 Wall assemblies. A hazardous exhaust duct that penetrates a fire-resistance-rated wall assembly must be enclosed in construction that is fire-resistance-rated from the point the duct penetrates the wall assembly to the outlet terminal unless the interior of the duct is equipped with an approved automatic fire suppression system. A duct must be enclosed consistent with the shaft construction requirements of the International Building Code. The enclosure must have a minimum fire-resistance-rating that meets or exceeds the highest fire-resistance-rated wall assembly the duct penetrates.

520.7.4 Fire walls. A duct may not penetrate a fire wall.

520.8 Suppression required. A duct must be protected by an automatic fire suppression system that is approved and installed consistent with the requirements of the International Building Code.

Exceptions. An automatic fire suppression system is not required if:

1. the duct conveys materials, fumes, mists, and vapors that are not flammable and not combustible under all conditions and at any concentrations;

2. the duct is metallic and not combustible, or nonmetallic and is used in semiconductor fabrication facility;

3. the duct has a cross-sectional diameter that is less than 10 inches (254 mm); or

4. the duct is part of a laboratory hood or exhaust system and is used in a laboratory, as defined in Section 520.1.

520.9 Duct construction. A duct used to convey hazardous exhaust must be constructed of approved materials and must comply with one of the following:

1. the duct is constructed of approved G90 galvanized sheet steel that meets the minimal nominal thickness required in Table 520.9; or

2. the duct is used in a system that exhausts nonflammable corrosive fumes or vapors, is constructed of nonmetallic materials with a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested consistent with ASTM E 84 or UL 23, and is listed and labeled for use in this system.

If the product exhausted is detrimental to the duct material used, an alternative material that is compatible with the exhaust must be used to construct the duct.

Table 520.9 Minimum Duct Thickness

Diameter of Duct or Maximum Side Dimension	Nonabrasive Materials	Nonabrasive/Abrasive Materials	Abrasive Materials
0-8 inches	24 gauge	22 gauge	20 gauge
9-18 inches	22 gauge	20 gauge	18 gauge
19-30 inches	20 gauge	18 gauge	16 gauge
Over 30 inches	18 gauge	16 gauge	14 gauge

520.9.1 Duct joints. A duct must be made tight using a lap joint with a minimum lap of 1 inch (25 mm). A joint constructed consistent with ANSI/SMACNA Round Industrial Duct Construction Standards or ANSI/SMACNA Rectangular Industrial Duct Construction Standards complies with this requirement.

520.9.2 Clearance to combustibles. A duct must have a clearance to combustibles that complies with Table 520.9.2. If the temperature of the exhaust gas exceeds 600 degrees Fahrenheit (316 degrees Celsius), the gas must be exhausted to a chimney.

Table 590.9.2 Clearance to Combustibles.

Type of Exhaust or Temperature of Exhaust (□F)	Clearance to Combustibles (Inches)
Less than 100	1
100-600	12
Flammable Vapors	6

520.9.3 Explosion relief. A system that exhausts potentially explosive mixtures must be protected with an approved explosion relief system, or by an approved explosion prevention system designed and installed consistent with NFPA 69. The explosion relief system must be designed to minimize the structural and mechanical damage that results from an explosion or deflagration within the exhaust system. An explosion prevention system must be designed to prevent the occurrence of an explosion or deflagration.

520.10 Supports. A duct must be supported at intervals not exceeding 10 feet (3048 mm) and must be constructed of noncombustible materials.

521.0 Listed recirculating hoods. The listed recirculating hood must be approved by the authority having jurisdiction.

522.0 Smoke control systems. A smoke control system must be designed and installed consistent with the requirements in Section 909 of the Building Code.

604.2 Conflicts between codes. If the requirements of the Mechanical Code conflict with the requirements in International Energy Conservation Code, the more restrictive requirement applies.

605 SMOKE DAMPERS, FIRE DAMPERS, AND CEILING RADIATION DAMPERS.

605.1 General. The requirements in this section apply the protection of a duct penetration or an air transfer opening in an assembly that must be protected.

605.1.1 Ducts and air transfer opening. A shaft enclosure is not required for a duct that transitions horizontally between shafts if the duct that penetrates each associated shaft is protected with a damper that complies with this section.

605.1.2 Ducts that penetrate a fire-resistance-rated assembly without a damper. A duct that penetrates a fire-resistance-rated assembly but is not required to have a damper must comply with Sections 714.2 through 714.3.3 of the International Building Code. A duct that penetrates a horizontal assembly, is not required to be contained within a shaft, and is not required to have a damper must comply with Section 714.4 of the International Building Code.

605.1.2.1 Ducts that penetrate an assembly that is not fire-resistance-rated. A duct penetrating a nonfire-resistance-rated floor assembly must have space around the duct that complies with Section 717.6.3 of the International Building Code.

605.2 Installation. A fire damper, smoke damper, combination fire and smoke damper, and ceiling radiation damper must be installed consistent with the requirements of this section and the manufacturer's instructions and listing.

605.2.1 Smoke control system. If the installation of a fire damper will interfere with the operation of a smoke control system that is required by Section 909 of the International Building Code, an alternative approved form of protection must be used.

605.2.2 Hazardous exhaust ducts. A fire damper for a hazardous exhaust duct system must comply with Section 520.0.

605.3 Damper testing, ratings, and actuation. Testing, ratings, and actuation of a damper must be consistent with Sections 605.3.1 through 605.3.3.

605.3.1 Testing. A damper must be listed and labeled consistent with the standards of this section. A fire damper must comply with UL 555. A fire damper labeled for use in a dynamic system must be installed in a heating, ventilation, and air conditioning system designed to operate with fans on during a fire. A smoke damper must comply with UL 555S. A combination fire and smoke damper must comply with both UL 555 and UL 555S. A ceiling radiation damper must comply with UL 555C or must be tested as a part of a fire-resistance-rated floor and ceiling or roof and ceiling assembly consistent with ASTM E119 or UL 263. A corridor damper must comply with both UL 555 and UL 555C. A corridor damper must demonstrate acceptable closure performance when subjected to 150 feet per minute velocity across the face of the damper using UL 555 fire exposure test.

605.3.2 Rating. A damper's rating must comply with the requirements in 605.3.2.1 through 605.3.2.4.

605.3.2.1 Fire Damper. A fire damper must comply with the minimum fire protection rating required in Table 605.3.2.1 for the type of penetration.

Table 605.3.2.1 FIRE DAMPING RATINGS

Type of Penetration (hour)	Minimum Damper Rating
Less than 3-hour fire-resistance-rated assemblies	1 ½
3-hour or greater fire-resistance-rated assemblies	3

605.3.2.2 Smoke Damper. A leakage rating for a smoke damper must be Class I or II. The elevated temperature rating must meet or exceed 250 degrees Fahrenheit (121 degrees Celsius).

605.3.2.3 Combination Fire and Smoke Damper. A combined fire and smoke damper must comply with the requirements in Table 605.3.2.1 and must comply with the requirements in 605.3.2.2.

605.3.2.4 Corridor damper. A corridor damper must meet or exceed a one hour fire-resistance rating and a Class I or II leakage rating set in Section 605.3.2.2.

605.3.3 Damper Actuation. A damper's actuation must comply with Sections 605.3.3.1 through 605.3.3.5.

605.3.3.1 Fire damper actuation device. A fire damper actuation device must have an operating temperature

1. of approximately 50 degrees Fahrenheit (28 degrees Celsius) above the normal temperature within the duct but no less than 160 degrees Fahrenheit (71 degrees Celsius); or

2. less than 350 degrees Fahrenheit (177 degrees Celsius) where located in a smoke control system complying with Section 909 of the International Building Code.

605.3.3.2 Smoke Damper Actuation. A smoke damper must close upon actuation of a listed smoke detector or detectors installed consistent with Section 907.3 of the International Building Code and one of the following methods:

1. For a smoke damper installed within a duct:

(a) a smoke detector must be installed inside of the duct, or outside of the duct with sampling tubes protruding into the duct, and located within 5 feet (1524 mm) of the damper;

(b) air outlets and inlets cannot be located between the detector or tubes and the damper;

(c) the detector must be listed for the air velocity, temperature, and humidity anticipated at the point where it is installed; and

(d) except in a mechanical smoke control system, a damper must close upon fan shutdown if the local smoke detector requires a minimum velocity to operate.

2. For a smoke damper installed above a smoke barrier door in a smoke barrier: a spot-type detector must be installed on either side of the smoke barrier door opening and if used for direct interface with the damper, the detector must be listed for releasing service.

3. For a smoke damper installed within an un-ducted opening in a wall: a spot-type detector must be installed within 5 feet horizontally of the damper and if used for direct interface with the damper, the detector must be listed for releasing.

4. For a smoke damper installed in a corridor wall or ceiling, the damper may be controlled by a smoke detection system installed in the corridor.

5. For a smoke detection system installed in all areas served by the duct in which the damper is located, the smoke dampers may be controlled by the smoke detection system.

605.3.3.3 Combination fire and smoke damper actuation. A combination fire and smoke damper actuation must comply with Sections 605.3.3.1 and 605.3.3.2. When a combination fire and smoke damper is installed within a smoke control system shaft, penetrations cannot 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 for a ceiling radiation damper actuation device must be at least 50 degrees Fahrenheit (28 degrees Celsius) above the normal temperature within the duct system and no less than 160 degrees Fahrenheit (71 degrees Celsius).

605.3.3.5 Corridor damper actuation. A corridor damper actuation must comply with Sections 605.3.3.1 and 605.3.3.2.

605.4 Access and Identification. A fire or smoke damper must be provided with an approved means of access that is large enough to permit inspection and maintenance of the damper and its operating parts. The access provided may not affect the integrity of a fire-rated assembly. An access opening may not reduce the fire-resistance rating of the assembly. An access point must be permanently identified on the exterior with a label with letters that are at least 0.5 inches (12.7 mm) in height. The label must read: FIRE/SMOKE DAMPER, SMOKE DAMPER, or FIRE DAMPER. An access door in duct must be tight fitting and suitable for the required duct construction.

605.5 Locations where required. A fire damper, smoke damper, or combination fire and smoke damper must be provided at the locations identified in Sections 605.5.1 through 605.5.7. If an assembly is required to have both fire dampers and smoke dampers, a combination fire and smoke damper or both a fire damper and a smoke damper must be installed.

605.5.1 Fire walls. A duct or air transfer opening permitted in a fire wall, as allowed in Section 706.11 of the International Building Code, must be protected with listed fire dampers installed consistent with the damper's listing.

605.5.1.1 Horizontal exits. A listed smoke damper designed to resist the passage of smoke must 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. A duct or air transfer opening that penetrates a fire barrier must be protected with a listed fire damper installed consisted with the fire damper's listing. A duct or air transfer opening may not penetrate an exit closure or exit passageway except as permitted by Sections 1022.5 or 1023.6, respectively, of the International Building Code.

Exception. A fire damper is note required at a penetration of a fire barrier if any of the following applies:

1. penetrations were tested in accordance with ASTM E 119 or UL 263 as part of the fire-resistance rated assembly;

2. the duct is used as part of an approved smoke control system and a fire damper would interfere with the operation of the smoke control system; or

3. the walls are penetrated by a ducted HVAC system, have a required fire-resistance rating of one hour or less, in an area that is not a Group H, and is in a building equipped throughout with an automatic sprinkler system consistent with Section 903.3.1.1 or 903.3.1.2 of the International Building Code. For purposes of this exception, a ducted HVAC system is a duct system for the structure's HVAC system, constructed of sheet steel not less than 26 gauge (0.0217 inch or 0.55 mm) thickness, and is 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 that is 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. A duct or air transfer opening that penetrates fire partitions must be protected with a listed fire damper installed consistent with the damper's listing.

Exception. In an occupancy that is not a Group H occupancy, a fire damper is not required if any of the following applies:

1. The corridor walls in a building equipped throughout with an automatic sprinkler system installed consistent 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 consistent with Section 714 of the International Building Code.

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

3. The duct system was constructed of approved materials consistent with Section 603 of the Mechanical Code and the duct penetrating the wall complies with the following:

(a) the duct does not exceed 100 square inches (0.06 mm^2);

(b) the duct is constructed of a steel with a minimum thickness of 0.0217 inch (0.55 mm) [26 gauge];

(c) the duct does not have openings that communicate the corridor with adjacent spaces or rooms;

(d) the duct is installed above a ceiling;

(e) the duct does not terminate at a wall register in the fire-resistance-rated wall; and

(f) each duct opening has a minimum 12-inch-long (305 mm) by 0.060-inch-thick (1.52 mm) steel sleeve that is centered, the sleeve is secured to both sides of the wall and all four sides of the sleeve with a minimum 1 ½-inch by 1 ½-inch by 0.060-inch (38 mm by 38 mm by 1.52 mm) steel retaining angles that are secured to the sleeve and the wall with No. 10 (M5) screws, and the annular space between the steel sleeve and the wall opening must be filled with rock (mineral) wool batting on all sides.

4. The walls are penetrated by a ducted HVAC system, have a required fire-resistance rating of one hour or less, in an area that is not a Group H, and is in a building equipped throughout with an automatic sprinkler system consistent with Section 903.3.1.1 or 903.3.1.2 of the International Building Code. For purposes of this exception, a ducted HVAC system is a duct system for the structure's HVAC system, constructed of sheet steel not less than 26 gauge (0.0217 inch or 0.55 mm) thickness, and is continuous from the air-handling appliance or equipment to the air outlet and inlet terminals.

605.5.4 Corridor or smoke barriers.

1. A listed smoke damper designed to resist the passage of smoke must 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 consistent with the International Building Code.

2. A corridor damper must be provided where corridor ceilings are constructed consistent with the requirements in Section 708.4, Exception 3, of the International Building Code, and are penetrated.

3. A ceiling radiation damper must be provided where the ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly is constructed consistent with the requirements in Section 708.4, Exception 2, of the International Building Code, and is penetrated.

4. Smoke dampers and smoke damper actuation methods must comply with Section 605.5.4.1.

Exceptions. A smoke damper is not required:

1. in a corridor penetration where the building is equipped throughout with an approved smoke control system that is consistent with Section 522 and smoke dampers are not necessary to operate and control the system;

2. in a smoke barrier penetration where the duct opening is limited to a smoke compartment and the duct is constructed of steel;

3. in a corridor penetration where the duct is constructed of steel with a minimum thickness of 0.019 inch (0.48 mm) and the openings do not serve the corridor; or

4. by Section 407.5 of the International Building Code for Group I-2, Condition 2 where the HVAC system is fully ducted consistent with Section 603, the building is equipped throughout with an automatic sprinkler installed consistent with Section 903.3.1.1 of the International Building Code, and equipped with quick-response sprinklers consistent with Section 903.3.2 of the International Building Code.

605.5.4.1 Smoke damper. A smoke damper must close as required in Section 605.3.3.2.

605.5.5 Shaft enclosures. A shaft enclosure that is permitted to be penetrated by a duct or air transfer opening must be protected with an approved fire and smoke damper that is installed consistent with its listing.

Exceptions:

1. A fire damper is not required at a penetration of the shaft if:

   a. the steel exhaust sub ducts extend at least 22 inches (559 mm) vertically in an exhaust shaft when there is a continuous airflow upward to the outdoors;

   b. the penetration is tested consistent with ASTM E 119 or UL 263 and as part of the fire-resistance-rated assembly;

   c. the duct is used as part of an approved smoke control system consistent with Section 909 of the International Building Code and when a fire damper will interfere with the operation of the smoke control system; and

   d. the penetration is in a parking garage exhaust or supply shaft that is separated from other building shafts by at least 2-hour fire-resistance-rated construction.

2. In a Group B or R occupancy that is equipped with an automatic sprinkler system installed consistent with Section 903.3.1.1 of the International Building Code, a smoke damper is not required at the penetration of the shaft when kitchen, clothes dryers, bathroom or toilet room exhaust openings have a steel exhaust sub-duct with a minimum thickness of 0.0187 inch (0.4712 mm) [No. 26 gage] that extends at least 22 inches (559 mm) vertically and the exhaust fan at the upper terminus is powered continuously consistent with Section 909.11 of the International Building Code and maintains airflow upwards to the outdoors.

3. A smoke damper is not required at a penetration of an exhaust or supply shaft in a parking garage that is separated from other building shafts by at least 2-hour fire-resistance-rated construction.

4. A smoke damper is not required at a penetration of the shaft when the duct is used as part of an approved mechanical smoke control system designed consistent with Section 909 of the International Building Code and when the smoke damper will interfere with the operation of the smoke control system.

5. A fire damper or combination fire/smoke damper is not required in a kitchen or clothes dryer exhaust system installed consistent with the Mechanical Code.

605.5.5.1 Enclosure at the bottom. A shaft enclosure that does not extend to the bottom of a building or structure must be protected as required in Section 713.11 of the International Building Code.

605.5.6 Exterior walls. A duct or air transfer opening in a fire-resistance-rated exterior wall with a protected opening as required by Section 705.10 of the International Building Code must be protected with a listed fire damper that is installed consistent with its listing.

605.5.7 Smoke partitions. A listed smoke damper designed to resist the passage of smoke is required at each point where an air transfer opening penetrates a smoke partition. A smoke damper or smoke damper actuation method must comply with Section 605.3.3.2.

Exception. If installing a smoke damper will interfere with the operation of a required smoke control system required by Section 522 of the Mechanical Code, an alternative and approved protection method is required.

605.6 Horizontal assemblies. An air duct that penetrates a floor, floor/ceiling assembly, or the ceiling membrane of a roof/ceiling assembly must be protected by a shaft enclosure that complies with Section 713 and Sections 717.6 through 717.6.3 of the International Building Code or complies with Sections 605.6.1 through 605.6.3 of the Mechanical Code.

605.6.1 Through penetrations. In all occupancies, except Group I-2 or I-3, a duct constructed of approved materials consistent 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 if the listed fire damper is installed at the floor line or the duct is protected in a manner that complies 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 if it meets the following requirements:

1. the duct is contained and located within the cavity of a wall and is constructed of steel with a minimum thickness of 0.0187 inch (0.4712 mm) [No. 26 gage];

2. the duct is open to only one dwelling or sleeping unit and the duct system is continuous from the unit to the exterior of the building;

3. the duct may not exceed 4-inch (102 mm) nominal diameter and the total area of the duct does not exceed 100 square inches for any 100 square feet (64516 mm^2 per 9.3 m^2) of the floor area;

4. the annual space around the duct is protected by 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 that is penetrated; and

5. a grille opening located in a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly is protected with a ceiling radiation damper installed consistent with Section 605.6.2.1.

605.6.2 Membrane penetrations. A duct or air transfer opening constructed with materials authorized by Section 603 that penetrates the ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly must be protected by:

1. a shaft enclosure that is consistent with Section 713 of the International Building Code;

2. a listed ceiling radiation damper installed at the ceiling line at the point where a duct penetrates the ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly; or

3. a listed ceiling radiation damper installed at the ceiling line at the point 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. A ceiling radiation damper must be tested consistent with Section 605.3.1 and installed consistent with the details listed in the fire-resistance-rated assembly, the manufacturer's installation instructions, and the listing. A ceiling radiation damper is not required when:

1. a test conducted consistent with ASTM E 119 or UL 263 show that a ceiling radiation damper is not necessary to maintain the fire-resistance rating of the assembly applies; or

2. the exhaust duct penetrations are protected consistent 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; or

3. the duct and air transfer openings are protected with a duct outlet protection system tested as part of a fire-resistance-rated assembly that is consistent with ASTM E 119 or UL 263.

605.6.3 Non-fire-resistance-rated floor assemblies. A duct system constructed with materials authorized by Section 603 that penetrate non-fire-resistance-rated floor assemblies shall be protected by:

1. a shaft enclosure that is consistent with Section 713 of the International Building Code; or

2. a duct connects a maximum of 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; or

3. in a floor assembly composed of noncombustible materials, a fire damper is installed at each floor line, 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 the shaft does not connect more than three stories.

Exception: A fire damper is not required in a duct within an individual residential dwelling unit.

605.7 Flexible ducts and air connectors. A flexible duct or air connector must not pass through a fire-resistance-rated assembly.

608 AUTOMATIC SHUTOFFS

608.1 General

Exception: 6. An automatic shutoff for a fan powered terminal unit must comply with Section 608.3.

608.2 Common supply and return air systems. When multiple air-handling systems share common supple or return air ducts or plenums with a combined design capacity greater than 2,000 cfm (0.9 m^3/s), the supply air system shall be provided with smoke detectors that comply with Section 608.1.

608.3 Individual smoke detectors. An individual smoke detector is not required for a new or relocated powered terminal unit if the unit does not have an individual design capacity greater than 2,000 cfm ($0.9m^3/s$) and will be shut down by activating:

1. a smoke detector required by Section 608.1; or

2. the duct smoke detector located in the supply side of main air-handler served by that system if the air-handling unit is located within a space or area and is interconnected with the FPTU's; or

3. an area smoke detector system authorized by the exceptions in Section 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 that is located in air handling equipment on a floor, or is located in air handling equipment in an independent smoke zone, the air handling equipment on that floor or in that independent smoke zone must be de-energized, including all fan-powered terminal units (FPTU).

A FPTU must have a fire alarm relay installed within three feet of the FPTU. The fire alarm relay must be controlled solely by the fire alarm system. The control wiring for a new or relocated FPTU must be wired through its associated fire alarm shut down relay so that the FPTU will be de-energized by a signal from the fire alarm system. The FPTU fan must remain off until the FPTU's fire alarm relay is reset through the fire alarm system. To comply with the Mechanical Code, it cannot be possible to override the fire alarm relay or the "off" control of the FPTU's fan through the building automation system or any other control system.

If an existing building or construction does not comply with this section, a FPTU located within the area being constructed or remodeled must be shut down. If construction or remodeling exceeds 50 percent of the aggregate area of the building as defined in the International Existing Building Code, any FPTU located within a system being modified must comply with this section of the Mechanical Code. If the permit authorizes a modification to the HVAC system, then a FPTU must comply with this section.

608.4 Return air risers. A smoke detector must be installed at each story if the return air risers serve two or more stories and serve any portion of a return air system with a design capacity that exceeds 15,000 cfm ($7.1\ m^3/s$). The smoke detector required by this section must be located upstream of the connection between the return air rise and any air ducts or plenums.

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

608.6 Controls Operation. When activated, a smoke detector must be capable of shutting down all operational capabilities of the air distribution system consistent with the listing and labeling of appliances used in the system. An air distribution system that is part of a smoke control system must be capable of switching to the smoke control mode when activated by the smoke detector.

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

Exceptions:

1. When the duct smoke detector activates the building's alarm-indicating appliances, a supervisory signal at a constantly attended location is not required.

2. When an occupancy is not required to be equipped with a fire alarm system, the actuation of a smoke detector must activate a visible and audible signal in an approved location; and the duct smoke detector trouble conditions must activate a visible or audible signal in an approved location and be identified as air duct detector.

1014.2 Licensing requirements for steam and hot-water boilers and piping. Steam and hot-water boilers and piping must be installed and maintained consistent with applicable regulations promulgated by the Texas Department of Licensing and Regulation.

1015.0 Efficiency standards for steam boilers. A steam boiler must:

1. be equipped with conductivity controllers that control blowdown and a cold water make-up meter. If the system is a 50 Boiler Horse Power or greater, the meter must be connected to the building's energy management system or utility monitoring dashboard;

2. include a steam condensate return system; and

3. be fitted with a blowdown heat exchanger to transfer heat from blowdown to the feed water; and

4. if the boiler exceeds 15 psi and 100 Boiler Horse Power and the heat recovery can be used to heat boiler make-up water or other purposes, the boiler blowdown must be directed to a heat recovery system that reduces the temperature of the blowdown discharge to below 140 degrees Fahrenheit without using tempering water.

1126.0 Standards for cooling towers. A cooling tower must:

1. achieve a minimum of five cycles of concentration if the cooling tower utilizes potable water as its primary source of make-up water;

2. be fitted with overflow sensors and alarms, make-up water and blowdown meters to manage water consumption, and conductivity controllers;

3. if the cooling tower is 100 tons or more, the make-up and blowdown meters and over flow alarm must be connected to the building's central energy management system or utility monitoring dashboard; and

4. be equipped with drift eliminators with a drift rate that does not exceed 0.005 percent of the circulated water flow rate when operated consistent with the equipment manufacturer's instructions and be used with the cooling tower, evaporative condensers, and fluid coolers; and

5. be registered with Austin Water Utility's Water Conservation Division; and

6. beginning January 1, 2017, include the installation of a water storage tank, plumbing, and treatment to utilize blowdown water for landscape or other authorized beneficial purposes or offset a minimum of 10 percent of the make-up water with reclaimed or onsite water reuse if the capacity of the cooling tower is 100 tons or more and installed for new commercial or multi-family development.

1126.0.1 Cooling tower owner obligations. On or before March 1st of each year, the owner of a cooling tower must submit an annual compliance inspection report prepared by an independent third party licensed through Texas Department of Licensing and Regulation as a mechanical contractor, prepared by a licensed professional engineer registered with the State of Texas as a mechanical engineer, or other persons approved by the authority with jurisdiction for performance testing for cooling towers. The report must be on a form promulgated by the authority with jurisdiction and the preparer must certify that the cooling tower meets or exceeds all applicable requirements of the Mechanical Code. Additionally, the owner must maintain on-site a written log that contains the monthly make-up and blow down meter reads, conductivity values, and cycles of concentration and must make it available to city employees upon request.

1403 PLANS REQUIRED.

1403.1 General. Each application for a permit must include plans, engineering calculations, diagrams, and other data required by the authority having jurisdiction. The authority having jurisdiction may require plans, computations, and specifications be prepared and designed by a professional engineer licensed by the State of Texas. Permit and plan review fees are set by separate ordinance.

CHAPTER 15 SOLAR SYSTEMS.

[B] 1502.0 Guards. A guard is required when appliances, equipment, or solar systems and appurtenances 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. A guard must be available when appliances, equipment, or solar systems and appurtenances require service. The guard must extend at least 30 inches (762 mm) beyond the end of any appliances, equipment, or solar systems and appurtenances; and the top guard must be located at least 42 inches (1067 mm) above the elevated surface adjacent to the guard. A guard must be constructed to prevent a 21-inch-diameter (533 mm) sphere from passing through and must comply with the loading requirements for guards that are set by the International Building Code. If parapets or other building structures are used in lieu of guards or rails, the minimum height for the parapet or other building structure must be at least 42 inches (1067 mm).

CHAPTER 18 FIREPLACES, SOLID FUEL-BURNING EQUIPMENT, AND OTHER SIMILAR APPLIANCES.

1801.1 Scope. This chapter governs the approval, design, installation, construction, maintenance, alteration, and repair of the appliances, factory-built fireplaces, and equipment specified in this chapter. The Uniform Plumbing Code regulates the installation of natural gas as it concerns gas-fired appliances.

1801.2. General. This requirements of this chapter apply to the mechanical equipment and appliances regulated by this chapter. Other City Code requirements may apply to the equipment and appliances regulated by this chapter.

1801.3 Hazardous locations. A fireplace or solid fuel burning appliance may not be installed in a hazardous location.

1801.4 Fireplace Accessories. A listed and labeled fireplace accessory must be installed consistent with the conditions of the listing and the manufacturer's instructions; and must comply with UL 907.

1802.0 Masonry Fireplaces. A masonry fireplace must be constructed as required by the International Building Code.

1803.0 Factory-Built Fireplaces.

1803.1 General. A factory-built fireplace must be listed and labeled and must be installed consistent with the conditions of the listing; and must be tested consistent with UL 127.

1803.2 Hearth Extensions. A hearth extension of an approved factory-built fireplace must be installed consistent with the listing of the fireplace. The extension must be distinguishable from the surrounding floor area. A listed and labeled hearth extension must comply with UL 1618.

1803.3 Unvented gas log heaters. Unless a factory-built fireplace system is specifically tested, listed, and labeled to include an unvented gas log heater, the factory-built fireplace cannot include an unvented gas log heater.

1804.1 Pellet Fuel-Burning Appliances. A pellet fuel-burning appliance must be listed and labeled consistent with ASTM E 1509 and must be installed consistent with the terms of the listing.

1805.0 Fireplace stoves and room heaters.

1805.1 General. A fireplace stove or solid-fuel-type room heater must be listed and labeled; and must be installed consistent with the conditions of the listing. A fireplace stove must be tested consistent with UL 737. A solid-fuel-type room heater must be tested consistent with UL 1482. A fireplace insert intended for use in a fireplace must be listed and labeled consistent with the requirements of UL 1482; and must be installed consistent with the requirements in UL 1482 and shall be installed consistent with the manufacturer's installation instructions.

1805.2 Connection to fireplace. A connection between a solid fuel appliance and a chimney flue that serves fireplaces must comply with Chapter 8 (*Chimneys and Vents*).

1806 SAUNA HEATERS.

1806.1 Location and protection. A sauna heater must be located in an area that minimizes the possibility of accidental contact by a person in the room.

1806.2 Guards. An approved guard or barrier of material with a low coefficient of thermal conductivity must be installed to protect from accidental contact. The guard may not substantially affect the transfer of heat from the heater to the room.

1806.3 Installation. A sauna heater must be listed and labeled consistent with UL 875 and must be installed consistent with the listing and the manufacturer's installation instructions.

1806.4 Access. A panel, grille, or access door that is required to be removed for normal services operations cannot be attached to the building.

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

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

1806.7 Sauna room. A sauna room must provide a ventilation opening that is at least 4 inches by 8 inches (102 mm by 203 mm) and is located near the top of the door into the sauna room.

1806.8 Warning notice. A permanent notice that is constructed of approved materials must be mechanically attached to the sauna room on the outside and include the following language:

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

The words must contract with the background and the lettering shall be at least 0.25 inch (6.4 mm) high.

> **Exception:** This notice requirement does not apply to one- and two-family dwellings.

1807.0 Forced air furnaces

> **1807.1 General.** An oil-fueled furnace must be tested consistent with UL 727. An electric furnace must be tested consistent with UL 1995. A solid fuel furnace must be tested consistent with UL 391. A forced-air furnace must be installed consistent 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 must be at least 2 square inches per 1,000 Btu/h (4402 mm2/kW) output rating capacity of the furnace that meets or exceeds the specifications established in the manufacturer's installation instructions. The minimum unobstructed total area of supply ducts from a forced-air warm-air furnace must be at least 2 square inches for each 1,000 Btu/h (4402 mm2/kW) output rating capacity of the furnace that meets or exceeds the specifications established in the manufacturer's installation instructions.

Exception. The total area of supply air ducts and outside and return air ducts are not required to be larger than the minimum size required by the 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 must not be 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 must be tested consistent with UL 1995.

1807.4 Dampers. Volume dampers may not be placed in the air inlet to a furnace in a manner that will required 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 must be conducted into the blower housing from outside the furnace enclosure by continuous airtight ducts.

1808.1 Kerosene and Oil-Fired Stoves. A kerosene or oil-fired stove must be listed and labeled and must be installed consistent with the listing and the manufacturer's installation instructions. A kerosene or oil-fired stove must comply with NFPA 31. An oil-fired stove must be tested consistent with UL 896.

1809.1 Masonry Heater. A masonry heater must be constructed as required by the International Building Code.

PART 5. This ordinance takes effect on September 6, 2017.

PASSED AND APPROVED

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§
_____, 2017 §

Steve Adler
Mayor

APPROVED:

Anne L. Morgan
City Attorney

ATTEST:

Jannette S. Goodall
City Clerk