

Houston Amendments to the *2015 Uniform Mechanical Code*



Adopted by Ord. No. 2021-1037¹

Passed December 1, 2021²

Effective April 1, 2022³

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1. The City Secretary shall insert the number of the adopting ordinance.
 2. The City Secretary shall insert the date passage and approval of the adopting ordinance.
 3. The City Secretary shall insert the effective date of the adopting ordinance.

CHAPTER 1

ADMINISTRATION

101.1 Title. ~~This document~~ These regulations shall be known as the “~~Uniform~~ *City of Houston Mechanical Code*,” ~~may be cited as such, and will be referred to hereinafter referred to~~ as “this code.” and also known as the *Mechanical Code*.

The *Construction Code* collectively includes this volume and certain other codes, pamphlets, specifications and documents that are adopted in or by reference through the adopting ordinance, City of Houston Ordinance No. 2021-1037⁴.

102.1 Conflicts Between Codes. ~~Where the requirements within the jurisdiction of this mechanical code conflict with the requirements of the plumbing code, the plumbing code shall prevail.~~ In instances where this code, applicable standards, or the manufacturer’s installation instructions conflict, the more stringent provisions shall prevail. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall prevail.

Where, in any specific instance, provisions of this code, including adopted appendices, specify different materials, different methods of construction, or other requirements that differ from those provided in the *City Code* or other volumes of the *Construction Code*, including adopted appendices, other than the *Fire Code* and its adopted appendices and standards, the most restrictive shall prevail. Where, in any specific instance, provisions of this code, including adopted appendices, specify different materials, different methods of construction, or other requirements that differ from those provided in the *Fire Code*, including its adopted appendices and standards, and the building official and the fire marshal are unable to mutually reconcile the requirements by issuing a written interpretation, then either of them may refer the matter to the General Appeals Board created under the *Building Code*, which shall conduct a review of the matter and issue a written code interpretation based upon the apparent intent of the codes involved. Notwithstanding any other provision, interpretations that are issued by the General Appeals Board shall not be subject to further appeal.

102.3 Mechanical Integrity Maintenance. Mechanical systems, materials, and appurtenances, both existing and new, of a premise under the Authority Having Jurisdiction shall be maintained in operating condition. Devices or safeguards required by this code shall be maintained in accordance with the code edition under which installed.

The owner or the owner’s designated agent shall be responsible for maintenance of mechanical systems. To determine compliance with this subsection, the Authority Having Jurisdiction shall be permitted to cause a mechanical system to be reinspected.

102.8 Appendices. The provisions in the appendices are intended to supplement the requirements of this code and shall not be considered part of this code unless formally adopted as such. Appendix F shall be adopted as part of this code.

4. The City Secretary shall insert the number of the adopting ordinance.

102.9 Retroactive Provisions. Notwithstanding any other provision of this section, those provisions of this code that are designated as being “retroactive” shall apply to existing installations and alterations thereof.

102.10 Residential Code. Mechanical systems for detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height, each with separate means of egress, and their accessory structures shall comply with the *Residential Code*. Mechanical systems for residential occupancies to which the *Residential Code* does not apply shall be governed by this code.

102.11 Energy Conservation. The *Energy Conservation Code* and Chapter 11 of the *Residential Code*, as well as any amendments adopted thereto as authorized by state law, shall be enforced by this jurisdiction in accordance with state law.

103.2 Liability. The Authority Having Jurisdiction charged with the enforcement of this code, acting in good faith and without malice in the discharge of the Authority Having Jurisdiction’s duties, shall not thereby be rendered personally liable for damage that accrues to persons or property as a result of an act or by reason of an act or omission in the discharge of such duties. A suit brought against the Authority Having Jurisdiction or employee because of such act or omission performed in the enforcement of provisions of this code shall be defended by legal counsel provided by this jurisdiction until final termination of such proceedings. Except as otherwise provided by law, the building official shall not personally be liable in damages for any act or omission arising out of any official action taken to implement and enforce the provisions of this code. Additionally, except as otherwise provided by law, the building official shall not personally be liable in damages for any act or omission taken in the course and scope of employment. Where and to the extent consistent with the provisions of Chapter 2, Article X, of the *City Code*, this jurisdiction shall provide legal representation and indemnification for any suit or claim brought against the building official or any deputies because of acts or omissions performed in the implementation or enforcement of this code.

This code shall not be construed to relieve from or lessen the responsibility of any person owning, operating, or controlling any building, structure or system or other construction for any damages to persons or property caused by defects, nor shall the code enforcement agency, or any member of the board of appeals, or the jurisdiction be held as assuming any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

103.5 Hearing Procedures.

103.5.1 Hearing notices. Unless otherwise specifically provided, whenever notice is to be given to any person concerning the right to a hearing, the notice may be given by personal hand delivery, certified mail, or private delivery service, return receipt requested. If there is documented proof that these methods are not successful, the written notice may be sent by email.

If the notice is being given to an applicant for a license or to a licensee or to a state license registrant, the notice may be mailed to the address set out in the application for the registration or license unless the applicant or registrant has given the Authority Having Jurisdiction written notice of a change of address, under which circumstances any notice concerning a hearing shall be sent to the most recent address shown on the notice. If any notice mailed to an applicant for a license or to a licensee or registrant is returned without

delivery, notice shall be effective if posted where the public may observe it in the Permit Office.

If notice is being given to a building owner or to a tenant therein and the Authority Having Jurisdiction is unable to determine the name or address of such person after checking the building records and the applicable records of Houston Public Works, the County Appraisal District, the electrical company, the gas company, and the water utility provider, notice shall be mailed to the billing addresses of the building as shown on the records of the electrical company and the gas company and shall be posted on or in view of each entrance to the building. Additionally, if any notice is mailed to a building owner or a building tenant and is returned without delivery, notice shall be effective if posted on or in view of each entrance to the building.

103.5.2 Hearings. Except where otherwise specifically provided, all hearings held pursuant to this code shall be conducted by the jurisdiction's Director of Houston Public Works or a representative, who shall hereinafter be referred to as the "hearing official." The director shall not designate any person to be a hearing official under this code who has taken any part in the investigation of the matter that is the subject of the hearing or any person who directly supervised the investigation. The hearing official shall consider only the evidence presented at the hearing in rendering a decision. The decision of the hearing official shall be set forth in writing and shall be served on each party in the same manner as a notice of right to a hearing.

104.3.2 Plan review fees. Where a plan or other data is required to be submitted in accordance with Section 104.3.1, a plan review fee shall be paid at the time of submitting construction documents for review.

The plan review fees for mechanical systems work shall be charged as described in Section 118.1.11 of the *Building Code* and the city fee schedule—determined and adopted by this jurisdiction.

The plan review fees specified in this subsection are separate fees from the permit fees ~~specified in Section 104.5.~~

~~Where plans are incomplete or changed so as to require additional review, a fee shall be charged at the rate shown in Table 104.5.~~

When approved plans are lost or changed so as to require an additional plan review or when a plan review is required and there is no building permit required, a plan review fee shall be charged as described in Section 118.2.8 of the *Building Code* and the city fee schedule.

104.3.2.1 Deferred Submittal Plan Review Fees. A plan review fee shall be paid at the time of submitting construction documents for review of deferred submittal plans. The fee for any deferred submittal review shall be charged at the rate shown in the city fee schedule for a minimum permit fee plus applicable administrative fee. The plan review fees specified in this subsection are separate fees from the permit fees.

104.3.3 Time Limitation of Application. An application for which no permit is issued within 180 days following the date of application shall become inactive, and plans and other data submitted for review thereafter shall be returned to the applicant or destroyed by the Authority Having Jurisdiction. The building official is authorized to grant one or more extensions of time for additional periods not to exceed 180 days each, for a maximum of

two years from the date of the original application, upon written request and justifiable cause demonstrated by the applicant. If an application for permit does not result in a permit within two years after the date of original application, the permit application shall expire. In order to renew action on an application after expiration, the applicant shall submit a new permit application and plans and shall pay a new plan review fee. Applications for which no permit is issued within 180 days following the date of application shall expire by limitation, plans and other data submitted for review thereafter, shall be returned to the applicant or destroyed by the Authority Having Jurisdiction. The Authority Having Jurisdiction *building official* shall be permitted to extend the time for action by the applicant for a period not to exceed 180 days upon request by the applicant showing that circumstances beyond the control of the applicant have prevented action from being taken. No application shall be extended more than once. In order to renew action on an application after expiration, the applicant shall resubmit plans and pay a new plan review fee.

104.4.2 Validity of Permit. The issuance of a permit or approval of construction documents plans and specifications shall not be construed to be a permit for, or an approval of, a violation of the provisions of this code or other ordinance of the jurisdiction. No permit presuming to give authority to violate or cancel the provisions of this code shall be valid.

The issuance of a permit based upon plans construction documents, specifications, or other data shall not prevent the Authority Having Jurisdiction from thereafter requiring the correction of errors in said plans the construction documents, specifications, and other data or from preventing building operations being carried on thereunder where in violation of this code or of any other applicable law ordinances of this jurisdiction.

A permit and all its privileges are issued to the owner of the property for which the permit is issued, regardless of who submits the application or pays the permit fees. Where a Texas license is not required to obtain a mechanical permit or complete the proposed mechanical work, Section 105.4 of the *Building Code* shall apply. Where a Texas license is required to perform specific work, a permit shall be valid only for work performed under the licensed mechanical contractor or licensed HVAC contractor named on the application.

A name change on an application or an existing permit must be obtained if the licensed mechanical contractor or licensed HVAC contractor listed on the application or existing permit is no longer responsible for the work performed. Provided that a refund has not been issued, the property owner has not changed, and written authority to amend the permit to designate a different licensed mechanical contractor or licensed HVAC contractor has been provided by the property owner to the building official, the building official shall issue an amended permit. A name change fee and an administrative fee shall be charged as provided in Section 118.1 of the *Building Code* and the city fee schedule.

In the case of the death or dissolution of the original property owner or licensed mechanical contractor or licensed HVAC contractor, pursuant to a timely name change request within 45 calendar days after such death or dissolution, the permit will be transferred to the new property owner or licensed mechanical contractor or licensed HVAC contractor at no fee except for the administrative fee established in Section 118.1.1. of the *Building Code* and the city fee schedule. A property owner, licensed mechanical contractor or licensed HVAC contractor requiring a re-permit who fails to re-permit any applicable work within the time frames established by this code shall be subject to permit fees

established in Section 118 of the *Building Code* and the city fee schedule based on the scope of work for all remaining construction and uninspected work.

104.4.3 Expiration. ~~A Every permit issued by the Authority Having Jurisdiction under the provisions of this code shall become inactive unless expire by limitation and become null and void where the work authorized by such permit is not has commenced and been inspected by a city inspector within 180 days after its issuance, or if from the date of such permit, or where the work authorized by such permit is suspended or abandoned at a time after the work is commenced for a period of 180 days after the time the work was commenced. Before such work is recommenced, a new permit shall first be obtained to do so, and the fee therefore shall be one-half the amount required for a new permit for such work, provided no changes have been made or will be made in the original construction documents for such work, and provided further that such suspension or abandonment has not exceeded 1 year. If work has not commenced under a permit within two years after the date of issuance or is suspended or abandoned at any time for a period of two years, the permit shall expire and become null and void. To recommence work under an expired permit, the permit holder shall pay the full applicable permit fee and submit plans that comply with this code for the previously uninspected portion of the work.~~

Exception: For the purpose of issuing a certificate of occupancy or certificate of compliance, the building official may, upon request, reactivate a permit and perform a final inspection of work.

104.4.4 Extension. ~~A permittee holding an unexpired permit shall be permitted to apply for an extension of the time within which work shall be permitted to commence under that permit where the permittee is unable to commence work within the time required by this section. The Authority Having Jurisdiction shall be permitted to extend the time for action by the permittee for a period not exceeding 180 days upon written request by the permittee showing that circumstances beyond the control of the permittee have prevented action from being taken. No permit shall be extended more than once. In order to renew action on a permit after expiration, the permittee shall pay a new full permit fee. The building official is authorized to grant, in writing, one or more extensions of time, for periods not more than 180 days each. The permit holder shall request the extension in writing and demonstrate justifiable cause.~~

104.4.5 Suspension or Revocation. ~~The After notice is provided of a right to a hearing pursuant to Section 103.5, the Authority Having Jurisdiction shall be permitted to, in writing, suspend or revoke a permit issued under the provisions of this code where the permit is issued in error, on the basis of incorrect information supplied, or in violation of other ordinance or regulation of the jurisdiction.~~

104.5 Fees. Fees shall be assessed in accordance with the provisions of this section and as set forth in the city fee schedule, Table 104.5. ~~The fees are to be determined and adopted by this jurisdiction.~~

104.5.1 Work Commencing Before Permit Issuance. Where work for which a permit is required by this code has been commenced without first obtaining said permit, a special investigation shall be made before a permit is issued for such work.

104.5.2 Investigation Fees. An investigation fee, in addition to the permit fee, shall be collected whether or not a permit is then or subsequently issued. The investigation fee shall be equal to the amount of the permit fee that is required by this code if a permit were to be issued, subject to applicable minimum investigation fees stated in the city fee

schedule. The payment of such investigation fee shall not exempt a person from compliance with other provisions of this code, nor from a penalty prescribed by law.

104.5.3 Fee Refunds. ~~The Authority Having Jurisdiction shall be permitted to authorize the refunding of a fee as follows:~~

~~(1) — The amount paid hereunder that was erroneously paid or collected.~~

~~(2) — Refunding of not more than a percentage, as determined by this jurisdiction where no work has been done under a permit issued in accordance with this code.~~

The building official may authorize the refund of any fee paid hereunder that was erroneously paid or collected due to an error by a city employee. This provision shall not be applicable if the error occurred because of incorrect information provided by the applicant.

The building official may authorize a refund of not more than 90 percent of the amount in excess of the minimum permit fee paid when no work has been done under a permit issued in accordance with this code. If work has been done under the permit, no refund shall be authorized. The originally paid administrative fee and the plan review portion of the permit fee shall be nonrefundable.

The building official Authority Having Jurisdiction shall not authorize a refunding of any fee paid except upon written application filed by the original permittee holder not to exceed later than 180 calendar days after the date of fee payment.

104.5.4 Annual Fee Increase. Notwithstanding any maximum fee established pursuant to the *Construction Code*, the fees in this volume of the *Construction Code*, as adjusted according to this section, shall be automatically increased on the first day of each subsequent calendar year as provided in Section 1-13 of the *City Code*.

{EDITORIAL NOTE: DELETE TABLE 104.5 IN ITS ENTIRETY.}

105.2.6 Reinspections. The building official may assess a A-reinspection fee shall be permitted to be assessed for each inspection or reinspection when an inspector arrives to perform the inspection and finds the where such portion of work for which inspection is called is not complete or where required when corrections called for in a previous inspection report have not been made.

This provision section shall not to be interpreted as requiring reinspection fees the first time a job is rejected for failure to comply be in accordance with the requirements of this code, but as controlling the practice of calling for inspections before the job is ready for inspection or reinspection.

The building official may assess a reinspection fee Reinspection fees shall be permitted to be assessed where when the inspection record card is not posted or otherwise available on the work site, when the approved plans are not readily available to the inspector, for failure to provide access on the date for which the inspection is requested, or for deviating from plans requiring the approval of the Authority Having Jurisdiction.

To obtain reinspection, the applicant shall file an application therefore in writing upon a form furnished for that purpose make a request and pay the reinspection fee in accordance with Table 104.5 Section 118 of the *Building Code* and the city fee schedule.

In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

105.4.1 Temporary Operation Inspection. For inspection of a boiler or a heating, ventilation, refrigeration, or air-conditioning system to be used on a temporary basis, a licensed air-conditioning contractor shall request the inspection and pay the fee stated for this provision in the city fee schedule. If the system is not approved for temporary operation on the first inspection, the reinspection fee will be charged for each subsequent inspection for such purpose.

No permit for temporary use shall be valid for a period longer than 30 calendar days. The Authority Having Jurisdiction is authorized to reissue a temporary permit upon payment of the fees stated for this provision in the city fee schedule for each successive period of not more than 30 days.

106.3 Penalties. A person, firm, or corporation violating or failing to comply with a provision of this code shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be punishable by the following penalties: where no specific penalty is otherwise provided in this code, a fine, of not less than \$500.00 and not more than \$2,000.00; imprisonment; or both set forth by the governing laws of the jurisdiction. Each separate day, or a portion thereof, during which a violation of this code occurs or continues, shall be deemed to constitute a separate offense. Where any conduct in violation of this code also constitutes a violation of state penal law, the offense shall be punishable as provided in the applicable state law. In prosecutions under this code, the various provisions hereof that are designated as an “exception” or “exceptions” shall not be treated as exceptions within the meaning of Section 2.02 of the *Texas Penal Code*, and instead, they shall constitute defenses to prosecution within the meaning of Section 2.03 of the *Texas Penal Code*.

106.4 Stop Work Orders. Where work is being done contrary to the provisions of this code, the Authority Having Jurisdiction shall be permitted to order the work stopped by notice in writing served on persons engaged in the doing or causing such work to be done, and such persons shall forthwith stop work until authorized by the Authority Having Jurisdiction to proceed with the work.

At the time a stop work order is issued, the person performing the work and the permit holder shall be given notice of a right to a hearing on the matter pursuant to Section 103.5. On written request from the permit holder, such a hearing shall be held within three business days from the issuance of the stop work order unless the permit holder or person who was doing the work requests an extension of time. Any stop work order that has been issued shall remain in effect pending any hearing that has been requested unless the stop work order is withdrawn by the Authority Having Jurisdiction.

106.5 Authority to Disconnect Utilities in Emergencies. The Authority Having Jurisdiction shall have the authority to disconnect a mechanical system to a building, structure, or equipment regulated by this code in case of emergency where necessary to eliminate an immediate hazard to life or property. The Authority Having Jurisdiction shall, wherever possible, notify the serving utility, the owner, and the occupant of the building, structure, or premises of the decision to disconnect prior to taking such action, and shall notify such serving utility, owner, and occupant of the building, structure, or premises in writing of such disconnection immediately thereafter.

The notice shall also inform the owner and the occupant of the building (or the user if the mechanical equipment is not within a building) of a right to a hearing on the matter pursuant to

Section 103.5. On request, a hearing shall be conducted within three business days unless the owner or the owners authorized agent requests an extension of time.

106.6 Authority to Condemn. Where the Authority Having Jurisdiction ascertains that a mechanical system or portion thereof, regulated by this code, has become hazardous to life, health, or property, or has become insanitary, the Authority Having Jurisdiction shall order in writing that such mechanical system either be removed or placed in a safe or sanitary condition. The order shall specify a reasonable time limit for compliance of not less than three days from the date of the order's issuance and shall inform the owner and the occupant of the right to a hearing on the matter pursuant to Section 103.5. No person shall use or continue using~~maintain~~ a defective mechanical system after receiving such notice.

Where such mechanical system is to be disconnected, written notice shall be given to the owner, or the occupant of the building as specified by Section 106.5. In cases of immediate danger to life or property, such disconnection shall be permitted to be made immediately without such notice.

107.0 Board of Appeals Boards and Licenses.

107.1 General. ~~In order to hear and decide appeals of orders, decisions, or determinations made by the Authority Having Jurisdiction relative to the application and interpretations of this code, there shall be and is hereby created a Board of Appeals consisting of members who are qualified by experience and training to pass upon matters pertaining to mechanical system design, construction, and maintenance and the public health aspects of mechanical systems and who are not employees of the jurisdiction. The Authority Having Jurisdiction shall be an ex-officio member and shall act as secretary to said board but shall have no vote upon a matter before the board. The Board of Appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business and shall render decisions and findings in writing to the appellant with a duplicate copy to the Authority Having Jurisdiction.~~ The Mechanical Code Review Board and the Boiler Code Review and Licensing Board shall hear and decide appeals of orders, decisions or determinations made by the Authority Having Jurisdiction relative to the application and interpretations of this code, as applicable. (See Sections 110 and 111.)

107.2 Limitations of Authority. ~~The Board of Appeals aforesaid boards shall have no authority relative to interpretation of the administrative provisions of this code, which shall be the purview of the General Appeals Board (see Section 113 of the *Building Code*), unless otherwise specified, nor shall the aforesaid boards be empowered to waive requirements of this code.~~

108.0 Emergency Work.

108.1 General. Notwithstanding any requirement in this code or in the *Construction Code* that requires the issuance of a permit under this code prior to commencing work or that imposes an additional fee for work commenced without a permit being first obtained, a permit or additional fee is not required to commence work if:

- (1) The work involves the emergency repair or replacement of an existing air-conditioning, heating, ventilation or refrigeration system;
- (2) The work needs to be commenced immediately in order to protect property or to preserve the health of persons;

- (3) Notice is given to the Authority Having Jurisdiction by mail, telephone, email, fax or other approved method when the work was commenced; and,
- (4) A permit is then obtained within 48-hours as provided in Subsection 108.2.

The Authority Having Jurisdiction shall promulgate regulations and forms as required to administer this section.

108.2 Time Limit for Obtaining Permit. The licensed contractor, in order to avoid penalties for failure to obtain a permit prior to commencing such emergency work, in addition to complying with Section 108.1, must also apply for a permit for the emergency work within 48 hours after 8:00 a.m. of the first day that the city permit office is opened for business after the date on which the contractor commences such repair or replacement.

108.3 Operation of System. If the repair or replacement is completed prior to the time that the licensed air-conditioning contractor is required to apply for a permit under these provisions, at the contractor's sole risk and responsibility for any and all injuries and damages that might result therefrom, the contractor may place the system or equipment in operation, provided that the contractor then remains at the job site and checks the operation for a period of at least 15 minutes before leaving the premises. The contractor shall instruct the occupant of the premises or the person in charge of the premises regarding the manner in which the system or equipment may be immediately shut off in case of malfunction in its operation and shall provide the aforesaid occupant or person with a telephone number(s), where the licensed contractor can be reached in case of an emergency resulting from operation of the system or equipment prior to inspection by the jurisdiction.

108.4 Emergency Appeal. In the event of a dispute between the jurisdiction's inspector and the licensed air-conditioning and refrigeration contractor doing the job as to the existence of the emergency requiring the commencing of the job without a permit, the dispute shall be first considered by the Authority Having Jurisdiction. The contractor may appeal the decision of the Authority Having Jurisdiction to the Mechanical Code Review Board or Boiler Code Licensing and Review Board, as applicable, for its consideration and decision. In reviewing the decision of the Authority Having Jurisdiction, the Board shall base its decision on the evidence and testimony presented by both parties.

109.0 Temporary Operation Permit.

109.1 General. Any heating, ventilating, refrigerating or air-conditioning system being altered or installed by authority of a permit issued under the provisions of this code may be operated for limited periods of time only for testing purposes prior to passing final inspection, on the following conditions:

- (1) The licensed air-conditioning contractor in whose name said permit is issued shall request that the Authority Having Jurisdiction inspect the system.
- (2) If, upon inspection, the system is approved for operation for testing purposes, the Authority Having Jurisdiction shall indicate the length of time that the system may be operated for testing purposes, based upon the size and type of system and the extent of the installation or alteration involved.
- (3) Upon expiration of the temporary operation permit for testing purposes, the system shall be given a final inspection. If the system is not approved, a reinspection fee will be charged on all subsequent inspections until the system is approved as complying with the requirements of the code, or is uninstalled.

109.2 Extension of Time. The time period permitted for operating the system for testing purposes only may be extended by the Authority Having Jurisdiction when necessary to complete the testing of the system to determine that it is operating safely. The extension of such time period shall be noted in writing on the permit, and the system shall still be subject to Section 109.1(3).

For the temporary operation permit fee, see the city fee schedule.

110.0 Mechanical Code Review Board.

110.1 Creation of Board. There is hereby created a Mechanical Code Review Board, hereinafter in this section called the "board," consisting of seven members. Each member of the board except the members in Position Nos. 1 and 2 shall be appointed by the mayor and confirmed by the city council. The mayor shall designate a member to be chairperson. The contractor members filling Position Nos. 5 and 6 shall have been actively engaged in the air-conditioning business in the jurisdiction for at least five years prior to the date of their appointment.

The positions on said board shall be filled as follows:

Position No. 1 shall be filled by the Authority Having Jurisdiction.

Position No. 2 shall be filled by the fire marshal of the jurisdiction.

Position No. 3 and 4 shall each be filled by a registered professional engineer licensed by the State of Texas who is actively engage in mechanical engineering.

Position No. 5 shall be filled by a duly licensed Class A air-conditioning and refrigeration contractor licensed under the Texas Air Conditioning and Refrigeration Contractor License Law.

Position No. 6 shall be filled by a duly licensed Class B air-conditioning and refrigeration contractor licensed under the Texas Air Conditioning and Refrigeration Contractor License Law.

Position No. 7 shall be filled by a representative of the public generally.

The Authority Having Jurisdiction and the fire marshal each, from time to time, may designate in writing a person under their supervision to act in their place as their duly authorized representative. The representative shall enjoy all rights and privileges of the position. A copy of such a designation, specifying the dates any such person shall act as representative of the Authority Having Jurisdiction or of the fire marshal, shall be filed with the minutes of the board.

The terms of office for the appointees to Position Nos. 3, 5 and 7 on the board will expire on the second day of January of odd-numbered years. The terms of office for the appointees to Position Nos. 4 and 6 will expire on the second day of January of even-numbered years. However, each member shall continue in office until a successor has been appointed and qualified.

Those members of the board in Position Nos. 1 and 2 shall serve ex officio.

The amendment of this code section shall not terminate the term of office of any person currently serving on the board. Any person who is currently serving on the board shall continue to serve in the position for which he was appointed and confirmed until a successor is appointed and qualified.

In addition to other qualifications hereinabove required, each member of the board shall be a citizen of the United States. All appointed members of the board shall be selected on the basis of their technical and professional qualifications, except that the appointee to Position No. 7 is not required to have the technical and professional qualifications required for other members

of the board. Each member of the board shall be subject to removal by the mayor. Four members of the board at any meeting shall constitute a quorum for transaction of all business of the board. A majority vote of the members present at any meeting at which a quorum is present shall prevail.

Whenever any position on the board becomes vacant by reason of death, resignation or removal, said vacancy shall be filled for the unexpired term of the member being replaced. Should a vacancy occur on the board, the mayor shall appoint, with the approval of the city council, another qualified person to serve the unexpired term of the vacancy.

The board shall hold regular annual meetings in Houston, Texas, the exact time and place to be designated by the chairperson of the board, who is also authorized to call special meetings when deemed necessary. The Authority Having Jurisdiction, or a duly authorized representative, shall act as secretary of the board. Each member of the board shall receive \$50.00 for each meeting the member attends (not to exceed three meetings in a calendar month) at which a quorum is present, provided, however, each member of the board who is an employee of the jurisdiction will be paid only for those meetings the member attends that are neither held during nor continue beyond the member's regular working hours.

The secretary of the board shall keep the minutes of the board meetings and other business of the board, including correspondence received and sent by the board. The minutes of the board shall be public records available for inspection by the public at all reasonable times.

110.2 Duties. The board shall serve as the Board of Appeals for matters relating to the provisions of this code and shall serve in an advisory capacity to the Authority Having Jurisdiction in technical matters pertaining to provisions of this code. In addition, the board is hereby authorized to perform such other duties as specified in this division and to make recommendations to city council regarding the provisions of this code pertaining to or affecting air-conditioning, ventilation, or refrigeration.

Exception: As provided by Section 111 of this code, matters within the jurisdiction of the Boiler Code Review and Licensing Board shall be heard by that board.

110.3 Restriction on Participation in Certain Matters. No board member shall vote on any matter or participate as a board member in the discussion of any matter in which the member has a personal or financial interest other than as a member of a class or group, of which each member will be affected substantially to the same extent by the board's action or decision in the matter as will the other members of the class or group. (For restrictions on jurisdiction officials, see Chapter 171 of the *Texas Local Government Code*.)

110.4 Approval of New Materials. A person, firm, or corporation (hereinafter called "person") desiring approval of any material, device, fixture, method of assemblage, installation, appurtenance, or appliance that is a part of or pertains to heating, air-conditioning, ventilation, refrigeration or heat-producing appliances or systems (hereinafter individually and collectively referred to as "item") may submit the item to the Authority Having Jurisdiction for approval along with a written application containing such information as the Authority Having Jurisdiction may require for determination of approval under Section 302.2.

If the Authority Having Jurisdiction denies a request for an approval, the person who made the request may appeal that decision by delivering a written notice of appeal to the secretary of the board within 10 days of receipt of the notice of the decision of the Authority Having Jurisdiction. Upon receipt of the notice of appeal, the board shall set the matter for hearing. The board may request any additional tests be conducted that it finds are necessary to determine whether the decision of the Authority Having Jurisdiction should be upheld or overturned. All such tests shall be at the expense of the person requesting the approval. The burden shall be on that person to show that the decision of the Authority Having Jurisdiction should be overturned.

The decision of the board upholding or overturning the decision of the Authority Having Jurisdiction shall be set out in the minutes of the board. If the board overturns the decision of the Authority Having Jurisdiction, it shall set forth in its minutes any conditions or limitations to which the approval is made subject.

110.5 Appeals. Any owner, user, license applicant, license holder, or interested person who is affected and aggrieved by a decision of the board may appeal the board's decision to the city council, pursuant to Rule 12 of Section 2-2 of the *City Code*.

Upon appeal to the city council from the board's decision, the board's secretary shall file with the city secretary a copy of the minutes of the board setting forth the board's decision and a copy of any minutes of the board reflecting any discussion or motions concerning the matter. Upon receipt of all materials required by the city secretary's Office, the city secretary shall set the matter for consideration.

All orders or decisions of the Authority Having Jurisdiction shall be in writing and shall be and remain in full force and effect until reversed, suspended, cancelled or annulled by the board or the city council.

The decision of the city council shall be final.

110.6 License Required. Except as otherwise provided herein, a person who does not hold a current and applicable license as required by the Texas Air Conditioning and Refrigeration Contractor License Law shall not install, alter or repair any heating, ventilating, air-conditioning or refrigeration system, or any part thereof, or obtain any permit to do so.

Note: The Texas Air Conditioning and Refrigeration Contractor Licensing Law, which is codified as Chapter 1302 of the *Texas Occupations Code*, includes certain exemptions from the requirement of obtaining a state license, which will be honored by this jurisdiction. These exemptions include: work performed by homeowners on their own homes, certain maintenance work by employees of the property owner or management company, certain work performed by employees of regulated electric and gas utility companies, and certain work performed by licensed professional engineers in connection with their business operations.

110.7 State License Notification Requirement. Each person licensed under the Texas Air Conditioning and Refrigeration Contractor License Law shall notify and register his notification with the Authority Having Jurisdiction in a form and manner prescribed by the Authority Having Jurisdiction prior to performing any work pertaining to that license within the jurisdiction. The notification shall be registered and maintained on file within the jurisdiction offices of the Mechanical Inspections Section, Code Enforcement Branch, Houston Public Works. Each notification registration shall expire on December 31 of each year. Additionally, a notification registration shall expire upon the registrant's failure to provide proof of current insurance coverage or proof of license renewal.

110.8 Liability Insurance. Each person who is required to register shall, upon registration and continuously thereafter for as long as the registration is renewed, maintain proof of current liability insurance coverage in the amount and form specified in applicable state laws and regulations. The proof shall be in the form of a copy of the certificate furnished to the state and evidence that the carrier of the insurance will provide 10 days' notice to the Authority Having Jurisdiction in the event that the policy is reduced or terminated prior to the expiration date specified on the certificate.

110.9 Violations. It shall be unlawful for any person, partnership, firm or corporation who is not licensed under the Texas Air Conditioning and Refrigeration Contractor License Law to display a

sign or advertise in any other manner that such person, partnership, firm or corporation is authorized to engage in business as an air-conditioning and refrigeration contractor.

It shall be unlawful for a licensed air-conditioning and refrigeration contractor to:

- (1) Permit a license to be used in any manner contrary to any of the provisions of this code;
- (2) Obtain a permit required under this code in another person's name or allow the use of his name by another person for the purpose of obtaining a permit when the licensed air-conditioning and refrigeration contractor does not intend to or does not, in fact, do or supervise the work authorized by the permit; or,
- (3) Take out permits for air-conditioning work to be done by a person, partnership, firm or corporation other than the person, firm, partnership, or corporation by whom the permittee is employed.

Licensed air-conditioning and refrigeration contractors shall not be simultaneously employed by, or work for, more than one business entity for the purpose of obtaining permits under this code or for the purpose of doing or supervising work that can be done only by authority of a permit obtained under the provisions of this code.

110.10 Identification of Vehicles and Sites. Each vehicle used in conjunction with air-conditioning and refrigeration contracting shall be marked as required by Title 16 Texas Administration Code Section 75.71(g). When an unlicensed subcontractor is at a job site not identified by a marked vehicle, the site shall be identified either by a temporary sign on the subcontractor's vehicle or on a sign visible and readable from the nearest public street containing the contractor's license number and company name.

110.11 Contractor Records. Each time that a licensed air-conditioning and refrigeration contractor or any employee thereof does any installation, replacement, or repair of any type on any air-conditioning, refrigeration, ventilation or heating system, or combination of such systems, the contractor shall make a record of the work. The contractor shall readily make available the records, upon request, for inspection and copying by the Authority Having Jurisdiction and the contractor must hold the records on file for at least two years. Before leaving the premises where the work is performed, the contractor shall deliver one copy of the record to the owner or the owner's representative. These records shall contain the following information:

- (1) Name and address of licensed contractor.
- (2) License number of licensed contractor.
- (3) Name of owner.
- (4) Date.
- (5) General nature of work performed.
- (6) Any other information required by applicable provisions of the Texas Air Conditioning and Refrigeration Contractor License Law and regulations issued thereunder.

111.0 Boiler Code Review and Licensing Board.

111.1 Creation and Composition. There is hereby created a Boiler Code Review and Licensing Board consisting of five members, hereinafter in this section called the "board." The members in Position Nos. 1 through 4 of the board shall be appointed by the mayor and confirmed by the city council. The mayor shall designate a member to be chairperson. Each of the five positions shall be filled as follows:

Position No. 1 shall be filled by a registered professional engineer licensed by the State of Texas who is actively engaged in the design of mechanical systems using boilers as a source of heat energy.

Position No. 2 shall be filled by an owner, partner, officer, or manager of a firm that is actively engaged in the manufacture, sale, repair or installation (or combination thereof) of boilers.

Position No. 3 shall be filled by a licensed stationary engineer who has held a first-grade license issued by the jurisdiction for not less than 10 years.

Position No. 4 shall be filled by a person who is an owner, partner, officer, or manager of a firm that is the user of a boiler.

Position No. 5 shall be filled by the Authority Having Jurisdiction.

The Authority Having Jurisdiction, from time to time, may designate in writing a member of the jurisdiction's Boiler Inspection Section to act in his place as a duly authorized representative. The representative shall enjoy all rights and privileges of the position. A copy of the designation, specifying the dates such a person shall act as representative of the Authority Having Jurisdiction, shall be filed with the minutes of the board.

111.2 Appointments, Removals, Etc. The terms of office for the appointees to Position Nos. 1 and 3 shall expire on the second day of January of odd-numbered years, and the terms of the appointees to Position Nos. 2 and 4 shall expire on the second day of January of even-numbered years. However, each member shall continue in office until a successor is appointed and qualified. The amendment of this code section shall not terminate the term of office of any person currently serving in any position of the board. Any appointed member who is currently serving on the board shall continue to serve in the position to which he was appointed and confirmed until a successor is appointed and confirmed by city council under this code. Each appointed member of the board shall be subject to removal at any time by the mayor. Each member of the board shall receive \$50.00 for services for each meeting of the board the member attends at which a quorum is present, provided, however, each member of the board who is an employee of the jurisdiction shall be paid only for those meetings that are not held during the board member's regular working hours.

Three members of the board present at any meeting shall constitute a quorum for the transaction of all business of the board. A majority vote of board members present at any meeting at which a quorum is present shall prevail.

The board shall meet twice each month. The chairperson shall have the power to call a special session of the board when deemed necessary, but no more than three meetings may be held in any month. In the absence of the chairperson at any meeting, the board members present may, by majority vote, select a temporary chairperson for that meeting.

111.3 Restriction on Participation in Certain Matters. No board member shall vote on any matter or participate as a board member in the discussion of any matter in which the member has a personal or financial interest other than as a member of a class or group, of which each member will be affected substantially to the same extent by the board's action or decision in the matter as will the other members of the class or group. (For restrictions on jurisdiction officials, see Chapter 171 of the *Texas Local Government Code*.)

111.4 Records. The board shall keep or cause to be kept a written record of its meetings. The records shall be open to inspection by the public at all reasonable times.

111.5 Authority Having Jurisdiction. The Authority Having Jurisdiction is hereby charged with determining compliance with the provisions of this code. The Authority Having Jurisdiction shall

prepare and maintain a record of all persons qualified to install and operate boilers under the provisions of this code. The Authority Having Jurisdiction or duly appointed representative shall act as secretary to the board at all meetings.

111.6 Examinations. The board shall develop and administer examinations for stationary engineer's licenses. The examinations shall determine the applicant's capacity and ability to understand and safely operate boilers, steam equipment and the various auxiliary machinery, appliances and appurtenances in conjunction with the operation of such boilers and steam equipment. The board shall perform such other duties as may be required of it by the governing body and mayor of the jurisdiction. The board shall adopt rules and regulations which, insofar as they relate to boilers, shall conform to the ASME Code and shall not be inconsistent with the terms and provisions of this code.

111.7 Review and Action of the Boiler Board. Disputes arising between inspectors and any person or persons concerning the application of the provisions of this code to the installation of boiler facilities serving the property of such person or persons may be submitted to the Authority Having Jurisdiction. An interested party (other than an inspector) who is dissatisfied with the decision of the Authority Having Jurisdiction in the matter may appeal that decision to the board. Upon such an appeal, each party to the dispute shall be entitled to present its side of the matter to the board, and the board shall render its decision on the matter based on the information presented by both sides and the board's interpretation of applicable provisions of this code.

The board shall have the power, by a majority vote, to revoke or cancel a stationary engineer's license, operator's license, or operator's permit for dishonesty, incompetency, or misconduct by the license or permit holder while discharging his duties or for neglect of his duties.

No license or permit shall be permanently revoked or canceled without first giving the license or permit holder an opportunity to be heard by the board. The Authority Having Jurisdiction shall provide notice of a right to a hearing on the matter pursuant to Section 103.5.

The Authority Having Jurisdiction shall have the authority to suspend for just cause a stationary engineer's license, operator's license, or operator's permit. The holder of a suspended license or permit shall not engage in activities authorized by the license or permit while such license or permit is suspended but shall be given an opportunity to be heard by the board within five working days after delivering to the Authority Having Jurisdiction a written request for a hearing.

111.8 Review of New Materials, Methods and Revisions to the Code. Any person whose boiler products are not approved under this code may file a petition in writing for approval thereof. The petition shall be delivered to the Authority Having Jurisdiction, who shall determine whether the material or method should be approved pursuant to Section 302.2 of this code. If the Authority Having Jurisdiction denies approval of the material or method, the person who made the request may appeal that decision by delivering a written notice of appeal to the secretary of the board within 10 days of receipt of the notice of the decision of the Authority Having Jurisdiction. Upon receipt of the notice of appeal, the board shall set the matter for hearing. The board may request any additional tests be conducted that it finds are necessary to determine whether the decision of the Authority Having Jurisdiction should be upheld or overturned. All such tests shall be at the expense of the person requesting the approval. The burden shall be on that person to show that the decision of the Authority Having Jurisdiction should be overturned.

The decision of the board upholding or overturning the decision of the Authority Having Jurisdiction shall be set out in the minutes of the board. If the board overturns the decision of the Authority Having Jurisdiction, it shall set forth in its minutes any conditions or limitations to which the approval is made subject.

The board shall receive requests for revisions to those provisions of this code that affect matters relating to boilers, and it shall be the duty of the board to recommend to the city council any changes to this code that the board deems necessary. The board shall make a report to the city council annually stating its recommended changes.

111.9 Appeals. Any owner, user, license applicant, license holder, or interested person who is affected and aggrieved by a decision of the board may appeal the board's decision to the city council, pursuant to Rule 12 of Section 2-2 of the City Code.

Upon appeal to the city council from the board's decision, the board's secretary shall file with the city secretary a copy of the minutes of the board setting forth the board's decision and a copy of any minutes of the board reflecting any discussion or motions concerning the matter. Upon receipt of all materials required by the city secretary's Office, the city secretary shall set the matter for consideration.

All orders or decisions of the Authority Having Jurisdiction shall be in writing and shall be and remain in full force and effect until reversed by the board or the city council or suspended, cancelled or annulled.

The decision of the city council shall be final.

112.0 Stationary Engineer's License.

112.1 License. Persons who desire to secure a stationary engineer's license shall apply to the board and pay to the Authority Having Jurisdiction the applicable fee stated in the city fee schedule.

Licenses shall be granted in three grades:

- (1) A first-grade stationary engineer's license authorizes the licensee to have direct charge of, operate or supervise any power boiler of any size.
- (2) A second-grade stationary engineer's license authorizes the licensee to have direct charge of, operate, and supervise any power boiler having an aggregate amount of heat output not to exceed 8,380,000 Btu per hour and to act as assistant or watch engineer under the charge and supervision of the holder of a first-grade stationary engineer's license of any power boiler.
- (3) A third-grade stationary engineer's license authorizes the licensee to have direct charge of, operate, or supervise any power boiler having an aggregate amount of heat output not to exceed 3,352,000 Btu per hour and to act as assistant or watch engineer under the charge and supervision of the holder of a first- or second-grade stationary engineer's license of any power boiler having an aggregate amount of heat output not to exceed 8,380,000 Btu per hour.

112.2 Stationary Engineer Examination Application. An applicant for a first-grade stationary engineer's license shall present to the board service letters showing that he has: (i) at least four years of hands-on boiler operating experience on boilers used to heat water or liquid for environmental heating or commercial processing purposes or for generating steam or vapor by direct application of heat; (ii) a graduation certificate from an accredited engineering school and at least two years of hands-on boiler operating experience with boilers used to heat water or liquid for environmental heating or commercial processing purposes or for generating steam or vapor by direct application of heat; or (iii) a United States Department of Labor diploma showing the applicant finished a full three-year course as an apprentice stationary engineer and two years of hands-on boiler operating experience with boilers used to heat water or liquid for environmental

heating or commercial processing purposes or for generating steam or vapor by direct application of heat.

An applicant for a second-grade stationary engineer's license shall present to the board service letters showing that he has: (i) at least three years of hands-on boiler operating experience with boilers used to heat water or liquid for environmental heating or commercial processing purposes or for generating steam or vapor by direct application of heat; or (ii) a graduation certificate from an accredited engineering school and at least one year of hands-on boiler operating experience on boilers used to heat water or liquid for environmental heating or commercial processing purposes or for generating steam or vapor by direct application of heat.

An applicant for a third-grade stationary engineer's license shall present to the board service letters showing that he has: (i) at least two years of hands-on boiler operating experience with boilers used to heat water or liquid for environmental heating or commercial processing purposes or for generating steam or vapor by direct application of heat; or (ii) a graduation certificate from an accredited engineering school and at least six months of hands-on boiler operating experience on boilers used to heat water or liquid for environmental heating or commercial processing purposes or for generating steam or vapor by direct application of heat.

No person may take an examination for a stationary engineer's license unless he has submitted the service letters, certificates, and/or diplomas to the board as required by this section and the submitted documents have been accepted by the board.

Applicants will be required to correctly answer at least 70 percent of the questions comprising the examination to qualify for a stationary engineer's license of any grade. All questions and answers will be written in the English language.

An applicant for a stationary engineer's license who fails to satisfactorily pass an examination shall not be entitled to a refund of the examination fee paid to the jurisdiction and shall not be reexamined for the grade in which the applicant failed, or examined for a higher grade, within a period of less than 30 days.

Each applicant shall pay the examination fee stated for this provision in the city fee schedule for each examination for which the applicant applies. The fee is to be paid to the Authority Having Jurisdiction at the time the application is filed. Service letters shall be filed with the application. An applicant shall be eligible for examination on the date of the next regularly scheduled examination that is held at least seven days after the date of application.

Applicants who have successfully passed the examination shall pay the license fee stated for this provision in the city fee schedule to the Authority Having Jurisdiction prior to the issuance of the license. The license shall expire on December 31 of the year of issuance, unless suspended or *revoked*. Thereafter, the license may be renewed annually pursuant to the provisions set forth below. The receipt for payment of a license renewal fee shall be displayed with the license. Failure to do so shall constitute grounds for the suspension or *revocation* of the license.

112.3 License Renewals. License renewals shall be granted without reexamination upon payment of the fee stated for this provision in the city fee schedule, provided such fee is paid within 30 days after the expiration date of the license and not thereafter. When a renewal application is filed more than 30 days after the expiration of the license, the fee for renewal shall be as stated for this provision in the city fee schedule. When the annual license renewal fee has not been paid for a period of *five consecutive* years, the license shall not be renewed until the applicant has successfully passed a reexamination.

Each certificate or license issued under the terms and provisions of this section shall be signed by the person to whom it was issued as required by the board.

112.4 Validity, Replacement of License. When the holder of a license is examined by the board and granted a license in a higher grade, the higher-grade license shall not be issued until the license of the lower grade is surrendered and all required fees are paid to the Authority Having Jurisdiction.

When a license becomes lost or destroyed, the board shall grant a new license in the same grade, provided proof of such loss or destruction is presented to the satisfaction of the board. The fee for a replacement license shall be stated for this provision in the city fee schedule. If the proof of such loss or destruction is not satisfactory to the board, reexamination in the same grade shall be required, and the fee for the reexamination shall be as provided in Section 112.2.

112.5 Reciprocity. A person who holds a current and valid marine engineer's license issued by the United States Coast Guard shall be qualified for examination by the board for a stationary engineer's license of equal or lower grade, provided the license fee set forth in Section 112.2 has been paid.

A person who holds a current and valid stationary engineer's or a steam engineer's license issued by a state, municipality, or government agency shall be qualified for examination by the board in the grade of the equivalent license in this jurisdiction, as determined by the board, provided the holder of the license presents proof to the satisfaction of the board that the license was granted as a result of boiler operating experience and a passing grade on a written examination on the operation, maintenance and repair of boilers and boiler accessories and safety rules for the boilers.

No license issued by a foreign government, graduation certificate from a foreign school, college, or university, or any service letter from an employer in a foreign country shall qualify the holder thereof to be examined by the board for a stationary engineer's license of any grade unless the submitted document and the information contained therein are determined valid by the board and equivalent to the standards prescribed above. Upon examination of the information presented, the board shall designate the grade in which the applicant may be examined, if such evidence is found by the board to be valid.

112.6 Expiration of License. Each license issued for stationary engineers that was in effect the day prior to the adoption of this code by city council shall expire on the 31st day of December of the year in which this code is adopted. Any such license may be renewed as though it had been originally issued pursuant to this code.

112.7 Limitations of Operator. Except as provided in Section 113.1, no person shall:

- (1) Have direct charge, control, or supervision of any power boiler; or,
- (2) Act as or perform the duties of a stationary engineer or assistant watch engineer on any power boiler.

Nor shall any owner, user or person operate or use, or cause or permit any boiler to be operated or used unless the persons responsible for the operation of the boiler have current and valid licenses for the applicable classes as required in Section 112.1.

112.8 Duties of the Certificate Holder. Each holder of a certificate of stationary engineer's license shall file with the board the name of the employer, the plant location, and the amount of Btu-per-hour heat output of the boiler that the holder is operating. Each holder of a stationary engineer's license shall enclose his license certificate under glass in a dustproof frame and shall display it in a conspicuous place in the plant where the holder is employed.

The operator's permit issued under Section 113.1 designating the person in charge of the boiler shall be enclosed under glass in a dustproof frame and prominently displayed as near as possible to the boiler to which the operator's permit applies.

112.9 Responsibility of the Boiler Owner or User. Every owner or user of a power boiler that has heat output that exceeds 2,100,000 Btu per hour shall establish a method of operation utilizing one or more licensed stationary engineers of the herein required license grade. The operating method shall include direct physical examination of the boiler by the licensed stationary engineer at reasonable time intervals to ensure its safe operation. The owner or user shall establish the operation method based on accepted boiler industry practices commensurate with load characteristics, use, and configuration of the boiler.

113.0 Boiler Operator's Permit.

113.1 Application, Issuance, Fee and Expiration. An owner or user of any hot-water-heating boiler, low-pressure hot-water-heating boiler, or steam-heating boiler at pressure of 15 pounds per square inch or less used to heat water or liquid for environmental heating or commercial processing purposes or a power boiler having an heat output that does not exceed 2,100,000 Btu per hour, may apply to the Authority Having Jurisdiction for a permit to allow the boiler to be operated by the owner or user or by a person knowledgeable in the operation of the boiler, instead of by a licensed stationary engineer. The person who is to operate the boiler shall be the owner of the boiler or his bona fide employee and shall demonstrate competency to do so in a manner determined by the board. The board shall establish the method of testing and the minimum knowledge, ability, and qualifications such person must demonstrate to show competency to operate the distinctive types of boilers. If a person demonstrates competency in the operation of the type of boiler for which the permit is sought, the permit shall be granted upon the payment of the permit fee stated in the city fee schedule. The permit shall expire on December 31st of each year, unless suspended or *revoked* before the expiration date.

113.2 Renewal Application and Fee. Renewal of such permits shall be granted upon the payment of the renewal fee stated for this provision in the city fee schedule if the renewal is applied for within 30 days after the expiration of such permit. If the renewal is not applied for within 30 days after the expiration of such permit, the applicant may renew the permit upon payment of the regular fee stated for this provision in the city fee schedule.

113.3 Permit Specific to Location and Boilers at the Location. A permit shall be valid only for the specific location and for the boilers at the location named on the permit. Separate permits may be issued for a person to operate boilers at two or more locations owned by the employer of the boiler operator listed on the permit. When a permit is issued for boiler operation at two or more locations, the applicant must file for a separate boiler operator permit for each location and pay the fee for each boiler operator permit received.

113.4 Replacement of Lost or Destroyed Permit. When an operator's permit becomes lost or destroyed, the Authority Having Jurisdiction may grant a replacement permit in the same manner as set forth for a stationary engineer's license in Section 112.4.

113.5 Expiration After Adoption of Code. All permits issued for the operation of boilers that were in effect the day prior to the adoption of this code by city council shall expire on the 31st day of December of the year in which this code is adopted. Any such permit may be renewed as though it had been originally issued pursuant to this code.

114.0 Boiler Related Inspections and Liabilities. The Authority Having Jurisdiction shall periodically inspect each location where a boiler is installed to determine if the boiler is being operated by an authorized person in accordance with all applicable laws. Such inspections shall

be made annually or at such other intervals as the Authority Having Jurisdiction determines is necessary to ensure compliance with applicable laws.

Exception: Boilers used solely for the production of domestic water are exempted from 114.0.

If there is a conflict between this code and the State of Texas Boiler Law in Chapter 755 of the *Texas Health and Safety Code* and any amendments thereto, then state law will apply.

The provisions of this code shall not be construed to relieve from responsibility or lessen the responsibility of any person, firm, corporation, master plumber, appliance dealer, or installer owning, operating, or installing any boiler or other equipment described in this section for damages to persons or property caused by any defect therein, nor shall the jurisdiction be held responsible for any such liability as a result of an inspection authorized or an approval issued by this code.

CHAPTER 2

DEFINITIONS

201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

201.3 Specific Construction and Terms Defined in Other Codes. Where specific rules of construction or terms are not addressed or defined in this code and are addressed or defined in the *City Code* or another volume of the *Construction Code*, such terms or specific constructions herein shall have the meanings ascribed to them in those other volumes, as applicable to the construction and proposed scope of work hereunder.

203.0

– A –

Alteration. Any change in an original design or configuration.

Authority Having Jurisdiction. The *Director of Public Works*, who is appointed to administer and enforce the provisions of this code. ~~organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, installations, or procedures. The Authority Having Jurisdiction shall be a federal, state, local, or other regional department or an individual such as a plumbing official, mechanical official, labor department official, health department official, building official, or others having statutory authority. In the absence of a statutory authority, the Authority Having Jurisdiction may be some other responsible party.~~—This definition shall include the Authority Having Jurisdiction’s duly authorized representatives.

204.0

– B –

Building Code. The ~~building code~~ *City of Houston Building Code*, as that is adopted and amended by this jurisdiction.

Building Official. The director of Houston Public Works or the duly authorized representative designated by the director to act as the chief construction code enforcement official of the jurisdiction; also known as chief building official. The term also includes the Houston Airport Systems building official who may be designated by the building official to perform *Construction Code* permitting and enforcement activities on Houston Airport Systems premises.

205.0

– C –

Certificate of Compliance. A certificate stating that materials and products meet specified standards or that the scope of work under a specific permit was done in compliance with approved construction documents. Any reference in the *Construction Code* to a “CC”, certificate of

completion, or a certificate of inspection issued by this jurisdiction, is a reference to a certificate of compliance as defined herein.

City Code. The Code of Ordinances, City of Houston, Texas.

City Fee Schedule. The schedule of fees charged by the city for various permits, licenses, authorizations and services, which is maintained on the city's website.

Code Official. The Houston Fire Department and Building Code Enforcement employees, including but not limited to, plan analysts, field inspectors, and other technical staff charged with the administration and enforcement of this code as specifically delegated by the Authority Having Jurisdiction. The code official is authorized to approve designs, construction, equipment, materials, installations, processes, procedures, practices, and other duties necessary to verify and document compliance with the Construction Code, ordinances, and other laws and policies as specifically delegated by the chief building official, fire chief, and the Authority Having Jurisdiction.

Construction Code. Has the meaning ascribed in Section 1-2 of the City Code.

206.0

– D –

Design Flood Elevation. See Chapter 19 of the City Code for provisions regarding the flood plain. The elevation of the “design flood,” including wave height, relative to the datum specified on the community’s legally designated flood hazard map. In areas designated as Zone AO, the design flood elevation is the elevation of the highest existing grade of the building’s perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number is taken as being equal to 2 feet (610 mm).

Detached Boiler. Any class of boiler that remains in its original installed location and is permanently disconnected from its energy source (i.e. natural gas, electricity, etc.).

207.0

– E –

Electrical Code. The National Electrical Code promulgated by the National Fire Protection Association, as adopted by this jurisdiction. The City of Houston Electrical Code, as adopted and amended by this jurisdiction.

Energy Conservation Code. The City of Houston Residential Energy Conservation Code or the City of Houston Commercial Energy Conservation Code, both as adopted and amended by this jurisdiction.

208.0

- F -

Family. An individual or two or more persons related by blood or marriage or a group of not more than 10 persons (excluding live in personnel hired to assist the family) who need not be related by blood or marriage living together in a dwelling unit.

Fire Code. The fire code *The City of Houston Fire Code, as* adopted by this jurisdiction.

Fire Code Official. The jurisdiction's fire marshal, who is charged with the administration and enforcement of the *Fire Code*, or an authorized representative.

Flood Hazard Area. See Chapter 19 of the *City Code* for provisions regarding the flood plain. The greater of the following two areas:

- (1) The area within a floodplain subject to a 1 percent or greater chance of flooding in any given year.
- (2) The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

212.0

- J -

Jurisdiction. The governmental unit that has adopted this code under due legislative authority.

215.0

- M -

Mechanical Integrity. The physical installation of products, systems, or equipment in accordance with their intended purpose and according to the manufacturer's specifications and manufacturer's installation instructions.

216.0

- N -

National Board Inspection Code. The manual for boiler and pressure vessel inspectors published by the *National Board of Boiler and Pressure Vessel Inspectors*.

Non-standard Boiler. A boiler that does not qualify as a standard boiler.

218.0

- P -

Plumbing Code. The Uniform Plumbing Code promulgated by the International Association of Plumbing and Mechanical Officials, *City of Houston Plumbing Code*, as adopted by this jurisdiction.

Portable Boiler. A boiler primarily designed and intended for temporary use by anyone at any location.

220.0

– R –

Repair (Boilers). The work necessary to restore a boiler or a pressure vessel to a good and sound operating condition, provided there is no deviation from the original design.

Residential Code. The *City of Houston Residential Code*, as adopted and amended by this jurisdiction.

221.0

– S –

Safety Appliances. Safety devices such as safety valves or safety relief valves (within the jurisdictional limits as prescribed by the Authority Having Jurisdiction) provided for the purposes of diminishing the danger of accidents.

Secondhand Boiler. A boiler for which both the location and ownership have changed.

Standard Boiler. A boiler that bears the Texas stamp, the ASME stamp, or the stamp of any jurisdiction that has adopted a standard of construction equivalent to that required by the State of Texas.

{EDITORIAL NOTE: ALL OTHER PORTIONS OF CHAPTER 2 REMAIN AS SET FORTH IN THE 2015 UMC.}

CHAPTER 3

GENERAL REGULATIONS

303.8 Equipment and Appliances on Roofs. Equipment and appliances on roofs shall be designed or enclosed so as to withstand climatic conditions in the area in which they are installed. Where enclosures are provided, each enclosure shall permit easy entry and movement, ~~shall be of reasonable height,~~ and shall have not less than a 30 inch (762 mm) clearance between the entire service access panel(s) of the equipment and appliance, and the wall of the enclosure. [NFPA 54:9.4.1.1]

303.8.4 Clearance. Equipment and appliances shall be installed on a well-drained surface of the roof. Not less than ~~6-10~~ 6-10 feet (1829 3048 mm) of clearance shall be between a part of the equipment and appliance and the edge of a roof or similar hazard, or rigidly fixed rails, guards, parapets, or other building structures not less than 42 inches (1067 mm) in height shall be provided on the exposed side. [NFPA 54:9.4.2.2]

303.10.1 Clearance Reduction. Reduced clearances to combustible construction for listed equipment and appliances shall comply with the listing and Table 303.10.1. Where permitted by the manufacturer, and not provided in this code, reduced clearances to combustible construction for unlisted equipment and appliances shall comply with Table 303.10.1. Unlisted equipment and appliances shall comply with Table 303.10.1.

304.1 General. Appliances shall be located with respect to building construction and other equipment so as to permit access to the appliance. ~~Sufficient~~ Clearance shall be maintained to permit cleaning of heating surfaces; the replacement of filters, blowers, motors, burners, controls, and vent connections; the lubrication of moving parts where necessary; the adjustment and cleaning of burners and pilots; and the proper functioning of explosion vents, where provided. For attic installation, the passageway and servicing area adjacent to the appliance shall be floored. [NFPA 54:9.2.1]

Unless otherwise specified, not less than 30 inches (762 mm) in depth, width, and height of working space shall be provided.

Exception: A platform shall not be required for unit heaters or room heaters.

304.3.1 Access. Buildings exceeding 15 feet (4572 mm) in height shall have ~~an inside~~ means of access to the roof in accordance with this section, unless other means acceptable to the Authority Having Jurisdiction are used. [NFPA 54:9.4.3.2]

304.3.1.1 Access Type. The inside means of access shall be a permanent, or foldaway inside stairway, or ladder, terminating in an enclosure, scuttle, or trap door. Such scuttles or trap doors shall be not less than 22 inches by 24 inches (559 mm by 610 mm) in size, shall open easily and safely under all conditions, especially snow; and shall be constructed so as to permit access from the roof side unless deliberately locked on the inside.

Not less than ~~6-10~~ feet (~~1829~~ 3048 mm) of clearance shall be between the access opening and the edge of the roof or similar hazard, or rigidly fixed rails or guards not less than 42 inches (1067 mm) in height shall be provided on the exposed side. Where parapets or other building structures are utilized in lieu of guards or rails, they shall be not less than 42 inches (1067 mm) in height. [NFPA 54:9.4.3.3]

304.4 Appliances in Attics and Under-Floor Spaces. An attic or under-floor space in which an appliance is installed shall be accessible through an opening and passageway not less than the largest component of the appliance, ~~and or~~ not less than 22 inches by 30 inches (559 mm by 762 mm) whichever is more restrictive. Where an appliance is located within the attic a pull down stair shall be provided that is not less than 22 inches (559 mm) in width at its narrowest point with a load capacity of not less than 350 pounds.

305.2 Flood Hazard Areas. See Chapter 19 of the City Code. ~~For buildings located in flood hazard areas, heating, ventilating, air-conditioning, refrigeration, miscellaneous heat-producing, and energy-utilizing equipment and appliances shall be elevated at or above the elevation in accordance with the building code for utilities and attendant equipment or the elevation of the lowest floor, whichever is higher.~~

Exception: ~~Equipment and appliances shall be permitted to be located below the elevation in accordance with the building code for utilities and attendant equipment or the elevation of the lowest floor, whichever is higher, provided that the systems are designed and installed to prevent water from entering or accumulating within their components and the systems are constructed to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to such elevation.~~

305.2.1 Coastal High Hazard Areas. ~~Mechanical systems in buildings located in coastal high hazard areas shall be in accordance with the requirements of Section 305.2, and mechanical systems, pipes, and appurtenances shall not be mounted on or penetrate through walls that are intended to breakaway under flood loads in accordance with the building code.~~

305.2.2 Air Exhaust and Intake Openings. ~~Outside air exhaust openings and air intake openings shall be located at or above the elevation required by the building code for utilities and attendant equipment or the elevation of the lowest floor, whichever is higher.~~

310.2 Condensate Control. Where an equipment or appliance is installed in a space where damage is capable of resulting from condensate overflow, ~~other than damage to replaceable lay-in ceiling tiles,~~ a secondary drain line shall be provided and shall be drained to a readily observed location in accordance with Section 310.1. An additional protection method for condensate overflow shall be provided in accordance with one of the following:

{EDITORIAL NOTE: THE REMAINDER OF THIS SECTION REMAINS AS SET FORTH IN THE 2015 UMC.}

310.3.2 Insulation. Primary drain piping inside buildings shall be insulated for the first 15 feet (4572 mm) horizontally from the drain pan. The insulation shall be a minimum of ½ inch (12.7 mm) in thickness.

CHAPTER 4

VENTILATION AIR

TABLE 402.1
MINIMUM VENTILATION RATES IN BREATHING ZONE^{1, 2, 4}
[ASHRAE 62.1: TABLE 6.2.2.1]

OCCUPANCY CATEGORY ⁴	PEOPLE OUTDOOR Air Rate R _P (cfm/person)	AREA OUTDOOR Air Rate R _A (cfm/ft ²)	DEFAULT OCCUPANT Density ³ (people/1000 ft ²)	AIR CLASS
CORRECTIONAL FACILITIES				
Booking/waiting	7.5	0.06	50	2
Cell	5	0.12	25	2
Day room	5	0.06	30	1
Guard stations	5	0.06	15	1
DRY CLEANERS / LAUNDRIES				
<u>Coin-operated dry cleaner</u>	<u>15</u>	<u>=</u>	<u>20</u>	
<u>Coin-operated laundries</u>	<u>7.5</u>	<u>0.12</u>	<u>20</u>	<u>2</u>
<u>Commercial dry cleaner</u>	<u>30</u>	<u>0.06</u>	<u>30</u>	
<u>Commercial laundry</u>	<u>25</u>	<u>=</u>	<u>10</u>	
<u>Storage, pick up</u>	<u>7.5</u>	<u>0.12</u>	<u>30</u>	
EDUCATIONAL FACILITIES				
Art classroom	10	0.18	20	2
Classrooms (ages 5-8)	10	0.12	25	1
Classrooms (age 9 plus)	10	0.12	35	1
Computer lab	10	0.12	25	1
Daycare (through age 4)	10	0.18	25	2
Daycare sickroom	10	0.18	25	3
Lecture classroom	7.5	0.06	65	1
Lecture hall (fixed seats)	7.5	0.06	150	1
Media center ^a	10	0.12	25	1
Multi-use assembly	7.5	0.06	100	1
Music/theater/dance	10	0.06	35	1
Science laboratories ^e	10	0.18	25	2
University/college laboratories	10	0.18	25	2
Wood/metal shop	10	0.18	20	2
FOOD AND BEVERAGE SERVICE				
Bars, cocktail lounges	7.5	0.18	100	2
Cafeteria/fast food dining	7.5	0.18	100	2

OCCUPANCY CATEGORY ⁴	PEOPLE OUTDOOR Air Rate R _P (cfm/person)	AREA OUTDOOR Air Rate R _A (cfm/ft ²)	DEFAULT OCCUPANT Density ³ (people/1000 ft ²)	AIR CLASS
Kitchen (cooking) ⁱ	7.5	0.12	20	2
Restaurant dining rooms	7.5	0.18	70	2
GENERAL				
Break rooms	5	0.06	25	1
Coffee stations	5	0.06	20	1
Conference/meeting	5	0.06	50	1
Corridors	–	0.06	–	1
Occupiable storage rooms for liquids or gels ^b	5	0.12	2	2
HOSPITALS, NURSING AND CONVALESCENT HOMES				
Autopsy rooms	=	<u>0.5</u>	<u>20</u>	
Medical procedure rooms	<u>15</u>	=	<u>20</u>	
Operating rooms	<u>30</u>	=	<u>20</u>	
Patient rooms	<u>25</u>	=	<u>10</u>	
Physical therapy	<u>15</u>	=	<u>20</u>	
Recovery and ICU	<u>15</u>	=	<u>20</u>	
HOTELS, MOTELS, RESORTS, DORMITORIES				
Barracks sleeping areas	5	0.06	20	1
Bedroom/living room	5	0.06	10	1
Dormitory sleeping areas	<u>5</u>	<u>0.06</u>	=	
Gambling casinos	<u>7.5</u>	<u>0.16</u>	=	
Laundry rooms, central	5	0.12	10	2
Laundry rooms within dwelling units	5	0.12	10	1
Lobbies/pre-function	7.5	0.06	30	1
Multipurpose assembly	5	0.06	120	1
OFFICE BUILDINGS				
Breakrooms	5	0.12	50	1
Main entry lobbies	5	0.06	10	1
Occupiable storage rooms for dry materials	5	0.06	2	1
Office space	5	0.06	5	1
Reception areas	5	0.06	30	1
Telephone/data entry	5	0.06	60	1
MISCELLANEOUS SPACES				
Bank or bank lobbies	7.5	0.06	15	1
Bank vaults/safe deposit	5	0.06	5	2
Computer (not printing)	5	0.06	4	1
Freezer and refrigerated spaces (<50°F) ^e	10	–	–	2
General manufacturing	10	0.18	7	3

OCCUPANCY CATEGORY ⁴	PEOPLE OUTDOOR Air Rate R _P (cfm/person)	AREA OUTDOOR Air Rate R _A (cfm/ft ²)	DEFAULT OCCUPANT Density ³ (people/1000 ft ²)	AIR CLASS
(excludes heavy industrial and processes using chemicals)				
Pharmacy (prep. area)	5	0.18	10	2
Photo studios	5	0.12	10	1
Shipping/receiving ^b	10	0.12	2	2
Sorting, packing, light assembly	7.5	0.12	7	2
Telephone closets	—	—	—	1
Transportation waiting	7.5	0.06	100	1
Warehouses ^b	10	0.06	—	2
PUBLIC ASSEMBLY SPACES				
Auditorium seating area	5	0.06	150	1
Courtrooms	5	0.06	70	1
Legislative chambers	5	0.06	50	1
Libraries	5	0.12	10	1
Lobbies	5	0.06	150	1
Museums (children's)	7.5	0.12	40	1
Museums/galleries	7.5	0.06	40	1
Places of religious worship	5	0.06	120	1
RESIDENTIAL				
Common corridors	—	0.06	—	1
Dwelling unit ^{f, g}	5	0.06	See footnote ^f	1
RETAIL				
Sales (except as below)	7.5	0.12	15	2
Barber shop	7.5	0.06	25	2
Beauty and nail salons ^h	20-25	0.12-0.25	25	2
Coin-operated laundries	7.5	0.12	20	2
Mall common areas	7.5	0.06	40	1
Pet shops (animal areas)	7.5	0.18	10	2
Supermarket	7.5	0.06	8	1
SPORTS AND ENTERTAINMENT				
Bowling alley (seating)	10	0.12	40	1
Disco/dance floors	20	0.06	100	2
Gambling casinos	7.5	0.18	120	1

OCCUPANCY CATEGORY ⁴	PEOPLE OUTDOOR Air Rate R _p (cfm/person)	AREA OUTDOOR Air Rate R _A (cfm/ft ²)	DEFAULT OCCUPANT Density ³ (people/1000 ft ²)	AIR CLASS
Game arcades	7.5	0.18	20	1
Gym, sports arena (play area) ^e	20	0.18	7	2
Health club/aerobics room	20	0.06	40	2
Health club/weight rooms	20	0.06	10	2
Spectator areas	7.5	0.06	150	1
Stages, studios ^d	10	0.06	70	1
Swimming (pool & deck) ^c	—	0.48	—	2

For SI units: 1 cubic foot per minute = 0.0283 m³/min, 1 square foot = 0.0929 m²

Notes:

- 1 This table applies to no-smoking areas. Rates for smoking-permitted spaces shall must be determined using other methods.
- 2 Volumetric airflow rates are based on an air density of 0.075 pounds of dry air per cubic foot (lb_{da}/ft³) (1.201 kg_{da}/m³), which corresponds to dry air at a barometric pressure of 1 atm (101 kPa) and an air temperature of 70°F (21°C). Rates shall be permitted to be adjusted for actual density but such adjustment is not required for compliance with this chapter.
- 3 The default occupant density shall be used where actual occupant density is not known.
- 4 Where the occupancy category for a proposed space or zone is not listed, the requirements for the listed occupancy category that is most similar in terms of occupant density, activities, and building construction shall be used.

ITEM-SPECIFIC NOTES FOR TABLE 402.1

- a For high school and college libraries, use values shown for Public Assembly Spaces – Libraries.
- b Rate is capable of not being sufficient where stored materials include those having potentially harmful emissions.
- c Rate does not allow for humidity control. Additional ventilation or dehumidification shall be permitted to be required to remove moisture. “Deck area” refers to the area surrounding the pool that would be expected to be wetted during normal pool use, i.e., where the pool is occupied. Deck area that is not expected to be wetted shall be designated as a space type (for example, “spectator area”).
- d Rate does not include special exhaust for stage effects, e.g., dry ice vapors, smoke.
- e Where combustion equipment is intended to be used on the playing surface or in the space, additional dilution ventilation, source control, or both shall be provided.
- f Default occupancy for dwelling units shall be two persons for studio and one-bedroom units, with one additional person for each additional bedroom.
- g Air from one residential dwelling shall not be recirculated or transferred to other space outside of that dwelling.
- h Provide minimum 80% outdoor makeup air to air conditioning system through fixed openings.
- i Where the hood is eliminated for enclosed single batch low temperature chemical dishwashers, the ventilation shall be designed by a licensed design professional to accommodate the latent and sensible heat load emitted from such appliances.

**TABLE 403.7
MINIMUM EXHAUST RATES
[ASHRAE 62.1: TABLE 6.5]**

OCCUPANCY CATEGORY ⁴	EXHAUST RATE (cfm/unit)	EXHAUST RATE (cfm/ft ²)	AIR CLASS
Arenas ²	–	0.50	1
Art classrooms	–	0.70	2
Auto repair rooms ¹	–	1.50	2
Barber shops	–	0.50	2
Beauty and nail salons	–	0.60	2
Cells with toilet	–	1.00	2
Copy, printing rooms	–	0.50	2
Darkrooms	–	1.00	2
Educational science laboratories	–	1.00	2
Janitor closets, trash rooms, recycling	–	1.00	3
Kitchens – commercial	–	0.70	2
Kitchenettes	–	0.30	2
Locker rooms	–	0.50	2
Locker/dressing rooms	–	0.25	2
Paint spray booths	–	–	4
Parking garages ³	–	0.75	2
Pet shops (animal areas)	–	0.90	2
Refrigerating machinery rooms ⁶	–	–	3
Residential – kitchens ⁷	2550 /100	–	2
Soiled laundry storage rooms	–	1.00	3
Storage rooms, chemical	–	1.50	4
Toilets – private ^{5, 9}	2025 /50	–	2
Toilets – public ^{4, 9}	50/70	–	2
Woodwork shop/classrooms	–	0.50	2

For SI units: 1 cubic foot per minute = 0.0283 m³/min, 1 square foot = 0.0929 m²

Notes:

- 1 Stands where engines are run shall have exhaust systems that directly connect to the engine exhaust and prevent escape of fumes.
- 2 Where combustion equipment is intended to be used on the playing surface, additional dilution ventilation, source control, or both shall be provided.
- 3 Exhaust rate is not required for open parking garages as defined in accordance with the building code.
- 4 Rate is per water closet, urinal, or both. Provide the higher rate where periods of heavy use are expected to occur, e.g., toilets in theatres, schools, and sports facilities. Otherwise the lower rate shall be permitted to be used.
- 5 Rate is for a toilet room intended to be occupied by one person at a time. For continuous system operation during normal hours of use, the lower rate shall be permitted to be used. Otherwise the lower rate shall be permitted to be used.
- 6 For refrigeration machinery rooms, the exhaust rate shall comply with Chapter 11.
- 7 For continuous system operation, the lower rates shall be permitted. Otherwise the higher rate shall be used.
- 8 For unlisted occupancies for a proposed space not listed in the table, the requirements for the listed occupancy that is most similar in terms of occupant density and occupancy type shall be used.
- 9 Exhaust air that has been cleaned in accordance with the criteria of Class 1 shall be permitted to be recirculated.

405.0 Smoke Control Systems.

405.1 Scope and Purpose. This section applies to mechanical and passive smoke control systems that are required by the *Building Code* or the *Fire Code*. The purpose of this section is

to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. These provisions are not intended for the preservation of contents, the timely restoration of operations or for assistance in fire suppression or overhaul activities. Smoke control systems regulated by this section serve a different purpose than the smoke- and heat-venting provisions in Section 910 of the *Building Code* or the *Fire Code*.

405.2 General Design Requirements. Buildings, structures, or parts thereof required by the *Building Code* or the *Fire Code* to have a smoke control system or systems shall have such systems designed in accordance with the applicable requirements of Section 909 of the *Building Code* and the generally accepted and well-established principles of engineering relevant to the design. The construction documents shall include sufficient information and detail to adequately describe the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied by sufficient information and analysis to demonstrate compliance with these provisions.

405.3 Special Inspection and Test Requirements. In addition to the ordinary inspection and test requirements that buildings, structures and parts thereof are required to undergo, smoke control systems subject to the provisions of Section 909 of the *Building Code* shall undergo special inspections and acceptance testing by a Houston registered special inspector, sufficient to verify the proper commissioning of the smoke control design in its final installed condition. The design submission accompanying the construction documents shall clearly detail procedures and methods to be used and the items subject to such inspections and tests. Such commissioning shall be in accordance with generally accepted engineering practice and, where possible, based on published standards for the particular testing involved. The special inspections and tests required by this section shall be conducted under the same terms as found in Section 1704 of the *Building Code*.

405.4 Analysis. A rational analysis supporting the types of smoke control systems to be employed, their methods of operation, the systems supporting them and the methods of construction to be utilized shall accompany the submitted construction documents and shall include, but not be limited to, the items indicated in Sections 405.4.1 through 405.4.7.

405.4.1 Stack Effect. The system shall be designed such that the maximum probable normal or reverse stack effects will not adversely interfere with the system's capabilities. In determining the maximum probable stack effect, altitude, elevation, weather history and interior temperatures shall be used.

405.4.2 Temperature Effect of Fire. Buoyancy and expansion caused by the design fire in accordance with Section 405.9 shall be analyzed. The system shall be designed such that these effects do not adversely interfere with the system's capabilities.

405.4.3 Wind Effect. The design shall consider the adverse effects of wind. Such consideration shall be consistent with the wind-loading provisions of the *Building Code*.

405.4.4 HVAC Systems. The design shall consider the effects of the heating, ventilating and air-conditioning (HVAC) systems on both smoke and fire transport. The analysis shall include all permutations of systems' status. The design shall consider the effects of fire on the HVAC systems.

405.4.5 Climate. The design shall consider the effects of low temperatures on systems, property and occupants. Air inlets and exhausts shall be located so as to prevent snow or ice blockage.

405.4.6 Duration of Operation. All portions of active or engineered smoke control systems shall be capable of continued operation after detection of the fire event for a period of not less than either 20 minutes or 1.5 times the calculated egress time, whichever is greater.

405.4.7 Smoke Control System Interaction. The design shall consider the interaction effects of the operation of multiple smoke control systems for all design scenarios.

405.5 Smoke Barrier Construction. Smoke barriers required for passive smoke control and a smoke control system using the pressurization method shall comply with the *Building Code*. Smoke barriers shall be constructed and sealed to limit leakage areas exclusive of protected openings. The maximum allowable leakage area shall be the aggregate area calculated using the following leakage area ratios:

(1) Walls:

$$\underline{A/A_W = 0.00100}$$

(2) Interior exit stairways and ramps and exit passageways:

$$\underline{A/A_W = 0.00035}$$

(3) Enclosed exit access stairways and ramps and all other shafts:

$$\underline{A/A_W = 0.00150}$$

(4) Floors and roofs:

$$\underline{A/A_F = 0.00050}$$

Where:

A = Total leakage area, square feet (m²).

A_F = Unit floor or roof area of barrier, square feet (m²).

A_W = Unit wall area of barrier, square feet (m²).

The leakage area ratios shown do not include openings created by gaps around doors and operable windows. The total leakage area of the smoke barrier shall be determined in accordance with Section 405.5.1 and tested in accordance with Section 405.5.2.

405.5.1 Total Leakage Area. Total leakage area of the barrier is the product of the smoke barrier gross area times the allowable leakage area ratio, plus the area of other openings such as gaps around doors and operable windows.

405.5.2 Testing of Leakage Area. Compliance with the maximum total leakage area shall be determined by achieving the minimum air pressure difference across the barrier with the system in the smoke control mode for mechanical smoke control systems utilizing the pressurization method. Compliance with the maximum total leakage area of passive smoke control systems shall be verified through methods such as door fan testing or other methods, as approved by the fire code official.

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

Exceptions:

- (1) Passive smoke control systems with automatic-closing devices actuated by spot-type smoke detectors listed for releasing service installed in accordance with the *Building Code*.
- (2) Fixed openings between smoke zones that are protected utilizing the airflow method.
- (3) In Group I-1 Condition 2, Group I-2 and ambulatory care facilities, where a pair of opposite-swinging doors are installed across a corridor in accordance with Section 405.5.3.1, the doors shall not be required to be protected in accordance with Section 716 of the *Building Code*. The doors shall be close-fitting within operational tolerances and shall not have a center mullion or undercuts in excess of ¾ inch (19.1 mm), louvers or grilles. The doors shall have head and jamb stops and astragals or rabbets at meeting edges and, where permitted by the door manufacturer's listing, positive-latching devices are not required.
- (4) In Group I-2 and ambulatory care facilities, where such doors are special-purpose horizontal sliding, accordion or folding door assemblies installed in accordance with Section 1010.1.4.3 of the *Building Code* and are automatic closing by smoke detection in accordance with Section 716.5.9.3 of the *Building Code*.
- (5) Group I-3.
- (6) Openings between smoke zones with clear ceiling heights of 14 feet (4267 mm) or greater and bank down capacity of greater than 20 minutes as determined by the design fire size.

405.5.3.1 Group I-1 Condition 2; Group I-2 and Ambulatory Care Facilities. In Group I-1 Condition 2; Group I-2 and ambulatory care facilities, where doors are installed across a corridor, the doors shall be automatic closing by smoke detection in accordance with Section 716.5.9.3 of the *Building Code* and shall have a vision panel with fire-protection-rated glazing materials in fire-protection-rated frames, the area of which shall not exceed that tested.

405.5.3.2 Ducts and Air Transfer Openings. Ducts and air transfer openings are required to be protected with a minimum Class II, 250°F (121°C) smoke damper complying with the *Building Code*.

405.6 Pressurization Method. The primary mechanical means of controlling smoke shall be by pressure differences across smoke barriers. Maintenance of a tenable environment is not required in the smoke control zone of fire origin.

405.6.1 Minimum Pressure Difference. The minimum pressure difference across a smoke barrier shall be 0.05-inch water gage (12.4 Pa) in fully sprinklered buildings. In building permitted to be other than fully sprinklered, the smoke control system shall be designed to achieve pressure differences not less than two times the maximum calculated pressure difference produced by the design fire.

405.6.2 Maximum Pressure Difference. The maximum air pressure difference across a smoke barrier shall be determined by required door-opening or closing forces. The actual force required to open exit doors when the system is in the smoke control mode shall be in accordance with the *Building Code*. Opening and closing forces for other doors shall be determined by standard engineering methods for the resolution of forces and reactions. The calculated force to set a side-hinged, swinging door in motion shall be determined by:

$$F = F_{dc} + K(WA\Delta P)/2(W-d)$$

Where:

A = Door area, square feet (m²).

d = Distance from door handle to latch edge of door, feet (m).

F = Total door opening force, pounds (N).

F_{dc} = Force required to overcome closing device, pounds (N).

K = Coefficient 5.2 (1.0).

W = Door width, feet (m).

ΔP = Design pressure difference, inches of water gage (Pa).

405.6.3 Pressurized Stairways and Elevator Hoistways. Where stairways or elevator hoistways are pressurized, such pressurization systems shall comply with Section 405 as smoke control systems, in addition to the requirements of Section 909.20 of the *Building Code* and 909.21 of the *Fire Code*.

405.7 Airflow Design Method. Where approved by the code official, smoke migration through openings fixed in a permanently open position, which are located between smoke control zones by the use of the airflow method, shall be permitted. The design airflow shall be in accordance with this section. Airflow shall be directed to limit smoke migration from the fire zone. The geometry of openings shall be considered to prevent flow reversal from turbulent effects. Smoke control systems using the airflow method shall be designed in accordance with NFPA 92.

405.7.1 Prohibited Conditions. This airflow design method shall not be employed where either the quantity of air or the velocity of the airflow will adversely affect other portions of the smoke control system, unduly intensify the fire, disrupt plume dynamics or interfere with building occupants exiting. Airflow toward the design fire shall not exceed 200 feet per minute (1.02 m/s). Where the calculated airflow exceeds this limit, the airflow method shall not be used.

405.8 Exhaust Method. Where approved by the building official, mechanical smoke control for large enclosed volumes, such as in atriums or malls, shall be permitted to utilize the exhaust method. Smoke control systems using the exhaust method shall be designed in accordance with NFPA 92.

405.8.1 Exhaust Rate. The height of the lowest horizontal surface of the accumulating smoke layer shall be maintained not less than 6 feet (1829 mm) above any walking surface that forms a portion of a required egress system within the smoke zone.

405.9 Design Fire. The design fire shall be based on a rational analysis performed by the registered design professional and approved by the code official. The design fire shall be based on the analysis in accordance with Section 405.4 and this section.

405.9.1 Factors Considered. The engineering analysis shall include the characteristics of the fuel, fuel load, effects included by the fire and whether the fire is likely to be steady or unsteady.

405.9.2 Design Fire Fuel. Determination of the design fire shall include consideration of the type of fuel, fuel spacing and configuration.

405.9.3 Heat-Release Assumptions. The analysis shall make use of the best available data from approved sources and shall not be based on excessively stringent limitations of combustible material.

405.9.4 Sprinkler Effectiveness Assumptions. A documented engineering analysis shall be provided for conditions that assume fire growth is halted at the time of sprinkler activation.

405.10 Equipment. Equipment, such as, but not limited to, fans, ducts, automatic dampers and balance dampers, shall be suitable for its intended use, suitable for the probable exposure temperatures that the rational analysis indicates and as approved by the code official.

405.10.1 Exhaust Fans. Components of exhaust fans shall be rated and certified by the manufacturer for the probable temperature rise to which the components will be exposed. This temperature rise shall be computed by:

$$\underline{T_s} = (Q_c/mc) + (T_a)$$

Where:

c = Specific heat of smoke at smoke-layer temperature, BTU/lb°F (kJ/kg • K).

m = Exhaust rate, pounds per second (kg/s).

Q_c = Convective heat output of fire, Btu/s (kW).

T_a = Ambient temperature, °F (K).

T_s = Smoke temperature, °F (K).

Exception: Reduced T_s as calculated based on the assurance of adequate dilution air.

405.10.2 Ducts. Duct materials and joints shall be capable of withstanding the probable temperatures and pressures to which they are exposed as determined in accordance with Section 405.10.1. Ducts shall be constructed and supported in accordance with Chapter 6. Ducts shall be leak tested to 1.5 times the maximum design pressure in accordance with nationally accepted practices. Measured leakage shall not exceed 5 percent of design flow. Results of such testing shall be a part of the documentation procedure. Ducts shall be supported directly from fire-resistance-rated structural elements of the building by substantial, noncombustible supports.

Exception: Flexible connections, for the purpose of vibration isolation, that are constructed of approved fire-resistance-rated materials are exempt from 405.10.2.

405.10.3 Equipment, Inlets and Outlets. Equipment shall be located so as to not expose uninvolved portions of the building to an additional fire hazard. Outdoor air inlets shall be located so as to minimize the potential for introducing smoke or flame into the building. Exhaust outlets shall be so located as to minimize reintroduction of smoke into the building and to limit exposure of the building or adjacent buildings to an additional fire hazard.

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

405.10.5 Fans. In addition to other requirements, belt-driven fans shall have 1.5 times the number of belts required for the design duty, with the minimum number of belts being two. Fans shall be selected for stable performance based on normal temperature and, where applicable, elevated temperature. Calculations and manufacturer's fan curves shall be part

of the documentation procedures. Fans shall be supported and restrained by noncombustible devices in accordance with the structural design requirements of the *Building Code*. Motors driving fans shall operate within the limits specified on their nameplate horsepower (kilowatts), as determined from measurement of actual current draw. Motors driving fans shall have a minimum service factor of 1.15.

405.11 Standby Power. The smoke control system shall be supplied with standby power in accordance with Section 2702 of the *Building Code*.

405.11.1 Equipment Room. The standby power source and its transfer switches shall be in a room separate from the normal power transformers and switch gears and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour fire-resistance-rated fire barriers constructed in accordance with Section 707 of the *Building Code* or horizontal assemblies constructed in accordance with Section 711 of the *Building Code*, or both. Power distribution from the two sources shall be by independent routes.

405.11.2 Power Sources and Power Surges. Elements of the smoke control system relying on volatile memories or the like shall be supplied with uninterruptible power sources of sufficient duration to span 15-minute primary power interruption. Elements of the smoke control system susceptible to power surges shall be suitable protected by conditioners, suppressors or other approved means.

405.12 Detection and Control Systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Section 907 of the *Building Code*. Such systems shall be equipped with a control unit complying with UL 864 and listed as smoke control equipment.

405.12.1 Verification. Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override and the presence of power downstream of all disconnects. A preprogrammed weekly test sequence shall report abnormal conditions audibly, visually and by printed report. The preprogrammed weekly test shall operate all devices, equipment and components used for smoke control.

Exception: Where verification of individual components tested through the preprogrammed weekly testing sequence will interfere with, and produce unwanted effects to, normal building operation, such individual components are permitted to be bypassed from the preprogrammed weekly testing, where approved by the building official and in accordance with both of the following:

- (1) Where the operation of components is bypassed from the preprogrammed weekly test, a listed control unit shall verify weekly the presence of power downstream of all disconnects.
- (2) Testing of all components bypassed from the preprogrammed weekly test shall be in accordance with Section 909.20.6 of the *Fire Code*.

405.12.2 Wiring. In addition to meeting the requirements of the *Electrical Code*, mechanical smoke control, wiring, regardless of voltage, shall be fully enclosed within continuous raceways. The requirement of this section shall apply only to wiring extending from the fire alarm system control unit that activates any required smoke-control system component such as relays, fans, dampers, or stair pressurization systems.

405.12.3 Activation. Smoke control systems shall be activated in accordance with the *Building Code* or the *Fire Code*.

405.12.4 Automatic Control. Where complete automatic control is required or used, the automatic control sequences shall be initiated from an appropriately zoned automatic sprinkler system complying with Section 903.3.1.1 of the *Fire Code*, from manual controls that are readily accessible to the fire department, and any smoke detectors required by engineering analysis.

405.13 Control-Air Tubing. Control-air tubing shall be of sufficient size to meet the required response times specified by the design professional or *Fire Code*, whichever is more restrictive. Tubing shall be flushed clean and dry prior to final connections. Tubing shall be adequately supported and protected from damage. Tubing passing through concrete or masonry shall be sleeved and protected from abrasion and electrolytic action.

405.13.1 Materials. Control-air tubing shall be hard-drawn copper, Type L, ACR in accordance with ASTM B 42, ASTM B 43, ASTM B 68, ASTM B 88, ASTM B 251 and ASTM B 280. Fittings shall be wrought copper or brass, solder type in accordance with ASME B 16.18 or ASME B 16.22. Changes in direction shall be made with appropriate tool bends. Brass compression-type fittings shall be used at final connection to devices; other joints shall be brazed using a BCuP-5 brazing alloy with solidus above 1,100°F (593°C) and liquids below 1,500°F (816°C). Brazing flux shall be used on copper-to-brass joints only.

Exception: Nonmetallic tubing used within control panels and at the final connection to devices are exempted from 405.13.1, provided all of the following conditions are met:

- (1) Tubing shall comply with the requirements of Section 602.2.3.
- (2) Tubing and connected devices shall be completely enclosed within a galvanized or paint-grade steel enclosure having a minimum thickness of 0.0296 inch (0.7534 mm) (No. 22 gage). Entry to the enclosure shall be by copper tubing with a protective grommet of Neoprene or Teflon or by suitable brass compression to male barbed adapter.
- (3) Tubing shall be identified by appropriately documented coding.
- (4) Tubing shall be neatly tied and supported within the enclosure. Tubing bridging cabinets and doors or moveable devices shall be of sufficient length to avoid tension and excessive stress. Tubing shall be protected against abrasion. Tubing serving devices on doors shall be fastened along hinges.

405.13.2 Isolation from Other Functions. Control tubing serving other than smoke control functions shall be isolated by automatic isolation valves or shall be an independent system.

405.13.3 Testing. Control-air tubing shall be tested at three times the operating pressure for not less than 30 minutes without any noticeable loss in gauge pressure prior to final connection to devices.

405.14 Marking and Identification. The detection and control systems shall be clearly marked at all junctions, accesses and terminations.

405.15 Control Diagrams. Identical control diagrams shall be provided and maintained as required by the *Fire Code*.

405.16 Fire Fighter's Smoke Control Panel. A fire fighter's smoke control panel for fire department emergency response purposes only shall be provided in accordance with the *Fire Code*.

405.17 System Response Time. Smoke control system activation shall comply with the *Fire Code*.

405.18 Acceptance Testing. Devices, equipment, components and sequences shall be tested in accordance with Section 405.3 of this code and the *Fire Code*.

405.19 System Acceptance. Authority Having Jurisdiction acceptance of the smoke control system shall be based on special inspections documenting compliance with the provisions of this code and the *Fire Code*.

CHAPTER 5

EXHAUST SYSTEMS

504.4 Clothes Dryers. A clothes dryer exhaust duct shall not be connected to a vent connector, gas vent, chimney, and shall not terminate into a crawl space, attic, or other concealed space. Exhaust ducts shall not be assembled with screws or other fastening means that extend into the duct and that are capable of catching lint, and that reduce the efficiency of the exhaust system. Exhaust ducts shall be constructed of rigid metallic material. Transition ducts used to connect the dryer to the exhaust duct shall be listed for that application or installed in accordance with the clothes dryer manufacturer's installation instructions. Clothes dryer exhaust ducts shall terminate to the outside of the building in accordance with Section 502.2.1 and shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination. Devices, such as fire or smoke dampers, that will obstruct the flow of the exhaust shall not be used. Where ducts are joined, the male end shall be inserted in the direction of airflow.

504.4.2.1 Length Limitation. Unless otherwise permitted or required by the dryer manufacturer's instructions and approved by the Authority Having Jurisdiction, domestic dryer moisture exhaust ducts shall not exceed a total combined horizontal and vertical length of 44 35 feet (4267-10,668 mm), including two 90 degree (1.57 rad) elbows. A length of 2 feet (610 mm) shall be deducted for each 90 degree (1.57 rad) elbow in excess of two. Where the exhaust duct is concealed within the building construction and exceeds the length limitation of this section, a permanent label or tag shall be located within 6 feet (1,829 mm) of the exhaust duct connection identifying the length of the exhaust duct.

504.6 Gypsum Wallboard Ducts. Bathroom and laundry room exhaust ducts, and other environmental air ducts shall not be permitted to be constructed of gypsum wallboard subject to the limitations of Section 602.5.

508.1 Where Required. Type I hoods shall be installed at or above commercial-type deep-fat fryers, broilers, grills, hot-top ranges, ovens, barbecues, rotisseries, and similar equipment that emits comparable amounts of smoke or grease in a food-processing establishment. For the purpose of this section, a food-processing establishment shall include a building or portion thereof used for the processing of food, but shall not include a dwelling unit. Type II hoods shall be installed above equipment and dishwashers that generate steam, heat, and products of combustion, and where grease or smoke is not present.

Exceptions:

- (1) Cooking appliance that is in accordance with UL 710B for reduced emissions where the grease discharge does not exceed 2.9 E-09 ounces per cubic inch (oz/in³) (5.0 E-06 kg/m³) where operated with a total airflow of 500 cubic feet per minute (cfm) (0.236 m³/s).
- (2) Recirculating systems listed in accordance with UL 710B and installed in accordance with Section 516.0.
- (3) Dishwashing machines connected to a Type II duct system and exhausted directly to the outdoors.

- (4) Dishwashing machines with a self-contained condensing system listed in accordance with UL 921 and installed in a space where the HVAC system has been engineered to accommodate the latent and sensible heat load emitted from such appliances as approved by the Authority Having Jurisdiction. Such equipment shall be provided with an interlocking device to prevent opening of the appliance prior to completion of its cycle.
- (5) Residential cooking equipment located in daycare facilities, churches, employee lunchrooms, or similar locations that are no more hazardous than kitchen facilities in an individual dwelling unit.
- (6) Listed convection ovens.

510.1.7 Type II Exhaust Duct Systems. Ducts and plenums serving Type II hoods shall be constructed of rigid metallic materials in accordance with Chapter 6. Duct bracing and supports shall comply with Chapter 6. Ducts subject to positive pressure and ducts conveying moisture-laden or waste-heat-laden air shall be adequately sealed.

510.9.1 Rooftop Terminations. Rooftop terminations shall be arranged with or provided with the following:

- (1) Not less than 10 feet (3,048 mm) of horizontal clearance from the outlet to adjacent buildings, property lines, and air intakes.

Exception: Exhaust outlets for grease ducts serving commercial food heat-processing equipment may terminate not less than 5 feet (1,524 mm) from an adjacent building, adjacent property line or air intake opening into a building if the air from the exhaust outlet is discharged away from such locations.

{EDITORIAL NOTE: THE REMAINDER OF THIS SECTION REMAINS AS SET FORTH IN THE 2015 UMC.}

513.1 General. Fire-extinguishing equipment for the protection of grease removal devices, hood exhaust plenums, and exhaust duct systems shall be provided in accordance with this section or the Fire Code, whichever is most restrictive. [NFPA 96:10.1.1]

CHAPTER 6

DUCT SYSTEMS

602.5 Gypsum. Where gypsum products are exposed in return air ducts or plenums, the air temperature shall be restricted to a range from 50°F (10°C) to 125°F (52°C), and moisture content shall be controlled so that the material is not adversely affected. For the purpose of this section, gypsum products shall not be exposed in ducts serving as supply from evaporative coolers, and in other air-handling systems regulated by this chapter where the temperature of the gypsum product will be below the dew point temperature, and exhaust systems complying with the requirements of Chapter 5.

603.11 Cross Contamination. Hazardous or product-conveying exhaust ~~Exhaust~~ ducts and venting systems under positive pressure shall not extend into or pass through ducts or plenums.

603.12 Underground Installation. Ducts installed underground shall be approved for the installation and shall have a slope of not less than $\frac{1}{8}$ inch per foot (10.4 mm/m). Ducts, plenums, and fittings shall be permitted to be constructed of concrete, clay, or ceramics where installed in the ground or in a concrete slab, provided the joints are tightly sealed. Metal ducts where installed in or under a concrete slab shall be stainless steel or galvanized and encased in not less than 2 inches (51 mm) of concrete.

604.1 General. Air ducts conveying air at temperatures exceeding 140°F (60°C) shall be insulated to maintain an insulation surface temperature of not more than 140°F (60°C). Factory-made air ducts and insulations intended for installation on the exterior of ducts shall be legibly printed with the name of the manufacturer, the thermal resistance (R) value at installed thickness, flame-spread index and smoke developed index of the composite material. Internal duct liners and insulation shall be installed in accordance with the Energy Conservation Code SMACNA HVAC Duct Construction Standards—Metal and Flexible.

Exceptions:

- (1) Factory-installed plenums, casings, or ductwork furnished as a part of HVAC equipment tested and rated in accordance with approved energy efficiency standards.
- (2) Ducts or plenums located in conditioned spaces where heat gain or heat loss will not increase energy use.
- (3) For runouts less than 10 feet (3,048 mm) in length to air terminals or air outlets, the rated R value of insulation need not exceed R-3.5.
- (4) The rated R value of required insulation on the bBacks of air outlets and outlet plenums exposed to unconditioned or indirectly conditioned spaces with face areas exceeding 15 square feet (0.09295 m²) need not exceed R-2; those 15 square feet (0.09295 m²) or smaller need not be insulated.
- (5) Ducts and plenums used exclusively for evaporative cooling systems.

605.5 Access and Identification. Fire and smoke dampers shall be provided with an approved means of access large enough to allow inspection and maintenance of the damper and its

operating parts. The access shall not affect the integrity of the fire resistance-rated assembly. The access openings shall not reduce the fire resistance rating of the assembly.

Access shall not require the use of tools. Access doors in ducts shall be tight fitting and approved for the required duct construction. Access points shall be permanently identified visibly on the exterior of the duct and at the ceiling level by a label with letters not less than ½ of an inch (12.7 mm) in height reading as one of the following:

- (1) Smoke Damper
- (2) Fire Damper
- (3) Fire/Smoke Damper

Access doors shall be not more than 2 inches (51 mm) less than the size of the duct up to 24 inches (610 mm), and 24 inch by 24 inch (610 mm by 610 mm) in ducts of 28 inches (711 mm) dimension or larger.

608.1 Air-Moving Systems and Smoke Detectors. Air-moving systems supplying air in excess of ~~2000~~ 2,200 cubic feet per minute (ft³/min) (~~0.9439~~ 1.0382 m³/s) to enclosed spaces within buildings shall be equipped with an automatic shutoff. Automatic shutoff shall be accomplished by interrupting the power source of the air-moving equipment upon detection of smoke in the main supply-air duct or return-air duct served by such equipment. Duct smoke detectors shall comply with UL 268A and shall be installed in accordance with the manufacturer's installation instructions. Such devices shall be compatible with the operating velocities, pressures, temperatures, and humidities of the system. Where fire-detection or alarm systems are provided for the building, the smoke detectors shall be supervised by such systems in an approved manner.

Exceptions:

- (1) Where the space supplied by the air-moving equipment is served by a total coverage smoke-detection system in accordance with the fire code, interconnection to such system shall be permitted to be used to accomplish the required shutoff.
- (2) Automatic shutoff is not required where occupied rooms served by the air-handling equipment have direct exit to the exterior and the travel distance does not exceed 100 feet (30,480 mm). For the purpose of this exception, occupied rooms shall not include rooms that have less than 300 square feet (27.8709 square meters) and are ancillary to the function of the space served by the air-handling system, such as restrooms, storerooms, or cashier or manager offices.
- (3) Automatic shutoff is not required for Group R, Division 3 and Group U occupancies.
- (4) Automatic shutoff is not required for approved smoke-control systems or where analysis demonstrates shutoff would create a greater hazard, such as shall be permitted to be encountered in air-moving equipment supplying specialized portions of Group H Occupancies. Such equipment shall be required to have smoke detection with remote indication and manual shutoff capability at an approved location.
- (5) Smoke detectors that are factory installed in listed air-moving equipment shall be permitted to be used in lieu of smoke detectors installed in the main supply-air duct served by such equipment.

CHAPTER 9

INSTALLATION OF SPECIFIC APPLIANCES

904.4 Temperature- or Pressure-Limiting Devices. See Chapter 10 of this code. ~~Steam and hot water boilers, respectively, shall be provided with approved automatic limiting devices for shutting down the burner(s) to prevent boiler steam pressure or boiler water temperature from exceeding the maximum allowable working pressure or temperature. Safety limit controls shall not be used as operating controls. [NFPA 54:10.3.4]~~

904.5 Low-Water Cutoff. See Chapter 10 of this code. ~~Water boilers and steam boilers shall be provided with an automatic means to shut off the fuel supply to the burner(s) where the boiler water level drops to the lowest safe water line. In lieu of the low-water cutoff, water tube or coil-type boilers that require forced circulation to prevent overheating and failure shall have an approved flow sensing device arranged to shut down the boiler where the flow rate is not capable of protecting the boiler against overheating. [NFPA 54:10.3.5]~~

904.6 Steam Safety and Pressure-Relief Valves. See Chapter 10 of this code. ~~Steam and hot water boilers shall be equipped, respectively, with listed or approved steam safety or pressure-relief valves of discharge capacity and shall comply with ASME requirements. A shutoff valve shall not be placed between the relief valve and the boiler or on discharge pipes between such valves and the atmosphere. [NFPA 54:10.3.6]~~

913.1.1 Gasketed Fireplace Doors. A gasketed fireplace door shall not be installed on a factory-built fireplace, except where the fireplace system has been tested in accordance with UL 127 and the *Energy Conservation Code*.

916.2.1.1 Unvented Room Heaters. Unvented room heaters shall be prohibited in accordance with Section 2445.1 of the *Residential Code* ~~not be installed in bathrooms or bedrooms.~~

{EDITORIAL NOTE: THE REMAINDER OF THIS SECTION REMAINS AS SET FORTH IN THE 2015 UMC AND IS NOT ADOPTED BY THIS JURISDICTION.}

928.0 Pool Heaters. Pool heaters shall comply with Appendix L of the *Plumbing Code*.

{EDITORIAL NOTE: THE REMAINDER OF SECTION 928 REMAINS AS SET FORTH IN THE 2015 UMC AND IS NOT ADOPTED BY THIS JURISDICTION.}

CHAPTER 10

BOILERS AND PRESSURE VESSELS

1001.1 Applicability. The requirements of this chapter shall apply to the construction, installation, operation, repair, and alteration of boilers and pressure vessels. Low-pressure boilers shall comply with this chapter and Section 904.0. The installation or repair of gas and potable water piping and/or accessories shall be subject to the provisions of the *Plumbing Code*.

Exceptions:

- (1) Listed and approved potable water heaters with a nominal capacity not exceeding 120 gallons (454 L) and having a heat input not exceeding 200,000 British thermal units per hour (Btu/h) (58.6 kW) used for hot water supply at a pressure not exceeding 160 pounds force per square inch (psi) (1,103 kPa) and at temperatures not exceeding 210°F (99°C), in accordance with the plumbing code.
- (2) Pressure vessels used for unheated water supply, including those containing air that serves as a cushion and is compressed by the introduction of water and tanks connected to sprinkler systems.
- (3) Portable unfired pressure vessels and Interstate Commerce Commission (I.C.C.) containers.
- (4) Containers for liquefied petroleum gases, bulk oxygen, and medical gas that are regulated by the fire code.
- (5) Unfired pressure vessels in business, factory, hazardous, mercantile, residential, storage, and utility occupancies having a volume not exceeding 5 cubic feet (0.14 m³) and operating at pressures not exceeding 250 psi (1,724 kPa).
- (6) Pressure vessels used in refrigeration systems shall comply with Chapter 11.
- (7) Pressure tanks used in conjunction with coaxial cables, telephone cables, power cables, and other similar humidity control systems.
- (8) A boiler or pressure vessel subject to regular inspection by federal inspectors or licensed by federal authorities.

1001.7 Makeup water connection to steam boilers. Approved backflow preventers shall be installed in accordance with the *Plumbing Code*.

1003.6 Potable Water Boilers. Permits and inspections pertaining to boilers used exclusively for the production of potable hot water shall be administered by the Plumbing Inspection Section staff of the Authority Having Jurisdiction.

1003.7 Permit Required. Except for work exempted by Section 104.2 of this code, a permit shall be obtained from the Authority Having Jurisdiction prior to installation, reinstallation, alteration, repair or replacement of boilers and pressure vessels related to steam and hot water boiler systems. Alteration of safety control systems on automatic boilers or replacement, repair, or alteration of breeching, vent connector, vent pipe or chimney, and the conversion of solid fuel-

fired boilers as permitted by Section 1010.0 shall also require a permit. See Chapter 1 for requirements for obtaining permits.

1003.8 Boiler Nameplate. A boiler nameplate shall be attached to each boiler. Lost or destroyed nameplates shall be replaced in accordance with the *National Board Inspection Code*.

1005.6 Authority to Set and Seal Safety Appliances. All safety and safety relief valves for ASME Section I, Section IV, and Section VIII Division 1 boilers must be repaired, tested, set, and sealed by one of the following, provided the scope of the issued certificate of authorization covers the work to be performed:

- (1) An organization holding a valid V, HV, or UV certification or authorization, as appropriate, issued by the American Society of Mechanical Engineers (ASME);
- (2) An organization holding a valid VR certificate of authorization issued by the National Board of Boiler and Pressure Vessel Inspectors; or
- (3) An organization holding a valid owner/operate certificate of authorization issued by the Texas Department of Licensing and Regulation.

1006.0 Gas Shutoff Valves.

1006.1 General. An approved manual shutoff valve shall be installed within 3 feet (914 mm) of the boiler gas train, upstream of all control devices on the main burner of a gas-fired boiler. The takeoff point for the gas supply to the pilot shall be upstream of the gas shutoff valve of the main burner and shall be valved separately. A union or other approved means of disconnect shall be provided immediately down-stream of these shutoff valves.

1008.2 Low-Water Fuel Cutoff and Feed Water Pump Control Combined in a Single Device. Where a low-water fuel cutoff and feed water pump control combined in a single device is used, an additional separate low-water fuel cutoff with manual reset shall be installed, or be in accordance with the manufacturer's specifications of a listed device. The additional control shall be wired in series electrically with the existing low-water fuel cutoff.

1008.3 Low-Water Fuel Cutoff Housed in Either the Water Column or Separate Chamber. The installation shall be provided with a blow down pipe and valve not less than $\frac{3}{4}$ inch pipe size. The arrangement shall be such that when the water column is blown down, the water level in it will be lowered sufficiently to activate the low-water fuel cutoff device.

1013.1 General. An installation for which a permit is required shall not be put into service until it has been inspected and approved by the Authority Having Jurisdiction.

It shall be the duty of the owner or his authorized representative to notify the Authority Having Jurisdiction that the installation is ready for inspection and test. It also shall be the duty of the owner or his authorized representative to post in a conspicuous position on the installation a notice in substantially the following form: "Warning! This installation has not been inspected and approved by the Authority Having Jurisdiction and shall not be covered or concealed until so inspected and approved," and it shall be unlawful for anyone other than the Authority Having Jurisdiction to remove such notice. The Authority Having Jurisdiction shall require such tests as it deems necessary to determine that the installation is in accordance with the provisions of this section. Such tests shall be made by the owner or his authorized representative in the presence

of the Authority Having Jurisdiction. All boiler installations shall be hydrostatically tested by the owner or owner's authorized representative in the presence of the Authority Having Jurisdiction and in accordance with the *National Board Inspection Code*.

Exception: On installation designed and supervised by a registered design professional, the Authority Having Jurisdiction shall have the authority to permit inspection and testing by such registered design professional.

Where the owner or his authorized representative requests inspection of a boiler prior to its installation, the Authority Having Jurisdiction shall make such inspection.

1013.2 Temporary Operating Permit. ~~It shall be unlawful to operate a boiler or pressure vessel without first obtaining a valid operating permit to do so from the Authority Having Jurisdiction. Such permit shall be displayed in a conspicuous place adjacent to the boiler or vessel. The operating permit shall not be issued until the equipment has been inspected and approved by the Authority Having Jurisdiction.~~

Exception: ~~The operation of steam heating boilers, low-pressure hot water heating boilers, hot water supply boilers, and pressure vessels in residential occupancies of less than six dwelling units and in utility occupancies.~~

An installer of a boiler installed by authority of a permit issued under the provisions of this code may operate a temporary boiler and its appurtenances for a limited time for the purpose of cleaning, testing and adjusting, prior to passing final inspection, upon the following conditions:

- (1) The installer in whose name the permit is issued shall request the Authority Having Jurisdiction to inspect the system for approval of such operation.
- (2) If upon inspection the system is approved for operation as described in this section, the Authority Having Jurisdiction shall indicate in writing on said permit that a temporary operation is approved for the purpose of cleaning, testing, and adjusting for a period of 30 working days from date of inspection.
- (3) On or before the expiration date of the temporary operating permit, the system shall be given a final inspection and if the system fails to be approved, a reinspection fee will be charged for each subsequent inspection until the system is finally approved as complying with the requirements of this code.
- (4) Should the cleaning, testing, and adjusting of a boiler system not be completed within the time stipulated on the temporary operating permit, the Authority Having Jurisdiction may extend the time for just cause.

CHAPTER 11

REFRIGERATION

1101.1 Applicability. Part I governs the design, installation, and construction of refrigeration systems, equipment, refrigerant piping, pressure vessels, and safety devices for new buildings, replacement of parts, alterations, and substitution of different refrigerants. Replacement of existing refrigeration systems, conversion to a different refrigerant or installation of a new refrigeration system into an existing building shall conform to the requirements of this chapter. Part II governs the installation and construction of cooling towers.

1101.1.1 Existing Systems. The requirements of this section shall apply to existing refrigerant systems, equipment or devices where a substitution of a different refrigerant or replacement or addition of a refrigeration system or equipment occurs, and:

- (1) The quantity of refrigerant in the largest system in the room exceeds the allowable quantities per Table 1102.2; or
- (2) The replaced, converted or altered system contains Group A1 refrigerant and has an aggregate horsepower of 100 or more for a single refrigerant system; or
- (3) The system contains other than Group A1 refrigerant

Exception: Absorption systems, see Section 1104.9, are exempted from 1101.2.

1104.9 Absorption Refrigeration.

1104.9.1 Lithium Bromide Absorption Refrigeration. Lithium bromide absorption refrigeration equipment using water as the refrigerant and steam or hot water as the energy source is exempt from refrigeration machinery room requirements and may be located in the same room with refrigeration equipment requiring a machinery room.

1104.9.2 Direct Fired Absorption Refrigeration. Direct fired absorption refrigeration equipment shall be installed in a room constructed as required for a boiler of similar Btu input. This equipment shall not be installed in a refrigeration machinery room.

1104.9.3 Ammonia Absorption Refrigeration. Ammonia absorption refrigeration equipment larger than 5 tons shall be installed in a refrigeration machinery room with the relief piped in accordance with the *Fire Code*.

1105.6 Prohibited Locations. Refrigeration systems or portions thereof shall not be located within a required exit enclosure. Refrigeration compressors exceeding 5 horsepower (3.7 kW) rating shall be located not less than 10 feet (3,048 mm) from an exit opening ~~in a Group A; Group B; Group E; Group F; Group I; Group R; Division 1; or Group S Occupancy,~~ unless separated by a one-hour fire-resistive ~~occupancy separation~~ fire barrier.

Exception: Refrigeration compressors containing A1 refrigerant located 10 feet (3048 mm) or less from an exit opening.

1106.9 Boilers in Existing Machinery Rooms.

1106.9.1 Isolation. Boilers and other heat-producing appliances shall be isolated from the machinery room by walls or partitions that create a reasonably distinct and separate atmosphere from the refrigeration machinery room. Combustion air shall be taken from other than refrigeration machinery rooms in accordance with Chapter 7 of this code. Partitions, doors and other components of the structure shall be made of materials as required for not less than a one-hour occupancy separation.

Exceptions:

- (1) Where it is physically impractical to comply with the above requirement, an evaluation report by a registered engineer or registered architect licensed to practice in the State of Texas shall be presented to the Authority Having Jurisdiction for approval. The walls, partitions and doors need not comply with the requirements set forth for a fire barrier, but may consist of one-hour material designed and constructed to isolate the machinery room from the boilers to create a reasonably distinct and separate atmosphere within the respective rooms.
- (2) Where it is found to be physically impractical to construct a separation of boilers and refrigeration machinery containing Group A1 or Group B1 refrigerant, a registered professional engineer licensed to practice in the State of Texas shall evaluate the effect that ventilation, both emergency and continuous, will have on the operation of boilers within the refrigeration machinery room. A report, including a statement clearly indicating that a boiler will operate safely shall be submitted to the Authority Having Jurisdiction for review and approval prior to placing the boilers and ventilation into operation simultaneously. If the registered professional engineer determines that the required continuous ventilation will not have a detrimental effect on the operation of boilers but that emergency ventilation will have a detrimental effect on boiler operation, an electrical interlock designed to shut off the fuel supply to boilers when emergency ventilation is energized may be used in lieu of isolation of the boilers from the machinery room.

1106.9.2 Engines in Existing Refrigeration Machinery Rooms. Engines are permitted in refrigeration machinery rooms, provided:

- (1) The refrigerant classification is Group A1 and Group B1 only;
- (2) Combustion air is taken from outside the building and to the engine in substantially sealed ducts or pipes;
- (3) Insulation is provided for all hot surfaces subject to a temperature of 800°F or higher;
- (4) Ventilation is provided to dissipate the radiant heat from the engines to keep the room below 120°F (48.89°C); and
- (5) There is no open flame or spark.

1106.9.3 Switchgear and Related Equipment in Machinery Rooms. Switchgear and related equipment may remain in an existing machinery room, provided:

- (1) The refrigerant classification is Group A1 or Group B1 only; and
- (2) The switchgear or related equipment possesses no clearance or work hazard in regard to the refrigeration machinery or the electrical switchgear.

1106.9.4 Emergency Control. Emergency control in accordance with Section 1107.6 shall be provided for the refrigeration equipment and existing air-handling equipment except machinery room ventilation fans.

1107.4 Distribution of Ventilation. Exhaust inlets or permanent openings shall be located to provide ventilation throughout the entire refrigeration machinery room. Emergency exhaust intakes shall be located within 12 inches (305 mm) of the floor unless the refrigerant is lighter than air.

1109.1.4 Piping Insulation. For minimum pipe insulation see the *Energy Code*.

CHAPTER 12

HYDRONICS

~~1207.4 Solar Heat Collector Systems.~~ Solar water heating systems used in hydronic panel radiant heating systems shall be installed in accordance with the *Uniform Solar Energy Code* and *Hydronics Code* (USEHC).

CHAPTER 13

FUEL GAS PIPING

1301.0 Scope of Gas Piping. For provisions pertaining to fuel gas piping see Chapter 12 of the *Plumbing Code*.

{EDITORIAL NOTE: THE REMAINDER OF THIS CHAPTER REMAINS AS SET FORTH IN THE 2015 UMC AND IS NOT ADOPTED BY THIS JURISDICTION.}

CHAPTER 14

PROCESS PIPING

{EDITORIAL NOTE: THE REMAINDER OF THIS CHAPTER REMAINS AS SET FORTH IN THE 2015 UMC AND IS NOT ADOPTED BY THIS JURISDICTION. PROCESS PIPING SHALL COMPLY WITH SECTION 2907 AND OTHER APPLICABLE PROVISIONS OF THE FIRE CODE AS DEFINED HEREIN.}

CHAPTER 15

SOLAR ENERGY SYSTEMS

{EDITORIAL NOTE: THE REMAINDER OF THIS CHAPTER REMAINS AS SET FORTH IN THE 2015 UMC AND IS NOT ADOPTED BY THIS JURISDICTION. THE INSTALLATION OF SOLAR ENERGY SYSTEMS SHALL COMPLY WITH ALL APPLICABLE PROVISIONS OF THE *CONSTRUCTION CODE*, AS DEFINED HEREIN.}

CHAPTER 17

REFERENCED STANDARDS

**TABLE 1701.1
REFERENCED STANDARDS**

Standard Number	Standard Title	Application	Referenced Sections
<u>ASTM B 68-2011</u>	<u>Specification for Seamless Copper Tube, Bright Annealed (Metric)</u>	<u>Miscellaneous</u>	<u>405.13.1</u>
NFPA 70-20 <u>20</u> 44*	National Electrical Code	Miscellaneous	301.4, 511.1.6, 512.2.5, 516.2.7, 516.2.9(4), 602.2.1, 905.10.2, 1104.4(6), 1217.7.1, 1311.14.5(2), 1312.6, E 503.5(11)(c)
<u>NFPA 92-2015</u>	<u>Standard for Smoke Control Systems</u>	<u>Smoke Control</u>	<u>405.7, 405.8</u>
<u>UL 864-2003</u>	<u>Standards for Control Units and Accessories for Fire Alarm Systems</u>	<u>Miscellaneous</u>	<u>405.12</u>