



February 26, 2020

Julius Ballanco, P.E., on behalf of Daikin US
JB Engineering and Code Consulting, P.C.
1661 Cardinal Dr.
Munster, IN 46321

Re: IAPMO Board of Directors Petition Decision to Standards Council Decision
TIA UMC-006-18
Uniform Mechanical Code

Dear Mr. Ballanco:

I am transmitting to you herewith the following decision of the IAPMO Board of Directors.

A duly appointed Subcommittee of the IAPMO Board of Directors consisting of myself as Chairman, Allen Becker, Steve Panelli, Kevin Tindall, and Jeremy Stettler held a hearing pursuant to the Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council, to consider the petition of Julius Ballanco, on behalf of Daikin US, concerning the IAPMO Standards Council decision referenced above relating to the proposed 2018 edition of the *Uniform Mechanical Code*.

Under IAPMO rules, the Standards Council has been delegated the responsibility for the administration of the codes and standards development process, including adjudication of appeals and the issuance of the *Uniform Mechanical Code* (see the IAPMO Regulations §§ 1-7, 2-2). On a petition, the Board of Directors must give due deference to the judgment of the IAPMO Standards Council and will not intervene unless the Petitioner demonstrates the existence of extraordinary circumstances requiring intervention to protect the integrity of the codes and standards development process (see the IAPMO Regulations Governing Petitions § 3; see also the IAPMO Regulations § 1-7).

Petitions to the Board of Directors are not intended to be a full appeal beyond that already afforded by the Standards Council but are rather an opportunity for the Board of Directors to intervene in the event the Board determines there to be extraordinary circumstances. On a Petition to the Board to issue a Tentative Interim Amendment (TIA), the Board may consider each element required to recommend issuance of the TIA (technical merit, emergency nature) against the mandate of the Board under the *Regulations*.

For the Board to issue the TIA, the Board must determine the elements of the TIA are satisfied to recommend issuance *and* there exist extraordinary circumstances. The Board finds that the TIA is of technical merit.¹ Petitioner and others in support of his position testified to three factors Petitioner believes meets the emergency nature of said TIA: 5-2(d), (e), and (f). Those in favor offered testimony regarding possible requirements to be enacted by the state of California for low global warming potential (GWP) refrigerants. Those in attendance at the hearing who spoke in opposition disagreed with said testimony, and voiced concerns over lack of training of the personnel who will install and maintain A2L systems, leak detection, and other safety matters concerning A2L refrigerants. These same concerns were raised by numerous members

¹ The IAPMO Standards Council determined that the TIA possessed technical merit; the Board defers to the Council.

of the Technical Committee, as fully represented by the Standards Council in its written decision.²

Petitioner asserts that the proposed TIA satisfies *Regulations* Section 5-2(d) as asserting that, as existing, the 2018 *Uniform Mechanical Code* pose a “hazard” because it does not contain provisions for low GWP refrigerants.³ The Board does not agree with the Petitioner; the Board finds that this allegation does not meet the letter nor the spirit of this subsection of the *Regulations*. Moreover, neither the Petitioner nor anyone in support presents evidence of any manner in which the UMC, omitting these refrigerants, has posed a hazard in the field.

Petitioner next asserts that the TIA satisfies *Regulations* Section 5-2(e).⁴ Petitioner in his written Petition states: “[t]he only means of complying with a mandate to use low GWP refrigerants is by using Group A2L refrigerants.”

Also, in his written brief Petitioner sums his argument as follows: “the main reason this is of an emergency nature is the fact that the State of California will be enacting requirements that mandate the use of low GWP refrigerants for direct systems for comfort cooling.” The Board heard testimony to the contrary. Importantly, even if the State of California does enact requirements in the future, this does not constitute a presently existing emergency at all.

Furthermore, all testimony in support of Petitioner highlighted the favorable environmental effects of low GWP refrigerants. The record is bare of written or oral testimony claiming that low GWP refrigerants advance the art of safeguarding life or property; this Section of the *Regulations* cannot be relied on to support Petitioner’s position.

Petitioner asserts that the TIA satisfies *Regulations* Section 5-2(f).⁵ The Board finds Petitioner’s arguments on this point unpersuasive. The 2018 Uniform Mechanical Code was not revised to create an adverse impact on A2L refrigerants; the Code’s silence on the subject matter is not an “adverse impact” as set forth in Section 5-2(f). If it can be said that there is an “adverse impact” on A2L refrigerants because they are not included in Table 1104.1, it must be said that this did not arise as a result of a revision, given that Table 1104.1 of the 2015 Uniform Mechanical Code also excludes A2L refrigerants. And so, it was in the 2012 Edition of the Uniform Mechanical Code.⁶ With these facts as a backdrop it becomes clear that *Regulations* Section 5-2(f) is not appropriately applied to the TIA at issue here.

² The Council decision states the Council “observes that an overwhelming majority of the Technical Committee members harbor concern with the health and safety aspects of A2L and other low flammable refrigerants for installers, repairers and occupants...”

³ Section 5-2(d) of the IAPMO Regulations Governing Committee Projects reads in full: *the proposed TIA intends to offer the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.*

⁴ Section 5-2(e) of the IAPMO Regulations Governing Committee Projects reads in full: *the proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable the public.*

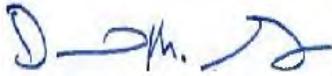
⁵ Section 5-2(f) of the IAPMO Regulations Governing Committee Projects reads in full: *the proposed TIA intends to correct a circumstance in which the revised document has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process, or was without adequate technical (safety) justification for the action.*

⁶ See Table 1105.1 of the 2012 Uniform Mechanical Code.

The Board was not presented with any facts or allegations of how the Standards Council may have erred in reaching their decision. Accordingly, the Board finds that the testimony provided to the Subcommittee did not articulate circumstances requiring Board intervention. Upon review of the entire record, the Board is not compelled to act.

The Board of Directors dismisses the petition.

Sincerely,



David Gans
Chairman

Cc: IAPMO Code Dept.
Members, Mechanical Technical Committee
Members, Standards Council
IAPMO Board of Directors
Charlie McCrudden, Daikin US
Andrew Klein, Chemours
Dominique Taudin, Carrier
Marc Nard, AHRI
Jay Peters, representing Honeywell
Jim Tidwell, Tidwell Code Consulting
Chris LaPietra, Honeywell
Harshad Inamdar, Rheem Manufacturing Company
Karen Meyers, Rheem Manufacturing Company
Mark Lessans, Johnson Controls
Chris Forth, Johnson Controls
Mike Fischer, Kellen Company



November 25, 2019

Julius Ballanco, P.E.
JB Engineering and Code Consulting, P.C.
Representing Daikin U.S.
1661 Cardinal Drive
Munster, IN 46321

Re: IAPMO Standards Council Decision
TIA UMC-006-18
Decision date: November 25, 2019**
*2018 Uniform Mechanical Code – Section 1104.0, Table 1104.1,
1104.6, 1104.7, 1115.5, Table 1701.1*

Dear Mr. Ballanco:

I am transmitting to you herewith the following decision of the Standards Council. At its meeting on November 14, 2019, the Standards Council considered your request for the issuance of proposed TIA UMC-006-18 in the 2018 edition of the *Uniform Mechanical Code*. The proposed Tentative Interim Amendment requested amendments to Table 1104.1, Table 1701.1 and Section 1104.7, as well as new Sections 1104.6 and 1115.5, as shown in Exhibit A.

Prior to the November 14 meeting, the proposed TIA was balloted through the Mechanical Technical Committee in accordance with the Regulations Governing Committee Projects to determine if there existed the necessary three-fourths majority support on technical merit and emergency nature to establish the recommendation for issuance. The ballot failed on both accounts and subsequently came to the IAPMO Standards Council, as prescribed by the Regulations. The Council was surprised to note the Technical Committee did not find the TIA to be of technical merit. The Council disagrees with the Technical Committee and finds the TIA does possess technical merit.

Upon review of the full record including oral testimony provided during the hearing, the Council hereby rejects the proposed TIA.

The Council notes the testimony on the record and observes that an overwhelming majority of the Technical Committee members harbor concern with the health and safety aspects of A2L and other low flammable refrigerants for installers, repairers and occupants, and the fact that there is an absence of industry-available training programs for installers and technicians. Council members also note the significant testimony of the importance to the environment of A2L and low GWP refrigerants that are available in the market today. This is an issue of clear significance and the Council has instructed the staff liaison to advise the next Mechanical Technical Committee Chair that industry would be well served by the formation of an A2L Task Group for Mechanical Systems to address this topic of industry-wide importance.

Sincerely,

A handwritten signature in black ink, appearing to read "Gabriella Davis". The signature is fluid and cursive, written over a light blue horizontal line.

Gabriella Davis
Secretary, Standards Council

CC: Monte Bogatz, Executive VP & General Counsel
Hugo Aguilar, VP, Codes & Standards Development
Zalmie Hussein, Staff Liaison
IAPMO Standards Council
Members of the Mechanical TC
Marc Nard, Air-Conditioning, Heating & Refrigeration Institute
Aanchal Kohli, California Air Resources Board
Dave Mann, Self

****NOTE:** Participants in IAPMO's codes and standards making process are advised that limited review of this decision may be sought from the IAPMO Board of Directors. For the rules describing the available review and the method for petitioning the Board of Directors for review, please consult Section 1-7 of the *IAPMO Regulations Governing Committee Projects* and the *IAPMO Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council*. **Notice of the intent to file such a petition must be submitted to the Petitions Clerk of the Board of Directors within 15 calendar days of the Date of Decision noted in the subject line of this letter.** As this document is an American National Standard (ANS), any persons who have directly and materially affected interests by this decision have the right to appeal to ANSI in accordance with ANSI procedures.

IAPMO Regulations Governing Committee Projects
Section 1-7

1-7 Petitions to the Board of Directors.

1-7.1 General. The Standards Council has been delegated the responsibility for the administration of the codes and standards development process and the issuance of Documents. However, where extraordinary circumstances requiring the intervention of the Board of Directors exist, the Board of Directors may take any action necessary to fulfill its obligations to preserve the integrity of the standards development process. Anyone seeking such intervention of the Board of Directors may petition the Board of Directors concerning Standards Council action on any matters. Such petitions shall be filed and processed in accordance with the Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council.

1-7.2 Notice of Intent to File the Petition. Anyone wishing to petition the Board of Directors concerning an Standards Council action related to the issuance of a document, shall file a Notice of Intent to File a Petition within 15 days following the Standards Council action. A Standards Council action related to the issuance of a document includes any action of the Council that issues or returns a Document or that affects the text of a Document. Petitions concerning other Standards Council actions shall be filed within a reasonable period of time.

1-7.3 Effect of Filing. The filing of a Petition will not serve to stay the effective date of a Document or a Tentative Interim Amendment unless the Chief Executive Officer of the Association or the Board of Directors acts, pursuant to 4-7.2 or 5-6, to delay the effective date. Any Petition pending at the time a Document or Tentative Interim Amendment becomes effective will be treated as a Petition to withdraw the Document or Tentative Interim Amendment.

1-8 Use of Visual Aids and Demonstrations Before the Standards Council or Board of Directors. The policy for the use of visual aids and physical demonstrations to the Standards Council and Board of Directors shall be the same as that required for TCCs, TCs, and Task Groups, in accordance with 3-3.3.3(e) and 3-3.3.3(f).

IAPMO Regulations Governing Petitions to the Board of Directors
from Decisions of the Standards Council

ADOPTED BY THE IAPMO BOARD OF DIRECTORS SEPTEMBER 4, 2000. Amended in January 2007.

Section 1 Scope of and Authority for these Regulations.

- (a) These regulations have been issued by the Board of Directors pursuant to its authority under Article 5, 6 and 8 of the IAPMO Bylaws.
- (b) These regulations set forth the procedures to be used for the filing and processing of all petitions to the Board of Directors filed pursuant to 1-7 of the Regulations Governing Committee Projects.
- (c) The Board of Directors can amend these regulations from time to time and waive or supplement, in whole or in part, at any time or times at its discretion.
- (d) For the purposes of these regulations, the Standards Council Secretary, or such other person as the Chair of the Board of Directors may appoint, shall act as a petitions clerk.

Section 2 Subcommittees of the Board of Directors. Unless the Board of Directors otherwise orders, the authority to consider and make recommendations on the disposition of a petition by the Board of Directors shall be delegated to a subcommittee of the Board of Directors, which shall be appointed, in accordance with 2.1 of these regulations. Subcommittees shall be appointed by the Chair of the Board of Directors.

2-1 Composition of Subcommittees. Subcommittees shall consist of three or more members of the Board of Directors. The criteria for selection and appointment of subcommittee members shall be as follows:

(a) A subcommittee member shall be a person who can decide the petition on the merits in an impartial manner.

(b) A subcommittee member shall not have any conflict of interest. (A conflict of interest is defined as any situation in which a decision on a petition could substantially and materially affect the member's financial or business interest.)

(c) Each subcommittee member shall, to the extent practicable, represent diverse interests within the association.

In making a decision of whether or not to serve on a subcommittee, the member may consult with the IAPMO general counsel.

Section 3 The Scope of Review. The petitioner shall generally confine the argument in the petition to matters that were presented below and shall not raise any new matters that could have but were not presented within the standards development process. A petition to the Board of Directors shall not be regarded as simply another opportunity to reargue a position that was rejected by the Standards Council. In considering a petition, the subcommittee shall give due deference to the judgment of the Standards Council and shall not intervene unless it can be demonstrated that extraordinary circumstances exist requiring the Board of Director's intervention to protect the integrity of the standards development process.

Section 4 The Record. In its consideration of the petition, the subcommittee shall have before it the entire record that was before the Standards Council, as well as all proceedings and decisions of the Standards Council on the issue. In addition, the subcommittee may consult any other records of the association that it deems pertinent to the issue, and the subcommittee may seek technical assistance from staff, the technical committee, or any other source or persons that it deems appropriate.

Section 5 Notice of Intent to File the Petition. Anyone wishing to petition the Board of Directors concerning a Standards Council action related to the issuance of a document, shall file a Notice of Intent to File a Petition within 15 days following the Standards Council action. A Standards Council action related to the issuance of a document includes any action of the Council that issues or returns a document or that affects the text of a document. Petitions concerning other Standards Council actions shall be filed within a reasonable period of time.

Section 6 Filing and Contents of the Petition.

(a) Within 15 days following the receipt of the notice of intent to file, or within such other time as the petitions clerk may allow, the petitioner shall file the petition together with 20 copies. The petition shall be no more than 10 pages in length and shall contain, in separately denominated sections, the following:

- (1) Name, affiliation, and address of the petitioner;
- (2) Statement identifying the particular Standards Council action to which the petition relates;
- (3) Argument setting forth the grounds for the petition and, in particular, addressing why there exist extraordinary circumstances requiring the intervention of the Board of Directors (see the preceding Section 3 and 1-7 of the Regulations Governing Committee Projects); and
- (4) Statement of the precise relief requested.

(b) Any part of the record related to the standards development process that is referenced or discussed in the petition should be clearly cited in the petition using available markings such as the title, author, date, and page of the record. Since the full record will be available to the subcommittee during its review, attachments and appendices shall not accompany the petition, unless express permission has been obtained from the petitions clerk.

Section 7 Consideration of the Petition.

7-1 Initial Review. The petitions clerk may, at his or her discretion, arrange for initial review of the petition by meeting, correspondence, or telephone conference. If upon such initial review of the petition and any relevant portions of the record, the subcommittee determines that the petition has no merit, it may dismiss the petition.

7-2 Full Review. If initial review is not conducted, or, if upon such review, the subcommittee determines that further review is warranted, it shall afford the opportunity for responses to be filed by interested parties.

Responses, together with 20 copies, shall be filed within 15 days or within such other time as the petitions clerk may allow.

(a) Responses shall be no more than 10 pages in length and shall contain, in separately denominated sections, the following:

(1) Name, affiliation, and address of the respondent;

(2) Statement identifying the petition to which the response relates and stating whether the respondent supports or opposes the petition; and

(3) Argument setting forth the grounds for opposing or supporting the petition and, in particular, addressing why there does or does not exist extraordinary circumstances requiring the intervention of the Board of Directors (see the preceding Section 3 and 1-7 of the Regulations Governing Committee Projects).

(b) Any part of the record related to the standards development process that is referenced or discussed in a response should be clearly cited in the response using available markings such as the title, author, date, and page of the record. Since the full record will be available to the subcommittee during its review, attachments and appendices shall not accompany the response, unless express permission has been obtained from the petitions clerk.

(c) So as to avoid unnecessary repetition and duplication of effort, parties are encouraged to file joint responses where possible and appropriate.

(d) Unless a hearing has been requested and granted by the subcommittee (see Section 8), the subcommittee shall, either by meeting or telephone conference, review and render a decision on the petition based on the written submissions of the parties and the record before it.

Section 8 Requests for Hearings. If the petitioner requests a hearing on the petition and that hearing is granted, the petitioner shall be assessed a filing fee of \$2,500 to be posted following the granting of the request. This fee may be reduced or waived by the Chief Executive Officer upon application of the petitioner if good cause for reducing or waiving the fee is presented. If a hearing is granted, the Procedures for Hearings shall be followed.

Section 9 Waiver of Regulations. Any of the deadlines or requirements set forth in these regulations may be waived by the subcommittee upon application of the petitioner or any other party for good cause shown, or in the discretion of the subcommittee.

Section 10 Subcommittee Report to the Board of Directors. The subcommittee shall file with the Board of Directors a written report concerning each petition that it has determined.

Exhibit A

**TABLE 1104.1
PERMISSIBLE REFRIGERATION SYSTEMS¹**

OCCUPANCY GROUP ³	HIGH-PROBABILITY SYSTEM	LOW PROBABILITY SYSTEM	MACHINERY ROOM
A-1	Group A1 <u>or A2L⁴</u> only	Any	Any
A-2	Group A1 <u>or A2L⁴</u> only	Any	Any
A-3	Group A1 <u>or A2L⁴</u> only	Any	Any
A-4	Group A1 <u>or A2L⁴</u> only	Any	Any
B	Group A1 ² <u>or A2L^{2,4}</u> only	Any	Any
E	Group A1 <u>or A2L⁴</u> only	Any	Any
F-1	Group A1 ² <u>or A2L^{2,4}</u> only	Any	Any
F-2	Any ²	Any	Any
H-1	Any	Any	Any
H-2	Any	Any	Any
H-3	Any	Any	Any
H-4	Group A1 <u>or A2L⁴</u> only	Any	Any
H-5	Group A1 <u>or A2L⁴</u> only	Any	Any
I-1	None	Any	Any
I-2	Group A1 <u>or A2L⁴</u> only	Any	Any
I-3	None	Any	Any
I-4	Group A1 <u>or A2L⁴</u> only	Any	Any
M	Group A1 ² <u>or A2L^{2,4}</u> only	Any	Any
R-1	Group A1 <u>or A2L⁴</u> only	Any	Any
R-2	Group A1 <u>or A2L⁴</u> only	Any	Any
R-3	Group A1 <u>or A2L⁴</u> only	Any	Any
R-4	Group A1 <u>or A2L⁴</u> only	Any	Any
S-1	Group A1 ² <u>or A2L^{2,4}</u>	Any	Any

	only		
S-2	Any ²	Any	Any
U	Any	Any	Any

Notes:

1 See Section 1104.0.

2 A refrigerant shall be permitted to be used within a high-probability system where the room or space is in accordance with Section 1104.4.

3 Occupancy classifications are defined in the building code.

4. See Section 1104.6 for requirements applicable to A2L equipment.

1104.6 Group A2L Refrigerants for Human Comfort. High-probability systems using Group A2L refrigerants for human comfort applications shall comply with this section. [ASHRAE 15:7.6]

1104.6.1 Refrigerant Concentration Limits. Occupied spaces shall comply with Section 1104.2. Unoccupied spaces with refrigerant containing equipment, including but not limited to piping or tubing, shall comply with Section 1104.2 except as permitted by Section 1104.6.4. [ASHRAE 15:7.6.1-7.6.1.2.1]

1104.6.2 Listing and Installation Requirements. Refrigeration systems shall be listed and shall be installed in accordance with listing, the manufacturer's instructions, and any markings on the equipment restricting the installation. [ASHRAE 15:7.6.2]

1104.6.2.1 Nameplate. The nameplate required by Section 1115.5 shall include a symbol indicating that a flammable refrigerant is used, as specified by the product listing. [ASHRAE 15:7.6.2.1]

1104.6.2.2 Labeling. A label indicating a flammable refrigerant is used shall be placed adjacent to service ports and other locations where service involving components containing refrigerant is performed, as specified by the product listing. [ASHRAE 15:7.6.2.2]

1104.6.2.3 Refrigerant Detectors. A refrigerant detector shall be provided in accordance with Section 1104.6.5 where any of the following apply:

(1) For commercial, public assembly, and large mercantile occupancies, when the refrigerant charge of any independent circuit exceeds $0.212 \times LFL$ (lb), where LFL is in pounds per 1000 ft³ ($6 \times LFL$ [kg] where LFL is in kg/m³), unless the concentration of refrigerant in a complete discharge from any independent circuit will not exceed 50 percent of the RCL.

(2) For residential occupancies, when the refrigerant charge of any independent circuit exceeds $0.212 \times LFL$ (lb), where LFL is in pounds per 1000 ft³ ($6 \times LFL$ [kg] where LFL is in kg/m³).

(3) When the occupancy classification is institutional.

(4) When required by the product listing.

(5) When using the provisions of Section 1104.6.4. [ASHRAE 15:7.6.2.3]

1104.6.2.4 Refrigerant Concentration Above Limit. When the refrigerant detector senses a rise in refrigerant concentration above the value specified in Section 1104.6.5(2), the following actions shall be taken:

(1) The minimum airflow rate of the supply air fan shall be in accordance with the following equation.

$$Q_{\min} = 1000 \times M / LFL \text{ [Equation 1104.6.2.4]}$$

Where:

Q_{min} = minimum airflow rate, ft³/min

M = refrigerant charge of the largest independent refrigerating circuit of the system, lb

LFL = lower flammability limit, lb per 1000 ft³

For SI units: $Q = 60000 \times M / LFL$, where Q is the supply air flow rate (m³/h), M is the refrigerant charge (kg), LFL is the lower flammability limit (g/m³).

(2) Turn off the compressor and all other electrical devices, excluding the control power transformers, control systems, and the supply air fan. The supply air fan shall continue to operate for at least five minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.6.5(2).

(3) Any device that controls airflow located within the product or in ductwork that supplies air to the occupied space shall be fully open. Any device that controls airflow shall be listed.

(4) Turn off any heaters and electrical devices located in the ductwork. The heaters and electrical devices shall remain off for at least five minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.6.5(2). [ASHRAE 15:7.6.2.4]

1104.6.3 Ignition Sources Located in Ductwork. Open-flame producing devices shall not be permanently installed in the ductwork that serves the space. Unclassified electrical devices shall not be located within the ductwork that serves the space. Devices containing hot surfaces exceeding 1290°F (700°C) shall not be located in the ductwork that serves the space unless there is a minimum airflow of 200 ft/min (1.0 m/s) across the heating device(s) and there is proof of airflow before the heating device(s) is energized.

[ASHRAE 15:7.6.3-7.6.3.3]

1104.6.4 Compressors and Pressure Vessel Located Indoors. For refrigeration compressors and pressure vessels located in an indoor space that is accessible only during service and maintenance, it shall be permissible to exceed the RCL if all of the following provisions are met:

(1) The refrigerant charge of largest independent refrigerating circuit shall not exceed

(a) 6.6 lb (3 kg) for residential and institutional occupancies and

(b) 22 lb (10 kg) for commercial and public/large mercantile occupancies.

(2) The space where the equipment is located shall be provided with a mechanical ventilation system in accordance with Section 1104.6.4(3) and a refrigerant detector in accordance with Section 1104.6.5. The mechanical ventilation system shall be started when the refrigerant detector senses refrigerant in accordance with Section 1104.6.5. The mechanical ventilation system shall continue to operate for at least five minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.6.5(2).

(3) A mechanical ventilation system shall be provided that will mix air with leaked refrigerant and remove it from the space where the equipment is located. The space shall be provided with an exhaust fan. The exhaust fan shall remove air from the space where the equipment is located in accordance with the following equation.

$Q_{min} = 1000 \times M/LFL$

Where:

Q_{min} = minimum airflow rate, ft³/min

M = refrigerant charge of the largest independent refrigerating circuit of the system, lb
 LFL = lower flammability limit in lb per 1000 ft³

For SI units: $Q = 60000 \times M / LFL$, where Q is the supply air flow rate (m³/h), M is the refrigerant charge (kg), LFL is the lower flammability limit (g/m³).

(4) The exhaust air inlet shall be located where refrigerant from a leak is expected to accumulate. The bottom of the air inlet elevation shall be within 12 in. (30 cm) of the lowest elevation in the space where the compressor or pressure vessel is located. Provision shall be made for make-up air to replace that being exhausted. Openings for the make-up air shall be positioned such that air will mix with leaked refrigerant.

(5) Air that is exhausted from the ventilation system shall be either

(a) discharged outside of the building envelope or

(b) discharged to an indoor space, provided that the refrigerant concentration will not exceed the limit specified in Section 1104.6.1.

(6) In addition to the requirements of Section 1104.6.3, there shall be no open-flame producing devices that do not contain a flame arrestor, or hot surfaces exceeding 1290°F (700 °C) that are installed within space where the equipment is located. [ASHRAE 15:7.6.4]

1104.6.5 Refrigerant Detectors. Refrigerant detectors required by Section 1104.6.2 shall meet the following requirements:

(1) Refrigerant detectors that are part of the listing shall be evaluated by the testing laboratory as part of the equipment listing.

(2) Refrigerant detectors as installed shall activate the functions required by Section 1104.6.2.4 within a time not to exceed 15 seconds when the refrigerant concentration reaches 25 percent of the lower flammability limit (LFL).

(3) Refrigerant detectors shall be located such that refrigerant will be detected if the refrigerating system is operating or not operating. Use of more than one refrigerant detector shall be permitted.

(a) For refrigerating systems that are connected to the occupied space through ductwork, refrigerant detectors shall be located within the listed equipment.

(b) For refrigerating systems that are directly connected to the occupied space without ductwork, the refrigerant detector shall be located in the equipment, or shall be located in the occupied space at a height of not more than 12 inches (30 cm) above the floor and within a horizontal distance of not more 3.3 feet (1.0 m) with a direct line of sight of the unit.

(4) Refrigerant detectors shall provide a means for an automatic operational self-test as provided in the product listing. Use of a refrigerant test gas is not required. If a failure is detected, a trouble alarm shall be activated, and the actions required by Section 1104.6.2.4 shall be initiated.

(5) Refrigerant detectors shall be tested during installation to verify the set point and response time as required by Section 1104.6.5(2). After installation, the refrigerant detector shall be tested to verify the set point and response time annually or at an interval not exceeding the manufacturer's installation instructions, whichever is less. [ASHRAE 15:7.6.5]

1104.6 1104.7 Applications for Human Comfort and for Nonindustrial Occupancies.

In nonindustrial occupancies, Group A2, ~~A2L~~, A3, B1, B2L, B2, and B3 refrigerants

shall not be used in high-probability systems for human comfort. Use of Group A2L refrigerants shall be in accordance with Section 1104.6.

(renumber remaining sections)

1115.5 Nameplate. Each unit system and each separate condensing unit, compressor, or compressor unit sold for field assembly in a refrigerating system shall carry a nameplate marked with the manufacturer's name, nationally registered trademark or trade name, identification number, design pressures, and refrigerant for which it is designed. The refrigerant shall be designated by the refrigerant number (R number) as shown in Table 1102.3. [ASHRAE 15:9.15]

**TABLE 1701.1
REFERENCED STANDARDS**

STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTIONS
UL 60335-2-40- 2017 <u>2019</u>	Household and Similar Electrical Appliances - Safety – Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers	Appliances	903.1, 904.13