MEMORANDUM

Dear UMC Committee Members:

After the circulation of votes, the final ballot results for **UMC TIA 006-18** are as follows on the attached ballot matrix:

26 Members Eligible to Vote
1 Ballot was not received for **Technical Merit** by the final closing date of November 8, 2019
1 Ballot was not received for **Emergency Nature** by the final closing date of November 8, 2019

Technical Merit
9 Affirmative (19 needed to pass)
16 Negative
0 Abstain
1 Not returned

According to Section 5-4 of the Regulations Governing Committee Projects, the final results of the UMC TIA 006-18 ballot did not achieve the necessary three-fourths majority for affirmative votes (19) on **Technical Merit** (26 eligible - 1 not returned - 0 abstain = 25 x 75% = 18.75 or **19**).

Emergency Nature
9 Affirmative (19 needed to pass)
16 Negative
0 Abstain
1 Not returned

According to Section 5-4 of the Regulations Governing Committee Projects, the final results of the UMC TIA 006-18 ballot did not achieve the necessary three-fourths majority for affirmative votes (19) on **Emergency Nature** (26 eligible - 1 not returned - 0 abstain = 25 x 75% = 18.75 or **19**).

Please feel free to contact me by phone at (909) 218-8122 or by email at zalmie.hussein@iapmo.org if you have questions.

Regards,

Zalmie Hussein

UMC TIA # 006-18
Final Ballot Results

Ballot Name:	**UMC TIA # 006-18 TECHNICAL MERIT**
Ballot Status:	Ballot has closed
Members Eligible to Vote:	26

Vote Summary		
Option	**Count**	**Percent**
AFFIRMATIVE	9	36%
NEGATIVE	16	64%
ABSTAIN	0	
DID NOT VOTE	1	

Voter Name	**Vote**
Koerber, Ralph	AFFIRMATIVE
Trafton, Phil	AFFIRMATIVE
Hargis, Shawn	AFFIRMATIVE
Adler, Bob	AFFIRMATIVE
Trafton, April	AFFIRMATIVE
Delaquila, David	AFFIRMATIVE
White, Charles	AFFIRMATIVE
Cudahy, Michael	AFFIRMATIVE
Howard, III, Eli	AFFIRMATIVE
Gunzner, Aaron	NEGATIVE
Hamilton, John	NEGATIVE
Van Rite, Chris	NEGATIVE
Mann, David	NEGATIVE
Feehan, Pennie	NEGATIVE
Taylor, Don	NEGATIVE
Egg, Jay	NEGATIVE
Kreitenberg, Harvey	NEGATIVE
Aguilar, Sarah	NEGATIVE
Berger, Donald	NEGATIVE
Young, Randy	NEGATIVE
Ribbs, Phil	NEGATIVE
MacNevin, Lance	NEGATIVE
Dias, David	NEGATIVE
Smith, Cary	NEGATIVE
Benkowski, Richard	NEGATIVE
Hyde, Michael	Did not vote

Ballot Name:	**UMC TIA # 006-18 EMERGENCY NATURE**
Ballot Status:	Ballot has closed
Members Eligible to Vote:	26

Vote Summary		
Option	**Count**	**Percent**
AFFIRMATIVE	9	36%
NEGATIVE	16	64%
ABSTAIN	0	
DID NOT VOTE	1	

Voter Name	**Vote**
Koerber, Ralph	AFFIRMATIVE
Trafton, Phil	AFFIRMATIVE
Hargis, Shawn	AFFIRMATIVE
Adler, Bob	AFFIRMATIVE
Trafton, April	AFFIRMATIVE
Delaquila, David	AFFIRMATIVE
White, Charles	AFFIRMATIVE
Cudahy, Michael	AFFIRMATIVE
Howard, III, Eli	AFFIRMATIVE
Gunzner, Aaron	NEGATIVE
Hamilton, John	NEGATIVE
Van Rite, Chris	NEGATIVE
Mann, David	NEGATIVE
Feehan, Pennie	NEGATIVE
Taylor, Don	NEGATIVE
Egg, Jay	NEGATIVE
Kreitenberg, Harvey	NEGATIVE
Aguilar, Sarah	NEGATIVE
Berger, Donald	NEGATIVE
Young, Randy	NEGATIVE
Ribbs, Phil	NEGATIVE
MacNevin, Lance	NEGATIVE
Dias, David	NEGATIVE
Smith, Cary	NEGATIVE
Benkowski, Richard	NEGATIVE
Hyde, Michael	Did not vote

UNIFORM MECHANICAL CODE TIA FORM - 2018

Reference Code Section: 1104.0, Table 1104.1, 1104.6, 1104.6.1, 1106.2, 1104.6.2.1, 1104.6.2.2, 1104.6.2.3, 1104.6.2.4, 1104.6.3, 1104.6.4, 1104.6.5, 1104.7, 1115.5, Table 1701.1

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Proposed language for TIA:
Modify the 2018 Uniform Mechanical Code as follows:

1104.0 Requirements for Refrigerant and Refrigeration System Use.

TABLE 1104.1
PERMISSIBLE REFRIGERATION SYSTEMS[1]

OCCUPANCY GROUP[3]	HIGH-PROBABILITY SYSTEM	LOW PROBABILITY SYSTEM	MACHINERY ROOM
A-1	Group A1 or A2L[4] only	Any	Any
A-2	Group A1 or A2L[4] only	Any	Any
A-3	Group A1 or A2L[4] only	Any	Any
A-4	Group A1 or A2L[4] only	Any	Any
B	Group A1[2] or A2L[2,4] only	Any	Any
E	Group A1 or A2L[4] only	Any	Any
F-1	Group A1[2] or A2L[2,4] 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 or A2L[4] only	Any	Any
H-5	Group A1 or A2L[4] only	Any	Any
I-1	None	Any	Any
I-2	Group A1 or A2L[4] only	Any	Any
I-3	None	Any	Any
I-4	Group A1 or A2L[4] only	Any	Any
M	Group A1[2] or A2L[2,4] only	Any	Any
R-1	Group A1 or A2L[4] only	Any	Any
R-2	Group A1 or A2L[4] only	Any	Any
R-3	Group A1 or A2L[4] only	Any	Any
R-4	Group A1 or A2L[4] only	Any	Any
S-1	Group A1[2] or A2L[2,4]	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 × *LFL* (lb), where *LFL* is in pounds per 1000 ft^3 (6 × *LFL* [kg] where *LFL* is in kg/m^3), 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 × *LFL* (lb), where *LFL* is in pounds per 1000 ft^3 (6 × *LFL* [kg] where *LFL* is in kg/m^3).

(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.

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

Where:
Qmin = minimum airflow rate, ft^3/min
M = refrigerant charge of the largest independent refrigerating circuit of the system, lb
LFL = lower flammability limit, lb per 1000 ft^3
For SI units: $Q = 60000 \times M / LFL$, where *Q* is the supply air flow rate (m^3/h), *M* is the refrigerant charge (kg), *LFL* is the lower flammability limit (g/m^3).
(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:
Qmin = minimum airflow rate, ft^3/min

M = refrigerant charge of the largest independent refrigerating circuit of the system, lb
LFL = lower flammability limit in lb per 1000 ft^3
For SI units: $Q = 60000 \times M / LFL$, where Q is the supply air flow rate (m^3/h), M is the refrigerant charge (kg), LFL is the lower flammability limit (g/m^3).
(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~~ 2019	Household and Similar Electrical Appliances - Safety – Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers	Appliances	903.1, 904.13

Substantiation:

Technical Merit: These are the extracted requirements from ASHRAE 15-2019 that regulate low GWP refrigerants that fall into the safety classification of Group A2L. The requirements follow the extraction policy of IAPMO.

Similar text was proposed as a code change however, the Mechanical Technical Committee rejected the change for the following reason:

The comment is being rejected as the industry is not ready to allow A2L refrigerants for human comfort as there are a lack of training programs and installation requirements available at this time. Furthermore, there are concerns for life safety and flammability. Although the adoption of A2L for the use of human comfort is progressing, these provisions should not be adopted until adequate training is complete and HVAC contractors are able to safely handle A2L refrigerants. Additional time is needed to allow for ongoing research to be done. The committee is also concerned that there are no listed detectors to protect public safety.

The industry is ready to allow A2L refrigerant for human comfort. There are thousands of units already installed in the United States using A2L refrigerants. Worldwide, there are millions of A2L units installed that are high probability systems used for comfort cooling.

The statement that there is a lack of training programs is incorrect. NATE and manufacturers have developed educational programs regarding the installation and use of Group A2L refrigerants. ASHRAE MTGLowGWP has also developed slides for use in training programs. The UA announced that they will be introducing a low GWP refrigerant training program for installers and technicians the beginning of next year.

Training programs will be available to the contractors and technicians well before these requirements will be adopted by any state or local jurisdiction following publication.

The statement that there are concerns for life safety and flammability may have been an issue the last time the TC met; however, life safety and flammability concerns are appropriately addressed in the newly approved UL/CSA 60335-2-40 standard (edition 3). Many life safety requirements for A2L refrigerants are found in the regulation for the equipment, UL/CSA 60335-2-40. This standard is used by testing laboratories to list and label refrigeration equipment. Remaining life safety requirements for application of listed equipment having A2L refrigerants are covered in ASHRAE Standard 15.

The TC was concerned that they did not have time to review UL/CSA 60335-2-40. The standard is available for review. A public review was completed in February 2019. All public comments have been addressed in the current version. The standard has completed the consensus process and is approved. This has occurred since the TC meeting in May 2019. The safety requirements are well defined in the standard. UL announced that the standard would be published November 1, 2019.

The statement regarding ongoing research is inappropriate. The years of research and the hundreds are research report that have been published on low GWP refrigerants were used to develop the consensus requirements in ASHRAE 15 and UL/CSA 60335-2-40. Additional research continues for all areas of construction. We do not stop technical advances simply because there is additional research.

The statement that there are no listed refrigerant detectors is incorrect. Components of a system do not receive a listing. Many components of an HVAC system do not even get "recognized" per a component standard. The approval for the component (a refrigerant detector in this case) is obtained as part of the product listing. Separately, there are many refrigerant detectors and refrigerant detection systems that have been used in machinery rooms for year. They have been required by the Uniform Mechanical Code and ASHRAE 15 for many years.

It should be noted that UL/CSA 60335-2-40 has requirements for refrigerant detection systems to be installed internal to the equipment. These requirements are extensive however, the TC was unaware of the requirements since they could not review UL/CSA 60335-2-40.

It should also be noted that UL/CSA 60335-2-40 edition 3 has extensive requirements for equipment other than A2L refrigerant equipment. These are electrical systems and refrigerant systems that use A1, A2, A3, and B1 refrigerants. It is necessary to update the reference to this edition of the standard.

The following supporting documentation has been submitted with this TIA: ASHRAE 15, Addendum d, ASHRAE 15, Addendum h, first modification of 3rd edition of UL/CSA 60335-2-40, second and final modification of 3rd edition of UL/CSA 60335-2-40. ASHRAE is submitting ASHRAE 15-2019 and ASHRAE 34-2019 to be posted on Kavi.

Emergency nature: The State of California has changed their requirements for use of refrigerants. Effective January 1, 2023, low GWP refrigerants will be required for high probability equipment installed in the state. California adopts the Uniform Mechanical Code, as such, there needs to be requirements that regulate equipment using low GWP refrigerants.

The only low GWP refrigerants for high probability systems listed in Table 1102.3 of the Uniform Mechanical Code are A2L refrigerants. There are no low GWP refrigerants that fall into Group A1. If the Uniform Mechanical Code is not modified, there will not be any regulations for the installation of low GWP refrigerant equipment. This will result in an extreme hazard to the public since there will be a significant void in the regulations.

IAPMO also supports sustainability and environmental issues. A major concern for protection of public health is the significant increase in CO_2 and other greenhouse gas emissions in the atmosphere. High GWP refrigerants are also causing damage to the environment. It is important for the immediate allowance of low GWP refrigerants in direct systems to protect the environment and reduce the levels of global warming gases.

The appropriate refrigerant requirements should be extracted from the internationally recognized consensus standard, ASHRAE 15.

Submitter signature (required):_____ Date:_10/20/19__

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