HOUSTON PUBLIC WORKS

Date:	August 29, 2023
To:	City of Houston HPW-HPC
Attention:	CCM
From:	Jensen Hughes
Subject:	UMC – A2L Refrigerants

This technical memo is provided to describe the new changes to the Houston Construction Codes with regards to the adopted amendment for A2L Refrigerants. The Federal Government is restricting/banning the use of ozone depleting chemicals. In an attempt to eliminate the ozone depleting chemicals in refrigerants, the industry has created these new A2L refrigerants. However, with the remove of the ozone depleting chemicals from the current refrigerants this creates a more flammable compound. The use, storage, and handling of the A2L refrigerants is specifically addressed in the 2024 Edition of the International Fire Code and the Uniform Mechanical Code. This new amendment brings forth the requirements specifically for the A2L refrigerants to allow the HVAC industry in Houston to be complaint with the new federal regulations.

The new amendments read as follows:

2021 Houston Mechanical Code

1103.1.1 Safety Group. Table 1102.3 classifies refrigerants by toxicity and flammability, and assigns safety groups using combinations of toxicity class and flammability class. For the purposes of this chapter, the refrigerant Groups A1, A2L, A2, A3, B1, B2L, B2, and B3 shall be considered to be individual and distinct safety groups, as shown in Table 1103.1.1. Each refrigerant is assigned into not more than one group.

TABLE 1103.1.1
REFRIGERANT SAFETY GROUP CLASSIFICATIONS

Higher Flammability	A3	B3
Flammable	A2	B2
Lower Flammability	A2L	B2L
No Flame Propagation	A1	B1
	Lower Toxicity	**Higher Toxicity**

memo.

1104.2 Refrigerant Concentration Limit. The concentration of refrigerant in a complete discharge of an independent circuit of high-probability systems shall not exceed the amounts shown in Table 1102.3, except as provided in Section 1104.3, ~~and~~ Section 1104.4, and Section 1104.6. The volume of occupied space shall be determined in accordance with Section 1104.2.1 through Section 1104.2.3.

Exceptions:

(1) Listed equipment in locations other than public corridors and lobbies containing not more than 6.6 pounds (2.99 kg) of refrigerant, regardless of the refrigerant safety classification, provided the equipment is installed in accordance with the listing and with the manufacturer's installation instructions.

(2) Listed equipment for use in laboratories with more than 100 square feet (9.29 m^2) of space per person, regardless of the refrigerant safety classification, provided that the equipment is installed in accordance with the listing and the manufacturer's installation instructions. [ASHRAE 15:7.2]

1104.5 Flammable Refrigerants. The total of Group A2, B2, A3, and B3 refrigerants, other than Group A2L and B2L refrigerants shall not exceed 1100 pounds (498.9 kg) without approval by the Authority Having Jurisdiction. Institutional Occupancies shall comply with Section 1104.3. Machinery rooms required in accordance with Section 1106.0 based on flammability shall be constructed and maintained in accordance with Section 1106.2.1 through 1106.2.6 and Section 1106.11 for Group A2L and B2L refrigerants.

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 Limit. Occupied spaces shall comply with the releaseable charge limitations of the equipment listing and ASHRAE 15. Unoccupied spaces with refrigerant containing equipment, not including continuous piping or tubing, shall comply with the releaseable charge limitations of the equipment listing or Section 1104.6.4. [ASHRAE 15:7.6.1-7.6.1.2]

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 Detection Systems. Refrigerant detection systems shall be in accordance with the listing and ASHRAE 15.

1104.6.2.4 Refrigerant Concentration Above Limit. When the refrigerant detection system senses a refrigerant exceeding its setpoint, the following actions shall be taken:

(1) The supply air fan of the equipment shall activate with a minimum airflow rate specified by the manufacturer.

(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 detection system has sensed a drop in the refrigerant concentration below the refrigerant detection system set point.

Exception: The compressor operation shall not be turned off when the compressor operation reduces the leak rate or the total amount of released refrigerant to the indoor space.

(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) Mitigation action required by the equipment listing shall be initiated. [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 Mechanical Ventilation. When the releaseable charge of the refrigeration system exceeds the refrigerant concentration limit specified in Section 1104.6.1, the refrigerant charge and ventilation air flow shall be in accordance with the equipment listing and ASHRAE 15.

1104.6.5 Compressors and Pressure Vessels Located Indoors. For refrigeration compressors and pressure vessels located in an indoor space that is accessible only during service and maintenance, the refrigerant charge shall be in accordance with the equipment listing and ASHRAE 15.

1104.6.6 Refrigerant Sensors. Refrigerant sensors required by Section 1104.6.2 shall meet the following requirements:

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

(2) Refrigerant sensors shall be located such that refrigerant will be detected if the refrigerating system is operating or not operating.

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

b) For refrigerating systems that are directly connected to the occupied space without ductwork, the refrigerant sensor shall be located in the equipment in accordance with the equipment listing. Additional remote refrigerant sensors shall be permitted within the occupied space when included as part of the equipment mitigation system according to manufacturer's instructions. [ASHRAE 15:7.6.5]

1104.7~~6~~ 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 used in high-probability systems for human comfort shall be in accordance with Section 1104.6.

1104.8~~7~~ Refrigerant Type and Purity. Refrigerants shall be of a type specified by the equipment manufacturer. Unless otherwise specified by the equipment manufacturer, refrigerants used in new equipment shall be of purity in accordance with AHRI 700.

1104.8~~7~~.1 Recovered Refrigerants. Recovered refrigerants shall not be reused except in the system from which they were removed or as provided in Section 1104.8~~7~~.2 or Section 1104.8~~7~~.3. When contamination is evident by discoloration, odor, acid test results, or system history, recovered refrigerants shall be reclaimed in accordance with Section 1104.8~~7~~.3 before reuse. [ASHRAE 15:7.5.1.4]

1104.8~~7~~.2 Recycled Refrigerants. Recycled refrigerants shall not be reused except in systems using the same refrigerant and lubricant designation and belonging to the same owner as the systems from which they were removed. Where contamination is evident by discoloration, odor, acid test results, or system history, recycled refrigerants shall be reclaimed in accordance with Section 1104.8~~7~~.3.

Exception: Drying shall not be required in order to use recycled refrigerants where water is the refrigerant, is used as an absorbent or is a deliberate additive. [ASHRAE 15:7.5.1.5]

1104.8~~7~~.3 Reclaimed Refrigerants. Used refrigerants shall not be reused in a different owner's equipment unless tested and found to be in accordance with the requirements of AHRI 700. Contaminated refrigerants shall not be used unless reclaimed and is in accordance with AHRI 700. [ASHRAE 15:7.5.1.6]

1104.8~~7~~.4 Mixing. Refrigerants with different refrigerant designations shall only be mixed in a system in accordance with the following:

(1) The addition of a second refrigerant is allowed by the equipment manufacturer and is in accordance with the manufacturer's instructions.

(2) The resulting mixture does not change the refrigerant safety group. [ASHRAE 15:7.5.1.7]

~~Refrigerants, including refrigerant blends, with different designations as in accordance with Table 1102.3 shall not be mixed in a system.~~

~~**Exception:** Addition of a second refrigerant shall be permitted where specified by the equipment manufacturer to improve oil return at low temperatures. The refrigerant and amount added shall be in accordance with the manufacturer's instructions. [ASHRAE 15.7.5.1.7]~~

1104.9~~8~~ Changing Refrigerants. Changes of refrigerant in an existing system to a refrigerant with a different refrigerant designation shall only be allowed where in accordance with Section 1104.9.1 through Section 1104.9.4. ~~A change in the type of refrigerant in a system shall not be made without notifying the Authority Having Jurisdiction, the user, and due observance of safety requirements. The refrigerant being considered shall be evaluated for suitability.~~ [ASHRAE 15:5.3]

1104.9.1 Approval. The change of refrigerant shall be approved by the owner. [ASHRAE 15:5.3.1]

1104.9.2 Procedures. The changes of refrigerant shall be in accordance with one of the following:

(1) Written instructions of the original equipment manufacturer.

(2) An evaluation of the system by a registered design professional or by an approved nationally recognized testing laboratory that validates safety and suitability of the replacement refrigerant.

(3) Approval of the Authority Having Jurisdiction. [ASHRAE 15:5.3.2]

1104.9.3 Replacement Refrigerant of Same Classification. Where the replacement refrigerant is classified into the same safety group, requirements that were applicable to the existing system shall continue to apply. [ASHRAE 15:5.3.3]

1104.9.4 Replacement Refrigerant of Different Classification. Where the replacement refrigerant is classified into a different safety group, the system shall comply with the requirements of this chapter for a new installation, and the change of refrigerant shall require Authority Having Jurisdiction approval. [ASHRAE 15:5.3.4]