



# Refrigerants and UL Standards

*Regulations & Standards Session*

# UL Joint Task Group (JTG)

JTG Task – Create a “Recommendation Report” outlining requirements applicable to HVAC & R equipment using ASHRAE Class A2 & A3 refrigerants:

- The JTG created 3 Working Groups (WG’s): 1, 2 & 3
- Focused on Class A2 and Class A3 (lower toxicity but higher flammability) refrigerants
- Initiated developing end-product Class A2L requirements

In September 2014, the JTG issued the “Recommendations Report” based on the information provided by the Working Groups.



# Working Group No. 1 (WG#1)

- UL 474 Dehumidifiers – No flammable requirements planned (being superseded by UL 60335-2-40)
- UL 1995 Heating and Cooling Equipment – No flammable requirements planned (parts being superseded by UL 60335-2-40)
- UL 484 Room air conditioners – Reviewed the requirements previously published and In 2014, requirements were proposed and reached consensus to UL 484 to REDUCE the amount allowed to 3 x LFL. More on this later.



# Working Group No. 1 (WG#1)

- UL 60335-2-40 - Heat pumps, air conditioners & dehumidifiers

Requirements currently being developed for small amounts of Class A3 refrigerants and somewhat larger amounts of A2/A2L refrigerants. Apply to equipment which is:

- Non-ducted
  - Factory charged
  - Sealed
- Requirements for HVAC equipment with larger amounts of A2L are being drafted as part of the IEC process.



# Working Group No. 2 (WG#2)

- UL 60335-2-24 Refrigerating Appliances, Ice Cream Appliance & Ice-Makers – 225 & 50 gm (A2 and A3 limits)
- UL 250 Household Refrigerators/Freezers – 225 & 57 gm
- UL 399 Drinking Water Coolers – 270 & 60 gm
- UL 427 Refrigerating Units – 500 & 150-300 gm
- UL 471 Commercial Refrigerators/Freezers – 500 & 150
- UL 541 Refrigerated Vending Machines – 500 & 150 gm
- UL 563 Ice Makers – 500 & 150 gm

No changes to the current standards are anticipated at this time, but during the review of UL 60335-2-24 the limit is being reviewed.



# Working Group No. 3 (WG#3)

- UL 2182 – Standard for Refrigerants
- ASHRAE 34 – Standard for Designation and Safety Classification of Refrigerants

Changes are being proposed for Flammability Limit,  
Fractionation Analysis

Burning Velocity test developed for Class A2L refrigerants.



# Changes to UL 484

The following change was proposed by JTG WG1 and adopted in UL 484, the standard for Room Air Conditioners

- Revision to Clause E.1.2 that would reduce the refrigerant charge from:

$$\bullet \quad m_1 = (4 \text{ m}^3) * \text{LFL} \quad \text{TO} \quad m_1 = (3 \text{ m}^3) * \text{LFL}$$

(and eliminate the  $m_2$  value, which was the previous limit)

Where:

- $m_1$  Value of the refrigerant charge limit (kg)
- $4 \text{ m}^3$  Constant
- $3 \text{ m}^3$  Constant
- LFL Lower Flammability Limit of the Refrigerant in  $\text{kg}/\text{m}^3$



# Changes to UL 484

- The changes eliminate all the room area and installation height criteria since the above equation would require a charge size based only on the refrigerant LFL.
- The proposal has been successfully balloted by the UL 484 STP, and the revised requirements will be published shortly.





# Changes to UL 484

These changes were made for the following reasons:

- Since RACs are a consumer purchased and installed product, the WG couldn't be sure they would be installed in rooms with sufficient area as marked on the product. The WG felt they should be “safe out of the box”.
- Many RACs are uninstalled and seasonally stored in a storage area. Some of these are quite small and the WG thought a refrigerant leak could be dangerous.
- Some U.S. manufacturers were concerned about the relatively large amounts of highly flammable refrigerant allowed, and wanted to pull back to a lesser amount.



# Changes to UL 484

## Example of this key change:

Propane (R-290), LFL = 0.038 kg/m<sup>3</sup>

- Revision results in the maximum charge amount for any “direct system” product being  $3 \times 0.038 = 0.114$  kg or 114 grams
- Proposal also defines the term “direct system” as “A system in which a single rupture of the refrigerant circuit would result in a refrigerant release to an unventilated space...”.



# Changes to N.A. 60335-2-40:

Changes are being proposed to the North American (U.S./Canada/Mexico) 60335-2-40 Standard:

- At present, a deviation eliminates all the flammable refrigerant requirements in 2-40, so products with flammable refrigerants cannot be certified at this time.
- Proposals are being made to remove this deviation.
- However, requirements that are more stringent than the IEC base requirements are being proposed for North America.
- CANENA WG#6 – Developing Class A2 and A3 requirements for UL/CSA/ANCE 60335-2-40; Met in Mexico City in May (Finish by end of year)



# Current HVAC Requirements

## KEY TAKEAWAY'S:

- Many products with a limited charge can be certified by UL for use in the North American market.
- UL 484 has been revised to limit the amount of flammable refrigerant that can be used.
- Products in the scope of North American 60335-2-40 will be able to be certified with a flammable refrigerant once this Standard is revised.





**ATMO**  
**sphere**  
business case  
**natural refrigerants**  
25 & 26 June - Atlanta, Georgia

Insert text