



ATMO  
sphere

business case

---

natural refrigerants

---

June 16 - 17 - 2016 - Chicago



## Refrigerants and UL Standards

*Regulations & Standards Session*

# UL Joint Task Group (JTG)

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

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

Disbanded since...



# HVAC Equipment (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- UL 474 Dehumidifiers – No flammable requirements planned (being superseded by UL 60335-2-40)
- UL 1995 Heating and Cooling Equipment – No flammable requirements planned (being superseded by UL 60335-2-40)
- UL 484 Room air conditioners – In 2014, consensus reached for the amount allowed to 3 x LFL. i.e., 114g R-290 (propane), 918g R-32
- UL 60335-2-40 HVAC Equipment – 2<sup>nd</sup> edition will be balloted this summer. Contains same requirements as 484.



# Refrigeration (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
- UL 621 Ice Cream Makers – No specific requirements.

A2 – Mildly flammable    A3 – Highly flammable



# Ongoing Committee Work

- UL/CSA/ANCE Technical Harmonization Committee for 60335-2-24 (Household Refrigeration)
- IEC SC61C WG4 (60335-2-89, Commercial Refrigeration)
- IEC SC61D WGs (60335-2-40, HVAC Equipment)
  - WG developing A2L requirements
  - WG further developing A2 and A3 requirements
- UL 60335-2-40 WG (HVAC Equipment).
  - WG10 developing A2L requirements



# Research Projects

- AHRI Research Project – “*Benchmarking Risk by Real Life Leaks and Ignitions Testing*”. Comparing A2Ls with current A1s.
- AHAM Research Project - *Benchmarking Risk by Real Life Leaks and Ignitions Testing for Room Air Conditioners (RAC), Portable Air Conditioners (PAC) and Dehumidifiers (DH)*
- Potential AHAM project on A3/household refrigeration
- AHRI/ASHRAE/DOE - \$5.2 million in funding for low GWP but flammable refrigerants.
  - <https://ashrae.org/news/2016/ashrae-ahri-doe-partner-to-fund-flammable-refrigerant-research>



# Carbon Dioxide

- Traditional 5X
  - 3X with pressure relief (For transcritical, but also applies to CO<sub>2</sub> used as a cooling fluid)
  - 3X with 250,000 cycles fatigue
  - 2X with 500,000 cycles fatigue (currently in UL 1995 and proposed for UL 471)
- 
- Tubing standard from ASHRAE 15 (ASME B31.5 *Refrigerant Piping and Heat Transfer Components*)





# Challenges

- ASHRAE 15 (Safety Standard for Refrigeration Systems) 150 gram A3 limit

**7.5.3 Higher Flammability Refrigerants.** Group A3 and B3 refrigerants shall not be used except where approved by the AHJ.

This restriction does not apply to listed portable-unit systems containing no more than 0.331 lb (150 g) of Group A3 refrigerant

- EPA Proposed Rule delisting R134a for household refrigerators.
  - 57 g A3 limit in UL 250
  - UL 60335-2-24 2<sup>nd</sup> edition not gaining consensus.



# 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 the 2<sup>nd</sup> edition of the Standard is published.





Thank you very much!