AHRI Research Activities on Low GWP Refrigerants

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Air-Conditioning, Heating, and Refrigeration Institute
AHRI is a Trade Association

Member Companies: Over 95% of all HVACR products manufactured and installed in North America

AHRI standards and guidelines in use across the globe

AHRI Certification Programs: Over 900 participants representing over 70% of all HVACR products manufactured globally
AHRI Members Manufacture:

- Residential and commercial central air conditioners, heat pumps, and components
- Residential and commercial furnaces, boilers, and components
- Residential and commercial water heaters and components
- Commercial refrigeration equipment and components
AHRI Low GWP Refrigerants Research

**Performance**
AHRI Low GWP Alternative Refrigerants Evaluation Program

**Safety**
AHRTI Flammable Refrigerants Research

**Use of low GWP refrigerants**

**Compatibility & property data**
AHRTI Low GWP Refrigerants Heat Transfer, Properties and Compatibility Studies
Low-GWP Alternative Refrigerants Evaluation Program (AREP)

• Industry-wide cooperative research & testing program to identify suitable alternatives to high GWP refrigerants
• Evaluation of candidates strongly desired by OEMs
• The program is NOT to prioritize refrigerants, rather test and present objective results in a consistent manner

• Completed in 2016
  • 50+ low GWP refrigerants were evaluated, and 67 test reports were published at AHRI website (http://ahrinet.org/arep).
  • Viable low GWP refrigerants exist
  • Many promising refrigerants are classified as 2L under ASHRAE Standard 34 (mildly flammable)
AHRTI Flammable Refrigerant Research

• A collaborated research program is supported by
  • AHRI ($1.3 million)
  • ASHRAE ($1.3 million)
  • California Air Resource Board ($0.3 million)
  • US Department of Energy ($3.3 million)

• The objective is to
  • produce publicly available technical results to support code and standard activities related to the use of flammable refrigerants.
AHRTI Flammable Refrigerant Research

• The program is administered and coordinated by AHRTI Flammable Refrigerants Subcommittee (FRS).

• The FRS had surveyed relevant codes and standards committees and organizations on:
  • the main knowledge gaps for the use of 2L flammable refrigerants
  • any standing issues and gaps that require additional research
  • current and past research activities on flammable refrigerants

• High priority projects were launched and carried out collaboratively by AHRTI, ASHRAE, NIST and ORNL
AHRTI Flammable Refrigerant Research

• AHRTI Conducting:
  • AHRTI-9007: Benchmarking Risk by Whole Room Scale Leaks and Ignitions Testing
  • AHRTI-9008: Investigation of Hot surface Ignition Temperature (HSIT) for A2L Refrigerants
  • AHRTI-9009: Leak Detection of A2L Refrigerants in HVACR Equipment
  • AHRTI-9014: Assess Refrigerant Detector Characteristics for Use in HVACR Equipment
  • AHRTI-9015: Assessment of Refrigerant Leakage Mitigation Effectiveness for Air-Conditioning and Refrigeration Equipment
AHRTI Flammable Refrigerant Research

• DOE funding:
  • ORNL: Investigate the proper basis for setting charge limits of A2L, A2, and A3 for various types of products
  • ORNL: Experimental Evaluation of Refrigerant Leak Characteristics for Different HVAC&R Equipment Types
  • NIST: Modeling tools for low-GWP refrigerant blends flammability
AHRTI Flammable Refrigerant Research

• ASHRAE conducting:
  • ASHRAE-1806: Flammable Refrigerants Post-Ignition Simulation and Risk Assessment Update
  • ASHRAE-1807: Guidelines for Flammable Refrigerant Handling, Transporting, Storing and Equipment Servicing, Installation and Dismantling
  • ASHRAE-1808: Servicing and Installing Equipment using Flammable Refrigerants: Assessment of Field-made Mechanical Joints
  • ASHRAE-1855: Determination of the Impact of Combustion byproducts on the Safe Use of Flammable Fluorinated Refrigerants
AHRTI Low GWP Refrigerants Compatibility Research

• Recent DOE award on generating necessary low GWP refrigerants data

• Goal:
  • to develop a critical refrigerant database for manufacturers to implement low GWP refrigerants.

• Scope of work:
  • characterize low GWP refrigerants heat transfer performance (ORNL)
  • develop refrigerant properties (NIST)
  • evaluate refrigerants stability and compatibility with lubricants and materials (AHRTI)
Questions?

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