IEA HPT Annex 64:
Safety with flammable refrigerants

Björn Palm, project leader

Senior professor, KTH Royal Institute of Technology, Sweden

Objectives of Annex 64

- Contribute to a broader safe use of flammable refrigerants

- Increase the understanding of the risks
- Investigate system designs to keep risks at acceptable levels
- Perform risk assessments

- Give recommendations for updates of the standards

Scope of Annex 64

- Focus on systems for heating/cooling or hot water production in single family or multifamily houses (< 50 kW).
- Focus on systems placed indoors
- Hydrocarbons and synthetics
- Safety during servicing and end of life will also be considered.

Participating countries and national contacts:

- Sweden: Björn Palm, KTH Royal Institute of Technology
- Germany: Thore Oltersdorf, Fraunhofer ISE
- Korea: Minsung Kim, Chung Ang Univ
- France: Odile Cauret, EDF
- Austria: Bernd Windholz, AIT
- USA: Kashif Nawaz, ORNL

Task 1: Technical solutions for limiting risks

Examples:

- Methods of limiting the amount of refrigerant released
- Rapid ventilation of gas to the ambient
- Ventilated enclosures
- Absorption of refrigerant
- Dilution of released refrigerant
- Avoiding sources of ignition
- …

Task 2: Investigation of leak scenarios

Methods:

- CFD simulations
- Practical tests

Task 3: Leak detection

- Available types of sensors and systems for leak detection accuracy, reliability and cost.
- Effect of the location of sensors

Indirect methods

- Leak detection by monitoring performance

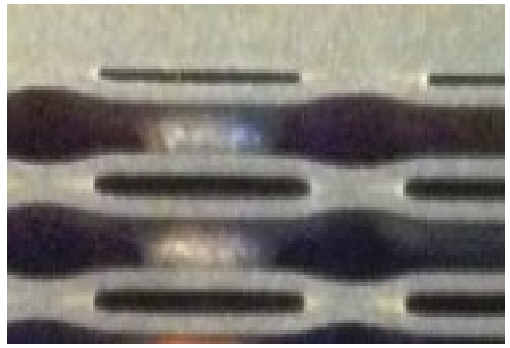
Task 4: Charge reduction

- Compact heat exchangers
- Alternative types of compressors
- Low oil charge
- Compact system designs

Sub-cooler

< 1 dl oil

210
mm



Task 5: Risk assessment

- Risk assessments for technical solutions suggested in Tasks no 1 and 4.

- Recommendations on how to do risk assessment in practice

Task 6: Communication and dissemination

- Publications in scientific journals
- Publications in technical magazines.
- Seminars
- Webinars
- Web page
- Annex report

Planned dissemination activities:

- State of the Art reports related to each task:
  - Technical solutions for limiting risks
  - Leak scenarios
  - Leak detection
  - Charge reduction
  - Risk Assessment
- Webinars related to each task during fall 2026
- Chillventa Congress Oct 2026
- China International Heat Pump Conference Oct 2026
- Final report

See also Project website

- https://heatpumpingtechnologies.org/project64/

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Agenda, webinar June 25, 13:00 – 14:30

- Welcome and introduction **(Metkel Yebiyo, HPC)**
- Introduction to Project 64 on Safety with Flammable Refrigerants
  - **(Björn Palm, KTH Royal Institute of Technology)**
- Experimental Study of R-290 Leak Behavior
  - **(Jafar Esmaeelian, KTH Royal Institute of Technology)**
- Austrian survey on the frequency, location, and detection of leaks in heat pump and cooling systems up to 50 kW nominal capacity
  - **(Bernd Windholz, Austrian Institute of Technology)**
- Limits of modelling approach for refrigerant charge assessment in residential heat pumps
  - **(Maëlle Journay, EDF)**
- Interpolation approaches to improve the exploitation of sparse sensor matrix in indoor release experiments
  - **(Arpit Baranwal, Fraunhofer ISE)**

Thanks for your attention

Björn Palm

bpalm@energy.kth.se