



## Dangerous Goods Safety Bulletin No. 0218 WorkSafe Bulletin

### Safety considerations when switching to flammable refrigerants

#### Background

Refrigeration and air-conditioning equipment, including systems in vehicles, contain refrigerants. With increased costs and environmental damage associated with the use of synthetic chemical refrigerants, such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), there has been an increased use of flammable refrigerants that are marketed as natural refrigerants or 'green' alternatives. These refrigerants mainly contain hydrocarbons (e.g. propane or butane – components of LP gas or other mixtures), or hydrofluoro-olefins (HFOs).

The use of flammable refrigerants has implications in how the refrigerant is stored, handled and used.

Equipment must be fit-for-purpose and those who supply services, such as installation and maintenance, must have the appropriate training and licences to carry out the work, (e.g. *Motor Vehicles Repairers Act 2003*, Australian Consumer Law).

The Department of Mines, Industry Regulation and Safety has become concerned following incidents involving flammable refrigerants. These have resulted in injury and damage to property within Western Australia and a fatality in New Zealand.

#### Summary of hazard

- Many 'green' refrigerants are flammable and/or toxic.
- Replacing non-flammable refrigerants with flammable ones without appropriate system assessments and modifications in industrial, commercial, domestic and automotive applications present a fire risk.
- The flammability hazard of these refrigerants is not properly communicated to emergency services and workers through correct placarding and labelling which can lead to improper emergency response and unsafe work practices.

#### Contributory factors

- Some individuals and businesses are unaware of the safety implications of replacing non-flammable refrigerants with flammable ones or the requirements to control the risks posed.
- Most refrigeration systems are not designed to handle flammable refrigerants e.g. industrial, commercial, domestic or motor vehicle systems.

- Standard electrical equipment associated with refrigeration systems designed for non-flammable refrigerants are not suitable for use with flammable refrigerants, as they become potential ignition sources, if there is a gas leak from the system.
- Some odourised hydrocarbons may have the odourant filtered out in the refrigeration process and therefore may not be detectable by smell, meaning that a leak of the refrigerant may go undetected. Some refrigerant gases are odourless and do not have an odourant added.

### **Actions required**

Employers and persons in control of a workplace have a general duty of care to provide a working environment in which employees are not exposed to hazards under s. 19 of the *Occupational Safety and Health Act 1984* (OSH Act). There is also a duty to minimise risk to people, property and the environment from dangerous goods under s. 8 of the *Dangerous Goods Safety Act 2004*.

Manufacturers, suppliers and importers have duties under legislation to disclose information on their products, on their labels and in safety data sheets (SDSs).

Before changing the refrigerant from a non-flammable to a flammable type in industrial, commercial, domestic and automotive refrigeration systems, assess the following matters.

### ***Use/application***

- Contact the manufacturer/supplier to ensure that the refrigeration equipment can safely use flammable refrigerants. Alternatively, undertake an engineering assessment and apply additional risk controls, to ensure the system can safely use flammable refrigerants.
- Ensure flammable refrigerants are used in accordance with the manufacturer's specifications and the information contained within the SDS.
- Ensure that the storage, handling and use of flammable refrigerants meet regulatory requirements.

### ***Installation and system maintenance***

- Use trained and licensed workers, where appropriate, to conduct work on systems that contain flammable refrigerants.
- Keep records of all maintenance that is conducted.
- Prior to work being conducted on the system, workers (e.g. electricians) should be aware of the refrigerant type in the system so the necessary controls and precautions can be taken.

- Ensure that refrigeration systems that contain flammable refrigerants are appropriately marked with Division 2.1 (flammable gas) class labels.
- Larger refrigeration plants, including chiller units (containing flammable refrigerants) with a water capacity of more than 500 L must be placarded with a Division 2.1 flammable gas class label with a minimum of 100 mm square.

*Note: See the placarding requirements in the Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007.*

### **Insurance Implications**

Businesses and consumers need to be aware that while alternative refrigerants, such as flammable refrigerants, can be used in existing refrigeration systems, most of these systems were not originally designed for flammable refrigerants and will require appropriate system assessments and modifications to operate safely.

Use of flammable refrigerants in equipment for which it is not designed for (e.g. vehicles, domestic air conditioners, etc.), may invalidate business, car and home/contents insurance policies.

If you have changed over to flammable refrigerants on existing equipment, or intend to, you should disclose the change to your insurance company and seek written confirmation that the insurance policies still cover you.

### **Further information**

- Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH),  
[www.airah.org.au](http://www.airah.org.au)

*Refrigerant handling code of practice 2007: Part 2 – Systems other than self-contained low charge systems*

*Flammable refrigerants safety guide*

*Discussion paper – Transition to low-emissions HVAC&R: Issues and solutions*

Air conditioning and heating training courses,

[www.airah.org.au/Web/Education/Training\\_Courses](http://www.airah.org.au/Web/Education/Training_Courses)

- Australian Refrigeration Council

[www.arctick.org/licensing/codes-of-practice/](http://www.arctick.org/licensing/codes-of-practice/)

*The Australian automotive code of practice – Control of refrigerant gases during manufacture, installation, servicing or de-commissioning of motor vehicle air-conditioners*

- Standards Australia, [www.standards.org.au](http://www.standards.org.au)

*AS/NZS ISO 817 Refrigerants – Designation and safety classification*

*AS/NZS 1596 Storage and handling of LP Gas*

AS 4332 *Storage and handling of gases in cylinders*

AS/NZS 5149.1 *Refrigerating systems and heat pumps – Safety and environmental requirements – Definitions, classification and selection criteria*

AS/NZS 5149.2 *Refrigerating systems and heat pumps – Safety and environmental requirements – Design, construction, testing, marking and documentation*

AS/NZS 60079.10.1 *Explosive atmospheres – Classification of areas – Explosive gas atmospheres*

AS/NZS 60079.14 *Explosive atmospheres – Electrical installations design, selection and erection*

- Department of the Environment and Energy

[www.environment.gov.au/protection/ozone/rac/safety-considerations](http://www.environment.gov.au/protection/ozone/rac/safety-considerations)

Safety considerations when using flammable refrigerants

[www.environment.gov.au/protection/ozone/publications/2015-analysis-whs-data-rac-industry](http://www.environment.gov.au/protection/ozone/publications/2015-analysis-whs-data-rac-industry)

Analysis of work health and safety data for the use of synthetic greenhouse gases and substitutes in the refrigeration and air-conditioning industry

- Department of Mines, Industry Regulation and Safety,

[www.dmp.wa.gov.au/Documents/Safety/MSH\\_SB\\_100.pdf](http://www.dmp.wa.gov.au/Documents/Safety/MSH_SB_100.pdf)

Mines Safety Bulletin No. 100 and Dangerous Goods Safety Bulletin No. 0312 *Safe use of flammable refrigerants*

- Department of Natural Resources and Mines

[www.dnrm.qld.gov.au/mining/safety-and-health/alerts-bulletins-search1/alerts-bulletins/petroleum-gas/illegal-hc-refrigerant-usage](http://www.dnrm.qld.gov.au/mining/safety-and-health/alerts-bulletins-search1/alerts-bulletins/petroleum-gas/illegal-hc-refrigerant-usage)

Petroleum and Gas Safety Alert No. 57 *Illegal hydrocarbon refrigerant usage*

- Department of Education and Training, <http://training.gov.au>

Courses and training providers

- Legislation

*Occupational Health and Safety Act 1984*

*Dangerous Goods Safety Act 2004*

Ross Stidolph

Director Dangerous Goods and Critical Risks

25 July 2018