



Dangerous Goods Safety Bulletin No. 0218 and 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 fatalities in Victoria and 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 or during routine service activities.

- It should be expected that in many cases, due to chemical reaction, 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

- It is preferable to only use flammable refrigerants in systems specifically designed for such refrigerants.
- Contact the manufacturer/supplier to ensure that the refrigeration equipment can safely use flammable refrigerants and follow their advice. Alternatively, as a minimum, undertake an engineering assessment conducted by competent persons experienced in electrical safety in hazardous areas and apply additional risk controls, to ensure the system can safely use flammable refrigerants. This assessment should be recorded and provided to the owner of the equipment for record keeping.
- 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, from a mechanical/functionality perspective, most of these systems were not originally designed for flammable refrigerants and will therefore require appropriate system assessments and modifications to operate safely as described above.

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

Before you change over to flammable refrigerants (i.e. 'green'/'natural') 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

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

- Australian Refrigeration Council

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

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

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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

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

- Heads of Workplace Safety Authorities – [Flammable Refrigerant Gases - Position Paper](#)

- 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

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

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