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Hydrocarbon refrigerants

This technical bulletin is aimed at businesses who design, manufacture, install, maintain, or repair air-conditioning, heat pump or refrigeration equipment that uses a hydrocarbon refrigerant.

Introduction

An uncontrolled release or leak of hydrocarbon gas from refrigeration plant is a health and safety risk which has the potential to cause a serious fire or explosion.

This guidance is to remind businesses that all equipment that uses hydrocarbon refrigerants must comply with the relevant safety standards and regulations.

Background

New Zealand is one of many countries who have agreed to take steps to reduce and eliminate the use of environmentally harmful refrigerants, such as hydrofluorocarbons (HFCs) and hydrochlorofluorocarbons (HCFCs).

The refrigerants that are being introduced to replace HFCs and HCFCs are often hydrocarbons which are flammable. This is leading to the regulation of the importation, exportation and use of those refrigerants.

What are hydrocarbon refrigerants?

Hydrocarbon refrigerants are non-toxic refrigerants. Their use is becoming popular as they are one of the most climate-friendly and cost-effective refrigerants used in heating and cooling.

All hydrocarbon refrigerants are classified as highly flammable. Below are common examples:

REFRIGERANT	SUBSTANCE	CLASSIFICATION ¹	LEVEL OF FLAMMABILITY
R290	Propane	A3	High flammability
R600a	Isobutane	A3	High flammability
R1270	Propylene	A3	High flammability

¹ According to standard AS/NZS ISO 817:2016.

Designing, manufacturing or installing equipment that uses a hydrocarbon refrigerant

Refrigeration, air-conditioning and heat pump equipment that uses flammable refrigerants must be designed and installed specifically for those refrigerants to avoid being in breach of:

- Electricity (Safety) Regulations 2010
- Health and Safety at Work (Hazardous Substances) Regulations 2017 (the Hazardous Substances Regulations)
- Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways) Regulations 1999.

Under the Hazardous Substances Regulations air-conditioning, heat pump or refrigeration equipment operating on a hydrocarbon refrigerant must comply with *AS/NZS 5149:2016*.

Note: The Hazardous Substances Regulations do not apply to domestic refrigerators, domestic heat pumps, or room air conditioners. These are required to comply with relevant appliance standard (*AS/NZS 60335*).

Repairing or maintaining equipment, including replacing refrigerants

Significant safety concerns have been raised about the practice of retrofitting hydrocarbon refrigerant into existing air-conditioning, heat pump or refrigeration equipment that is not specifically designed for a flammable type.

This greatly increases the risk of a serious fire or explosion.

Under the Electricity (Safety) Regulations 2010, an installation is deemed **unsafe** if it is retrofitted with a refrigerant other than the one that it was designed to operate on.

The replacement of a non-flammable refrigerant with a flammable refrigerant renders the heat pump, refrigeration or air-conditioning system unsafe unless:

- the equipment has been adapted to operate safely, or
- the equipment was designed to be retrofitted with that refrigerant.

Retrofitting must not be undertaken, unless the person retrofitting existing equipment with a hydrocarbon refrigerant has:

- undertaken a full redesign of the refrigerant system
- completed a process safety review identifying and controlling all the risks of commissioning and operating the re-engineered system
- ensured compliance with all relevant standards, including but not limited to *AS/NZS 5149* and *AS 4343* or *AS/NZS 60335*.

Note: Compliance with *AS/NZ 5149* is deemed to be compliance with *AS/NZ 1677.2* as cited in the Electricity (Safety) Regulations.

The Health and Safety at Work Act 2015 (HSWA)

A PCBU must ensure, so far as is reasonably practicable, the health and safety of workers, and that other persons are not put at risk by its work.

Risks associated with the installing, commissioning, operating, maintaining or servicing air-conditioning, heat pump or refrigeration plant must be managed appropriately, even if the plant is fully compliant with all requirements of *AS/NZS 5149*.

Persons undertaking redesign of systems take on the duties of a designer. The designer must, so far as is reasonably practicable, ensure that plant is designed to be without risks to the health and safety of workers or others.

For more information including other duties under HSWA, see our quick reference guide [Health and safety at work](#)

Standards

AS/NZS ISO 817:2016 Refrigerants - Designation and safety classification - safety classification

AS/NZS 5149:2016 (Parts 1-4) Refrigerating systems and heat pumps - safety and environmental requirements

AS 4343:2005 Pressure equipment - hazard levels

More information

[Flammable Refrigerants - Be Informed, Be Aware Fact Sheets 1-4](#)

[Flammable Refrigerant Safety Guide \(2013\) and Update 1 \(2018\)](#)

[Flammable Refrigerant Gases Position Paper](#)