

Safe use of hydrocarbon refrigerants

➤ **IF HYDROCARBON REFRIGERANTS ESCAPE FROM REFRIGERATION AND STORAGE SYSTEMS THEY CAN MIX WITH AIR TO FORM A POTENTIALLY EXPLOSIVE MIXTURE. THIS FACT SHEET PROVIDES INFORMATION ABOUT THE NEED FOR SAFE DESIGN OF PLANT AND CONTROL SYSTEMS, ADEQUATE MAINTENANCE, AND SAFE OPERATION PRACTICES WHEN USING HYDROCARBON REFRIGERANTS.**

It is relevant to refrigeration engineers, electricians, contractors, coolstore operators, and industries involved in refrigerated food storage.

Statutory requirements

The following laws include legal duties that apply to the use of hydrocarbon refrigerants in workplaces. Operators of coolstores and commercial refrigeration systems are advised to seek assistance from a qualified refrigeration expert on how to meet the legal requirements.

- Under the Health and Safety in Employment Act, employers and people “in control of a place of work” (building owners, contractors, landlords, tenants etc) must take “all practicable steps” to ensure various people are not harmed in the workplace. Taking “all practicable steps” would include complying with relevant standards and regulations.
- All hydrocarbon refrigerants are hazardous substances under the Hazardous Substances and New Organisms Act (HSNO), and are subject to various regulatory controls under the Act. The controls depend on the quantities of the substance and circumstances involved.

- Under the Electricity Act precautions must be taken where flammable gases or vapours may be present, to prevent them being ignited by electrical equipment.
- The Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways) Regulations 1999 (PECPR) contain specific duties and requirements on certification of the design, manufacture, supply, operation, and repair of pressure equipment used in workplaces. This includes refrigeration systems that exceed 50 kPag. A copy of these regulations is available at www.legislation.govt.nz/regulation/public/1999/0128/latest/DLM284452.html

Standards

A number of standards provide information on how to design and operate refrigeration systems safely. Copies of the standards are available from www.standards.co.nz. (Enter the keywords provided to order or download a copy, or call 0800 782 632.):

- AS/NZS 1677.1 Refrigerating systems Part 1: Refrigerant classifications (keyword 1677.1)



- AS/NZS 1677.2 Refrigerating systems Part 2: Safety requirements for fixed installations (keyword 1677.2)
- AS/NZS 2430.1-9 Set of Standards for the classification of hazardous areas (keyword 2430)
- AS/NZS 60079.10:2004 Standard for electrical apparatus for explosive gas atmospheres (keyword 60079.10)
- AS/NZS 3823.1.1:1998 Performance of electrical appliances - Airconditioners and heat pumps - Test methods - Non-ducted airconditioners and heat pumps - Testing and rating for performance (keyword 3823.1)
- AS/NZS 4041:2006 Pressure Piping (no keyword) or Ansi/Asme B31.3 Refrigerant Piping Standard) (keyword B31.3 and check 'BSI' category)

Other precautionary measures

- Always conduct a risk assessment to determine whether it is appropriate to use a flammable gas refrigerant in the particular workplace.
 - Only use hydrocarbon refrigerants in the system if this has been approved by the unit's manufacturer and the refrigerant supplier.
 - Do not retrofit a system to use a flammable refrigerant unless the system is designed, or has been properly modified, to be used that way. The unit may need to be recertified to meet PECPR regulatory requirements and may be subject to different HSNO requirements. Check with the Department of Labour's HSNO and Engineering Safety specialist advisers.
 - Ensure that the people who install and maintain equipment that uses hydrocarbon refrigerants are trained and knowledgeable about the regulatory controls and standards.
 - Ensure that no potential sources of ignition are used where flammable gas could be present. This includes all electrical equipment not certified for use in hazardous areas.
 - All premises, areas, and equipment should have signs to show the nature of any hazardous substances present in the refrigeration system. This includes having Hazchem signs at the entrance to the site to alert outsiders –
- such as emergency services workers – of the potential dangers.
- Only use hydrocarbon refrigerants in properly ventilated areas and seek competent advice on how to achieve that.
 - Include well designed monitoring/isolation systems for individual lines that go into enclosed spaces so that leaks can be picked up.

More information

- The manufacturer or supplier of any hydrocarbon refrigerant, or equipment using hydrocarbon refrigerants, must provide safety data sheets for each hazardous substance involved as well as provide advice on risk mitigation.
- The Department of Labour's HSNO and Engineering Safety specialist advisers can provide information about using hydrocarbon refrigerants in the workplace, and the PECPR requirements. The Department also provides general information on health and safety in the workplace. Visit www.dol.govt.nz or call 0800 20 90 20.
- The Environmental Risk Management Authority (ERMA) has information about the controls required for the safe use of hydrocarbon refrigerants under the HSNO Act. Visit www.ermanz.govt.nz or call 0800 376 234.
- For information on issues associated with the Electricity Act visit Energy Safety's website, www.energysafety.govt.nz.

Other useful information:

- Department of Labour approved codes: Approved Code of Practice for Pressure Equipment
- ERMA New Zealand approved codes: Signage for Premises Storing Hazardous Substances and Dangerous Goods
- AS 1210: 1997 Pressure Vessel Code
- AS/NZS 3788:2006 Pressure equipment - In-service inspection (keyword 3788)
- AS 4343: 2005 Pressure Equipment Hazard Levels

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Please note: As a summary, this fact sheet covers common problems. It will not answer every question and should not be used as a substitute for legislation or legal advice. The Department of Labour takes no responsibility for the results of any action taken on the basis of information on this leaflet nor for any errors or omissions.