



COOLCHANGE

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Pride in the profession

The refrigeration and air conditioning (RAC) industry is critical to modern life and has a profound impact on the community.

Few industries have such a large influence on everyday life than the RAC industry. Just think, a blood transfusion or surgery cannot be performed without the work of a refrigeration technician, not to mention the importance of technicians to other industries like the fresh food industry and scientific research.

Environmental success

RAC industry scheme members have increased the level of skills in the RAC industry across the nation and have contributed significantly to the prevention of greenhouse gas emissions by approximately 24.37 megatonnes of CO₂ since the scheme's inception. This speaks volumes for the RAC industry as a whole, and the influence of the licence scheme. In addition, the Australian Government's 'State of the Environment Report' released in March 2017 highlighted continued improvements in the ozone layer above the Antarctic as a result of controls on the use of ozone depleting substances. These results have had a direct impact on improving human health and lifestyle and the RAC industry ought to be proud of these achievements.

Good regulation

The Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995 establish the licensing scheme that is administered by the Australian Refrigeration Council (ARC).

The scheme provides a framework which has driven the level of skill in the industry up, whilst ensuring the right players are in the game. Last financial year, 74 licences were not renewed due to lack of compliance. With over 85,000 licence holders Australia-wide, 74 is a small but important number.

While the high level policy drivers for state-based occupational licence schemes (WHS and consumer protection) and the RAC permit scheme (environmental) are different, in practice (or on the ground), both schemes result in controls on work practices. It is through compliant technicians and standards on work practices that the licence scheme achieves its goal of reducing refrigerant greenhouse gas emissions.

Industry partnerships

One key to the success of the licence scheme has been the way in which the Government, ARC and industry have been able to partner. The ARC's Refrigeration and Air Conditioning Industry Board is made up of representatives from mainstream industry, who guide the ARC and advise the Government on issues related to the scheme – a scheme which has technicians at its heart. The ARC takes pride in the RAC profession and licensed technicians.

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Pride in the profession (continued)

Business building

The ARC seeks to add value to the RAC Industry by helping technicians promote their business as being environmentally responsible. We promote and actively encourage customers to use licensed businesses. ARC advertising attracted over 100,000 people to visit the licensed business directory website www.lookforthetick.com.au over summer. In addition, the recently launched RAC industry careers video promotes the licensed industry as the best option and encourages smart, passionate and hard-working school leavers to join the industry. Check out the video at www.arcltd.org.au/careers. All these initiatives and success should help the industry be recognised for the substantial and positive impact it has on modern society.

Penalties increase for offences listed under the Ozone Act and Regulations

Penalties have increased for offences listed under *the Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* and the *Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995*.

The Crimes Act 1914 (Cth) has been amended to increase the Commonwealth penalty unit from \$180 to \$210 per penalty unit, effective from 1 July 2017. Penalty units apply where a person or corporation has committed a Commonwealth offence. This includes offences listed under the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* (the Act) and the *Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995* (the Regulations).

Not holding the relevant permit – A person who imports, exports or manufactures fluorocarbon refrigerant (either in bulk or pre-charged into equipment) without the appropriate licence (or exemption) is committing an offence under section 13 of the Ozone Act and may be fined up to \$105,000. Under Ozone Regulation 111, it is also an offence to handle refrigeration and air conditioning (RAC) equipment containing fluorocarbon refrigerant without a refrigerant handling licence (RHL). A penalty of up to \$2,100 may apply. Under Ozone Regulation 112, it is an offence to acquire, possess or dispose of bulk fluorocarbon refrigerant without a Refrigerant Trading Authorisation (RTA). A penalty of up to \$2,100 may apply.

Unlawful discharge of fluorocarbon refrigerant – It is an offence under section 45B(1) of the Ozone Act to act in a way that results in the unlawful discharge of ozone depleting substances (ODS) and synthetic greenhouse gases (SGG), including fluorocarbon refrigerant. A penalty of up to \$63,000 for an individual or up to \$315,000 for a corporation may apply.

Breaching permit conditions – It is an offence under Ozone Regulation 136 for an RHL holder to breach a condition of their licence. A penalty of up to \$2,100 may apply. It is an offence under Ozone Regulation 142 for a RTA holder to breach a condition of their permit. A penalty of up to \$2,100 may apply.

Effects of breaches on gaining future permits – Under Ozone Regulation 122, an individual or corporation who is convicted of an offence under the Act or Regulations, or who has had a permit or licence cancelled, may be considered unfit to hold a RAC industry permit or licence. As a result, their permit or licence may be refused on reapplication or, in accordance with Ozone Regulation 123, their permit or licence may be cancelled.

Nitrogen is not Nitrogen

Dry nitrogen purging when welding pipework

Why do we nitrogen purge?

Nitrogen purging is an integral process in producing a quality HVAC-R system, however there are some factors to be aware of. Brazing at such high temperatures results in a heavy black oxide (cupric oxide), forming both inside and outside of the pipe. On cooling, this oxide flakes off to form scale. While only a cosmetic issue on the outside, inside the tube the oxide flakes are carried by the refrigerant through the system. This can result in loss of performance or failure of a system component.

This problem has long been an issue when brazing HVAC-R pipework. It has become more important with the change from HCFC refrigerants, like R-22 that use mineral oil, to HFC refrigerants (R410a) using polyol ester (POE) oils. POE oils have a solvent effect and can 'scrub' the copper tube walls. Oxide from tube walls and loose scale can circulate through the system, usually ending up in the crankcase of the compressor. The following picture identifies when dry nitrogen has been used during the brazing process (left pipes) and when it is not used (right pipes).



As reported in our last newsletter (#44), the use of dry nitrogen during installation must follow the Australian and New Zealand refrigerant handling code of practice 2007, part 2, including clauses:

- 5.25 After pipework has been fixed in position, dry nitrogen **must** be passed through the system to remove oxygen prior to brazing or silver soldering joints.
- 5.26 Dry nitrogen **must** be bled continuously through the system during the brazing operation to eliminate oxidation (scaling), a common cause of choked dryers, blocked expansion valve strainers, dirty oil and compressor failure.
- 5.27 The dry nitrogen **must** be at minimal gauge pressure during the brazing operation to eliminate the possibility of pin hole leaks.

Which nitrogen do you use?

Historically, the type of dry nitrogen used during installation was branded as 'Industrial Dry Nitrogen'. This labelling has (generally) now been replaced with 'High Purity (HP)' or 'Ultra High purity (UHP)' nitrogen.

The following graph highlights nitrogen grades. They are graded, at least in part, by moisture content. To use anything other than a dry, inert gas such as HP or UHP nitrogen, increases the risk of introducing unacceptable levels of moisture and oxygen (O₂) into the HVAC-R system.

Product name	N ₂	O ₂	Moisture
UHP Nitrogen	99.999%	< 3 ppm	< 2 ppm
HP Nitrogen	99.99%	< 10 ppm	< 10 ppm
Industrial Nitrogen	99.9%	< 1000 ppm	< 100 ppm

Convert your customers to preventative maintenance



With regular maintenance your customers can save money.

RAC licensed technicians, as qualified professionals, have an opportunity to make customers aware of:

- why they carry out their work in a certain way
- why it is inherently beneficial to the customer
- why it is necessary, from an environmental and legal perspective, to employ a licensed technician who can properly maintain and repair equipment.

Not only does leaking equipment directly emit environmentally harmful gasses to the atmosphere, equipment runs less efficiently and this causes indirect emissions through greater electricity use. For the equipment owner, this lowered efficiency and loss of refrigerant can have a financial impact on repairs and the life expectancy of the system, in addition to the cost of reducing the leaking refrigerant.

It makes good business sense for equipment owners to maintain their equipment

For one case in South Australia, ongoing leaking of a major piece of refrigeration equipment resulted in the facility having to close its doors while the system was replaced, losing them business and income for several months. This cost the owner far more than if they had appropriately maintained the equipment from day one.

Failing to repair leaking equipment and topping up is illegal

Some technicians may feel pressured to perform temporary fixes, particularly on large pieces of equipment. However, as a RAC licensed technician, if you are going to work on a piece of equipment, you have an obligation under the conditions of your permit to ensure that leaking equipment is tested and repaired before reintroducing refrigerant to the system. Under the stationary and the automotive refrigerant handling codes of practice topping up equipment without first testing for leaks and repairing the equipment is not allowed.

Not repairing a leaking system and topping it up with refrigerant is discharging a scheduled substance which is an offence under section 45B of the Ozone Act. It can result in a civil penalty of \$63,000 for an individual and \$315,000 for a business and, in some circumstances, can result in a criminal conviction. It's also possible that an equipment owner, knowingly emitting refrigerant by failing to repair the system, could be found to be committing an offence under section 45B.

For owners, consider replacing old equipment rather than continually repairing it. With such rapid improvements to technology over the last 10-15 years, this could turn out to be a great opportunity to improve the efficiency of their operation and save them money, despite the initial outlay. With some alternative refrigerants, it also reduces the impact on the environment significantly.

Risky business – unlocking your risk management plan for refrigerants

Why do I need a risk management plan?

Businesses need to be aware of their risks. Overall business success depends largely on effective management and minimisation of risk – refrigerant is no different.

Under the Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995, a condition of holding a Refrigerant Trading Authorisation (RTA) is implementing an effective risk management plan (RMP), which outlines the handling and storage of refrigerant in the holder's business.

What should my RMP include?

An RMP must identify potential risks which could result in the emission of refrigerant to the atmosphere and identify processes and practices that minimise the possibility of those risks occurring. Your RMP must reflect the risks of emissions relevant to all parts of your business practices, including refrigerant handling, storage and transport. This applies whether your business is conducted from a vehicle or building, and whether you are a sole trader or employ 100 or more technicians.



Over the next 2 pages is a useful template you can use, or compare to your existing RMP. Feel free to use this template, just make sure you apply it to your specific business practices and do the following:

- Identify if you work in the Automotive or Stationary fields
- Insert relevant person responsible against each risk
- Insert review date
- Read over the whole plan carefully and put lines through the areas that don't relate to your business. In particular, see the section 'Decommissioning end of life equipment'.
- Add further risks and control measures if relevant to your business.

Risk Management Plan

Business name

Automotive Stationary (please tick)

RTA Number

Main contact for your business RMP

Activity steps	Potential hazards/risks	Risk control measures	Australian Standards and Code of practice reference	Person responsible (full name)	Next review date (within 12 months)
Purchase of refrigerant	Loose, damaged or missing cylinder caps	<ul style="list-style-type: none"> At time of purchase check that refrigerant cylinders are tightly capped Ensure quarterly purchase records are kept up to date Only accept refrigerant cylinders from wholesalers if they are properly sealed (bunged or capped). 	✓		
	Poor cylinder condition (rusted, corroded, damaged). Expired, or close to expired 'Test Date'	<ul style="list-style-type: none"> Check cylinder date markings/imprints – specifically, that they are 'In Test' Good condition etc. 	✓		
Transportation of refrigerant	Damaged cylinder during transportation	<ul style="list-style-type: none"> Keep out of direct sunlight and/or in cooler area of vehicle Safely stored/fixing when transporting Fitted with safety equipment etc. 	✓		
	Damage to gas cylinders during handling (hand-moved, equipment-moved)	<ul style="list-style-type: none"> Implement proper handling techniques Report accidents immediately. 	✓		
Using equipment containing refrigerant	Leakage of refrigerant during charging of equipment	<ul style="list-style-type: none"> Implement best practice procedure as per the Standards AS 2030.1 & AS 4332 and/or code of practice 	✓		
	Improper care of cylinders	<ul style="list-style-type: none"> After each use check that refrigerant cylinders are tightly capped Check for leakage etc. 	✓		
Handling	Unlicensed handling staff or contractors	<ul style="list-style-type: none"> All refrigerant handling must be carried out by qualified licensed staff or contractors Check temporary contractor's licence before commencement of refrigerant handling work Ensure quarterly refrigerant handling licence holder records are up to date, taking particular note of expiry dates. 	✓		
Installation, service and maintenance of equipment containing refrigerant	Lack of servicing of equipment containing refrigerant	<ul style="list-style-type: none"> Adhere to manufacturers' recommendations and relevant standards Maintain recommended servicing frequency: <ol style="list-style-type: none"> Obtain and keep warranties on repairs Keep record of each service to equipment Check cylinder weight regularly etc. Refer to appropriate standards. 	✓		
	Infrequent testing of equipment containing refrigerant	<ul style="list-style-type: none"> Check that all test equipment is in good working condition at least once every three months. Test leak detectors and recovery units Regularly monitor vacuum pump oil etc Ensure quarterly equipment maintenance records are kept up to date. 	✓		
	Inadequate leak testing	<ul style="list-style-type: none"> Implement best practice procedure as per Standards AS 2030.1 & AS 4332 and/or code of practice Check at least every three months Ensure quarterly cylinder leak test & in-test expiry date records are kept up to date. 	✓		



Risk Management Plan (continued)

Provide a short description of your business (i.e. what the business does; how many branches; how many staff handle refrigerant, etc.)

Activity steps	Potential hazards/risks	Risk control measures	Australian Standards and Code of practice reference	Person responsible (full name)	Next review date (within 12 months)
Recovery and recycling of refrigerant	Improper filling of cylinders	<ul style="list-style-type: none"> Fill bulk refrigerant cylinders in-line with manufacturers' recommendations etc. 	✓		
	Poor cleaning and flushing	<ul style="list-style-type: none"> Never charge refrigerant into equipment with identified leaks Refer to standards and Code of Practice for leak testing procedures. 	✓		
	Venting	<ul style="list-style-type: none"> Never vent fluorocarbon refrigerant where its release is avoidable etc. 	✓		
Decommission end of life equipment	Leakage of refrigerant if pumped down and left in the equipment	Put line through dot point 1 or 2 if not relevant: <ul style="list-style-type: none"> When a vehicle is being scrapped or dismantled or the air-conditioning system is being de-commissioned all refrigerant is to be recovered from the system (AUTOMOTIVE) All refrigerant is to be reclaimed from all parts of the system at the time of decommissioning (STATIONARY) After recovery refrigerant is to be recycled or returned to an authorised refrigerant supplier (see 'Disposal'). 	✓		
	Poor storage of cylinders on premises	<ul style="list-style-type: none"> Ensure all cylinders are stored in a safe and secure location: <ol style="list-style-type: none"> climate controlled (cool place, removed from direct sources of heat and the risk of fire) free of obstacles with appropriate signage to provide ready identification for emergency teams. 	✓		
Disposal	Inadequate seals	<ul style="list-style-type: none"> Closed valves when not in use Check all seals for leakage every 3 months. 	✓		
	Mixing refrigerant types	<ul style="list-style-type: none"> Clearly identify refrigerant stored in cylinders Store reclaimed refrigerant separately. 	✓		
	Lack of labelling	<ul style="list-style-type: none"> Clearly label refrigerant type Clearly label lubricant type Store in specific locations Training personnel. 	✓		
	Equipment that cannot be repaired	<ul style="list-style-type: none"> Document and keep records of reasons why Establish a retirement plan of action. 	✓		
	Recovered refrigerant	<ul style="list-style-type: none"> Return refrigerant contaminated to supplier for disposal Document and keep records of recovered refrigerant returned to supplier for disposal Ensure quarterly recovered refrigerant returned records are kept up to date. 	✓		

Australia's HFC phase-down – providing certainty for business

The Australian Parliament has passed legislation to implement a gradual phase-down of hydrofluorocarbon (HFC) imports over almost 20 years from 1 January 2018. The phase-down will result in an 85% reduction in imports (and therefore emissions) of HFCs.

HFCs are the most commonly used refrigerants both in Australia and worldwide. Refrigerants include R404a, R410a and R134a. When emitted, HFCs trap heat in the atmosphere adding to the impact on the climate. Introduction of the legislation, first announced by the Government in June 2016 and passed in June 2017, was the next step in implementing the phase-down. Australia's phase-down leads the global phase-down agreement under the Montreal Protocol. The global phase-down was agreed in October 2016 and commits all 197 United Nations member states to phase-down imports and production of HFCs within a set timeframe. The global phase-down puts all countries on a level playing field by applying the phase-down through the Montreal Protocol on substances that Deplete the Ozone Layer, to which there are 197 parties covering both developed and developing countries.

The phase-down is designed to provide a sufficient supply of HFCs for the Australian market while promoting the uptake of new, more environmentally friendly and energy efficient technologies through investment certainty for business. As the phase-down has been designed with projected demand in mind, it will encourage transition however there should not be significant price changes after 1 January 2018. Owners of long-lived HFC equipment shouldn't be concerned about the availability of HFCs to service their equipment. The 15% residual from 2036 provides for future servicing requirements and for equipment where alternatives are not readily available.

The phase-down is a long-term policy and the effects are not expected to be felt immediately. Businesses are encouraged to learn about alternative technologies and their characteristics and to update their skills for install and servicing of next generation equipment. New equipment using a range of alternatives with no or very low global warming potential (GWP) is already available in Australia.

Australian Standards have changed and will continue to change over time to accommodate the safety hazard of alternative refrigerants. AS/NZ 5149 'Refrigerating systems and heat pumps – Safety and environmental requirements' and AS/NZ 817 'Refrigerants – Designation and safety classification' were updated in 2016. International standards organisations are working to further update these and other relevant standards.

Further information and FAQs on the HFC phase-down can be found at www.environment.gov.au/protection/ozone/legislation/opsqgm-review/hfc-phase-down-faqs

Further information on Australian Standards can be found at www.standards.org.au

You may also direct enquiries to ozone@environment.gov.au

New auto gas under microscope at AAA Expo

For the fourth time, the ARC exhibited at the Australian Automotive Aftermarket and Collision Repair Expo, in Melbourne from the 6-8 April.

This event attracts a variety of people, in particular, automotive air conditioning and refrigerant recovery licence holders. With almost 30,000 Automotive air conditioning licence holders Australia-wide, it is important the ARC attends these exhibitions to meet technicians, provide advice and offer relevant education material. The main questions from the event were around the transition from R134a refrigerant to R1234yf and what this means for industry. There are significant differences between the two gasses. Technicians need to be aware of the following:

- R1234yf has a global warming potential (GWP) of < 1
- R1234yf is not a scheduled substance so does not require a refrigerant handling licence to use (R134a is a scheduled substance so a handling licence is required)
- R1234yf is rated A2L mildly flammable (R134a is non-flammable).

Properties	R1234YF	R134a
Boiling Point	-29°C	-26°C
Critical Point	95°C	102°C
Saturation Pressure at 25°C	580 kPa gauge	567 kPa gauge
Saturation Pressure at 80°C	2400 kPa gauge	2490 kPa gauge
Global Warming Potential (100 ITH)	< 1	1430
Flammability rating	A2L – mildly flammable	A1 – non-flammable

When working with flammable refrigerant R1234yf, technicians will require different equipment that is safe to use and meets Society of Automotive Engineers (SAE) Standards. We recommend you contact your automotive wholesaler and supplier for more information.

Due to its low global warming potential, R1234yf is not a scheduled substance under the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*. Therefore, a refrigerant handling licence is not required to handle this refrigerant, nor is a RTA required to buy, sell or store it.

ARC advises businesses to check their relevant state-based authorities for any additional requirements. It's important to remember R134a will still be charged in the current fleet of vehicles for years to come, and will continue to be available for servicing and maintenance work. This means the automotive air conditioning licence will remain non-negotiable for technicians working in the automotive sector.