



Build your business and protect the environment

Benefits of preventative maintenance and leak detection for mobile air conditioning

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Australian Refrigeration Council (ARC)

ARC administers the refrigeration and air conditioning (RAC) industry permit scheme on behalf of the Australian Government, under Australia's Ozone Protection and Synthetic Greenhouse Gas Management legislation. Since 2004, ARC has raised public awareness of the sector as a network of regulated, highly-skilled professionals, and has supported its growth and expansion.

www.arctick.org

Introduction

This booklet has been developed as a reference for holders of a refrigerant trading authorisation (RTA) in the mobile refrigeration and air conditioning (RAC) sector, to provide information about industry regulations and how they can guide and benefit businesses and the environment.

Working together is good for your business and the environment – read on to learn more about how you can save your business time and money, and protect the environment, by implementing regular preventative maintenance and leak detection processes on mobile air conditioning systems.

Since the Australian Government's introduction of specific laws and regulations to protect the environment from ozone depleting substances

and synthetic greenhouse gases more than 20 years ago, servicing and repairing automotive air conditioning systems has developed into a specialised field that relies on skilled technicians to provide a best-practice approach.

It is a key responsibility of RTA holders to oversee the management of synthetic refrigerant gases, to maintain the systems that utilise them, and thereby to protect the environment.



Our environment

Refrigerants contained in air conditioners can be extremely harmful to the environment. Australia has specific laws and regulations that apply to people who acquire, possess, dispose of or handle ozone depleting substances or synthetic greenhouse gases.

From 2018, the Australian Government began its hydrofluorocarbon (HFC) phasedown with a plan to reach an 85% reduction by 2036.

As a result, alternative refrigerants are slowly making their way onto the market in Australia. R1234yf and R744 (carbon dioxide) are two refrigerants that are being adopted by vehicle manufacturers as alternatives to R134a.

Who needs a licence?

Any person or business who acquires, possesses or disposes of ozone depleting substances and synthetic greenhouse gases must hold a refrigerant trading authorisation (RTA) under the Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995.

Likewise, any person who handles these substances in bulk or in equipment, or works on equipment containing these gases, needs to have a refrigerant handling licence (RHL).

These refrigeration and air conditioning industry licences are administered by the Australian Refrigeration Council (ARC) on behalf of the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW).



Responsibilities

Playing your part benefits your business, the community and the environment. A refrigerant trading authorisation (RTA) is a licence to buy, sell or store fluorocarbon refrigerant according to the Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995.

It is an RTA's responsibility to ensure only technicians with an appropriate automotive refrigerant handling licence (RHL), service and repair these mobile systems.

Regular service over the life of equipment by technicians who hold a refrigerant handling licence (RHL) is the most effective way to minimise refrigerant leakage to the atmosphere, whilst maintaining efficient system performance.

Other essential actions and reporting include:

- maintaining refrigerant records – amounts purchased, sold and recovered for destruction
- having appropriate minimum equipment (leak detector, vacuum pump and refrigerant recovery unit) to prevent avoidable emissions
- implementing a refrigerant risk management plan that's tailored to your workplace
- maintaining equipment maintenance and cylinder leak test records
- keeping an up-to-date list of RHL holders on staff
- supervising trainee RHL holders
- displaying RTA number on relevant advertising and stationery

Read more about RTA obligations at www.arctick.org/refrigerant-trading-authorisation/permit-condition-check-audit/

End of life is just as important

Captured refrigerant must be handled safely and carefully to ensure recovered refrigerant is appropriately recycled or destroyed.

Refrigerant Reclaim Australia (RRA) works with refrigerant wholesalers to collect and destroy refrigerants that are ozone depleting substances and synthetic greenhouses gases.

Benefits of preventative maintenance and avoiding refrigerant emissions

Modern vehicles operating in Australian conditions demand a lot of their thermal management systems. Air conditioning, refrigeration, engine cooling, and electrical systems are all expected to perform at their best regardless of the environmental conditions.

Help your business, your customer and the environment

Regular refrigerant leak monitoring can identify issues early and reduce costs associated with refrigerant loss and downtime if equipment fails unexpectedly. It also minimises the risks of emissions of refrigerants to the atmosphere.

The main types of refrigerant leaks (emissions) are:

- losses during substandard or lack of equipment service and maintenance, and
- losses at end of equipment life as equipment is handled for disposal.

Regular maintenance is key

Air conditioning systems can suffer faults that lead to performance degradation over their operating lifetime. Preventative maintenance minimises the occurrence and impact of these issues.

For the environment, levels of maintenance and servicing have a direct relationship with emissions over time from air conditioning equipment.

It's expected that regular maintenance to reduce emissions from refrigerant leaks and energy use across the RAC sector will reduce greenhouse gas emissions by 35 million tonnes CO₂e by 2030.

Best practices in this area are shown to reduce energy use by 10 to 20 per cent.*

**Leaks, maintenance and emissions:
Refrigeration and air conditioning equipment:
www.environment.gov.au/protection/ozone/publications/leaks-maintenance-emissions-refrigeration-air-conditioning-equipment*

Faults build up

A lack of maintenance can lead to a range of faults, including incorrect refrigerant charge, dirty filters or fouled evaporators and condensers.

These problems build up over the operational life of the system, and may be further aggravated by environmental factors or operator error.

An effective maintenance program includes finding and repairing refrigerant leaks, ensuring the correct refrigerant charge, cleaning heat exchangers (condensers and evaporators), replacing filters, ensuring good airflow and resetting controls.

It's important to check the product manufacturer's guide when implementing a maintenance program for your air conditioning systems.

Common causes of poor performance and refrigerant leakage

The most common causes of poor performance and refrigerant leakage across mobile air conditioning equipment include:

- Damage to flexible hoses
- Fixed pipe fractures and damage
- Joint integrity, O-ring condition, incorrect tension of fittings
- Condenser fouling and restricted airflow
- Evaporator fouling and restricted airflow
- Compressor shaft seal leakage, dirt ingress, overheating
- Incorrect refrigerant charge
- Refrigerant contamination, degradation and non-condensables
- Control system faults



Solutions for preventative maintenance and leak detection

Using quality equipment may mean a higher investment initially but it's a smart way to ensure accurate results, thereby saving time and money.

Increase reliability and minimise emissions by:

- servicing according to manufacturers' recommendations
- identifying and assessing refrigerant charge
- cleaning heat exchanger surfaces
- reviewing the installation for deficiencies
- logging and ongoing analysis of monitoring information – flows, pressures, temperatures, refrigerant leakage rate, etc.

Target refrigerant leakage by:

- regular servicing according to manufacturers' recommendations
- visual inspections for oil sweating and signs of physical damage to system
- monitoring of system charge through system pressure and pipe temperature analysis
- completion of documentation relating to system inspections
- annual servicing or replacement of critical components

Leak detection is best conducted in conjunction with:

- regular maintenance service procedures
- testing an AC system post-repair (as per the Australian Automotive Code of Practice 2008).

Formalised leak detection procedures must be followed when system servicing and repairs are conducted (electronic, oxygen free nitrogen pressure testing and bubble detection that may include the use of dye).

This information is a guide only. It's important to check air conditioning manufacturers' recommendations for appropriate maintenance and servicing of mobile air conditioning equipment.

Penalties

Australia's laws around handling and maintaining air conditioning equipment were created to reduce refrigerant leaks that damage the environment.

Penalties can be severe

Unlawful discharge of refrigerants that are ozone depleting substances or synthetic greenhouse gases can result in a penalty of up to \$66,600 for an individual or up to \$333,000 for a corporation.

For RTA or RHL holders who breach a condition of their licence, a penalty of up to \$2,220 may apply.

Effects of breaches on gaining future permits

An individual or corporation convicted of an offence under the Act* or Regulations†, or who has had a permit or licence cancelled, may be considered unfit to hold an RTA or RHL.

As a result, their permit or licence may be refused on reapplication or even cancelled. As a result, the business will not be able to purchase refrigerant, or work on systems that contain refrigerant.

* *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*

† *Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995*



'Topping up'

Fluorocarbon refrigerant, including the R134a which is found in most car air conditioning systems, is an ozone depleting substance and synthetic greenhouse gas. Released into the atmosphere, it can damage the ozone layer and contribute to global warming.

'Topping up' is an illegal and dangerous practice that harms the environment

If a leak is not identified and repaired, 'topping up' by adding refrigerant will result in the continued release of damaging refrigerant directly into the atmosphere.

For these reasons, 'topping up' is an offence in Australia and goes against the Australian Automotive Code of Practice 2008.

Unlawful discharge of fluorocarbon refrigerant can lead to penalties of up to \$66,600 for an individual or up to \$333,000 for a business. It also breaches the ARC's conditions for holding a permit (licence or authorisation) and penalties of up to \$2,220 may apply.

Safety

The relevant standards and codes of practice must be followed in any refrigerant charging.

For example, equipment should not be charged with refrigerant that has a higher hazard classification, such as replacing A1 rated refrigerant (R134a) with an A2L (R1234yf) or A3 (Hydrocarbon), unless the system has been converted in accordance with all relevant codes of practice, Australian Standards and Commonwealth, state and territory laws.

If a system is to be retrofitted for use with a different refrigerant, full refrigerant evacuation and recovery, and system leak testing, are required, and seeking guidance from manufacturers is recommended.

New technologies

In recent years, advancements within the automotive industry have not only provided consumers with a more enjoyable driving experience, they've led to the development of exciting RAC business and career opportunities that draw on these new technologies.

The automotive sector has seen consistent improvements in safety systems, and a resulting increase in demand for technicians with the high-level skills required to perform fault diagnosis and analysis in order to repair these systems.

Emerging safety requirements need to be reflected in industry training to ensure the safety of automotive workers, as well as consumers of automotive products and services.

As organisations look to expand their service offerings in response to market demand as these new technologies arrive, they'll need to transition to different types of automotive repair work.



Contributors

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More information

Mobile fleet air conditioning – Refrigerant leakage detection
www.arctick.org/information/automotive

Refrigeration and air conditioning industry permit scheme www.arctick.org

Australian Automotive Code of Practice 2008

www.arctick.org/refrigerant-handling-licence/codes-of-practice/

Use of R1234yf, R744 (CO₂) and R134a in automotive air conditioning

<https://www.arcltd.org.au/media/1074/auto-gas-booklet.pdf>

Leaks, maintenance and emissions: Refrigeration and air conditioning equipment

www.environment.gov.au/protection/ozone/publications/leaks-maintenance-emissionsrefrigeration-air-conditioning-equipment

Flammable refrigerants and safety in automotive applications

https://vasa.org.au/wp-content/uploads/2019/07/flammables_guide_WEB.pdf

To access the relevant Australian Standards, visit: www.standards.org.au

Refrigerant Reclaim Australia www.refrigerantreclaim.com.au

Equipment operating instructions

Contact the relevant equipment manufacturer, importer or supplier/wholesaler for further information on your equipment and the refrigerants it uses.

This initiative was developed by:

