



ADVISORY NOTICE

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HFC R134A PHASE-DOWN AND TRANSITION TO HFO R1234YF FOR EARTHMOVING MACHINERY

This CMEIG advisory notice was updated in March 2026 as a result of further industry queries related to Australia's continued transition to R1234yf refrigerant in earthmoving machinery applications.

CMEIG members have received inquiries from equipment users regarding plans to phase-down the use of refrigerant R134a, transitioning to R1234yf. This advisory notice is intended to provide related clarity.

Background

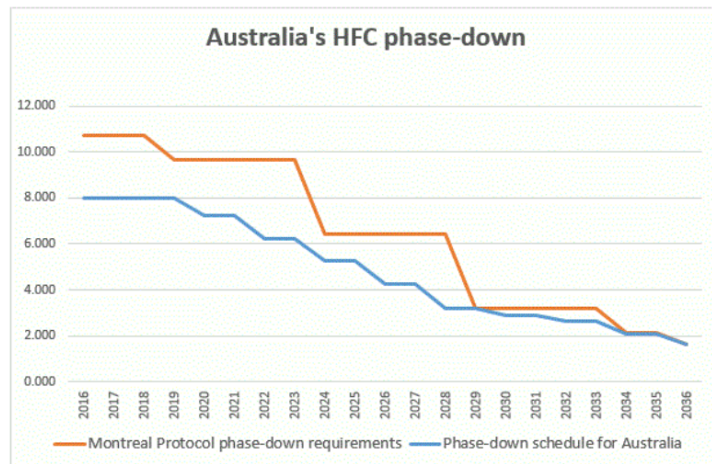
Australia has requirements and restrictions on the use of Hydrofluorocarbons (HFCs), Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs). HFCs, CFCs and HCFCs are regulated under the Ozone Protection and Synthetic Greenhouse Gas Management Act 1989 and associated Regulations, administered by the Australian Government Department of the Environment and Energy. The applicable laws are intended to protect the environment by reducing emissions of ozone depleting substances (ODS) and synthetic greenhouse gases (SGGs).

HFC R134a is a commonly used refrigerant gas in air-conditioning systems on earthmoving machinery. In accordance with Australia's commitment to the Montreal Protocol (an international treaty designed to protect the ozone layer) and the Kigali Accord¹, Australia enacted a phase-down of HFC (including HFC R134a) imports, among other higher GWP (Global Warming Potential) refrigerants, from 1 January 2018 for bulk gas importers.



¹ A HFC phase-down under the Montreal Protocol was agreed in Kigali, Rwanda, in October 2016 - Developed countries will phase-down their production and imports of HFCs by 85% between 2019 and 2036. Developing countries will also phase-down their HFC production and imports

Australia's phase down is managed by the DCCEEW (Australian Federal Department of Climate Change, Energy, the Environment and Water, and more detailed guidance can be found on their website. The scheme mechanism is via an annual import quota that will gradually reduce over 18 years. The end point of the phase-down, 15% of the baseline level, will be reached on 1 January 2036²



Situation for new earthmoving machinery

The Australian phase-down does not cover gas imported in pre-charged air-conditioning systems fitted to earthmoving machinery. HFCs contained in imported equipment are accounted for in the country of manufacture which typically also has phase-down plans under the Montreal Protocol.

As such, progressively, Australian end-users will observe earthmoving machinery manufacturers transition from using HFC R134a to HFO (Hydrofluoroolefin) R1234yf as the refrigerant gas.

Situation for existing earthmoving machinery

Existing equipment that has already been imported into Australia is not directly affected by the phase-down, nor should end users expect to be unable to service these air-conditioning systems with R134a. The Australian Government Department of the Environment and Energy has clarified that the overall pace of the phase-down is designed to match demand and end-of-life equipment replacement, and that consumers will not be forced to change their existing equipment.

Servicing and support

For entities servicing such systems, new equipment and procedures may be required, including:

- Fill equipment, such as
 - Air-conditioning servicing machines
 - Gauges
 - Contamination recovery equipment
 - Gas analysers
- Leak test equipment
- Gas storage equipment

² <https://www.dceew.gov.au/environment/protection/ozone/publications/hfc-phase-down-factsheet>

Frequently Asked Questions:

1. Can I revert from my factory-fitted R1234yf system, back to an R134a system?

In relation to this line of questioning, there are two typical request scenarios that have been received by CMEIG members. Each scenario, and associated guidance is provided below:

a. ***Can I replace the factory-fitted R1234yf system, with a R134a system?***

Unless specifically catered for by the OEM (e.g. where a machine can be optioned from the factory with either an R134a or R1234yf system) this is not supported. A retrofit can introduce significant complexity both for installation, as well as for ongoing support. Please also note, R134a is being progressively phased out, so such optionality (where available) will likely not be available further in the future as it is not a viable long-term solution for industry.

b. ***Can I swap out R1234yf refrigerant gas for R134a refrigerant gas in my factory supplied HVAC system?***

Unless the system is specifically designed to be used interchangeably with R1234yf or R134a, this is not possible as R1234yf systems are specifically designed and tuned to run that particular refrigerant. Moreover, even for dual-gas capable systems, it may be an offence under applicable laws to use a higher GWP refrigerant – please see below for details.

In relation to both questions 1a and 1b, CMEIG also notes that the Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995³ may be interpreted to prohibit the replacement of low GWP refrigerant with higher GWP refrigerants. Some relevant extracts from these laws are shown below. Stakeholders are encouraged to seek their own independent legal advice where appropriate.

Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995

2AAA Meaning of prohibited refrigerant charging

Scope of this regulation

1. ***This regulation applies in relation to equipment that is designed:***
 - a. ***to be used for the heating or cooling of anything; and***
 - b. ***to operate solely by using a particular refrigerant (the design refrigerant) other than an HCFC refrigerant.***

2. ***For the purposes of paragraph (1)(b), equipment is taken to be designed to operate solely by using a particular refrigerant if:***
 - a. ***the equipment has a compliance plate that specifies that particular refrigerant; or***
 - b. ***both of the following subparagraphs apply:***
 - (i) ***a manual, issued by the manufacturer, that relates to the equipment states that the equipment is designed to operate solely by using that particular refrigerant;***
 - (ii) ***the equipment does not have a compliance plate that specifies any particular refrigerant.***

Meaning of prohibited refrigerant charging

3. ***A person engages in prohibited refrigerant charging if:***
 - a. ***the person charges the equipment with a GWP refrigerant (the new refrigerant) other than the design refrigerant; and***
 - b. ***either:***
 - (i) ***the design refrigerant is not a scheduled substance; or***

³ <https://www.legislation.gov.au/F1996B02085/latest/>

(ii) the design refrigerant is a GWP refrigerant and the new refrigerant has a higher 100-year global warming potential than the design refrigerant; and

c. subregulation (4) does not apply.

4. This subregulation applies if:

- a. the continued functioning of the equipment is essential for health or public safety purposes; and
- b. no refrigerant that:
 - (i) is not a GWP refrigerant; or
 - (ii) is the design refrigerant; or
 - (iii) has a 100-year global warming potential equal to or lower than that of the design refrigerant; is available as an alternative to the new refrigerant to ensure the continued functioning of the equipment.

2. Where do I obtain the necessary skills and tooling to service an R1234yf system?

Please contact your equipment manufacturer or supplier to discuss specific matters. We do note that:

- Due to the widespread adoption of R1234yf in the automotive sector since 2013, tooling to service R1234yf systems is readily available.
- There are also relevant nationally accredited courses for applicable trades to complement their capability to service such systems. In particular – **AURETU005 – Retrofit and modify air conditioning and HVAC systems**⁴ specifically covers the use of R1234yf refrigerant in air conditioning and HVAC systems.

3. Why are CMEIG members transitioning to R1234yf? And why now?

The transition away from R134a to R1234yf is a global environmental sustainability initiative under the Montreal Protocol. The goal is to reduce the use of R134a due to its relatively high GWP of 1400+ (in comparison, R1234yf has a GWP<1).

This is also not a new phenomenon. By way of example, the European Union announced its ban back in 2006 (2006/40/EC – Mobile Air-Conditioning systems (MAC) Directive), with the aim for this to take effect conditionally from 2011/2017⁵.

Australia ratified the Montreal Protocol, and relevant Australian Laws were passed in support and the phase-down commenced in 2018. The transition in Australia continues to accelerate due to a range of factors which may include, but are not limited to the following:

- International regulations regarding manufacture/export of R134a systems which impacts machines imported into Australia
- Australian and global quota reductions, and increasing cost of R134a
- Logistics and supply chain transitions to R1234yf HVAC systems
- In anticipation of the 2028 step-change phase-down of R134a according to the Montreal Protocol

⁴ <https://training.gov.au/Training/Details/AURETU005/unitdetails>

⁵ https://single-market-economy.ec.europa.eu/sectors/automotive-industry/environmental-protection/mobile-air-conditioning-systems-macs_en

4. I am concerned about R1234yf flammability and toxicity. Can you tell me more about this?

It is CMEIG's understanding that the topic of flammability and toxicity of R1234yf vs R134a is considered resolved by industry.

R1234yf has a very high minimum ignition energy (5,000-10,000 mJ) compared to many widely used and readily accepted refrigerants like Propane (R-290), Isobutane (R-600a), R32 (Difluoromethane). R1234yf also has a very low burning velocity (1.5cm/s), and an auto ignition temperature of over 400°C. These are some of the characteristics that result in R1234yf being classed as only 'mildly flammable' according to *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Standard 34 - Designation and Safety Classification of Refrigerants*.

With regards to toxicity, this issue tends to be about the production of Hydrogen Fluoride (HF) during the breakdown of R1234yf in the event of a fire. As such, the toxicity concern is inexorably linked first, to the flammability concern i.e. R1234yf in a HVAC system must first catch on fire, before it can produce HF at concentrations of concern. This combustion-driven generation of HF is not particularly different from R134a in today's HVAC systems – similar to R1234yf, R134a also breaks down under typical fire temperatures, to similarly produce HF. As such, the concern about a typical fire auto-igniting R1234yf would similarly apply to R134a. Over the decades that R134a has been supplied to the earthmoving and automotive sectors, this concern regarding production of HF is considered as refuted.

Notwithstanding the above arguments, CMEIG also notes the following:

- Extensive research of flammability and toxicity concerns has been carried out by SAE (Society of Automotive Engineers) International⁶. The conclusions of this research in 2013, were that the risk of a vehicle occupant or service personnel being exposed to a fire or toxic gas were orders of magnitude lower than risks that were already considered acceptable by members of the public.
- The European Commission reviewed prior industry research and concluded in March 2014 that there was no evidence to support these safety concerns⁷. This position was reaffirmed by the United States Department of Transport, the US EPA and Japanese related automotive organisations. The outcomes of this position were also accepted by all major automotive OEM's.
- Specific to earthmoving machines, discussion also occurred with the United States Environmental Protection Agency leading to the following Final Ruling in 2022⁸:

[40 CFR Part 82, Vol. 87, No 86 - United States EPA Final Ruling \(May 4, 2022\)](#)

[Protection of Stratospheric Ozone: Listing of HFO-1234yf Under the Significant New Alternatives Policy Program for Motor Vehicle Air Conditioning in Nonroad Vehicles and Servicing Fittings for Small Refrigerant Cans](#)

⁶ <https://www.sae.org/standards/development/ground-vehicle/cooperative-research-program/alternate-refrigerants-research>

⁷ https://ec.europa.eu/commission/presscorner/detail/en/memo_14_168

⁸ <https://www.govinfo.gov/content/pkg/FR-2022-05-04/pdf/2022-08923.pdf>

SUMMARY: Pursuant to the EPA's Significant New Alternatives Policy program, this action lists the refrigerant 2,3,3,3-tetrafluoroprop-1-ene, also known as HFO-1234yf or R-1234yf, as acceptable, subject to use conditions, in the motor vehicle air conditioning end-use for certain types of newly manufactured nonroad (also called offroad) vehicles, including some vehicles that are also considered heavy-duty (HD) 4 vehicles:

- Agricultural tractors with greater than 40 horsepower (HP);
- Self-propelled agricultural machinery;
- Compact equipment;
- Construction, forestry, and mining equipment; and
- Commercial utility vehicles.

In this action, EPA is requiring the same use conditions, with certain updates discussed below, for MVAC systems designed to use HFO-1234yf in certain new nonroad vehicles. . .

The use conditions for those prior listings, which are intended to mitigate flammability and toxicity risks, require that MVAC systems designed to use HFO-1234yf meet the requirements of three technical safety standards developed by SAE International (SAE) (i.e., SAE J639, SAE J1739, and SAE J2844).

5. Are there any relevant International Standards?

Yes, earthmoving machinery HVAC systems using R1234yf are typically designed to meet the requirements of:

- **SAE J639** - *Safety Standards for Motor Vehicle Refrigerant Vapor Compressions Systems*

Doing so requires conformance to applicable parts of the following additional standards:

- **SAE J1739** - *Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA-MSR, and Process FMEA*
- **SAE J2842** - *R-1234yf and R744 Design Criteria and Certification for OEM Mobile Air Conditioning Evaporator and Service Replacements*
- **SAE J2844** - *R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems*

6. The SDS sheet from my refrigerant supplier doesn't show R1234yf as a low flammability (A2L) gas. Why?

This is a discussion that should be had with the relevant SDS supplier. CMEIG does note that some SDS information providers may be using a general classification for flammability in their data sheets, rather than the internationally recognised methods for classification specifically in place for flammability of refrigerants - *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Standard 34 - Designation and Safety Classification of Refrigerants*, and *EN 378 - Refrigerating Systems and heat pumps - Safety and environmental requirements*.

Where required, please contact your SDS provider to verify this.

7. Is R1234yf like LPG (Butane) or Propane in terms of fire risk? Is it toxic like Ammonia?

No, below is an illustration of where R1234yf sits in terms of flammability and toxicity relative to the above commonly used refrigerants, according to ASHRAE 34 and EN 378.

Higher Flammability	A3 Propane Butane	B3 R-1140
	A2 R-142b, R-152a	B2 R-30, R-40, R-611, R-717
Lower Flammability	A2L R-32, R-1234yf, R1234ze	B2L R-717 Ammonia
	A1 R-11, R-22, R410A, R134a, R515B, R-744	B1 R-10, R-21, R-123, R-764
No Flame Propagation	Lower Toxicity (OEL of 400 ppm or greater)	Higher Toxicity (OEL of less than 400 ppm)

Increasing toxicity

Increasing flammability

8. Is only the earthmoving sector transitioning to R1234yf? What about cars?

Current data suggests over 50% of new road vehicles being sold in Australia today now come with R1234yf HVAC systems – the automotive sector leads the earthmoving machine sector in terms of rollout. However, CMEIG expects this to change with time for some of the reasons identified earlier in this Notice.

9. Is my machine risk-profile materially impacted by the use of an R1234yf system in place of an R134a system? Do I need to do a risk assessment as an end user?

The examples of international regulatory review of this matter, as outlined in this Advisory Notice suggest there is no credible flammability and toxicity risk. As such, the risk profile is unlikely to differ materially from the existing risk profile with the use of R134a refrigerant on earthmoving machines.

In terms of whether to conduct a risk assessment, and the nature of that risk assessment, CMEIG cannot speak for specific circumstances or site process, storage and handling policies for bulk fluids. As such, even though CMEIG shares the same objective to have safe systems of work and safe places of work, CMEIG notes that this is a matter for each regulatory duty holder to ascertain.

Please contact your equipment manufacturer or supplier for more details.