

Time to change.

Prime is here to help you navigate the best refrigerant alternative.



In 2016 Australia agreed to implement the Kigali amendment to the Montreal Protocol to reduce the Global Warming Potential (GWP) of HFC refrigerants imported and used. The goal is an 85% reduction in the GWP footprint by 2036 meaning a transition to low GWP HFC’s and increasing use of alternate refrigerants like HFO, HC and other industrial gasses over the next decade.

GWP is measured as the equivalent emissions of CO2 (CO2 e) in Kilograms for the emission of 1 Kilogram of a HFC refrigerant. This is achieved by Quota that regulates the total amount of CO2e that can be imported annually and drive the market to select refrigerants with a lower GWP to continue supply

This means as the CO2 quota diminishes the price and availability of high GWP refrigerants will alter dramatically. Based on data from Cold Hard Facts the CO2e mix of HFC’s purchased in 2023 exceed our ability import in 2024 so we have reached a tipping point and need to accelerate transition.

Year	HFC GWP reduction every 2 years	HFC cumulative reduction from 2017
2018	25%	25%
2020	9%	32%
2022	14%	41%
2024	16%	51%
2026	19%	60%
2028	25%	70%
2030	9%	73%
2032	9%	75%
2034	21%	80%
2036	23%	85%

Welcome to a new world of refrigerants.

In 1989, governments around the world agreed to phase out Ozone Depleting Substances from the atmosphere. Recently, this agreement was extended to include the phase down of substances with high Global Warming Potential. As a party to this agreement, Australia & New Zealand has now begun the phase down of HFCs.

CFCs

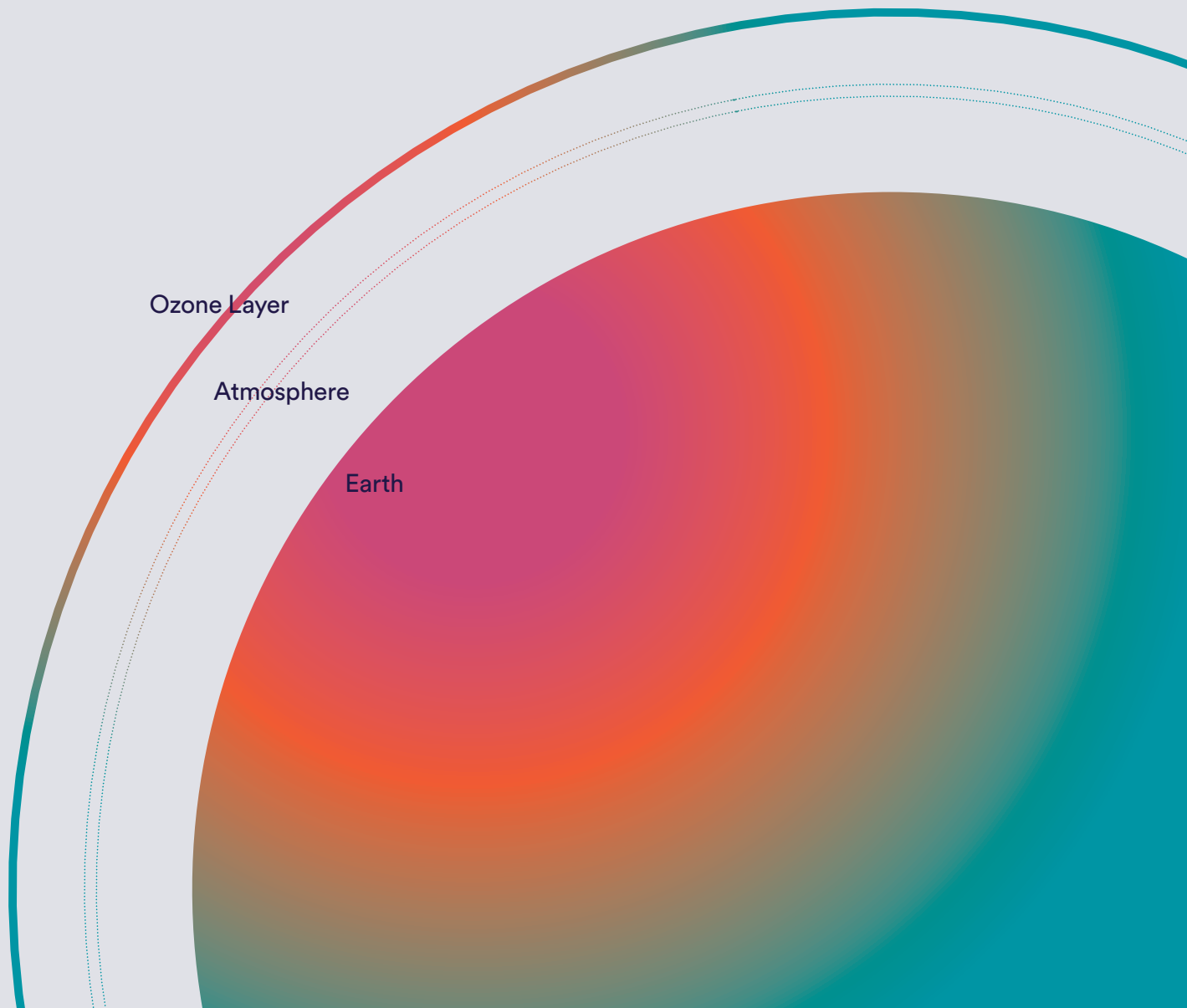
Deplete the ozone layer

- Harmful UV rays reach the Earth's surface
- The ozone layer and atmosphere absorb UV radiation

HFCs

Contribute to global warming (GWP)

- Sunlight warms the planet
- Greenhouse gases like HFCs trap extra emitted heat warming the planet



Global Warming Potential.

The Global Warming Potential of a refrigerant is measured by the amount of heat a gas will trap in the atmosphere over time, against a carbon dioxide benchmark. Carbon dioxide has a baseline GWP of 1, therefore a gas that has a GWP higher than 1, will trap more heat than CO2.

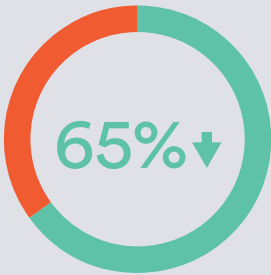
Refrigerant	Refrigerant Type	Safety Classification	GWP (AR4)
R404A	HFC	A1	3922
R438A	HFC	A1	2254
R452A	HFC	A1	2139
R427A	HFC	A1	2138
R410A	HFC	A1	2088
R22	HCFC	A1	1810
R407C	HFC	A1	1774
R134a	HFC	A1	1430
R449A	HFC/HFO	A1	1396
R448A	HFC/HFO	A1	1386
R32	HFC	A2L	675
R513A	HFC/HFO	A1	629
R450A	HFC/HFO	A1	601
R454B	HFC/HFO	A2L	465
R455A	HFC/HFO	A2L	145
R1234yf	HFO	A2L	<1
R1234ze	HFO	A2L	<1

*Global Warming Potential (GWP) values are determined by The Intergovernmental Panel on Climate Change (IPCC) and are subject to revision.

The next phase of refrigerants.



R448A | can replace R404A



Lower Global Warming Potential than the current R404A

	Medium
COP Cool	106.3%
Compressor Power (kW)	94.1%
Mass Flow (m3/h)	95.5%
Discharge (C)	117.4%
COP Heat	104.5%
Refrigeration Capacity	104.8%
Charge Size	107.5%

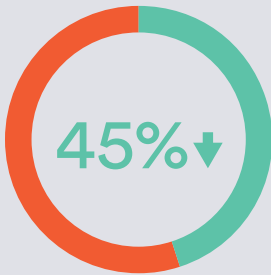
GWP: 1386
Temperature: Medium
Flammable: No
Toxic: Low Toxicity
ASHRAE Classification: A1

Common Application
Commercial
Industrial

*Low temperature applications require system modification.



R452A | can replace R404A



Lower Global Warming Potential than the current R404A

	Low	Medium
COP Cool	100.4%	106.6%
Compressor Power (kW)	99.6%	93.8%
Mass Flow (m3/h)	97.1%	103.2%
Discharge (C)	100.4%	100.4%
COP Heat	100.3%	104.7%
Refrigeration Capacity	103.0%	96.9%
Charge Size	108.9%	109.3%

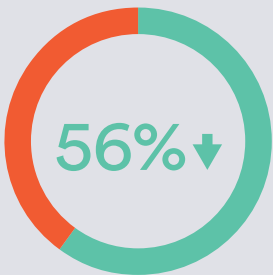
GWP: 2139
Temperature: Low & Medium
Flammable: No
Toxic: Low Toxicity
ASHRAE Classification: A1

Common Application
Commercial
Transport DX

The next phase of refrigerants.



R513A | can replace R134a



Lower Global Warming Potential than the current R134a

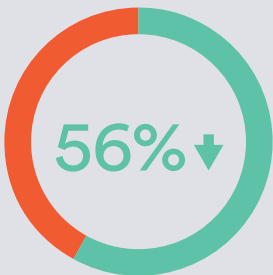
	Medium
COP Cool	95.5%
Compressor Power (kW)	104.8%
Mass Flow (m3/h)	93.0%
Discharge (C)	88.7%
COP Heat	96.6%
Refrigeration Capacity	107.6%
Charge Size	94.2%

GWP: 629
Temperature: Medium
Flammable: No
Toxic: Low Toxicity
ASHRAE Classification: A1

Common Application
Chillers
Light Industrial
Commercial Coldrooms
Automotive AC
Shipping Reefers



R450A | can replace R134a



Lower Global Warming Potential than the current R134a

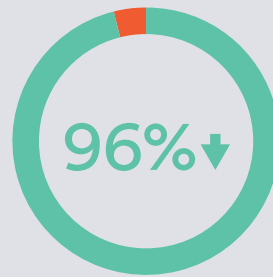
	Medium
COP Cool	99.2%
Compressor Power (kW)	100.9%
Mass Flow (m3/h)	111.4%
Discharge (C)	92.4%
COP Heat	99.4%
Refrigeration Capacity	89.7%
Charge Size	97.0%

GWP: 601
Temperature: Medium
Flammable: No
Toxic: Low Toxicity
ASHRAE Classification: A1

Common Application
Commercial
Cold Rooms



R455A | long term
option **R404A**



**Lower Global
Warming Potential
than the current
R404A**

R455A properties vs. R404A

	Low	Medium
COP cool	108.20%	106.70%
Compressor power (kW)	92.20%	96.00%
Mass flow (kg/h)	73.60%	76.40%
Discharge (C)	122.60%	117.60%
COP heat	104.60%	104.60%
Refrigeration capacity	99.70%	102.40%
Charge size	102.40%	103.20%

GWP: 145

Temperature: Low and medium

Flammable: Yes

Toxic: Low Toxicity

ASHRAE Classification: A2L

Common Application

Commercial/Industrial
Refrigeration

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or find out more at actrol.com.au/brands/prime

How to choose

These options will replace **R404A**

What is the application	A1 Commercial/Light Industrial		
Temperature application	Low		Medium
Is additional compressor cooling available ?	No	Yes	No
Is the equipment A1 rated ?	Yes	Yes	Yes
Recommended alternative refrigerant	R452A	R448A	R448A

What is the application	A1 Transport		
Temperature application	Low	Dual Temp	Medium
Is the equipment A1 rated ?	Yes	Yes	Yes
Recommended alternative refrigerant	R452A	R452A	R448A

What is the application	A2L Commercial/Light Industrial		
Temperature application	Low	Medium	
Does the charge fall within the AS5149 application charge limit	Yes	Yes	Yes
Is an ARC licence required ?	Yes	Yes	Yes
Recommended alternative refrigerant	R455A	R455A	R454C**

** Limited availability

These options will replace **R134a**

What is the application	A1 Commercial/Light Industrial	
Temperature application	Medium/High Temperature	
Are you using existing R134a equipment	Yes	No
Is the equipment A1 rated ?	Yes	Yes
Recommended alternative refrigerant	R513A	R450A/R513A

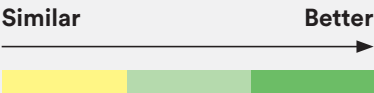
What is the application	<150 GWP Large Commercial/ Industrial	
Temperature application	Medium /High Temperature	
Safety Classification	A2L	A1
Is an ARC licence required ?	No	Yes
Recommended alternative refrigerant	R1234ze^	R471A^

^ Availability of refrigerant and equipment is limited at this time

Comparison chart for HFC and HFO replacement refrigerants

Current Refrigerant	Type	ASHRAE No	Brand name	GWP (AR4)*	Glide	Flammable	Oil	Refrigeration Capacity	Charge size	COP cool
R22	HCFC	R22	R22	1810	0.0	No (A1)	MO and POE	100.0%	100.0%	100.0%
	HFC	R407C	R407C	1774	7.2	No (A1)	POE	94.8%	93.7%	96.6%
	HFC	R427A	Forane 427A	2138	4.0	No (A1)	POE	90.5%	92.9%	96.0%
	HFC	R438A	MO99	2264	3.6	No (A1)	MO* and POE	86.9%	94.1%	94.6%
	HFC	R422D	Genetron 422D Isceon MO29	2729	2.3	No (A1)	MO* and POE	85.0%	92.7%	89.8%
	HFO/HFC	R448A	Solstice N40	1386	5.6	No (A1)	POE	104.7%	92.0%	93.7%
R134a	HFO/HFC	R134a	R134a	1430	0.0	No (A1)	POE	100.0%	100.0%	100.0%
	HFO/HFC	R450A	Solstice N13	601	0.6	No (A1)	POE	89.7%	97.0%	99.2%
	HFO/HFC	R513A	Opteon XP10	629	0.0	No (A1)	POE	107.6%	94.2%	95.5%
	HFO	R1234yf	Solstice yf Opteon YF	<1	0.0	Low (A2L)	POE	94.0%	90.0%	94.6%
	HFO	R1234ze	Solstice ze	<1	0.0	Low (A2L)	POE	73.5%	97.2%	99.6%
R404A	HFC	R404A	R404A	3922	0.9	No (A1)	POE	100.0%	100.0%	100.0%
	HFC	R407F	Performax LT	1825	4.3	No (A1)	POE	101.5%	108.3%	109.2%
	HFO/HFC	R448A	Solstice N40	1386	6.0	No (A1)	POE	102.6%	106.8%	107.5%
	HFO/HFC	R449A	Opteon XP40	1396	5.5	No (A1)	POE	101.7%	107.4%	107.3%
	HFO/HFC	R452A	Opteon XP44	2139	1.8	No (A1)	POE	103.0%	108.9%	100.4%
	HFO/HFC	R455A	Solstice L40	145	8.2	Low (A2L)	POE	96.9%	94.7%	111.0%

Table shows % comparison of various attributes to refrigerant it is replacing.



Note: % above 100% is generally regarded as a better result for COP, Mass flow, and Refrigeration capacity.

% below 100% is a generally regarded as a better result for Compressor power, Discharge temp, and Charge size.

GWP based on AR4. Import of HFCs in Australia is limited by a quota system relative to the GWP of the imported refrigerants. Higher GWP refrigerants reduce total available quota volume so are likely to be higher priced.

*Mineral oil is only suitable for some applications. Oil changes are sometime quoted as “not required” but well maintained systems are likely to perform better and with longer life if POE is used. If mineral oil is used and the oil level is falling, top up with POE.

Compressor Power [kW]	Mass Flow [m3/h]	Discharge Temperature [°C]	COP heat	Retrofit?	Additional notes
100.0%	100.0%	100.0%	100.0%		
103.5%	105.4%	89.2%	97.4%	Suitable for retrofit	Higher glide and must have oil change. System flush required
104.2%	110.5%	85.4%	96.9%	Suitable for retrofit	Closest match to R22 with low discharge temperatures and lowest GWP. Oil change recommended
105.7%	115.1%	80.3%	95.8%	Suitable for retrofit	Higher GWP, low discharge temperature but lower capacity. Oil Change recommended. Not compatible with R22 Elastomeric seals.
111.3%	117.7%	74.7%	92.1%	Suitable for retrofit	High GWP with lower COPs and capacity. Manufacturer claims no oil change required.
111.7%	113.1%	89.5%	95.8%	Suitable for retrofit	Oil change needed, recommend to change O ring/seal

100.0%	100.0%	100.0%	100.0%		
100.9%	111.4%	92.4%	99.4%	Suitable for retrofit	
104.8%	93.0%	88.7%	96.6%	Suitable for retrofit	Closest match to R134a, little to no TX valve adjustment and slight capacity gain
105.7%	106.4%	81.9%	96.0%	New equipment only	Automotive A/C
100.5%	136.0%	87.7%	99.7%	New equipment only	A/C and refrigeration

100.0%	100.0%	100.0%	100.0%		
91.6%	98.5%	138.3%	105.8%	Suitable for retrofit	High GWP and very high discharge temperature.
93.1%	97.5%	125.0%	104.7%	Suitable for retrofit	Lower GWP. Improved COP but high discharge temperatures
93.2%	98.3%	123.1%	104.6%	Suitable for retrofit	Lower GWP. Improved COP but high discharge temperatures
99.6%	97.1%	100.4%	100.3%	Suitable for retrofit	Preferred option for low temperature transport refrigeration.
90.1%	103.2%	117.4%	106.9%	New equipment only	

The data in these charts was derived using CYCLE_D (NIST) software.

Parameters used:

R134A SST=-5, SCT=45, SC=3

R404A SST=-25, SCT=40, SC=3

R22 SST=7, SCT=50, SC=3

R410A SST=7, SCT=50, SC=3

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The power/capacity figures don't take into account any changes in heat exchanger performance for retrofit options.



Leading the way in the refrigerant industry.



Disclaimer: GWP based on AR4. Import of HFCs in Australia is limited by a quota system relative to the GWP of the imported refrigerants. Higher GWP refrigerants reduce total available quota volume so are likely to be higher priced. *Mineral oil is only suitable for some applications. Oil changes are sometime quoted as "not required" but well-maintained systems are likely to perform better and with longer life if POE is used. The data in these charts was derived using CYCLE_D (NIST) software. Parameters used: Medium Temperature SST=-5, SCT=45, SC=3. Low Temperature SST=-25, SCT=40, SC=3.