



total gas management system

R22 Service and Retrofit Alternatives

HCFC Phase Out

HCFCs are being phased out globally under the Montreal Protocol on Substances that Deplete the Ozone Layer. The import, export and manufacture of Hydrochlorofluorocarbons (HCFC) has been controlled under *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* (the Act) since 1996.

The most prevalent of the HCFCs is R22, which is commonly used in small and packaged air conditioning equipment. R22 has a large installed base in the Australian market, hence there is a significant amount of serviceable equipment in operation today. It is important to remember that this equipment may have many years of service remaining.

The HCFC phase-out will affect the installed base of equipment using R22. The limitations to R22 supply will cause product to be more expensive.

Beyond this, Australia has adopted a gradual phase-out of HFCs. The level of permitted imports will decrease based on a predetermined quota set by the Federal Government every 2 years until 2036.

What are your options?

1. Continue to operate existing systems, and risk supply issues.
2. Establish a plan to replace/repair leaking equipment: Repair all leaks, continue to use R22 for service work – with some risk of supply issues.
3. Recover and reuse refrigerant, from equipment that is discarded, to service other equipment.
4. Retrofit existing equipment to use an alternative refrigerant.
5. Buy a new system that uses an alternative refrigerant.

What are the R22 replacement options?

There are a number of ASHRAE designated products that can be considered for R22 retrofits. Kirby recommends that you refer to the retrofit guidelines of specific refrigerants and manufacturer's data relative to the refrigerants / fluids and specific application before carrying out any retrofit.

Tips for considering replacement options:

1. No two refrigerants behave in the same way, as there will be performance differences. The term 'drop-in' is often loosely used. All replacement retrofits still require consideration for; changing filter driers and seals, setting superheat, recovering the original refrigerant, oil change, etc.
2. All R22 retrofits are blends based on two or more of the four basic HFCs; R32, R125, R134a, R143a. If you are disappointed by a particular retrofit, odds are similar products will not fare much better. Be sure to resolve any existing system problems before carrying out a refrigerant retrofit.
3. All retrofit blends should be charged as liquid. High glide blends boil and condense at varying temperatures for a given pressure. High glide blends are not recommended for flooded evaporator retrofits.
4. HFCs do not expand elastomers the same way as R22, which can create 'induced' leaks. As a minimum replace all Schrader valve caps/cores and other critical seals before the retrofit.
5. Most R22 replacements blends are primarily HFCs that use POE oils, and immiscible with mineral oil (MO) or alkylbenzene (AB). The use of POE is recommended for all 400 series refrigerants, additives within these blends to aid miscibility of MO and AB oils, but should not be relied upon for use in systems with over 5kg refrigerant charge or where scroll compressors are used.
6. Changing from R22 to an alternative "drop-in" will require diligent maintenance with the first period of operation, ensuring all filters, driers & strainers are replaced and oil returns are checked. The 400 series refrigerants have a higher mass flow. This tends to flush out any loose material that may have previously "hung up" in the system, hence the requirement to change to POE and heightened initial maintenance. A subsequent maintenance check is recommended within a month of the retrofit.
7. Retrofits with similar mass flow rates typically do not require TXV replacement, however adjustments are required and an assessment of other system components is still recommended.
8. Use of any 400-series retrofit blend is not recommended in systems with flooded evaporators.
9. Where a new compressor is being installed, the compressor manufacturer's data should be referenced to identify approved refrigerants and applications. This would also be the optimum time to change a system over to POE oil.

Kirby stock the recommended R22 replacement refrigerants overleaf. Should you require other replacement products for a particular application, contact your nearest Kirby branch or Account Manager on **13 23 50**.

QUICK SELECTION GUIDE - R22 REPLACEMENTS

HFC	Application	Where Suitable	Performance Advantage/Issue	Retrofit Advantage/Issue	Glide	GWP (ARS)
R422D Genetron®	Unitary Air Conditioning Chillers without flooded heat exchangers Commercial refrigeration (Low – Med temp)	<ul style="list-style-type: none"> • “Drop in” option in air conditioning systems that do not have a liquid receiver • Supermarket display cases • Ice machines • Food preservation and processing • Direct expansion evaporators 	<ul style="list-style-type: none"> • Can replace R22 in many cases without having to change compressor lubricant. In most cases can be used with existing R22 thermostatic expansion valves. Larger valves may be needed in cases where R-22 valve is near its maximum capacity • Lower discharge temperature than R22 which may extend compressor longevity • Non-ozone depleting HFC refrigerant • Allows for use in existing equipment 	<ul style="list-style-type: none"> • May be used with alkyl benzene (AB), mineral oil (MO), and polyolester (POE) lubricants. If inadequate oil return is observed for AB or MO, addition of POE is needed. • Refer to detailed retrofit guidelines regarding air conditioning and refrigeration options prior to installation. https://www.honeywell-refrigerants.com/americas/applications/r-22-retrofit-solutions/#retrofit_guidelines 	2.3K	2230
R438A ISCEON® (MO99™)	Refrigeration Air Conditioning	<ul style="list-style-type: none"> • Small systems (retrofit at service). • Direct Expansion (DX) systems in residential and commercial air conditioning. • Direct expansion chillers. • Medium temperature refrigeration. • Not recommended for use in centrifugal compressor systems or for chillers with flooded evaporators. 	<ul style="list-style-type: none"> • Cooling capacity and energy efficiency depend greatly on system design, operating conditions and the actual condition of the equipment. MO99™ provides similar cooling capacity and energy efficiency to R22 in most systems. Actual performance depends on system design and operating conditions. 	<ul style="list-style-type: none"> • MO, AB, POE oil compatible. • No valve or pipe size change. • Minimal set point adjustments. Drier should be changed to a solid core type. • Can be topped off charge during service. • Works well in systems designed with fixed expansion devices such as capillary tubes, pistons, or other fixed orifices; in most cases, a change in expansion device is not required. • Scroll and large hermetic compressors may require a change to POE. Refer to manufacturer’s guidelines for details. 	4K	2059
R407C	Air Conditioning (Med-High temp)	<ul style="list-style-type: none"> • Small systems. • Large systems (planned retrofit). • Positive displacement equipment: new or existing residential and commercial air-conditioners. 	<ul style="list-style-type: none"> • Best capacity and efficiency match to R22 for application range. 	<ul style="list-style-type: none"> • A change to POE lubricant required. Some residue mineral oil is acceptable but should be around 5% wt. or less of the total lubricant used in the system. • No valve change required. • Can be topped up. 	7.2K	1774
R448A	Refrigeration (Low-Med temp)	<ul style="list-style-type: none"> • Supermarket applications. • Food processing. • Cold storage. 	<ul style="list-style-type: none"> • Improved capacity and energy efficiency over R22 and R404A. • Lower discharge temperatures. • Lower GWP. 	<ul style="list-style-type: none"> • POE oil. • No valve required. • Adjust superheat. • Consider electronic expansion device. 	3.5K	1273
R407F	Refrigeration (Low-Med temp)	<ul style="list-style-type: none"> • Small systems. • Large systems (planned retrofit). • Supermarket freezer cases, display cases, coolers, transport refrigeration, ice machines. 	<ul style="list-style-type: none"> • Minor capacity and efficiency drop, depending on application. • Lower discharge temperature than R22. 	<ul style="list-style-type: none"> • POE oil. • No valve changes in most instances. • Adjust superheat. • Manage discharge temperatures. • Consider electronic expansion valve. 	approx 4K	1670

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