

Making our world more productive



R438A – ISCEON[®] M099.

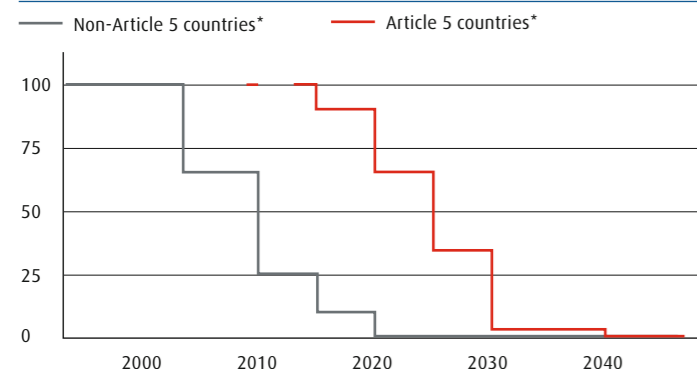
Zero ozone depletion potential
replacement for R22.



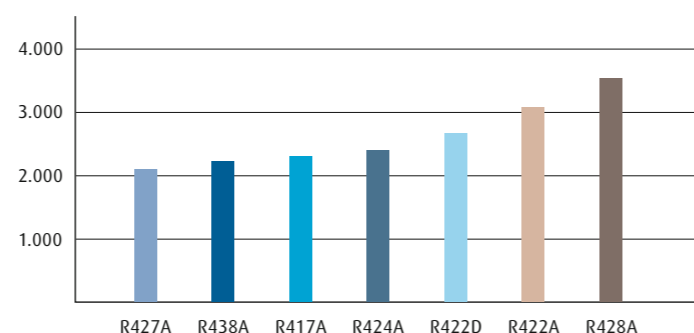
R438A – ISCEON® M099.

Zero-ODP replacement for R22.

HCFC phase-down schedule (in %)



GWP of some common R22 replacement gases



The environmental challenge

For over twenty years, the hydrochlorofluorocarbon (HCFC) R22 has been an extremely useful refrigerant gas across a wide range of air conditioning and refrigeration applications.

Like all HCFCs, however, R22 has been shown to deplete the ozone layer and is being phased out globally under the Montreal Protocol. At the same time, refrigeration solutions offering improved environmental performance are rapidly moving up the corporate sustainability agenda. These developments are fuelling demand for retrofit refrigerant gas solutions suited to existing R22 refrigeration and air conditioning equipment. The aim is to provide satisfactory cooling performance with zero ozone depletion potential (ODP) and lower global warming potential (GWP).

The zero-ODP solution

Developed by DuPont™, R438A (ISCEON® M099) is the ideal retrofit solution for many existing R22 systems across a wide range of applications, including low- and medium-temperature refrigeration equipment and air conditioning systems. R438A is a zero-ODP hydrofluorocarbon blend. Containing less than 3% hydrocarbons, it ensures compatibility with mineral oils while eliminating the risk of flammability. This blend has been shown to be as efficient as R22, thus combining environmental gains with similar energy costs. A relatively straightforward retrofit process adds to the appeal of this solution.

	R22	R438A
Gas type	HCFC	HFC blend (Blend of HFCs R32, R125 & R134a with HCs R600a and R601a)
Preferred oil	Mineral (MO) or alkylbenzene (AB)	Mineral (MO), alkylbenzene (AB) or polyolester (POE)
ASHRAE safety classification	A1 – non-toxic & non-flammable	A1 – non-toxic & non-flammable
Boiling point @ 1atm	-41°C	-42°C
Critical temperature	96°C	85°C
Critical pressure	50 bar(a)	43 bar(a)
Ozone depletion potential (ODP)	0.055	0
Global warming potential (GWP)	1810	2265

* As defined by the Montreal Protocol Article 5 are developing countries, non-Article 5 are developed countries.



Benefits at a glance

Broad application spectrum

- Low- and medium-temperature commercial refrigeration equipment
- Commercial and domestic air conditioning systems
- Heat pumps

Lower environmental impact

- Zero ozone depletion potential
- Non-toxic and non-flammable
- Lower GWP than other R22 replacements

Easy, fast retrofit process

- No need to replace expensive equipment during the retrofit process
- No oil change necessary in many applications - compatible with MO, AB and POE oils

Impressive performance

- Cooling capacity, coefficient of performance and operating pressure similar to R22
- Power consumption similar to R22
- Lower discharge temperatures, extending equipment life

Retrofit made easy

Linde does not recommend mixing R438A and R22. Therefore the entire original R22 charge should be recovered without releasing any gas to the atmosphere. We also strongly recommend that you overhaul your refrigeration system – filter drier and seals included – during the retrofit operation.

As R438A is compatible with traditional MO and AB, plus newer POE oils, the oil does not generally need to be changed. In systems where oil return is a concern, POE oil may need to be added.

Add R438A, with an initial charge of 85% of the original weight. This can be topped up to approximately 95% as needed.

R438A (like other gases such as R407C) is a zeotrope. Therefore it must be charged in the liquid phase to prevent fractionation. R438A does have a moderate glide of approximately 4°C. This can normally be managed by a minor adjustment to the expansion device. R438A is generally not suitable for systems with centrifugal compressors or flooded evaporators.

Trusted partner

The Gases Division of Linde plc is one of the largest and most global distributors of refrigerants. For more than 40 years, we have been a trusted partner of refrigeration and air conditioning companies around the world. We operate throughout Europe, Africa, Asia-Pacific and the Americas. Linde is the leading industrial gas company in Northern Europe.

Our broad product range spans both traditional fluorocarbon and natural refrigerants in a wide range of packages. R438A is commonly available in cylinders and drum tanks. For larger volumes, it is also available in bulk ISO containers in some markets. Our high-quality operations and vast distribution networks ensure the quality and availability of our products. We also offer a range of complementary services, including technical support, legislative compliance assistance and environmental audits.

Getting ahead through innovation.

With its innovative concepts, Linde is playing a pioneering role in the global market. As a technology leader, our task is to constantly raise the bar. Traditionally driven by entrepreneurship, we are working steadily on new high-quality products and innovative processes.

Linde offers more. We create added value, clearly discernible competitive advantages and greater profitability. Each concept is tailored specifically to meet our customers' requirements – offering standardized as well as customised solutions. This applies to all industries and all companies regardless of their size.

Linde – Making our world more productive.