

**Topic**

Cool in the Face of Challenge – Legislation and Refrigerant Choices

**Author**

Rob Lamb  
Group Sales and Marketing Director



## Considerations for plant owners and operators in making refrigerant choices and meeting legislation

*Rob Lamb talks about the considerations plant owners and operators face in terms of refrigerant choices and legislation*

Given the restrictions placed on F gas production under the European F- gas regulations, the recent response from one of the major manufacturers to phase out production of R507 and R404a sooner rather than later was inevitable. The much restrictive quotas, measured in terms of carbon equivalent rather than kg, require a 37% cut in CO2e in 2018, 55% by 2021 and 79% by 2030. The manufacturers have no option other than to produce the refrigerants that allow them to use their quota most sensibly, or significantly raise the price of the high GWP refrigerants, which has been occurring with alarming regularity. HFCs R507 and R404a with their high GWP's are no longer viable in an environmental or a commercial sense.

Recent research and development has focussed on the fluorinated propene isomers, HFOs, which have a particular place in the market but too have their challenges. The refrigeration industry has reacted to several refrigerant genre phase outs already and with a diminishing life cycle for each generation of refrigerants: the CFCs lasted 50 years, HCFCs 40 years, HFCs 20 years. The question this raises is, are the next generation, the HFOs, on this downward life cycle trajectory, or do they offer a long term solution?

It also needs to be emphasised that these refrigerants cannot be applied in the same way that most HFCs have been, as they are potentially flammable, sharing the same 2L classification as ammonia. This means that, in the same way as ammonia, HFOs need to meet the requirements of a range of regulations and standards, such as The Dangerous Substances & Explosive Atmosphere Regulations (DSEAR), BSEN378-2016, covering the safety & environmental requirements and BSEN60079, covering classification of areas for explosive atmospheres. Of concern is the situation where product information for various large air cooled packaged chillers running on HFOs omit any mention of the flammability or of the risk assessments required to comply with legal requirements.

The options for alternative synthetic refrigerants are near exhaustion. Although HFOs can meet some of the requirements they are not the rounded option. They are expensive, potentially flammable and arguably their long term stability has yet to be proven. To mitigate the flammability and improve their suitability, mixes with HFCs have been developed, the lower the fluorine content the greater the flammability but the lower the GWP. This has resulted in what seems like infinite possibilities of not totally satisfactory refrigerants. This uncertainty means that owners and operators of refrigeration plant face a challenging choice in refrigerant selection when converting plant or for new plant.

Star Refrigeration has long been an advocate for the use of natural refrigerants such as Ammonia

### Refrigerant Overview

Criteria	HFC/HFO blends	HFO	CO2	R717	HC
Low GWP	Yellow	Green	Green	Green	Green
Flammability	Yellow	Yellow	Green	Yellow	Red
Toxicity	Yellow	Yellow	Green	Red	Green
Materials of Construction	Yellow	Yellow	Yellow	Yellow	Yellow
Refrigerant Cost	Red	Red	Green	Green	Yellow
Retrofit Cost	Yellow	Red	N/A	N/A	N/A
New Installation Cost	Yellow	Yellow	Yellow	Yellow	Yellow
Longevity	Yellow	Green	Green	Green	Green

and CO2. Ammonia is an exceptionally efficient refrigerant with zero GWP and has been used as a refrigerant for over 100 years. It is inexpensive, has long term availability and has maintained a constant presence whilst the alternatives have been phased out due to firstly ODP and now GWP. Its challenges are well understood, and with robust and long developed standards / guidelines its use has increased for a wide range of applications. CO2 too is on an exponential growth path, in terms of use, providing a highly efficient and safe working fluid, again across a wide range of applications. For new installations, particularly in the industrial field, these are undoubtedly the refrigerants of choice.

The selection of refrigerant for system conversions is more complicated. Many factors need to be accounted for in the process – capacity reduction, operating pressures, temperature glide, relief valve setting to name but a few. We are currently working on tailor made action plans for all of our R404A and R507 customers in light of the impending phase outs.

**Published on FMCG News in November 2017**

For further information, contact [rlamb@star-ref.co.uk](mailto:rlamb@star-ref.co.uk)

**This article has been certified for Continuing Professional Development (CPD) by CIBSE and The CPD Certification Service. To get your CPD Certificate please email your request to [CPDCertificate@star-ref.co.uk](mailto:CPDCertificate@star-ref.co.uk)**

## Star Refrigeration

Thornliebank Industrial Estate, Nitshill  
Rd, Thornliebank,  
Glasgow G46 8JW

Tel: 0141 638 7916 [star@star-ref.co.uk](mailto:star@star-ref.co.uk)

@StarRefrig

[www.star-ref.co.uk](http://www.star-ref.co.uk)



## The Star Refrigeration Group

