

Star CO₂ Solutions

Sustainable natural refrigeration systems





Why CO₂?

Carbon dioxide (CO₂) refrigeration systems offer a number of benefits

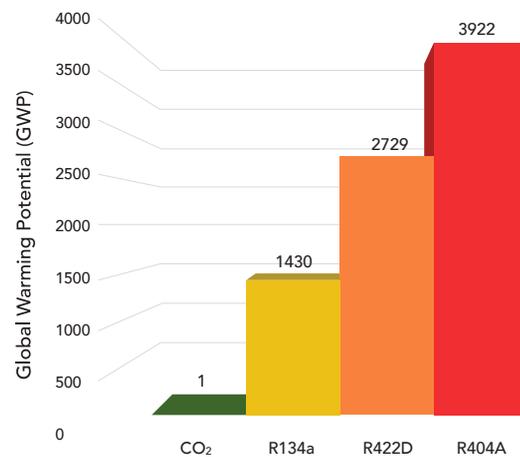
Key Benefits of CO₂ systems

Sustainability

CO₂ is a naturally occurring substance which is found in abundance throughout our environment; it is in the air that we breathe and the beverages that we drink.

CO₂ has a global warming potential (GWP) of just one, thousands of times lower than many traditional synthetic refrigerants.

Furthermore, with an Ozone Depletion Potential (ODP) of zero, CO₂ has no effect on the ozone layer, making it a sustainable and environmentally sound refrigerant choice.



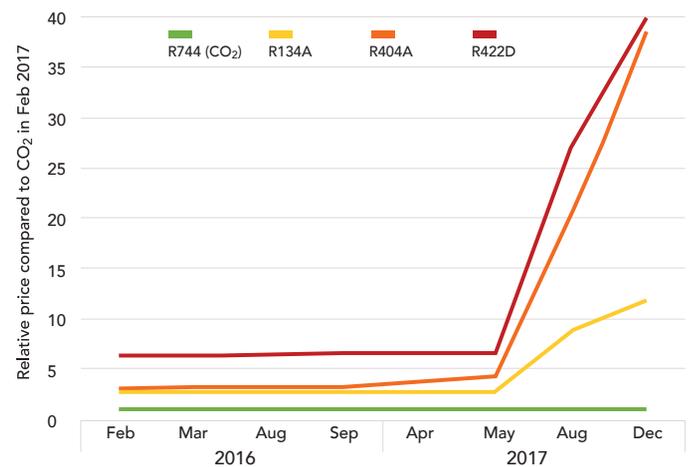
Refrigerant GWP Comparison

Future Proofing

Increasingly stringent environmental legislation sees operators of refrigeration systems under increasing pressure to reduce or eliminate their use of traditional, high-GWP refrigerants.

This is highlighted by the revised EU F-Gas Regulation (517/2014), which will see the availability of HFCs reduced by 79% between the years of 2015 and 2030, whilst simultaneously introducing step-wise bans on the installation and servicing of systems using higher-GWP refrigerants.

In addition, the Kigali Amendment to the Montreal Protocol, agreed in 2016, saw 197 countries across the globe commit to cutting the production and consumption of HFCs by more than 80 percent by the year 2047. The continued use of HFC systems is consequently becoming both less feasible and more expensive over time; as evidenced by the adjacent refrigerant price evolution chart.



F-Gas Price Evolution 2016 - 2017

As a low-GWP natural refrigerant, CO₂ is unaffected by HFC restrictions; thereby representing a reliable, long term and future-proof solution in which businesses can invest with confidence.



Key Benefits of CO₂ systems

Safety

CO₂ has an A1 safety rating (BS EN378-1: 2016), being classified as non-flammable with low toxicity. As a result, CO₂ systems are straightforward to implement, with fewer safety stipulations than systems using toxic or flammable refrigerants.



CO₂ operates at higher pressures than traditional refrigerants; a factor which should be considered when designing the system.

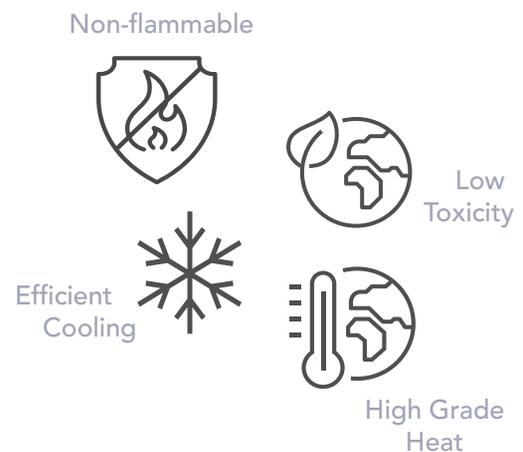
It is interesting to note however that the higher pressures associated with CO₂ also result in smaller compressors and system components.

Performance

In addition to favourable environmental and safety qualities, CO₂ systems also offer attractive energy performance.

CO₂ is very effective at transferring heat, allowing higher evaporating temperatures than many traditional refrigerants. It is also relatively insensitive to pipe work pressure drops, resulting in higher suction pressures and improved efficiency.

Mild climates such as the United Kingdom are ideal for air cooled transcritical CO₂ systems, allowing them to function in their most efficient operating mode for large portions of the year.



Star Refrigeration's CO₂ systems are designed to ensure optimal performance for your specific application. Star offers a number of features to further enhance the performance of its CO₂ systems, including its optimised Low Pressure Receiver (LPR) design for semi-flooded evaporator operation.



CO₂ systems also operate at higher discharge temperatures than traditional refrigerants. By recovering waste heat that would otherwise be rejected to atmosphere, CO₂ systems offer a source of high grade heat for use elsewhere on your premises, facilitating the reduction or elimination of other conventional heat sources.

Star Market Sectors

With over 25 years of CO₂ experience, Star Refrigeration has an unrivalled track record of providing turnkey CO₂ solutions. With in-house design, project management, M&E and aftercare capabilities, Star delivers total project solutions for end users.



As a business, Star work closely with a broad range of industry sectors, including:

| | |
|--|---|
| Food Manufacturing  | Temperature Controlled Storage & Distribution  |
| Freezing & Chilling  | Dairy  |
| Brewing & Distilling  | HVAC  |
| Leisure & Ice  | Data Centres  |
| Pharmaceutical & Process  | Petrochemical & Nuclear  |

Star CO₂ Solutions



Star Refrigeration provides robust, engineered industrial solutions that are built to last. The expected life span of Star-built products is over 20 years, with some Star plants still running after almost 40 years.

Star offers a variety of standard and bespoke packaged CO₂ products, including its in-house Envichill, Envicold and Envifreeze ranges, manufactured in Glasgow, UK. Examples of Star-built CO₂ systems are shown below. As an independent company, Star also has the ability to objectively compare outsourced units and components from across the entire marketplace, selecting only those which are best suited to your specific application.

Our range of CO₂ solutions includes:

Envifreeze

Two stage transcritical plant for food production and temperature controlled storage applications



Envichill Envicold

Single stage transcritical plant for temperature controlled storage applications

Envichiller

Single stage transcritical plant for chiller applications



Total Solutions Provider

Founded in 1970, Star Refrigeration is the UK's largest independent industrial refrigeration engineering company, specialising in the provision of high quality natural refrigeration and heating solutions.

As a turnkey provider, Star work in partnership with customers throughout the project life cycle; from initial design through to commissioning and maintenance.

With over 300 employees across the UK, Star delivers award winning, first class installations and unbeatable aftercare; helping end users to reduce energy consumption, increase efficiency and drive down lifecycle operating costs.

Star Refrigeration is the parent company to six other business units:



Star Technical Solutions (STS) is the technical advisory service of the Star Refrigeration Group. Operating as an independent consultancy, STS provides technical advice to clients on a wide range of refrigeration engineering issues.



Starfrost specialises in the design, manufacture, installation and aftercare of industrial freezing and chilling equipment, delivering innovative IQF & Spiral systems for the global food processing industry.



Star Renewable Energy provides the design and manufacture of bespoke air and water source heat pumps, a natural alternative to traditional methods of heating for medium to large capacity applications.



Star Learning Solutions provides practical and online training for the Continuing Professional Development (CPD) of refrigeration, air conditioning and heat pump professionals world-wide.



Star M&E Solutions offers a unique blend of mechanical and electrical expertise across a wide range of markets, both public and private sector.



Azane is a world-leading manufacturer of low-charge ammonia refrigeration solutions.

UK Branch Network

Aberdeen

Unit 5 Wellheads Crescent, Wellheads Industrial Estate
Dyce, Aberdeen, AB21 7GA
Telephone: 01224 723301 Email: star.aberdeen@star-ref.co.uk

Bellshill

4 Murray Place, Righead Industrial Estate
Bellshill, ML4 3LP
Telephone: 01698 841535 Email: star.bellshill@star-ref.co.uk

Manchester

Unit C6, Brookside Business Park, Greengate
Middleton, Manchester, M24 1GS
Telephone: 0161 655 0240 Email: star.manchester@star-ref.co.uk

Newcastle

15 Tower Road, Glover Industrial Estate
Washington, Tyne & Wear NE37 2SH
Telephone: 0191 415 7755 Email: star.newcastle@star-ref.co.uk

Leeds

Astley Lane Industrial Estate, Swillington
Leeds, LS26 8XT
Telephone: 01132 320000 Email: star.leeds@star-ref.co.uk

Bristol

Unit 11, Gordano 19, Garonor Way, Portbury
Bristol, BS20 7XE
Telephone: 01275 375600 Email: star.bristol@star-ref.co.uk

Derby

Wincanton Close, Ascot Drive
Derby, DE24 8NB
Telephone: 01332 756041 Email: star.derby@star-ref.co.uk

Oxford

13A Couching Street, Watlington
Oxfordshire, OX49 5QF
Telephone: 01491 614161 Email: star.oxford@star-ref.co.uk

London

Unit 8, Imperial Business Estate,
Gravesend, DA11 0DL
Telephone: 01474 568221 Email: star.london@star-ref.co.uk

Starfrost Lowestoft

Craftsman's Way
Lowestoft NR32 3FB
Telephone: 01502 562206 Email: sales@starfrost.com



Star Refrigeration's network of offices across the UK provide services including maintenance, service, spares, new equipment/installations, retrofits and consultancy. We specialise in industrial refrigeration including temperature controlled storage & distribution, food production, beverage, process, pharmaceutical, petrochemical, leisure & ice, data centres and HVAC. Contact your local office for more details.

Glasgow Head Office

Thornliebank Industrial Estate
Glasgow, G46 8JW

Tel: 0141 638 7916
Email: star@star-ref.co.uk

www.star-ref.co.uk  @StarRefrig

Contact us today for full details +44 141 638 7916