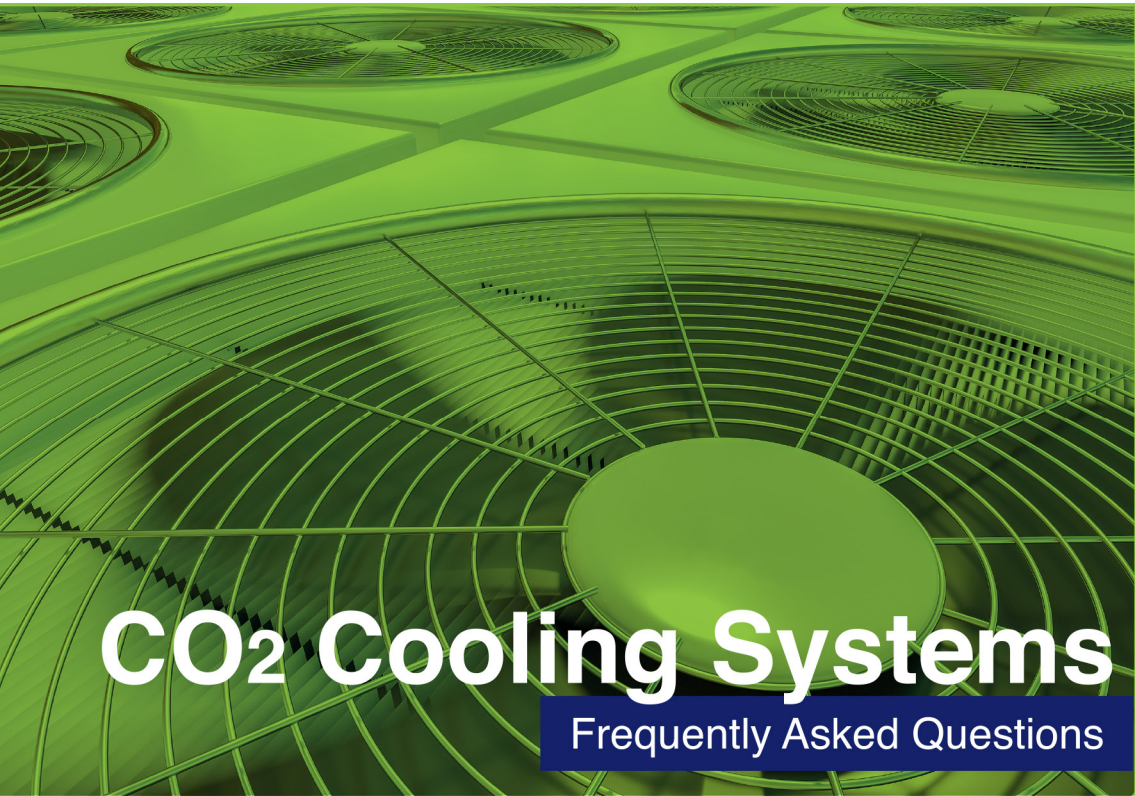
ddcooling

air conditioning | refrigeration | cold stores | co_2 refrigeration



CO_2 Cooling Systems

Frequently Asked Questions

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1. What is R744?

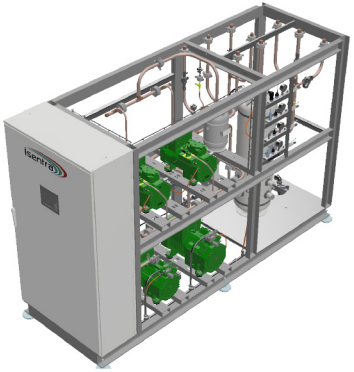
R744 is the chemical reference for carbon dioxide (CO_2) used as refrigerant. It is a naturally occurring substance that can be applied as a working fluid in different heating and cooling applications, due to its excellent heat transfer properties and its high volumetric cooling capacity.

2. What are the main characteristics of R744?

R744 is:
Non-toxic
Non-flammable
Non-ozone depleting
Environmentally friendly, with a Global Warming Potential = 1

3. Why is R744 environmentally friendly?

Applying R744 in vapour compression applications significantly reduces the amount of Greenhouse Gas (GHG) emissions released into the atmosphere, which is at the origin of climate change. Besides, R744 systems, many applications have the potential to be more efficient than current systems in most climate conditions, and therefore indirect emissions of GHG resulting from energy consumption are also reduced.



Frequently Asked Questions

4. Is R744 flammable?

No, R744 is not flammable and presents no risks in case of interaction with other substances or chemical blends. CO_2 is applied in many fire extinguishers.

5. Is R744 toxic?

R744 is not toxic at moderate concentrations. Given the small system charge used for heating and cooling applications, R744 thus presents minimal health risks.

6. Does R744 have any impact on the Ozone layer?

No, R744 does not contribute in any way to the depletion of the ozone layer.

7. What are natural refrigerants?

The very first refrigeration systems ever built used natural refrigerants such as Ammonia (NH3), Hydrocarbons (HCs) and Carbon Dioxide (CO_2). After the invention of CFC's in 1929, the industry all but forgot these original gases, but the Montreal Protocol in 1987 changed all of that, forcing the large chemical companies to invent the alternative Hydro Fluorocarbon (HFC) gases.

Although HFC's do not directly deplete the ozone layer, they are powerful greenhouse gases. These gases are regulated by the 1997 Kyoto Protocol, and increasing pressure from subsequent regulations and emissions trading systems will force the industry to go back to the same roots that it started from.
However, this time engineers will be far better prepared to deal with the technical challenges of toxicity and flammability posed by these environmentally benign gases, and their public acceptance will inevitably grow as environmental awareness grows.

Frequently Asked Questions

8. Why is CO_2 the refrigerant of choice for the future?

• CO_2 is a naturally occurring gas. It's in the air we breathe and our fizzy drinks, and it's set to replace highly polluting HFC synthetic refrigerants in mainstream cooling systems.

• CO_2 is low cost. CO_2 is widely used in many different industries and in a vast number of applications. Its price has been low and stable for many years and it will remain a highly cost-effective refrigerant.

• CO_2 is a mainstream solution. The food retail industry effectively funded the development of the CO_2 cooling technology to mitigate the impact of the F-Gas Regulation, and CO_2 cooling systems are now tried and trusted by most UK supermarket chains. Now, CO_2 is a mature and frequently used, large-scale refrigeration solution.

• CO_2 is safe. Unlike any other natural refrigerant, Carbon Dioxide is both non-toxic and non-flammable, making it a very safe refrigerant to operate and handle. CO_2 has an 'A1' safety rating and is not subject to the many onerous operator obligations that are in force with Ammonia refrigeration systems.

• CO_2 is a fantastic refrigerant. CO_2 has excellent refrigeration properties and can provide cooling down to -50°C and up to +15°C, an impressive temperature range that can be delivered in high capacity, with great energy efficiency.

• CO_2 is freely available. CO_2 is highly unlikely to be regulated against and is set to remain a mainstream refrigerant.

Frequently Asked Questions

9. What is the F-Gas regulation?

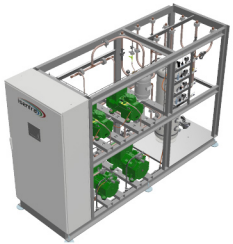
The original F-Gas Regulation was adopted in 2006 to manage and track the use of highly polluting synthetic fluorinated HFC gases. Further changes to the F-Gas legislation were made in 2014, these amendments centre heavily around the aggressive phase down in the supply and use of HFC Refrigerants.

10. What do I need to know about F-Gas?

The F-Gas Regulations are now being aggressively put into force throughout Europe and they are completely forcing a change in refrigeration choice. Carbon Dioxide is the natural choice over HFC refrigerants, such as R404A, R134A. R407 & R448. Carbon Dioxide is a fantastic, natural refrigerant, despite the irony of it being frowned upon in the climate change debate. CO_2 / R744 is actually, 3,821 times less polluting to the environment than the traditional mainstream synthetic HFC R404A.

11. What are the reasons to move away from HFC refrigerants?

- HFC Phase Down is now – there's already been a 79% reduction in HFC use
- Mandatory requirements are being policed now
- Costs are volatile and unpredictable
- HFC refrigerants will stop being freely available
- In new systems, HFC refrigerants will soon be illegal
- Service bans imposed for old HFC refrigerants
- End users must track their HFC usage
- Documented and frequent HFC leak checks



Frequently Asked Questions

12. What is Phase Down?

The quantity of HFC's that can be placed on the EU market will be cut in a series of steps. By 2030, only 20% of the quantity of HFC's that were sold in 2015 will be available. The remaining 20% supply will be for specialist applications and not for mainstream refrigeration use.

13. How has the cost of HFC been affected?

HFC refrigerants have suffered a cost rise in excess of 400% between 2016 and 2020, with these looking set to continue to rise as further quotas are imminent.

14. What is the future for HFC Refrigerants?

As one of the world's largest polluters, synthetic HFC refrigerants are now subject to aggressive phase down legislation, limited availability and higher costs which are forcing end users to choose alternative cooling solutions with a much lower Global Warming Potential (GWP) than HFC gases can provide. Continued capital investment in HFC refrigeration systems is not advisable.

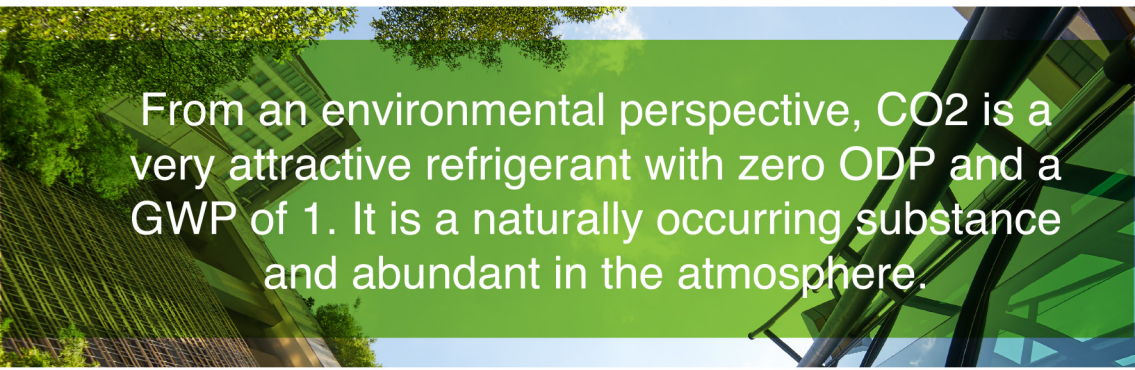
15. How safe is CO_2 in refrigeration?

CO_2 falls into safety group A1 which means it is non-toxic and non-flammable. CO_2 is the only natural refrigerant with an A1 safety rating. Ammonia is B2, i.e. toxic and low flammability, whist Hydrocarbons are A3, i.e. none toxic but highly flammable. The pressures inside a CO_2 systems are higher that HFC systems, but after years of component development, these pressure are now the 'new normal' and perfectly safe.

Frequently Asked Questions

16. For which applications is R744 suitable?

R744 can be applied in most heating and cooling systems such as Mobile Air Conditioning (MAC) in vehicles and buses, vending machines, coolers, commercial cabinets for supermarkets, containers and climate control systems for residences. CO_2 Technology (R744) has also shown to be extremely efficient in heating water.



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