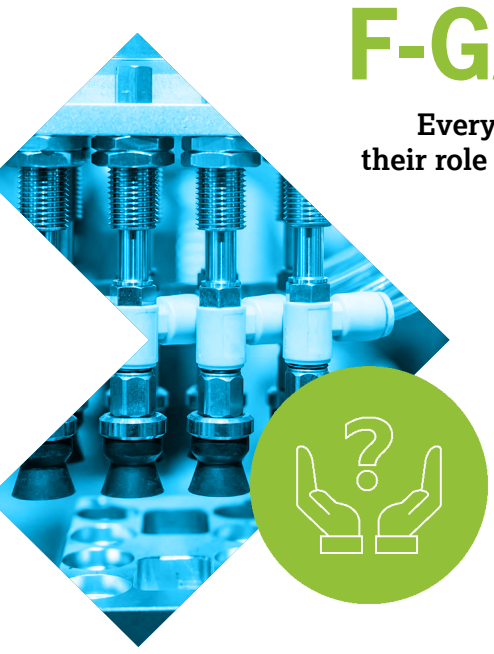
EFCTC

F-GASES EXPLAINED

Everything you need to know about fluorinated gases, their role in decarbonising Europe and how they are regulated



WHAT ARE F-GASES?

Fluorinated gases (F-gases) are a family of man-made gases that play a vital role in modern society.

They are used throughout the cold chain to keep food fresh and safe to eat, in air conditioning units and heat pumps by providing the 'working fluid' of these heating and cooling systems, and as high-performance blowing agents to make insulation foams and fire suppressants. F-gases are also used as propellants in medical devices and other technical aerosol products.

The use of F-gases by manufacturers has increased steadily since the 1990s due to the phase-out of CFCs, which have been banned by the Montreal Protocol to protect the Earth's ozone layer.

WHY ARE F-GASES USED?

Hydrofluorocarbons (HFCs), hydrofluoroolefines (HFOs) and hydrochlorofluoroolefines (HCFOs) are the most widely used F-gases since they are highly energy efficient, and their low levels of toxicity and flammability allow for them to be used effectively in a wide range of applications.

They are gases or low boiling point liquids, and, if unintentionally released, in most cases they break down rapidly and do not persist in the environment.

The so-called natural alternatives have their own challenges and do not have the same balance of properties that F-gases do, limiting their usability. Hydrocarbons pose a risk of flammability, particularly when used in large quantities and in confined spaces. Carbon dioxide (CO_2) is hazardous to human health at high concentrations, it operates at high pressures and is less efficient at high ambient temperatures, while ammonia is highly toxic, resulting in specific requirements for its use.

BENEFITS OF F-GASES

- Some F-gases, and lower global warming potential (GWP) blends of HFCs/HFOs, are becoming the refrigerants of choice in new energy-efficient equipment for many Heating, Ventilation and Air Conditioning and Refrigeration (HVACR) applications.
- HFOs and HCFOs have ultra-low GWPs and negligible contribution to global warming.
- They are widely used as the heat transfer medium in heat pumps, thereby enabling this key application to be a source of renewable energy, necessary to decarbonising heating.
- They offer excellent performance for the widespread adoption of Organic Rankine Cycle (ORC), which generates electrical energy from waste heat sources, geothermal, and hydrothermal reservoirs, and high temperature heat pump systems used for energy recovery from a wide range of waste heat sources, particularly in industry.
- HFCs and HFOs are used across the globe as propellants for lifesaving metered dose inhaler (MDI) medical devices.
- Their good balance of safety properties means they can be recycled locally, by refrigerant engineers and technicians, using readily available equipment for reuse, or sent to reclaim specialists to return them to a high specification.

THE ENVIRONMENTAL IMPACT OF F-GASES

To minimise this potential contribution to global warming, the EU regulates F-gas emissions via two legislative acts:

The F-gas Regulation 517/2014, which aims to contain F-gas emissions by mandating reporting and introducing a quota system to control the quantity of HFCs that can be placed on the EU market. The quota system aims to achieve a 79% reduction of HFCs by 2030 compared to 2015 by driving the transition to lower GWP alternatives, including F-gases. Through the current revision of the F-gas Regulation, the containment provisions are anticipated to be extended to also cover HFOs and HCFOs.

The MAC (Mobile Air Conditioning systems) Directive 2006/40/EC, which prohibits the use of F-gases with a global warming potential of more than 150 times greater than carbon dioxide in new types of cars and vans from 2011, and in all new cars and vans produced from 2017. It covers MACs fitted to passenger cars and light commercial vehicles.

ABOUT EFCTC

The European FluoroCarbons Technical Committee is a Cefic Sector Group that monitors legislation related to HFCs (hydrofluorocarbons), and HFOs (hydrofluoro-olefins) in the EU and at global level.

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THE UNINTENDED SIDE EFFECTS OF THE CURRENT F-GAS REGULATION

The F-gas Regulation has been a success and has resulted in the adoption of lower GWP F-gases, it also improved containment and reduced emissions. However, one of the unintended side-effects of imposing a quota system and reducing HFC availability has been the development of a black market for HFCs in the EU.

Illegal HFC refrigerants are being smuggled into the EU in a variety of ways, impacting many individuals and companies, and undermining the objectives of the F-gas Regulation and the EU's climate goals.