

The European regulation on Fluorinated greenhouse gases

Effective from January 1, 2015, the EU F-gas regulation aims to protect the environment and prevent unwanted effects on climate changes by containing the global average temperature increase.

The European Commission has agreed to pursue this intent by following a precise roadmap: the next goal is to reduce fluorinated greenhouse gases (F-gases) emissions by 79% by 2030, arriving at a 80 -95% reduction by 2050.

What are F-gases?

Fluorinated gases or F-gases (HFCs, PFCs and SF6s) are artificial chemicals used in various sectors: as refrigerant gases for industrial refrigeration, air conditioning and in heat pumps; as blowing agents for foams; as extinguishing agents in fire-fighting systems or also propellants for aerosols and solvents.

F-gases do not contribute to the depletion of the ozone layer, then why limit or ban them? The answer lies in the GWP, the value that indicates the planet Global Warming Potential of these gases.

What is the GWP?

GWP is the acronym for Global Warming Potential and expresses the effect of a gas compared to CO₂.

The GWP is therefore the measure that determines the climate-changing power of greenhouse gases, relating the heating potential of one kilogram of gas to one kilogram of carbon dioxide CO₂, whose reference potential has by definition the value of 1. The GWP value of these gases is usually very high, even up to 23,000 times higher than that of CO₂.

The reduction in the use of F-gases, required by the 2015 European regulation, is accomplished by regulating the quantities of gas in the market through a CO₂ emission quota system. Producers and importers consume a quantity of shares proportional to the product between gas quantity and GWP. In this way, the use of gases with a high GWP value is discouraged.

What does the European regulation entail for the simulated environmental testing sector?

Most of the environmental test chambers that need to reach temperatures below -50°C use a type of F-gas that falls within those called HFCs. These refrigerant gases usually have a GWP value much higher than the imposed limit. In derogation from the regulation, their use is allowed according to quotas, only because there is - or rather, there was - no climate-friendly alternative that meets the thermodynamic and safety requirements needed to replace traditional HFCs.

The use of these gases too, however, will be drastically reduced starting in 2030, making the use of an alternative capable of meeting the stringent objectives imposed by the new F-gas regulation necessary also at legislative level.

The only alternative known to date in the ULT (Ultra Low Temperature) refrigeration sector is based on the use of hydrocarbons as refrigerants. Hydrocarbons are extremely flammable, and although their performance is satisfactory from a thermodynamic perspective, there are significant safety limits connected with their use, even limited to only 150 grams, completely insufficient for medium-large plants.

The new ACS gas R472B

Safe solutions are therefore required, capable of both preserving the environment by minimizing GWP and maintaining the performance of the HFCs that will soon be banned.

Angelantoni Test Technologies, thanks to its deep experience in refrigeration technologies and to the continuous research activity in collaboration with Universities, Research Centers and Accreditation Centers, is proud to present R472B, its new refrigerant gas optimized by ACS R&D Department for the most widespread use and the majority of environmental test standards used by worldwide testing laboratories.

R472B has already obtained ASHRAE certification.

Advantages of the new R472B refrigerant gas

- **APPLICATIONS.** R472B has been developed for the most common needs of Test Laboratories, allowing most of suitable environmental test chambers to reach -70°C without significant refrigerant plant modifications.
- **GWP.** R472B has a GWP that is about 96% lower than other gases used for ULT applications, such as R23 and 508b. Putting it in numbers: 14800 for R23, compared to 526 for our R472B.
- **SAFETY.** The ACS gas is non-flammable and non-toxic, and it is safe even in the event of escapes. R472B also passed the WCF (Worst Case Fractionations) and WCF (Worst Case Fractionations for Flammability) tests. This is confirmed by ASHRAE, which has accredited our gas by assigning it the A1 safety class.
- **PERFORMANCE.** R472B allows to reach the following results when operating in the most common temperature range provided by most standards: a better cooling gradient down to -45°C (it is normally lower than R23 below -45°C).
- **RETROFITTING.** Refrigeration plants currently using R23 are 99% compatible with R472B; those machines that are not perfectly compatible can be adapted simply without structural modifications.
- **AVAILABILITY.** The mixture components are easily procurable, so guaranteeing availability on the market and a long lifetime to our R472B.
- **COMPATIBILITY.** The laboratory analyses of the mixture components subjected to endurance test showed that R472B is perfectly compatible with the commercial elements used in cascade refrigeration plants charged with R23 or similar. It is therefore not harmful and does not cause abnormal wears or premature aging.
- **EASY USE AND REFILL.** Miscibility is the property of two or more substances to be mixed together to form a homogeneous solution. Unlike the other available alternatives to R23, R472B is the only gas that makes it possible to use the gas bottle even partially, always ensuring the homogeneity of the mixture both inside the refrigerating plant and in the gas quantity remained in the bottle, being reusable in the future. This is a great advantage for the customer, since he can manage the gas bottles in an extremely easy and safe way, as it is normally the case for other gases commonly used in refrigeration, such as R449A or R452A.
ACS has selected **Nippon Gases**, one of the best gas producers in the world with a strong international presence, for the exclusive production of its ecological gas R472B.



FAQ

1. What is the basic of EU regulation about refrigerants?

Effective from January 1, 2015, the EU F-gas regulation aims to protect the environment and prevent unwanted effects on climate changes by containing the global average temperature increase. The European Commission has agreed to pursue this intent by following a precise roadmap: **the next goal is to reduce fluorinated greenhouse gases or F-gases (HFCs, PFCs and SF6s) emissions by 79% by 2030.**

2. What is the challenge for environmental test chamber manufacturers?

Most of the environmental test chambers that need to reach temperatures below -50°C use a type of F-gas that falls within those called HFCs. These refrigerant gases usually have a GWP value much higher than the imposed limit. In derogation from the regulation, their use is allowed according to quotas, only because there is - or rather, there was - no climate-friendly alternative that meets the thermodynamic and safety requirements needed to replace traditional HFCs.

The only alternative known to date in the ULT (Ultra Low Temperature) refrigeration sector is based on the use of hydrocarbons as refrigerants. Hydrocarbons are extremely flammable, and although their performance is satisfactory from a thermodynamic perspective, there are significant safety limits connected with their use, even limited to only 150 grams, completely insufficient for medium-large plants.

3. Which was the answer by Angelantoni Test Technologies?

Safe solutions were required after the EU regulation about F-gases, capable of both preserving the environment by minimizing GWP and maintaining the performance of the HFCs that will soon be banned.

Thanks to our deep experience in refrigeration technologies and to the continuous research activity in collaboration with Universities, Research Centers and Accreditation Centers, **we are proud to have been the first with a challenging solution: our green gas R472B has a GWP of 256, that is 96% lower than other gases used for ULT applications such as R23.**

5. How many test have been conducted to achieve these results?

To achieve these ambitious results, a dedicated team has been involved for 5 years in this project - with the contribution of 2 Universities and 2 Research Centers - and more than 35 chambers tested in the ACS R&D Laboratory with thousands of hours of testing recorded.

6. Is R472B stable?

Yes, the stability of our R472B gas is ensured by its mixture components - CO₂ (R744), R32 and R134A - which are common refrigerants having their own solid stability.

7. Is R472B safe?

Yes, our gas is non-flammable and non-toxic: R472B passed the WCF (Worst Case Fractionations) and WCFF (Worst Case Fractionations for Flammability) tests. This is confirmed by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers), which has accredited our gas by assigning it the A1 safety class.

8. Is it possible to partially use the gas bottle?

Yes, thanks to the excellent homogeneous mixture of R472B, it is possible to safely store our gas and partially use it, reusing the quantity remained in the bottle (up to 80%)

9. How about retrofit?

Refrigeration plants currently using R23 are 99% compatible with R472B; those machines that are not perfectly compatible can be adapted simply without structural modifications.

10. How long will R472B will be available on the market?

The mixture components are common and easily procurable, so guaranteeing a long availability on the market to our new refrigerant gas.

11. Where can I buy your new R472B gas?

You can directly ask our ACS SERVICE Dept using the contact form available in our website.

12. Who's taking care of R472B shipment?

We will provide for shipment together with the partner we have selected to produce our gas: Nippon Gases, one of the best gas producers in the world with a strong international presence that is exclusively producing our gas R472B.