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Commercial refrigeration: application of safety and environmental laws

First Edition

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Eurovent, Rue de la Loi 62, 1040 Brussels, Belgium
secretariat@eurovent.eu

Document history

This Eurovent Industry Recommendation / Code of Good Practice supersedes all of its previous editions, which automatically become obsolete with the publication of this document.

Modifications

This Eurovent publication was modified as against previous editions in the following manner:

Modifications as against	Key changes
1st edition	Present edition

Preface

In a nutshell

This document introduces commercial refrigeration, describing the most commonly used plant types and refrigerants. A regulatory and standardisation framework is provided. The document offers a more detailed guide on the contexts, with examples and clarifications.

Authors

This document was originally published in Italian by the Associations AssoCold and Assofrigoristi. The Eurovent participants of the Product Group 'Commercial Refrigeration Equipment' (PG-RDC), which represents a vast majority of all manufacturers of these products active on the EMEA market, assessed and endorsed this work.

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Important remarks

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Introduction

Today, refrigeration, especially commercial refrigeration, has a central task: to function at its best, which is substantiated in a series of "sub-tasks": protecting the product (especially the food product), being efficient, containing its environmental impact, being safe for those who install it and for those who use it.

All these tasks, which are combined in the aim of the best possible functioning, pass through an essential path: compliance with current regulations. Standards that are the responsibility of all the stakeholders who give life to a refrigeration system and that oversee all phases of its life: its design, installation, start-up, management, maintenance, decommissioning, dismantling and disposal at the end of its life.

This is why Eurovent adopted the AssoCold (Federated in ANIMA Confindustria) and Assofrigoristi guide, the one you find in the following pages, which aims to be a roadmap for the obligations to which a refrigeration system must be subjected during its life and to which all the elements that constitute it and all the actors are subject, from the designer to the manufacturer and the maintenance technician, who have formal and substantial roles to guarantee performance, efficiency, minimum environmental footprint, safety. The refrigeration of the future seriously aims at a drastic reduction of the overall carbon and environmental footprint in the life cycle of all equipment, not only with the use of refrigerants with an ever-decreasing greenhouse impact and increasing efficiency, but also through products designed to last longer, suitable for a climate-neutral and circular economy model, capable of regenerating itself by focusing on recycling and recovery of materials at the end of their life.

In this sense, the national and European regulatory framework is evolving rapidly. It requires us not only to adapt but, in some cases, to anticipate sustainability requirements that require a deep understanding to be implemented in the best possible way, in a way that is once again sustainable also for equipment manufacturers and for all operators who will interact with them.

At a time when every business that has food as a business is urged to follow up on the ecological transition and to choose and use the best and most modern technologies to offer a reliable service at low costs, we felt a strong duty to give all our customers a guideline of the obligations that the law and technical standards impose, of the responsibilities they imply and of those who are required to meet them.

The increasing complexity of plants and the need to make them sustainable from an economic, environmental and social point of view must be faced with awareness and does not admit ignorance, because it turns into risk and economic, environmental and social damage. For this reason, you will find in these pages the indications that give a practical sense to the bureaucracy and documentary obligations to which a plant is subject, to understand why it is precisely a legal obligation, for example, to draw up a plant file and a declaration of conformity, to have a PED file or to correctly prepare the documentation necessary for the disposal of plant elements at the end of their life. To understand the meaning of these obligations and facilitate their performance.

We know that the rule is often experienced as a burden, but we are convinced that – once the reason why it exists and the protection generated by its compliance have been explained – all those who use this tool will have a different idea of the obligations, an idea that makes compliance with these obligations an indicator of the quality of the service offered.

Purpose and scope of the document

The purpose of this document is to provide a guide to the regulatory application for commercial refrigeration systems with a focus on safety, in the context of a changed scenario of refrigerant use in light of the new rules deriving from the application of the "new F-Gas" Regulation.

The guide is aimed at all those involved in the construction of commercial refrigeration systems, including customers, suppliers, technicians, designers, maintenance technicians, and, in general, all those involved in the life cycle of the system.

The document is useful for those who are changing or have to deal with different types of systems from the past, new or partially new, and who want to have a first quick clarification on the obligations and points of greatest attention in charge of safety.

In the first part, commercial refrigeration and its context are defined, describing the most commonly used plant types and refrigerant gases, also including the classification for safety and environment.

Subsequently, a regulatory framework is provided that aims to list the main provisions on the environment, safety and energy efficiency at the EU level, with a nod to the evolution of the legislation on fluorinated greenhouse gases and PFAS. To complete the list, the inventory of the main technical reference standards for the systems described is reported.

In the second part, the document frames the previous topics in 4 specific application contexts differentiated by plant type to offer a more detailed, concrete guide on the contexts examined, with examples and clarifications.

The contexts covered are

- 1. Medium and large size remote CO_2 plants (A1)
- 2. Non-flammable F-Gas systems (A1)
- 3. Plants with slightly flammable fluorinated gas (A2L)
- 4. Systems with flammable refrigerant gas (A3)

The document, while trying to offer clear and concrete guidance to respond to the most controversial issues by moving between international requirements and national legislation, cannot replace the detailed analysis that only experts in each area of competence can offer.

If, on the one hand, an attempt has been made to provide an interpretation of the regulatory and legislative framework that is as essential and simplified as possible for manufacturers, refrigeration technicians and economic operators operating in the field of refrigeration, on the other hand, it must be clarified that a complete and exhaustive treatment goes far beyond the ambitions of this document.

Commercial refrigeration and its context

Types of plant and equipment

Refrigerating equipment for trade means all equipment intended for the storage and sale of food products, such as counters for assisted and self-service sales for fresh and frozen food, cold rooms and refrigeration systems in general, which are connected in an electrically interdependent manner. Electronic, refrigerator and mechanical control to form a complete and interconnected system.

Generally, the refrigeration system is essentially composed of the following fundamental components:

- Refrigeration unit or condensing unit
- One or more remote refrigerated counters and/or cold rooms connected to it
- Condenser or gas cooler
- Any other heat exchangers for the processing rooms or for the recovery of condensation heat that can be used for space heating or domestic water

The heart of the system consists of the refrigeration unit and its most immediate components (condenser or gas cooler). Remote refrigerated cabinets are utilities, i.e. appliances equipped with an evaporator, which "use" the cold produced by the control unit and conveyed to the network at points at a distance from it.

There are different types of refrigerated cabinets:

- Vertical or semi-vertical with remote positive temperature, open or with doors, for fresh products
- Horizontal positive temperature remote self-service or assisted service
- Vertical or horizontal at remote negative temperature, for frozen products
- Combined with a remote negative temperature (base protected by sliding glass and riser with glass doors).
- Integral, plug-in or semi-plug-in (water loop), with built-in refrigeration unit (refrigeration circuit completely closed on board and air condensation taken directly from the environment or chilled water loop condensation).

In order to perform their function, remote refrigerated cabinets must be connected to a refrigeration unit or a condensing unit designed and built for installation inside a machine room or outside the building, connected to a condenser or gas cooler, or a condensing unit.

The storage of food products in distribution warehouses or at the point of sale is done in refrigerated cold rooms for the preservation of food products at medium and low temperatures, powered by means of a refrigeration unit, a condensing unit or a monobloc unit.

Each remote cabinet is designed to be used as part of a central refrigeration installation and therefore cannot operate autonomously.

The refrigeration system also consists of other devices that allow its integration, such as refrigeration and hydraulic connections and pipes, electrical power supply and control panels, electrical connections and wiring for electrical connections, controllers for utilities and refrigeration plants, platforms and remote monitoring and control systems.

The design and construction of the food store take into account the following aspects:

1. Dimensional: dislocation of the various departments in the store layout, taking into account structural and logistical constraints.
2. Electrical: articulation of technological solutions for the connection, interconnection and management of refrigeration and electrical utilities.
3. Refrigerators: sizing of the elements that produce and distribute food cold in the store and warehouses, keeping the food product at the appropriate storage temperature in the most efficient way.
4. Displays: choice of merchandising, with customisations of the furniture for an effective display and rotation of food products.
5. Aesthetics: enhancement of sales spaces through the creation of concept stores, where refrigeration users create an environment that represents the retailer's style.

In the choice of the technology to be used to set up the system and, more specifically, in the choice of the refrigerant, it is necessary to consider some particularly relevant and significant characteristics in light of the existing legislation on refrigerant gases and safety.

Safety

A decisive component in the choice of the technology to be adopted for the system is the safety variable.

Each refrigerant gas, fluorinated or the so-called natural alternatives, has its own chemical characteristics from which a different degree of toxicity and flammability derives, two fundamental variables for safety assessment.

Each gas is classified, both in terms of toxicity and flammability, according to the level of risk it can generate.

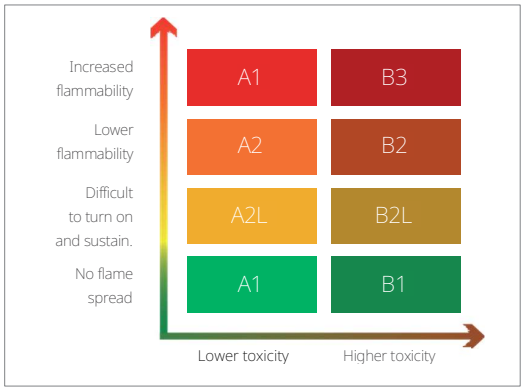
According to ISO 817, US ASHRAE 34 and EN378, the safety classification of refrigerants is defined by two alphanumeric symbols:

The letter indicating the level of toxicity:

- A: refrigerant with low toxicity;
- B: Toxic refrigerant

The number indicating the degree of flammability:

- 1: non-flammable;
- 2L: low flammability;
- 2: flammable;
- 3: highly flammable.



Class	Description	Flammability	Refrigerant
A1	Non-flammable	Non-flammable	R404A, R134a, R407F, R448A, R449A
A2L	Mildly flammable	Very difficult to ignite, slow propagation of combustion, self-extinguishing when the ignition source is removed	R454C, R454B, R32, R455A,
A2	Flammable	Easy to ignite, and if it is not extinguished quickly it will continue to burn creating a real danger	R152a
A3	Highly flammable	Very easy to ignite, combustion with risk of explosion	R290, R600A

A2L and CO_2 refrigerants have low toxicity, but the former are mildly flammable. Conversely, ammonia R717 is in class B2L; therefore, it has high toxicity and low flammability.

Refrigeration systems that use flammable gases must comply with specific safety rules, including safety devices and a specific design that considers the risk of flammability. The place of installation may also require specific solutions, such as, for example, adequate ventilation of the rooms in which they are installed to prevent the danger of fire in the event of a refrigerant leak.

It is also necessary to comply with the maximum refrigerant charge limits according to the space occupied (e.g. as provided for in the EN 378 standard) to minimise the risks associated with a possible gas leak, i.e. the occurrence of a fire.

A further topic of attention is the fact that the gas used by the refrigeration system to produce the cooling effect operates under precise pressure conditions, and this issue is also part of the variables that determine the safety of the system. The PED Directive on pressure equipment classifies refrigerants into two distinct groups according to their hazardous characteristics:

- GROUP 1: hazardous fluids (explosive, flammable, toxic, oxidising)
- GROUP 2: Fluids not listed in group 1.

The global warming potential

The Global Warming Potential (GWP) of a refrigerant gas expresses the contribution to the greenhouse effect of the gas calculated for a specific time interval with respect to the effect of CO_2, whose potential is taken as a unit of measurement and so indicated with a value of 1. The GWP of the refrigerant used plays a decisive role in the technical choices, within the framework of European environmental regulations. Until recently, the GWP of refrigerants was only measured over a period of 100 years, which remains the reference for the calculation of quotas and for all the measurements provided for by F-Gas.

However, given the importance of rapidly reducing greenhouse gas emissions to keep greenhouse gas emissions within reach global warming target of 1.5°C set by the Paris Agreement, the global warming potential in 20 years of greenhouse gases is increasingly relevant. European law imposes very strict limits for the use of refrigerants with significant GWP values both for new products and for maintenance in the European EU market. The table shows the safety classification, PED group and GWP of some commonly used refrigerants.

Substance	Composition	Safety category	PED group	GWP 100 yrs*	GWP 20 yrs**
R125	CHF3	A1	2	3.500	6.740
R134a	CH2FCF3	A1	2	1.430	4.140
R143a	CH3CF3	A2L	1	4.470	7.840
R152a	CH3CHF2	A2	1	124	591
R23	CHF3	A1	2	14.800	12.400
R32	CH2F2	A2L	1	675	2.690
R404A	R-125/143a/134a	A1	2	3.922	7.258
R407A	R-32/125/134a	A1	2	2.107	4.864
R407C	R-32/125/134a	A1	2	1.744	4.411
R407H	R-32/125/134a	A1	2	1.588	4.002
R410A	R-32/125	A1	2	2.088	4.705
R413A	R-218/134a/600a	A2	1	2.053	4.196
R422A	R-125/134a/600a	A1	2	3.143	6.245
R448A	R-32/125/1234yf/134a /1234ze(E)	A1	2	1.273	3.300
R449C	R-32/125/1234yf/134a	A1	2	1.340	3.060
R450A	R-1234ze(E)/134a	A1	2	618	1.708
R452A	R-1234yf/32/125	A1	2	2.336	4.295
R452B	R-32/125/1234yf	A2L	1	676	2.231
R454B	R-32/1234yf	A2L	1	466	1.806
R454C	R-32/1234yf	A2L	1	162	565
R455A	R-744/32/1234yf	A2L	1	162	565
R507A	R-125/143a	A1	2	3.985	7.345
R513A	R-1234yf/134a	A1	2	573	1.788
R744 (CO2)	CO2	A1	2	1	1
R600a (isobutane)	CH(CH3)2CH3	A3	1	3	<1
R290 (propane)	CH3CH2CH3	A3	1	3	0,072
R1270 (propylene)	C3H6	A3	1	2	<1
R717 (ammonia)	NH3	B2L	1	0	0
R718 (water)	H20	A1	2	0	0

R729 (air)	N2/O2/CO2/others	A1	2	0	0

(*) Based on the Fourth Assessment Report adopted by the Intergovernmental Panel on Climate Change (IPCC)

(**) Based on the Sixth Assessment Report adopted by the Intergovernmental Panel on Climate Change (IPCC)

Regulatory framework for refrigeration systems and equipment

Refrigeration equipment and systems are machines placed inside buildings, in contact with workers, customers and goods, and which exchange heat by using electrical energy through refrigeration cycles by means of pressurised gas, which can also be flammable and/or polluting.

For these reasons, they are subject to various regulations, directives, laws and standards in order to safeguard the safety of people and property, limit direct pollutant emissions into the environment and preserve energy efficiency to avoid high indirect emissions and contain energy costs. These regulatory provisions can be applied at the European level, such as EU directives and regulations and/or at the national level.

A directive is a legal act that sets out a target that EU countries must achieve and by what deadline. However, it is up to individual countries to define, through national provisions, how this is achieved.

A European regulation is a binding legal act that must be applied in all its elements by entering into force simultaneously in every member state of the European Union without the need for further national acts, laws or decrees.

Legislation often refers to technical standards, developed by the relevant technical committees at international, European or national level.

Technical standards are documents that define "how to do things well", guaranteeing certain quality and safety performance for materials, products, processes, services, people and organisations, but which constitute, if harmonised, a practical and effective way to verify compliance with the law. In fact, harmonised standards describe the technical requirements to be met for a solution to be considered compliant with a requirement that is often indicated in a non-exhaustive way in regulations.

However, the choice whether to apply the technical standards is always voluntary, unless specifically prescribed, unlike European Regulations and national laws or decrees, which, if violated, can result in administrative or criminal sanctions depending on the case.

In the European Union, the use of harmonised technical standards whose reference has been published on the Official Journal of the European Union provides the manufacturer with the presumption of conformity with the essential safety requirements of CE-marked products and therefore their free circulation in the Single Market.

They must therefore be known above all if they can be considered at the origin of legal provisions or even referred to by the law itself.

	Legislation	Technical Standards
International	Agreements and regulations in market areas	Standards produced by ISO, IEC
European	Directives and Regulations	Standards produced by CEN, CENELEC

Laws and regulations

SUMMARY OF LAWS AND REGULATIONS FOR COMMERCIAL REFRIGERATION		
Scope	Subject area	Europe
Environment	Emissions and Waste	
	Fluorinated greenhouse gases	Reg. (UE) N. 2024/573 F-GAS Reg. (EC) No. 1516/2007 leak checks Reg. (EU) No. 2024/2215 certification of companies and persons Reg. (EU) 2019/661 HFC Quota Register Reg. (EU) 2019/522 amendments to communications art.19 reg.517/2014 Reg. (EU) 2018/1992 amendments to communications art.19 reg.517/2014 Dec. (EU) 2017/1984 references HFC quotas Reg. (EU) 2017/1375 art.19 reg. 517/2014 modality Reg. (EU) 2016/879 declaration of conformity pre-loaded Reg. (EU) No. 1191/2014 Art. 19 Reg. 517/2014 format and transmission mode Reg. (EU) No. 2024/2174 FGAS labelling
	Ozone-depleting substances	Reg. (CE) N. 1005/2009 ODS
Efficiency	Ecodesign and ecolabel REFRIGERATION	Reg. (EU) 2019/2019 Ecodesign household appliances refrigeration Reg. (EU) 2019/2016 Ecolabel household appliances refrigeration Reg. (EU) 2021/340 Ecolabel household appliances refrigeration – amendments Reg. (EU) 2015/1094 Ecolabel for commercial/professional refrigeration Reg. (EU) 2015/1095 Ecodesign commercial/professional refrigeration Reg. (EU) 2019/2018 Ecolabel for commercial refrigeration for direct sale Reg. (EU) 2019/2024 Ecodesign commercial refrigeration for direct sale
	Energy efficiency in general	Dir. (EU) 2018/2002 energy efficiency
Safety	Fire Prevention	National codes
	Merchandise labelling	Reg. (CE) n. 1272/2008 CLP
	Pressure Equipment Management	National codes
	CE marking of equipment	PED 2014/68/UE Machinery Regulation (EU) 2023/1230 LVD 2014/35/EU

		EMC 2014/30/UE ATEX Equipment 2014/34/EU
	Job Requirements	National codes
	Workers' health and safety	ATEX Dir. workplaces 1999/92/EC

In terms of safety, we point out:

The European Directives that define the minimum safety requirements for the placing on the market of equipment:

- DIRECTIVE 2014/68/EU pressure equipment (PED Directive)
- DIRECTIVE 2006/42/EC Machinery Directive
- DIRECTIVE 2014/35/EU electrical equipment (Low Voltage Directive - LVD)
- DIRECTIVE 2014/30/EU electromagnetic compatibility (EMC)
- DIRECTIVE 2014/34/EU equipment and protective systems for use in potentially explosive atmospheres (ATEX)
- REGULATION (EC) 1272/2008 classification, labelling and packaging of substances and mixtures
- DIRECTIVE 1999/92/EC protection of the safety and health of workers exposed to the risk of explosive atmospheres

Regarding environmental protection, we point out:

Regulation on fluorinated greenhouse gases

- Regulation (EU) 2024/573 on fluorinated greenhouse gases, which repealed the previous Regulation (EU) 517/2014

Regulation on ozone-depleting substances

- REGULATION (EC) 1005/2009 substances that deplete the ozone layer

On energy efficiency, we point out:

- DIRECTIVE (EU) 2018/2002 on energy efficiency
- REGULATION (EU) 2015/1095 Ecodesign of professional refrigerated cabinets, blast chillers, condensing units and process chillers
- REGULATION (EU) 2019/2019 Ecodesign of refrigerating appliances
- REGULATION (EU) 2019/2024 Ecodesign of refrigerating appliances with a direct sales function
- DELEGATED REGULATION (EU) 2019/2016 energy labelling of refrigerating appliances
- DELEGATED REGULATION (EU) 2021/340 energy labelling for electronic displays, washing machines, washer-dryers and dishwashers for domestic use, light sources, refrigerating appliances and refrigerating appliances with direct sales function
- DELEGATED REGULATION (EU) 2015/1094 energy labelling of professional refrigerated cabinets/freezers
- DELEGATED REGULATION (EU) 2019/2018 energy labelling of refrigerating appliances with direct sales function

Technical standards

The main technical standards include:

Gas designation:

- ISO 817:2014 Refrigerants - Designation and safety classification
- Amendment 1:2017
- Amendment 2:2021

Technical standards, safety and environment, ISO level

- ISO 5149-1:2014 Refrigerating systems and heat pumps - Safety and environmental requirements
    - Part 1: Definitions, classification and selection criteria
    - Part 2: Design, construction, testing, marking and documentation
    - Part 3: Installation site
    - Part 4: Operation, maintenance, repair and recovery

Technical standards for safety and environment, level EN

- EN 378
    - Part 1: Basic Requirements, Definitions, Classification and Selection Criteria (2021)
    - Part 2: Design, Construction, Testing, Marking, and Documentation (2017)
    - Part 3: Installation Site and Protection of People (2021)
    - Part 4: Operation, Maintenance, Repair and Recovery (2020)

Product-specific technical standards

- IEC 60335-2-89:2019 Household and similar electrical appliances – Safety
    - Part 2-89: Particular requirements for commercial refrigerating appliances and icemakers with an incorporated or remote refrigerant unit or motor-compressor
    - Part 2-24: Particular requirements for refrigerating appliances, ice-cream appliances and ice makers

Technical standards for staff competence

- EN ISO 22712:2023 Refrigeration systems and heat pumps - Staff competence

SUMMARY OF TECHNICAL STANDARDS FOR COMMERCIAL REFRIGERATION		
SCOPE	INTERNATIONAL	EUROPEAN
Gas classification	ISO 817	
Safety and environment	ISO 5149 -1, -2, -3, -4	EN 378 -1, -2, -3, -4
Commercial refrigeration appliances comprising a unit refrigerant condensing fluid, or a compressor, built-in or remote	IEC 60335-2-89	EN 60335-2-89
Competence of the staff	ISO 22712	EN ISO 22712 (former EN13313)

The European regulation on fluorinated gases

The European Regulation on fluorinated greenhouse gases (also known as the F-Gas Regulation) is the European Union's main legislative instrument to reduce the production, use and emissions of F-gases due to their climate-changing impact. The refrigerants used historically and still today in refrigeration have an impact up to thousands of times greater than that of CO_2 itself.

A bit of history ...

In 2006, the European Union adopted the first F-Gas Regulation (EU) 842/2006.

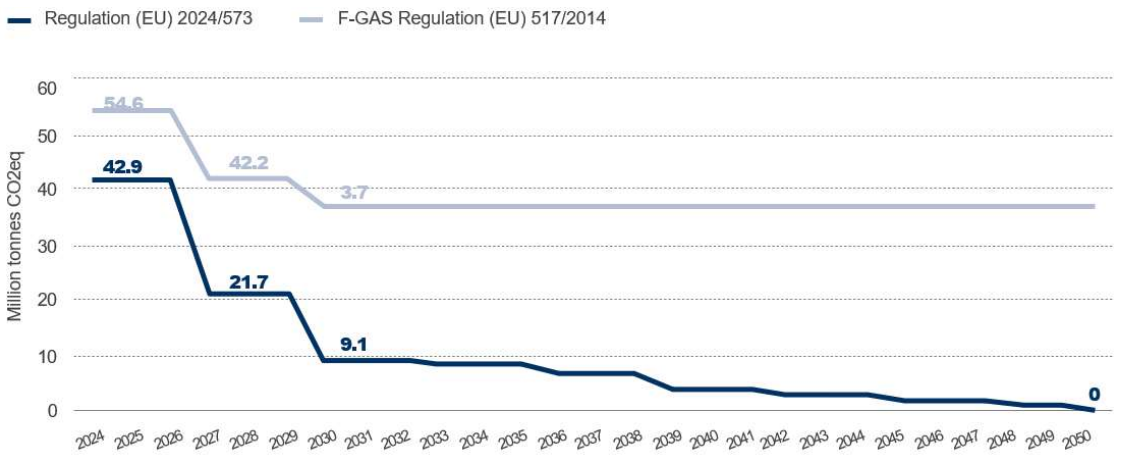
The regulation focused mainly on the prevention of leaks during the use phase and at the end of the life of stationary equipment, as well as introducing the first bans on F-Gases in a limited number of application sectors. Subsequently, in 2015, Regulation (EU) 517/2014 entered into force on fluorinated gases, which introduced a series of measures to gradually reduce the consumption of these gases by 80% (expressed in tonnes of CO_2 equivalent) by 2030 and established precise rules on the containment, use, recovery and disposal of these substances, while encouraging their replacement with refrigerants with progressively lower and lower GWPs.

New Regulation (EU) 2024/573 in force from March 2024

Considering the EU's increased climate ambitions, particularly the European Green Deal, which envisages carbon neutrality by 2050, and to align the rules with the Kigali Amendment and the Montreal Protocol, the current Regulation (EU) 2024/573 was published on 20 February 2024, repealing the previous Regulation (EU) No. 517/2014.

The main objective of the new law is to further reduce F-Gas emissions by at least 40 Mt CO_2 equivalent by 2030 and 310 Mt by 2050, mainly through a rapid reduction in HFC allowances and a series of bans on new products.

The new F-Gas Regulation establishes that the consumption of hydrofluorocarbons (HFCs), i.e. the maximum amount of hydrofluorocarbons that can be placed on the Union market, is eliminated by 2050 based on a particularly rapid quota reduction trajectory as early as 2025, with 2 particularly critical steps in 2027 and 2030, when the expected residual share will be only 16% of the current value (Annex VII). The production rights of HFCs allocated by the Commission will also be rapidly reduced to a minimum (15%) from 2036 (Annex V). Any residual need for HFCs in the most challenging sectors will be reviewed in 2040, depending on technological developments and the availability of alternatives to HFCs for some specific applications.



The text also introduces some important bans on the placing on the market of stationary refrigeration equipment that contains or whose operation depends on medium-high GWP F-Gases, to accelerate the shift towards more climate-friendly solutions, including, with reference to Annex IV points:

- Self-contained refrigerators and freezers for commercial use: GWP<150 from 1 January 2025 (plug-in cabinets, packaged units for cold rooms, refrigerated vending machines, etc.)
- Other stand-alone refrigeration equipment (except chillers): GWP<150 from 1 January 2025* (coolers, ice makers, ice cream machines, industrial process machines, etc.)
- Refrigeration equipment in general (except chillers): GWP<150 from 1 January 2030* (remote refrigerated cabinets, professional cabinets, blast chillers, walk-in cold rooms, condensing units, refrigeration units, heat exchangers, condensers, cell evaporators, etc.)
- Multipack centralised refrigeration systems for commercial use with a capacity ≥ 40 kW: GWP<150 from
- 1 January 2022, except in the primary refrigerant circuit of cascade systems, where GWP<1500 is expected
- Foams: stop F-Gas from 1 January 2033*

(*) Exceptions are provided for the use of refrigerant gases with a higher GWP in the event that it is necessary to comply with safety requirements at the site of activity.

The new F-Gas Regulation also introduces:

- New restrictions on the repair and maintenance of existing equipment
    - Replacement parts for the repair and maintenance of existing equipment included in the bans will be allowed, provided that the repair or maintenance does not result in an increase in cooling capacity, or in the quantity or GWP of refrigerant.
    - Certification of technicians: natural persons must be certified for carrying out activities that also involve the so-called natural refrigerants (current certificates will remain valid until they expire);
- Export ban: From 2025, the export of stationary refrigeration equipment covered by the bans will be limited to GWP<1000
- The allocation of allowances for refrigerant producers will be subject to the payment of EUR 3/CO2eqT, which is inflation-adjusted
- New measures to combat the illegal trade in HFCs

- Extended Producer Responsibility (EPR) provided for from 01 January 2028 for F-Gases present in products and equipment falling under the categories of electrical and electronic equipment subject to Directive 2012/19/EU (on waste electrical and electronic equipment).
- The possibility for Member States to lay down rules on effective, proportionate and dissuasive penalties applicable to infringements

Due to the reduction in the quotas, i.e. the quantity and global warming potential (GWP), of HFCs available on the European market, in the presence of sustained demand for these gases for the maintenance of existing plants, there could soon be significant price increases or problems with the availability of refrigerants involved in the phase-down and phase-out process.

This highlights the importance of carefully evaluating which refrigerant to use, taking into account the measures provided for in the Regulation, to make optimised choices in a long-term perspective, i.e. technologies suitable for dealing with the ecological transition, a key factor also in relation to the price and future availability of the refrigerant itself.

Limits on the use of fluorinated gases under maintenance according to their GWP

Only natural persons in possession of a certificate or undertakings employing natural persons in possession of a certificate or certificate of training are authorised to purchase F-Gases to carry out the installation, maintenance, service or repair of equipment containing or the operation of which depends on such gases.

In addition, only companies established within the Union, or which have appointed an exclusive representative established within the Union who assumes full responsibility for compliance with the F-Gas Regulation, are allowed to place on the market and subsequently supply bulk F-Gases.

The use of F-Gases with a global warming potential of 2500 or more for maintenance or the servicing of refrigeration equipment with a charge equal to or greater than 40 tonnes of CO_2 equivalent is already prohibited today, but from 01 January 2025, this limit is extended to all refrigeration equipment.

However, until 01 January 2030, the ban does not apply to F-Gases listed in Annex I that are regenerated, provided that the containers of such gases have been labelled, or recycled, provided that they have been recovered from such equipment and are used exclusively by the company that carried out the recovery.

From 01 January 2032, the use of F-Gases with a GWP equal to or greater than 750 for the maintenance or servicing of stationary refrigeration equipment (excluding chillers) is prohibited, unless they are also regenerated or recycled.

These prohibitions do not apply to military equipment or equipment designed to cool products to temperatures below -50 °C.

Maintenance in refrigeration (commercial and industrial)

GWP	Quality	→ → → →	01/01/25	01/01/30	01/01/32
GWP>2,500	virgin	(*)	NO	NO	NO
	regenerated	YES	YES	NO	NO
750<GWP<2,500	virgin	YES	YES	YES	NO
	regenerated	YES	YES	YES	YES
GWP<750	virgin	YES	YES	YES	YES
	regenerated	YES	YES	YES	YES

(*) Only in circuits with total charge <40 tonnes CO2 eq.

In detail, the most widely used refrigerants with a virgin or reclaimed status

Gas Type	Quality	→ → → →	01/01/25	01/01/30	01/01/32
R404A	virgin	(*)	NO	NO	NO
R507A	virgin	(*)	NO	NO	NO
All gases with GWP>2,500	virgin	(*)	NO	NO	NO
R452A	virgin	YES	YES	YES	NO
R448A	virgin	YES	YES	YES	NO
R449A	virgin	YES	YES	YES	NO
R507A	virgin	YES	YES	YES	NO
All gases with GWP>2,500	virgin	YES	YES	YES	NO
All gases with GWP<750	virgin	YES	YES	YES	YES
R404A	regenerated	YES	YES	NO	NO
R507A	regenerated	YES	YES	NO	NO
All gases with GWP>2,500	regenerated	YES	YES	NO	NO
R452A	regenerated	YES	YES	YES	YES
R448A	regenerated	YES	YES	YES	YES
R449A	regenerated	YES	YES	YES	YES
Gas with 750<GWP<2,500	regenerated	YES	YES	YES	YES
Gas with GWP<750	regenerated	YES	YES	YES	YES

(*) Only in circuits with total charge <40 tonnes CO2 eq.

The PFAS issue and the Reach Regulation

The REACH Regulation regulates the registration, management, authorisations and restrictions of chemicals in the European Union.

The European Chemicals Agency (ECHA) published on 07 February 2023 the proposal of five European countries – Germany, the Netherlands, Norway, Sweden and Denmark – to restrict more per- and polyfluorinated alkyl substances (PFAS), including some HFC and HFO refrigerants, under REACH.

PFAS, which are currently a group of over 4,700 "forever chemicals", are used to produce many consumer products and in different industrial sectors, but according to authoritative studies, exposure to PFAS would be linked to various harmful effects on the environment and human health.

There is therefore a growing concern about PFAS, given the harmful effects on the environment and human health resulting from prolonged exposure or intake of these chemicals, given their presence in the water cycle.

Every year in Europe, more than 850,000 tons of PFAS are used in substances, mixtures and an infinite number of articles and products, and the health costs related to PFAS are estimated at 52 to EUR 84 billion per year. From preliminary assessments by the European Chemicals Agency ECHA, the application of some fluorinated gases is at the top of the ranking of sources of PFAS emissions into the environment.

Among the HFCs that these countries have identified as PFAS are R134a, R125, R143a, while HFOs are R1234yf, R1234ze(E) and R1233zd(E). In addition, trifluoroacetic acid (TFA), which is itself a PFAS substance, is a product of the atmospheric decomposition of R1234yf and R134a.

Alternatives to PFAS substances exist and are, for example, R32 and R152a and the so-called natural refrigerants.

The proposed restriction, which could have considerable impacts for the HVAC&R sector, is currently in the process of "final opinions" by ECHA's Committee for Risk Assessment (RAC) and Committee for Socio-Economic Analysis (SEAC), before being adopted by the European Commission.

Actors and responsibilities

The table below briefly illustrates tasks, responsibilities, documentation and procedures. For further details, see the chapter "Planned activities on refrigeration systems: the macro phases depending on the type of gas used".

Actor	Tasks and responsibilities	Documentation/Legal procedure for the equipment or system
Equipment manufacturer/importer	Manufactures/imports equipment in compliance with minimum safety requirements and, if applicable, Ecodesign and fluorinated greenhouse gases	CE marking, EC declaration of conformity, Use and maintenance manual, technical file, F-Gas declaration
Equipment Seller	Provides refrigeration equipment and components	F-Gas Communications (Sale of hermetically sealed equipment to end customers)
Plant Designer	Design the system in compliance with standards	Project
System Installer	It installs the equipment by creating systems serving buildings in compliance with national legislation and standards.	Declaration of conformity Communications F-Gas Database for activities on the refrigeration circuit, where available. Operation and Maintenance Instructions
Maintainer	Carries out maintenance and possibly dismantling according to standards	Communications F-Gas Database for activities on the refrigeration circuit, where available.
Principal/end user	standards and contract	Declaration of commissioning to national bodies, record keeping when the database is not present.

Planned activities on refrigeration systems: the macro-phases

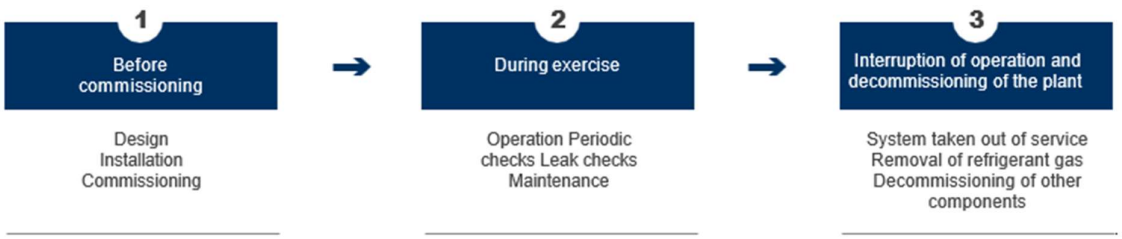
The activities that are envisaged in the life cycle of a refrigeration system can be described by referring to those indicated in EN133313:2011, which can be grouped into 3 macro-phases:

Before commissioning:
Activities between design and start-up

During exercise:
Operation management, maintenance and audits

Interruption of operation and decommissioning of the plant or parts thereof:
Management of the interruption of the operation of the system and/or the decommissioning of the same, and the disposal of the refrigerant

The following diagram shows what is indicated.



Planned activities on refrigeration systems: the macro phases depending on the type of gas used

CO_2 systems

The regulatory application relating to a commercial carbon dioxide (CO_2) refrigeration system is described below.

Certification and training

In the coming years, certification programs for the so-called natural refrigerants will be made available, and then individuals will have to be certified to carry out the activities of installation, maintenance or service, repair, leak checks, equipment dismantling and refrigerant recovery.

Before commissioning

Design

The client of the business will have to appoint a designer or a company that builds refrigeration systems to draw up the project and develop the offer.

In the design phase, once the specific intended use of the system has been defined and the sizing has been carried out in relation to the thermal loads, as well as the route of the pipes, compliance with the technical standards must be assessed. The customer of the business must perform (or have performed) the risk analysis and implement all the necessary corrective actions by highlighting any residual risks.

For example, it will be necessary to assess whether the maximum gas charge limit (which in the event of a leak could lead to asphyxiation) for sales areas and other departments, as defined by EN 378-1 and the need for adaptation of the premises (ventilation, gas detection sensors and alarms) as indicated by EN 378-3 is respected.

Locating the PED category of components and assemblies:

For example, a CO_2 system can easily fall into Category III or Category IV.

Project Compliance Verification Procedure:

For example, according to PED, one of two options:

- Third-party certification of the technical file and company quality system for the realisation of assemblies (module B + D);
- Specific project through a third party (module G)

Installation

After the preparation of the construction site, it will be possible to proceed with the installation, which mainly consists of creating the refrigeration circuit by joining the different components by means of pipes.

The installation of systems serving buildings must be conducted by a company with the appropriate national requirements.

Depending on the size of the system and the pressures involved, it will also be necessary to follow the compliance procedure for the safety of pressure equipment as indicated in EN378-2, defining the PED classification and installing the related safety devices with their respective calibrations.

Put into service

In order to proceed with commissioning as prescribed by EN 378-2, the executing company in charge must carry out resistance and tightness tests, the creation of the vacuum and the loading of the system with refrigerant gas, which must be accompanied by a specific report.

Commissioning

The commissioning phase will then verify the performance of the system in relation to what is indicated in the project and in the assignment stipulated between the customer and the installer, who will have to issue all the required documentation (such as the declaration of conformity of installation in a workmanlike manner, certifications of materials, installation reports, use and maintenance manuals). It should also be noted that EN 378-2 requires the presence of an equipment register for systems containing at least 3kg of refrigerant gas.

During exercise

Operation

The customer may operate the system by delegating the control of operation to personnel adequately trained on the methods provided by the installer and on the risks present.

Periodic

It is important to comply with periodic verification activities.

For example, according to EN 378-3, the condition of the premises and their safety devices (sensors, alarms, ventilation, etc.) must be checked at least once a year.

As far as the system is concerned, in addition to the indications provided by the installer, reference can be made to EN 378-4 (Annex D), which requires, for example:

- The annual verification of the functioning of the safety devices,
- The calibration or replacement of the release valves according to the manufacturer's instructions is, in any case, no later than 5 years.

Leak checks

Although not required by law, checking the refrigerant charge of the system through periodic checks is important.

For example, EN 378-4 indicates that a refrigeration system containing more than 3 kg of non-fluorinated refrigerant gas must be subject to an inspection at least annually up to 30 kg, every six months up to 300 kg and every three months over 300 kg.

Refrigeration circuit maintenance and general maintenance

Equipment maintenance must be carried out by competent personnel, scrupulously following the instructions of the equipment manufacturer and the installer.

In this sense, any certifications of skills with reference to EN 13313 are valid.

Depending on the operations carried out (mechanical, electrical, cooling, etc.), the skills required may also be of a different nature and require different qualifications.

Interruption of operation and decommissioning of the plant or parts thereof

Plant is put out of service

If the plant has to be taken out of service, decommissioning will be carried out in order to avoid any risk to the safety of people, property and the environment.

Removal of refrigerant

Although the F-Gas Regulation does not establish a legal obligation, it is recommended that the CO_2 refrigerant not be dispersed into the environment and is entirely recovered.

The removal must be carried out by specialised companies equipped with suitable recovery equipment. The recovered gas can be reused, recycled or regenerated, in accordance with current regulations, therefore not necessarily disposed of (as indicated by EN 378-4).

A1 F-Gas systems

The application to a commercial refrigeration system containing gases covered by the F-Gas Regulation and classified A1 according to the ISO 817 standard is described below.

The F-Gas Regulation applies to this type of plant, which establishes provisions on the containment, use, recovery, recycling, regeneration and destruction of fluorinated greenhouse gases (F-Gases), and imposes conditions for the production, import, export, placing on the market, subsequent supply and use of fluorinated greenhouse gases and those products and equipment that contain or whose operation depends on these gases. National legislation may also apply.

Restrictions on placing on the market and sale

For certain applications, depending on their GWP and the type of equipment, the placing on the market of products and equipment listed in Annex IV to the F-Gas Regulation is prohibited from the date indicated in that Annex.

For more information, see the section "The European F-Gas Regulation".

Non-hermetically sealed equipment loaded with F-Gases listed in Annex I and Annex II, Section 1, may only be sold to end-users if it is demonstrated that the installation will be carried out by a certified company.

Equipment labelling

It should also be remembered that refrigeration equipment containing F-gases or the operation of which depends on such gases may only be placed on the market if labelled.

The label shall be clearly legible and indelible and shall indicate that the product or equipment contains F-gases or that its operation depends on such gases, the industrial name of the gas concerned, the quantity expressed in weight and CO_2 equivalent contained in or for which the equipment is designed, the global warming potential of the gas and, where applicable, an indication that the F-gases are contained in hermetically sealed equipment.

Premixed foams and polyols containing F-gases may only be placed on the market if they are identified by a label indicating the presence of these gases and bearing the industrial name of the gas.

This information must also appear in the user manuals of the products and equipment in question and in the description used for advertising purposes.

Certification and training

Natural persons must be certified to carry out the activities of installation, maintenance or service, repair, leak checks, equipment dismantling and refrigerant recovery, for fluorinated greenhouse gases.

F-Gas Database

In some Member States, operators of equipment containing quantities equal to or greater than 5 tonnes of CO_2 equivalent of F-gases listed in Annex I or quantities equal to or greater than 1 kilogram of F-gases listed in Annex II, Section 1, not contained in foams, shall be obliged to update the F-Gas Database about the quantity and type of gases contained in the equipment and/or the quantity and type of gas added during installation, maintenance or service or following leaks, and whether they have been recycled or regenerated, the amount of gases recovered, the dates and results of checks carried out and the results of any leak repairs, whether the equipment has been dismantled, the measures taken to recover and dispose of the gases. The record keeping is, anyway, an obligation for all the operators; Member States only decide on how to implement this rule.

Before commissioning

Design

The client of the business will have to appoint a designer or a company that builds refrigeration systems in order to draw up the project and develop the offer.

In the design phase, once the specific intended use of the system has been defined and the sizing has been carried out in relation to the thermal loads, as well as the route of the pipes, compliance with the technical standards must be assessed. The customer of the business must perform (or have performed) the risk analysis and implement all the necessary corrective actions by highlighting any residual risks.

For example, it will be necessary to assess whether the maximum gas charge limit (which in the event of a leak could lead to asphyxiation) for sales areas and other departments, as defined by EN 378-1 and the need for adaptation of the premises (ventilation, gas detection sensors and alarms) as indicated by EN 378-3 is respected.

Leak detection systems

Operators of stationary equipment containing F-gases listed in Annex I in quantities equal to or greater than 500 tonnes of CO_2 equivalent or 100 kilograms or more of gases listed in Section 1 of Annex II shall ensure that the equipment has a leak detection system that warns the operator or maintenance organisation in the event of a leak, and that it is checked at least every twelve months to ensure that it is functioning correctly.

Locating the PED category of components and assemblies

For example, a system with A1 refrigerants can fall into category I, II, III or IV.

Project compliance verification procedure

For example, according to PED, one of two options:

- third-party certification of the technical file and company quality system for the realisation of assemblies (module B + D);
- specific project through a third party (module G).

Installation

After the preparation of the construction site, it will be possible to proceed with the installation, which mainly consists of creating the refrigeration circuit by joining the different components by means of pipes.

Depending on the size of the system and the pressures involved, it will also be necessary to follow the compliance procedure for the safety of pressure equipment as indicated in EN378-2, defining the PED classification and installing the related safety devices with their respective calibrations.

Commissioning

To proceed with commissioning as prescribed by EN 378-2, the executing company in charge must carry out resistance and tightness tests, the creation of the vacuum and the loading of the system with refrigerant gas, which must be accompanied by a specific report.

At the end of the installation, within 30 days, the communication of the intervention must be made if a national database is available.

For equipment containing a quantity equal to or greater than 5 tCO_2 equivalent (10 tCO_2 equivalent if hermetically sealed), there is an obligation to register the interventions on the F-GAS Database (where available) or to keep a record.

The commissioning phase will then verify the performance of the system in relation to what is indicated in the project and in the assignment stipulated between the customer and the installer, who will have to issue all the required documentation (such as the declaration of conformity of installation in a workmanlike manner, certifications of materials, installation reports, use and maintenance manuals). It should also be noted that EN 378-2 requires the presence of an equipment register for systems containing at least 3 kg of refrigerant gas.

During exercise

Operation

The customer may operate the system by delegating the control of operation to personnel adequately trained on the methods provided by the installer and on the risks present.

Periodic

It is important to comply with periodic verification activities. For example, according to EN 378-3, the condition of the premises and their safety devices (sensors, alarms, ventilation, etc.) must be checked at least once a year. As far as the system is concerned, in addition to the indications provided by the installer, reference can be made to EN 378-4 (Annex D), which requires, for example:

- the annual verification of the functioning of the safety devices,
- the calibration or replacement of the release valves according to the manufacturer's instructions and in any case no later than 5 years.

Leak checks

Operators of refrigeration equipment containing F-gases must ensure that leaks are checked as frequently as possible:

Frequency of checks*	Annex I
Free	Up to 5 tons of CO2eq
12 months	From 5 to 50 tons of CO2eq
6 months	50 to 500 tons of CO2eq
3 months	Over 500 tons of CO2eq

(*) If a leak detection system is installed in this equipment, then the mandatory frequency is halved.
NOTE: Over 500 tons of CO2 equivalent, a leak detection system is required in any case.

Hermetically sealed equipment is exempted from leak checks only if it is labelled as such and contains less than 10 tonnes of CO2 equivalent of F-gases listed in Annex I, or less than 2 kilograms of F-gases listed in Annex II, Section 1.

Refrigeration circuit maintenance and general maintenance

For F-gases, the F-GAS regulation provides for limits on the use of refrigerants (virgin and regenerated) depending on their GWP.

For further details, see the paragraph "Limits on the use of F-gases in maintenance according to their GWP" in the chapter "The European F-Gas Regulation".

Equipment maintenance must be carried out by competent personnel, scrupulously following the instructions of the equipment manufacturer and the installer:

- Any certifications of skills with reference to EN 13313 are valid.
- Plant engineer with certified staff and company according to Regulation 2024/2215

If maintenance has required intervention on the refrigerant circuit, within 30 days, the communication of the intervention must be made on the F-GAS Database, where available; otherwise, the operator shall keep a record of the intervention.

Leak repair

If a leak of fluorinated greenhouse gases is detected, the operator shall ensure that the equipment or system is repaired without undue delay.

If a leak in the equipment is repaired, the operator of the equipment must check the repair not before an operating time of 24 hours has elapsed, but in any case, within one month of the repair to verify that the latter has been effective: within 30 days, the communication of the intervention must be made on the F-GAS database where available, or records shall be kept.

Furthermore, it should be noted that, within the period indicated above, EN 378-4 recommends that the repair be checked no earlier than one week after the repair.

Equipment repair

The placing on the market of parts of products and equipment necessary for the repair and maintenance of existing equipment listed in Annex IV is permitted, provided that the repair or maintenance does not involve:

- an increase in the cooling capacity of the product or equipment
- an increase in the amount of F-gases contained in the product or equipment; or
- a change in the type of F-gases used that would result in an increase in the global warming potential of the gas used.

In the event of a change in the quantity or type of F-gas, within 30 days, the intervention must be communicated to the F-GAS Database, where available, or records shall be kept.

Depending on the operations carried out (mechanical, electrical, cooling, etc.), the skills required may also be of a different nature and require different qualifications.

Interruption of operation and decommissioning of the plant or parts thereof

Plant is put out of service

If the plant has to be taken out of service, decommissioning will be carried out in order to avoid any risk to the safety of people, property and the environment.

In addition, the F-GAS Regulation requires the customer to take all measures to avoid refrigerant gas leaks and therefore the customer must contact a plant engineer with certified personnel and the company according to Regulation 2024/2215, who must communicate the intervention on the F-GAS Database within 30 days, where available; otherwise the operator shall keep a record of the intervention.

Removal of refrigerant

Operators of equipment containing F-gases, which are not contained in foams, must ensure that these substances are recovered and, after dismantling the equipment, are recycled, remanufactured or destroyed. The recovery of these substances must be carried out by natural persons who hold the necessary certificates.

Recovered fluorinated greenhouse gases listed in Annex I and Annex II, Section 1, may not be used to charge or recharge equipment unless the gas has been recycled or regenerated.

Within 30 days of the intervention, the recovered gas must be reported to the F-GAS database, where available, or records shall be kept by the operator.

A2L F-Gas systems

The application to a commercial refrigeration system containing gases covered by the F-Gas Regulation and classified as A2L according to the ISO 817 standard is described below.

Although the A2L ("low flammability") rating indicates a refrigerant characterised by a low flammability level, high ignition energy and low flame spread rate, A2L gas is to be considered hazardous, and the associated fire risk must be assessed.

Examples of A2L F-Gas systems: medium-small remote systems, indirect distribution systems (chillers + brine ring) with charges from kg to tens of kg.

The F-GAS Regulation applies to this type of plant, which establishes provisions on the containment, use, recovery, recycling, regeneration and destruction of fluorinated greenhouse gases, and imposes conditions for the production, import, export, placing on the market, subsequent supply and use of

fluorinated greenhouse gases and those products and equipment that contain or whose operation depends on such gases.

Restrictions on placing on the market and sale

For certain applications, depending on their GWP and the type of equipment, the placing on the market of products and equipment listed in Annex IV to the F-GAS Regulation is prohibited from the date indicated in that Annex.

For more information, see the section "The European F-Gas Regulation".

Non-hermetically sealed equipment loaded with F-gases listed in Annex I and Annex II, Section 1, may only be sold to end-users if it is demonstrated that the installation will be carried out by a certified company.

Equipment labelling

It should also be remembered that refrigeration equipment containing F-gases or the operation of which depends on such gases may only be placed on the market if labelled.

The label shall be clearly legible and indelible and shall indicate that the product or equipment contains F-gases or that its operation depends on such gases, the industrial name of the gas concerned, the quantity expressed in weight and CO2 equivalent contained in or for which the equipment is designed, the global warming potential of the gas and, where applicable, an indication that the F-gases are contained in hermetically sealed equipment.

Premixed foams and polyols containing F-gases may only be placed on the market if they are identified by a label indicating the presence of these gases and bearing the industrial name of the gas.

This information must also appear in the user manuals of the products and equipment in question and in the description used for advertising purposes.

Certification and training

Natural persons must be certified to carry out the activities of installation, maintenance or service, repair, leak checks, equipment dismantling and refrigerant recovery, for fluorinated greenhouse gases.

F-Gas Database

In some Member States, operators of equipment containing quantities equal to or greater than 5 tonnes of CO2 equivalent of F-gases listed in Annex I or quantities equal to or greater than 1 kilogram of F-gases listed in Annex II, Section 1, not contained in foams, shall be obliged to update the F-GAS Database about the quantity and type of gases contained in the equipment and/or the quantity and type of gas added during installation, maintenance or service or following leaks, and whether they have been recycled or regenerated, the amount of gases recovered, the dates and results of checks carried out and the results of any leak repairs, whether the equipment has been dismantled, the measures taken to recover and dispose of the gases. The record keeping is, anyway, an obligation for all the operators; Member States only decide on how to implement this rule.

Before commissioning

Design

The client of the business will have to appoint a designer or a company that builds refrigeration systems to draw up the project and develop the offer.

In the design phase, once the specific intended use of the system has been defined and the sizing has been carried out in relation to the thermal loads, as well as the route of the pipes, compliance with the technical standards must be assessed. The customer of the business must perform (or have performed) the risk analysis and implement all the necessary corrective actions by highlighting any residual risks.

For example, it will be necessary to assess whether the maximum gas charge limit (which in the event of a leak could lead to asphyxiation) for sales areas and other departments, as defined by EN 378-1 and the need for adaptation of the premises (ventilation, gas detection sensors and alarms) as indicated by EN 378-3, is respected.

In addition, the presence of A2L gas involves the evaluation of considering within the risk analysis the problem relating to flammability, which, although not at the same level as hydrocarbons, requires particular attention.

Components, machines and machine parts must be suitable for use with A2L flammable refrigerant for the charges envisaged in the installation, designed and manufactured in such a way as to limit the risks, according to the state of the art, using specific product standards for the use of A2L flammable refrigerants.

In addition, it is advisable to consider the possible application of fire regulations to the activity, to understand whether the addition of equipment with flammable refrigerant gas involves an increase in risk. The customer should therefore contact their fire prevention professional or contact one if the system may be of significant size.

Non-hermetically sealed equipment loaded with F-gases listed in Annex I and Annex II, Section 1, may only be sold to end-users if it is demonstrated that the installation will be carried out by a certified company.

Leak detection systems

Operators of stationary equipment containing F-gases listed in Annex I in quantities equal to or greater than 500 tonnes of CO2 equivalent or 100 kilograms or more of gases listed in Section 1 of Annex II shall ensure that the equipment has a leak detection system that warns the operator or maintenance organisation in the event of a leak, and that it is checked at least every twelve months to ensure that it is functioning correctly.

Locating the PED category of components and assemblies

For example, a system with A2L refrigerants can fall into category I, II, III or IV.

Project compliance verification procedure

For example, according to PED, one of two options:

- Third-party certification of the technical file and company quality system for the realisation of assemblies (module B + D);
- Specific project through a third party (module G).

Installation

After the preparation of the construction site, it will be possible to proceed with the installation, which mainly consists of creating the refrigeration circuit by joining the different components by means of pipes.

Depending on the size of the system and the pressures involved, it will also be necessary to follow the compliance procedure for the safety of pressure equipment as indicated in EN378-2, defining the PED classification and installing the related safety devices with their respective calibrations.

The use of flammable refrigerant gases may result in a more restrictive PED classification.

For example, we remind you that if with refrigerant classified A1, the transition to category I of the PED begins with a pipe with a diameter of 32 mm, with an A2L refrigerant, the transition to category I or II of the PED, depending on the pressure, begins with a diameter of 25 mm.

Similar considerations apply to all other components of the system (tanks, valves, etc.) and are to be considered even more significantly in the event of a system transformation.

Furthermore, since it is A2L, it will be advisable for the installation company to adopt the precautions indicated by EN378-4 on activities related to the presence of flammable refrigerant gas, using suitable equipment.

The equipment must be positioned in accordance with the manufacturer's instructions, also considering the distances from places where, in the event of a leak, the gas could accumulate and form a flammable gas mixture.

Put into service

To proceed with commissioning as prescribed by EN 378-2, the executing company in charge must carry out resistance and tightness tests, the creation of the vacuum and the loading of the system with refrigerant gas, which must be accompanied by a specific report.

The presence of A2L gas requires the use of additional precautions regarding the equipment to be used for field activities with flammable refrigerant gas. For this purpose, reference can be made to the indications given by EN378-4 in addition to those provided by the manufacturer.

At the end of the installation, within 30 days, the communication of the intervention must be made on the F-GAS database, where available, or records shall be kept by the operator.

For equipment containing a quantity equal to or greater than 5 tCO2 equivalent (10 tCO2 equivalent if hermetically sealed), there is an obligation to register the interventions on the F-GAS Database, where available, or records shall be kept by the operator. Since a flammable refrigerant is used, the warning mark B.3.2 of ISO Publication 3864 must be permanently affixed to the appliance.

NOTE: For both A2L and A3

The putting into operation of the equipment or the use of the products listed in Annex IV after the date of prohibition shall be prohibited, unless the operator can provide evidence that the relevant safety requirements in a given location do not permit the installation of any equipment using F-gases below the global warming potential value specified in the prohibitions or the equipment was placed on the market before the date of entry into force of the ban.
In this case, the operator must keep the documentation attesting to the above for at least 5 years and must make it available, upon request, to the competent authorities or the Commission.

Commissioning

The commissioning phase will then verify the performance of the system in relation to what is indicated in the project and in the assignment stipulated between the customer and the installer, who will have to issue all the required documentation (such as the declaration of conformity of installation in a workmanlike manner, certifications of materials, installation reports, use and maintenance manuals). It should also be noted that EN 378-2 requires the presence of an equipment register for systems containing at least 3kg of refrigerant gas.

During exercise

The presence of A2L gas requires the use of additional precautions regarding the equipment to be used for field activities with flammable refrigerant gas. For this purpose, reference can be made to the indications given by EN378-4 in addition to those provided by the manufacturer.

Operation

The customer may operate the system by delegating the control of operation to personnel adequately trained in the methods provided by the installer and the risks present.

Periodic

It is important to comply with periodic verification activities.

For example, according to EN 378-3, the condition of the premises and their safety devices (sensors, alarms, ventilation, etc.) must be checked at least once a year.

As far as the system is concerned, in addition to the indications provided by the installer, reference can be made to EN 378-4 (Annex D), which requires, for example:

- The annual verification of the functioning of the safety devices,
- The calibration or replacement of the release valves according to the manufacturer's instructions is, in any case, no later than 5 years.

Leak checks

Operators of refrigeration equipment containing F-gases must ensure that leaks are checked as frequently as possible:

Frequency of checks*	Annex I	Annex II, Sec. 1
Free	Up to 5 tons of CO2eq	Up to 1 kg
12 months	5 to 50 tons of CO2eq	1 kg to 10 kg
6 months	50 to 500 tons of CO2eq	From 10kg to 100kg
3 months	Over 500 tons of CO2eq	Over 100kg

(*) If a leak detection system is installed in this equipment, then the mandatory frequency is halved.

Hermetically sealed equipment is exempted from leak checks only if it is labelled as such and contains less than 10 tonnes of CO2 equivalent of F-gases listed in Annex I, or less than 2 kilograms of F-gases listed in Annex II, Section 1.

Refrigeration circuit maintenance and general maintenance

For F-gases, the F-GAS regulation provides for limits on the use of refrigerants (virgin and regenerated) depending on their GWP.

For further details, see the paragraph "Limits on the use of F-gases in maintenance according to their GWP" in the chapter "The European F-Gas Regulation".

The maintenance of the equipment must be carried out – scrupulously following the instructions of the equipment manufacturer and the installer – by competent personnel in possession of

- any certifications of skills with reference to EN 13313.
- of the qualifications of a plant engineer with certified personnel and company according to Regulation 2024/2215.

If maintenance has required intervention on the refrigerant circuit, within 30 days, the communication of the intervention must be made on the F-GAS database, where available; otherwise, records shall be kept by the operator.

Leak repair

If a leak of fluorinated greenhouse gases is detected, the operator shall ensure that the equipment or system is repaired without undue delay.

If a leak in the equipment is repaired, the operator of the equipment must check the repair not before an operating time of 24 hours has elapsed, but in any case within one month of the repair to verify that the latter has been effective: within 30 days, the communication of the intervention must be made on the F-GAS database where available, otherwise records shall be kept by the operator.

Furthermore, it should be noted that, within the period indicated above, EN 378-4 recommends that the repair be checked no earlier than one week after the repair.

Equipment repair

The placing on the market of parts of products and equipment necessary for the repair and maintenance of existing equipment listed in Annex IV is permitted, provided that the repair or maintenance does not involve

- an increase in the capacity of the product or equipment,
- an increase in the amount of F-gases contained in the product or equipment, or
- a change in the type of F-gases used that would result in an increase in the global warming potential of the fluorinated greenhouse gas used.

In the event of a change in the quantity or type of F-gas, within 30 days, the intervention must be communicated to the F-GAS Database, where available; otherwise, records shall be kept by the operator.

Interruption of operation and decommissioning of the plant or parts thereof

Plant is put out of service

If the plant has to be taken out of service, decommissioning will be carried out in order to avoid any risk to the safety of people, property and the environment.

In addition, the F-GAS Regulation requires the customer to take all measures to avoid refrigerant gas leaks and therefore the customer must contact a plant engineer with certified personnel and company, who must communicate the intervention within 30 days on the F-GAS database, where available; otherwise, records shall be kept by the operator.

The presence of A2L gas requires the use of additional precautions regarding the equipment to be used for field activities with flammable refrigerant gas. For this purpose, reference can be made to the indications given by EN378-4 in addition to those provided by the manufacturer.

Removal of refrigerant

Operators of equipment containing fluorinated greenhouse gases, which are not contained in foams, must ensure that these substances are recovered and, after dismantling the equipment, are recycled, remanufactured or destroyed. The recovery of these substances must be carried out by natural persons who hold the necessary certificates.

Recovered fluorinated greenhouse gases listed in Annex I and Annex II, Section 1, may not be used to charge or recharge equipment unless the gas has been recycled or regenerated.

The presence of A2L gas requires the use of additional precautions regarding the equipment to be used for field activities with flammable refrigerant gas. For this purpose, reference can be made to the indications given by EN378-4 in addition to those provided by the manufacturer.

Within 30 days of the intervention, the recovered gas must be reported to the F-GAS database, where available; otherwise, records shall be kept by the operator.

A3 plants and equipment

The application of flammable gases such as hydrocarbons (e.g. R290 and R600) in installations for commercial refrigeration applications is described below, including, for example:

- Small-sized autonomous (so-called "plug-in") equipment, with a limited quantity of gas (<500g) for each appliance, suitable for use in rooms occupied by people;
- Chiller, generally located outside the building, served by a series of different refrigeration users, with quantities of gas proportionate to the cooling capacity that can vary from kg to tens of kg. The cooling capacity cools water or other non-flammable energy carriers, which are subsequently distributed to users in the occupied rooms.
- Equipment equipped with a refrigeration circuit, with limited charge (<500g) and connected to a water ring for the disposal of condensation heat with a simple dry cooler. In this case, the refrigerant is only contained in the individual refrigeration units.

Other equipment is not considered (e.g. direct expansion systems with a remote condenser or split with evaporator inside the rooms).

In the case of A3 refrigerants, special attention must be paid to the main hazard arising from the flammability of the gas.

Classification A3 indicates an extremely flammable and/or explosive refrigerant to be considered hazardous, and the repercussions on the risk of fire must be assessed.

Certification and training

In the coming years, certification programs for the so-called natural refrigerants will be made available and then individuals will have to be certified to carry out the activities of installation, maintenance or service, repair, leak checks, equipment dismantling and refrigerant recovery.

Before commissioning

Design

In the case of plug-ins (that are machines and not systems) or chillers with an exclusively water-powered plant part, the design, in relation to the refrigerant, is exclusively pertinent to the machines being installed. This design is the responsibility of the machine manufacturer who will provide the CE marking, the CE declaration, the manuals, etc., for each machine.

- For plug-ins, it is not necessary for the customer to commission a designer or a company that manufactures refrigeration systems to draw up the project and process the offer.
- For the water distribution system of a system with A3 refrigerant chillers, it is necessary for the customer to commission a designer or a company that builds refrigeration systems to draw up the project for the water part of the system only and to draw up the offer.

In the plant design phase, once the specific intended use of the system has been defined and the sizing has been carried out in relation to the thermal loads, as well as the route of the pipes, compliance with the simplified technical standards must be assessed in the case of brine water distribution, as it is refrigerant-free.

In the case of plug-ins with charges limited to what is defined in the relevant product standards, the risks are already considered by the machine manufacturer during the design phase of the same. The installer must follow the manufacturer's instructions.

In the case of a system with an A3 refrigerant chiller, the flammability of the refrigerant normally leads to the installation of the equipment outdoors (roof or well-ventilated environment). The plant design is related to the hydraulic circuit for the distribution of glycol water where one of the risks to be considered is the possibility of leakage of flammable refrigerant into the distribution circuit and the consequent leakage in unforeseen areas (as indicated in EN 378).

Locating the PED category of components and assemblies

Plug-ins or machines connected exclusively with a water distribution system will comply with the applicable directives which, depending on the solution used, will provide for compliance, if necessary, with the PED. Such conformity is the responsibility of the machine manufacturer. For these types of systems, it is advisable to draw up a technical system file, but it is not necessary to identify PED assemblies given the limited operating pressure of water distributions.

For example, a plant with chillers and brine may have a significant distribution system for which a technical file is required where the main components of the system (pumps, taps, branches, piping, etc.) are identified.

Project compliance verification procedure

According to the Machinery Directive (superseded by the new Machinery Regulation) and all applicable Directives for individual equipment, checks with type conformity tests and CE marking.

Installation

The installation phase of the equipment under examination does not require the construction of refrigeration lines but only electrical and hydronic connections. However, the company in charge must, in addition to the aforementioned requirements, have experience in the installation of equipment with flammable gas and must adopt the precautions indicated by EN378-4 on activities related to the presence of flammable refrigerant gas, using suitable equipment, if it is necessary to carry out operations with the gas.

The positioning of the equipment must be done according to the manufacturer's instructions, also considering the distances from places where, in the event of a leak, the gas can collect and cause a flammable gas mixture.

For example, for chillers, EN378-3 prescribes the assessment of the risk of explosion in the rooms where the equipment is installed, for example by carrying out an assessment according to 60079-1-10 standard.

Appropriate precautions must also be taken to prevent the refrigerant gas from being inside the secondary circuit (e.g. double-walled separation executions or venting systems).

A plug-in has no intervention on the refrigerant circuit, the only connection to a system could be the one for draining condensate.

Commissioning

If a flammable refrigerant is used, the warning mark B.3.2 of ISO Publication 3864 must be permanently affixed to the appliance. For equipment such as plug-ins, this symbol is placed directly by the manufacturer.

Please note that if the equipment exceeds 10kg of refrigerant gas, the room or area where the equipment is positioned must be marked with appropriate symbols that highlight the presence of flammable gas.

During exercise

In the case of plug-ins (that are machines and not systems) or chillers with an exclusively water-powered plant part, the activities to be carried out during operation, in relation to the refrigerant, are exclusively pertinent to the machines being installed.

The presence of non-fluorinated flammable gases in the current state of the legislation does not require special certifications. The presence of A3 gas requires the use of additional precautions regarding the equipment to be used for field activities with flammable refrigerant gas, in particular the use of instrumentation suitable for explosive atmospheres. For this purpose, reference can be

made to the indications given by EN378-4 or any product standards, in addition to those provided by the manufacturer.

Operation

The customer may operate the system by delegating the control of operation to personnel adequately trained in the methods provided by the installer and the risks present. In particular, in the event that there is not a plant but a set of machines (plug-ins), those who carry out the installation must make sure that they know and follow the instructions (use and/or maintenance manual) of the manufacturers of the machines themselves.

For example: display cases, water ring pumping unit, dry cooler, chiller etc....

Periodic

Normally, plug-ins or other appliances, having a charge of less than 3 kg (less than 6 kg if hermetically sealed), do not require periodic inspection to check for leaks.

On the other hand, for chillers with more than 3 kg of charge, it is important to comply with periodic verification activities.

For example, according to EN 378-3, the condition of the premises and their safety devices (sensors, alarms, ventilation, etc.) must be checked at least once a year.

For water ring systems where there is a possibility that the refrigerant gas is dispersed within the secondary circuit, it is necessary to include in the periodic checks the control of the operation of the devices responsible for reducing the risk (e.g. valves or vent systems) according to the provisions of the system manufacturer (system user and/or maintenance manual). For systems with a high refrigerant gas content (300kg), it is necessary to periodically check the presence of refrigerant gas on the secondary refrigerant gas circuit.

For example, for detection systems for A3, if provided, EN378 requires at least annual verification of the devices on premises.

For the equipment, you can refer to the manufacturer's instructions.

Leak checks

Normally, plug-ins or other appliances, having a charge of less than 3 kg, do not require periodic inspection to check for leaks.

On the other hand, for propane chillers, although not required by law, checking the refrigerant charge in the machine through periodic checks is important. These checks depend on the installation site and must comply with the requirements of the machine manufacturer and applicable product or other standards (e.g. EN 378-4).

For example, EN 378-4 indicates that a refrigeration system containing more than 3 kg of fluorinated refrigerant gas must be subject to a check at least annually up to 30 kg, every six months up to 300 kg and every three months over 300 kg.

Refrigeration circuit maintenance and general maintenance

The maintenance of the equipment must be carried out – scrupulously following the instructions of the equipment manufacturer and the installer – by competent personnel in possession of the qualifications and any certifications of skills with reference to EN 13313 for chillers.

Depending on the operations carried out (mechanical, electrical, cooling, etc.) the skills required may also be of a different nature and require different qualifications.

Interruption of operation and decommissioning of the plant or parts thereof

Plant is put out of service

If the plant has to be taken out of service, decommissioning will be carried out to avoid any risk to the safety of people, property and the environment.

The presence of A3 gas requires the use of additional precautions regarding the equipment to be used for field activities with flammable refrigerant gas. For this purpose, reference can be made to the indications given by EN378-4 in addition to those provided by the manufacturer.

Removal of refrigerant

Personnel working must consider the precautions provided for in EN378-4 for flammable refrigerant gases.

Although the F-GAS Regulation does not establish a legal obligation, it is recommended that non-fluorinated A3 refrigerants are not dispersed into the environment and are fully recovered, also for reasons related to site safety. Even for non-fluorinated gases, the recovered gas can be reused, recycled or regenerated, in accordance with current standards, therefore not necessarily disposed of (as indicated by EN 378-4).

The removal of refrigerant gas must be carried out by specialized companies. The presence of A3 gas requires the use of additional precautions regarding the equipment to be used for field activities with flammable refrigerant gas. For this purpose, reference can be made to the indications given by EN378-4 in addition to those provided by the manufacturer.

Disclaimer

With this document, Eurovent has endorsed the AssoCold and Assofrigoristi guide, which intend to provide some practical support, addressing manufacturers, refrigeration technicians and economic operators involved in the supply and management of the life cycle of commercial refrigeration products and systems for a consistent and uniform application of the regulatory obligations that apply to them.

It should be noted that the indications contained therein, although elaborated and shared within AssoCold – Assofrigoristi and taking as a reference technical standards, European regulations and national laws, are not legally binding and are not intended in any way to replace or interfere with the correct application of all the legal requirements on the subject which always and in any case prevail in the event of incompatibility and whose careful compliance is recommended in any case.

Annexes

ANNEX I to Regulation (EU) 2024/573

Fluorinated greenhouse gases referred to in article 2, point (a)(1)– hydrofluorocarbons, perfluorocarbons and other fluorinated compounds

Substance			GWP(2)	20 years-GWP (3) for information purposes only
Industrial designation	Chemical name (Common name)	Chemical formula		
Section 1: Hydrofluorocarbons (HFCs)				
HFC-23	trifluoromethane (fluoroform)	CHF_3	14 800	12 400
HFC-32	difluoromethane	CH_2F_2	675	2 690
HFC-41	Fluoromethane (methyl fluoride)	CH_3F	92	485
HFC-125	pentafluoroethane	CHF_2CF_3	3 500	6 740
HFC-134	1,1,2,2-tetrafluoroethane	CHF_2CHF_2	1 100	3 900
HFC-134a	1,1,1,2-tetrafluoroethane	CH_2FCF_3	1 430	4 140
HFC-143	1,1,2-trifluoroethane	CH_2FCHF_2	353	1 300
HFC-143a	1,1,1-trifluoroethane	CH_3CF_3	4 470	7 840
HFC-152	1,2-difluoroethane	CH_2FCH_2F	53	77,6
HFC-152a	1,1-difluoroethane	CH_3CHF_2	124	591
HFC-161	Fluoroethane (ethyl fluoride)	CH_3CH_2F	12	17,4
HFC-227ea	1,1,1,2,3,3,3-heptafluoropropane	CF_3CHFCF_3	3 220	5 850
HFC-236cb	1,1,1,2,2,3-hexafluoropropane	$CH_2FCF_2CF_3$	1 340	3 750
HFC-236ea	1,1,1,2,3,3-hexafluoropropane	CHF_2CHFCF_3	1 370	4 420
HFC-236fa	1,1,1,3,3,3-hexafluoropropane	$CF_3CH_2CF_3$	9 810	7 450
HFC-245ca	1,1,2,2,3-pentafluoropropane	$CH_2FCF_2CHF_2$	693	2 680
HFC-245fa	1,1,1,3,3-pentafluoropropane	$CHF_2CH_2CF_3$	1 030	3 170
HFC-365mfc	1,1,1,3,3-pentafluorobutane	$CF_3CH_2CF_2CH_3$	794	2 920
HFC-43-10mee	1,1,1,2,2,3,4,5,5,5 decafluoropentane	$CF_3CHFCHFCF_2CF_3$	1 640	3 960

Substance			GWP 100 (4)	GWP 20 (4)
Industrial designation	Chemical name (Common name)	Chemical formula		
Section 2: Perfluorocarbons (PFCs)				
PFC-14	Tetrafluoromethane (perfluoromethane, carbon tetrafluoride)	CF_4	7 380	5 300
PFC-116	Hexafluoroethane (perfluoroethane)	C_2F_6	12 400	8 940
PFC-218	Octafluoropropane (perfluoropropane)	C_3F_8	9 290	6 770
PFC-3-1-10 (R-31-10)	Decafluorobutane (perfluorobutane)	C_4F_{10}	10 000	7 300
PFC-4-1-12 (R-41-12)	Dodecafluoropentane (perfluoropentane)	C_5F_{12}	9 220	6 680
PFC-5-1-14 (R-51-14)	Tetradecafluorohexane (perfluorohexane)	$CF_3CF_2CF_2CF_2CF_2CF_3$	8 620	6 260
PFC-c-318	Octafluorocyclobutane (perfluorocyclobutane)	c-C_4F_8	10 200	7 400
PFC-9-1-18 (R-91-18)	Perfluorodecalin	$C_{10}F_{18}$	7 480	5 480
PFC-4-1-14 (R-41-14)	perfluoro-2-methylpentane	$CF_3CFCF_3CF_2CF_2CF_3$ (i-C_6F_{14})	7 370 (5)	(*1)
Section 3: Other (per)fluorinated compounds and fluorinated nitriles				
	sulphur hexafluoride	SF_6	24 300	18 200
	Heptafluoroisobutyronitrile (2,3,3,3-tetrafluoro-2-(trifluoromethyl)-propanenitrile)	Iso-C_3F_7CN	2 750	4 580

ANNEX II to Regulation (EU) 2024/573

Fluorinated greenhouse gases referred to in Article 2, point (a)(1)– unsaturated hydro(chloro) fluorocarbons, fluorinated substances used as inhalation anaesthetics and other fluorinated substances

Substance		GWP (2)	20 years-GWP (2) for information purposes only
Common name/industrial designation	Chemical formula		
Section 1: Unsaturated hydro(chloro)fluorocarbons			
HCFC-1224yd	$CF_3CF=CHCl$	0,06 (3)	(*1)
Trans–1,2 -difluoroethylene (HFC-1132) and isomers	CHF=CHF	>1	(*1)
1,1-difluoroethylene (HFC-1132a)	$CH_2=CF_2$	0,052	0,189
1,1,1,2,3,4,5,5,5(or1,1,1,3,4,4,5,5,5)-nonafluoro-4(or2)-(trifluoromethyl)pent-2-ene	$CF_3CF=CFCFCF_3CF_3$ Or $CF_3CF_3C=CFCF_2CF_3$	1 (4)	(*1)
HFC-1234yf	$CF_3CF = CH_2$	0,501	1,81
HFC-1234ze and isomers	$CHF = CHCF_3$	1,37	4,94
HFC-1336mzz(E)	(E)-$CF_3CH = CHCF_3$	17,9	64,3
HFC-1336mzz(Z)	(Z)-$CF_3CH = CHCF_3$	2,08	7,48
HCFC-1233zd and isomers	$CF_3CH = CHCl$	3,88	14
HCFC-1233xf	$CF_3CCl = CH_2$	1 (4)	(*1)
Section 2: fluorinated substances used as inhalation anaesthetics			
HFE-347mmz1 (sevoflurane) and isomers	$(CF_3)_2CHOCH_2F$	195	702
HCFE-235ca2 (enflurane) and isomers	CHF_2OCF_2CHFCl	654	2 320
HCFE-235da2 (isoflurane) and isomers	$CHF_2OCHClCF_3$	539	1 930
HFE-236ea2 (desflurane) and isomers	$CHF_2OCHFCF_3$	2 590	7 020
Section 3: other fluorinated substances			
nitrogen trifluoride	NF_3	17 400	13 400
sulfuryl fluoride	SO_2F_2	4 630	7 510

(1) As per Article 2, point (a), mixtures containing the substances listed in this Annex are considered as fluorinated greenhouse gases covered by this Regulation.

ANNEX IV to Regulation (EU) 2024/573

Placing on the market prohibitions referred to in Article 11(1)

Products and equipment		Date of prohibition
(1)Non-refillable containers for fluorinated greenhouse gases listed in Annex I, empty, partially or fully filled, used to service, maintain or fill refrigeration, air-conditioning or heat pump equipment, fire protection systems or electrical switchgear, or for use as solvents.		4 July 2007
STATIONARY REFRIGERATION		
(2)Domestic refrigerators and freezers:	(a)that contain HFCs with GWP of 150 or more;	1 January 2015
	(b)that contain fluorinated greenhouse gases, except if required to meet safety requirements at the site of operation.	1 January 2026
(3)Refrigerators and freezers for commercial use (self-contained equipment):	(a)that contain HFCs with GWP of 2 500 or more;	1 January 2020
	(b)that contain HFCs with GWP of 150 or more;	1 January 2022
	(c)that contain other fluorinated greenhouse gases with a GWP of 150 or more.	1 January 2025
(4)Any self-contained refrigeration equipment, except chillers, that contains fluorinated greenhouse gases with a GWP of 150 or more, except if required to meet safety requirements at the site of operation.		1 January 2025
(5)Refrigeration equipment, except chillers and equipment covered in points (4) and (6), that contains, or whose functioning relies upon:	(a)HFCs with GWP of 2 500 or more except equipment intended for application designed to cool products to temperatures below – 50 °C;	1 January 2020
	(b)fluorinated greenhouse gases with a GWP of 2 500 or more, except equipment intended for application designed to cool products to temperatures below – 50 °C;	1 January 2025
	(c)fluorinated greenhouse gases with a GWP of 150 or more, except if required to meet safety requirements at the site of operation.	1 January 2030

(6)Multipack centralised refrigeration systems for commercial use with a rated capacity of 40 kW or more that contain, or whose functioning relies upon, fluorinated greenhouse gases listed in Annex I with GWP of 150 or more, except in the primary refrigerant circuit of cascade systems where fluorinated greenhouse gases with a GWP of less than 1 500 may be used.	1 January 2022

STATIONARY CHILLERS		
(7)Chillers that contain, or whose functioning relies upon:	(a)HFCs with GWP of 2 500 or more except equipment intended for application designed to cool products to temperatures below – 50 °C;	1 January 2020
	(b)fluorinated greenhouse gases with a GWP of 150 GWP or more for chillers up to and including a rated capacity of 12 kW, except if required to meet safety requirements at the site of operation;	1 January 2027
	(c)fluorinated greenhouse gases for chillers up to and including a rated capacity of 12 kW, except if required to meet safety requirements at the site of operation;	1 January 2032
	(d)fluorinated greenhouse gases with a GWP of 750 for chillers above 12 kW, except if required to meet safety requirements at the site of operation.	1 January 2027

About Eurovent

Eurovent is the voice of the European HVACR industry, representing over 100 companies directly and more than 1.000 indirectly through our 16 national associations. The majority are small and medium-sized companies that manufacture indoor climate, process cooling, and cold chain technologies across more than 350 manufacturing sites in Europe. They generate a combined annual turnover of more than 30 billion EUR and employ over 150.000 Europeans in good quality tech jobs.

Mission

Eurovent's mission is to bring together HVACR technology providers to collaborate with policymakers and other stakeholders towards conditions that foster fair competition, innovation, and sustainable growth for the European HVACR industry.

Vision

Eurovent's vision is an innovative and competitive European HVACR industry that enables sustainable development in Europe and globally, which works for people, businesses, and the environment.

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