



UNIFE F-Gas Regulation factsheet

November 2024

About UNIFE

Operating in Brussels since 1992, UNIFE, the European Rail Supply Industry Association, represents European train builders and rail equipment suppliers. The association advocates for more than 110 of Europe's leading rail supply companies – from SMEs to major industrial champions – active in designing, manufacturing, maintaining and refurbishing rail transport systems (trains, metros, trams, freight wagons), subsystems and related equipment. UNIFE also brings together national rail industry associations from 12 European countries. UNIFE members have an 84% market share in Europe and supply 46% of the worldwide rail production, representing more than 400,000 jobs in Europe.

The [UNIFE Chemical Risks Topical Group \(CR TG\)](#) leads UNIFE's policy on chemicals and hazardous substances management at the world and European levels, including the *European Chemicals Agency* (ECHA) activities, but not limited to them. It focuses on batteries, F-Gases (fluorinated gases), OHS (occupational health and safety), PFAS (Per- and polyfluoroalkyl substances), REACH (Registration, Evaluation, Authorization and restriction of Chemicals), RoHS (Restriction of Hazardous Substances), SCIP (substances of concern in products), and WEEE (waste electrical and electronic equipment). It updates the [Railway Industry Substance List \(RISL\)](#).

Introduction

This UNIFE fact sheet explains to what extent products from its member companies fall within the scope of the [Regulation on Fluorinated Greenhouse Gases \(EU\) No 2024/573, amending Directive \(EU\) No 2019/1937 and repealing Regulation \(EU\) No 517/2014](#).

Additionally, the following regulations need to be respected:

- EU 2024/2215 – certification of staff;
- EU 2024/2174 – labelling of equipment.

It is recommended that this fact sheet be considered in conjunction with the legal text and the separate guidance documents from the European Commission.

F-Gas Regulation (EU) No 2024/573

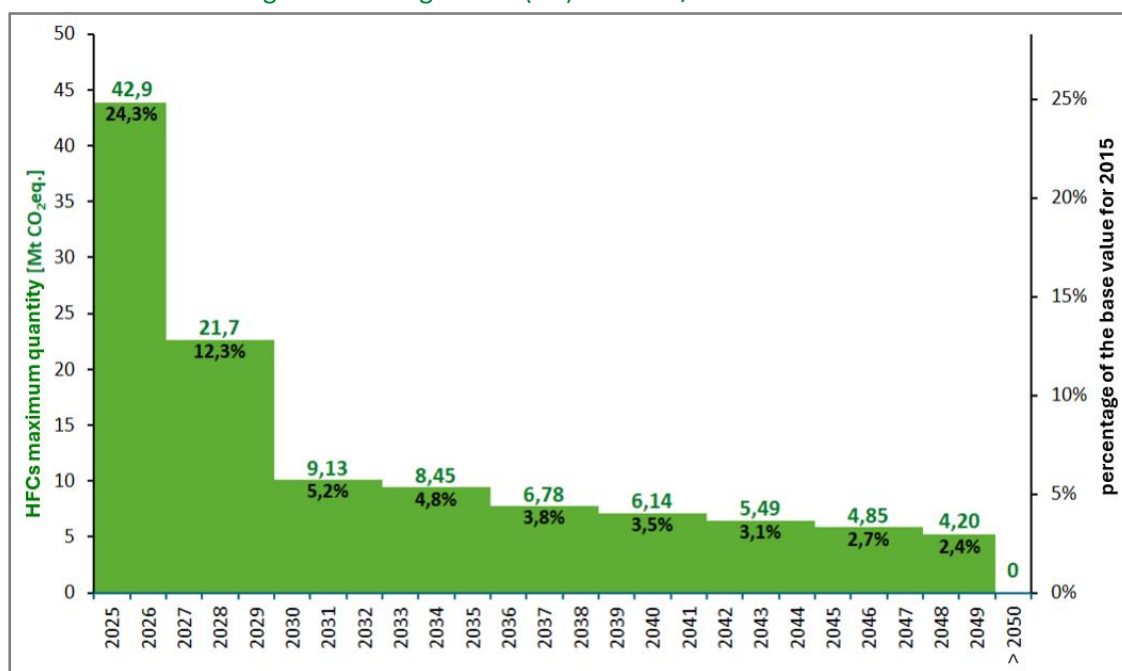
Regulation (EU) No 2024/573 on fluorinated greenhouse gases (**F-Gas Regulation**) entered into force on 11 March 2024 and replaced the previous F-Gas Regulation (EU) No 517/2014, which entered into force on 1 January 2015.

Content of the F-Gas Regulation (EU) No 2024/573

The phase-out of F-gases will be significantly accelerated through a more stringent phase-down. The phase-down until 2032 was set in the F-Gases Regulation (EU) No 517/2014. With F-Gas Regulation (EU) No 2024/573, this will be tightened again and continued until 2050 with the ban on all F-gases.

In addition, a fixed amount of three euros per tonne of CO₂ of the existing quota is due. This amount is intended to cover part of the administrative costs. The fee of 3€/t will likely be increased in the future as the quota is completed, but the administrative costs will remain the same. In particular, the F-Gas Regulation (EU) No 2024/573 will create incentives to use alternatives to the previous F-gases.

Phase-down according to F-Gas Regulation (EU) No 2024/573



Base value = 176,7 Mt CO₂eq. (source: German Environment Agency)

Prohibitions and restrictions under F-Gas Regulation (EU) No 2024/573

The new F-Gas Regulation prohibits using and placing F-gases in the market, which takes effect at different points in time. Article 13 of the F-Gas Regulation governs prohibitions of use. Article 11, in association with Annex IV, regulates market placement restrictions.

According to the F-Gas Regulation, heating, ventilation, and air conditioning (HVAC) units installed in rolling stock are considered mobile in the rail industry, as they are normally in transit during operation.

The majority of products or equipment for the rail Industry is not part of the scope of the F-Gas Regulation as it does not fall into one of the following products or equipment listed in the extract (domestic or general public prohibitions omitted) of Annex IV, see below:

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		
(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

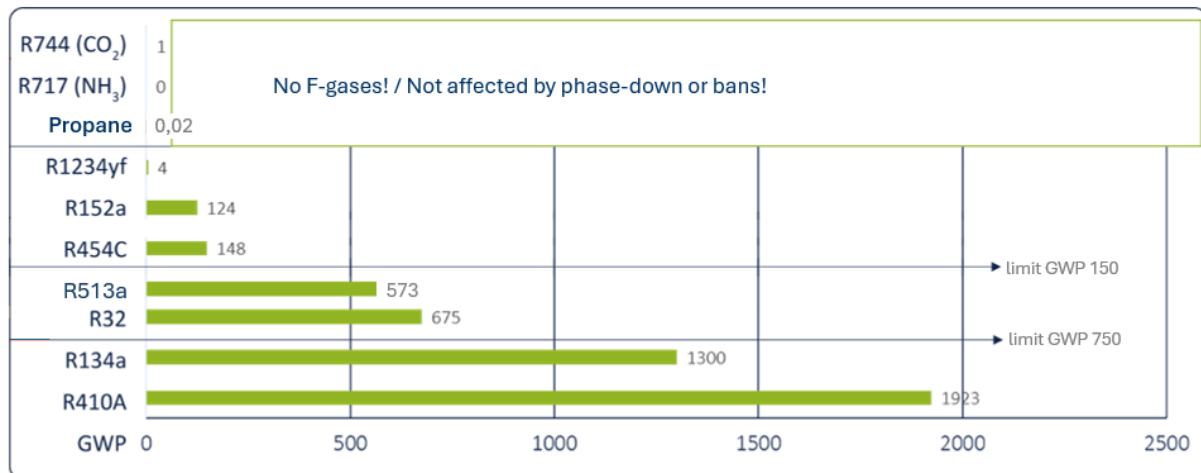
STATIONARY CHILLERS		
(7) Chillers that contain, or whose functioning relies upon:	(a) HFCs with GWP of 2 500 or more except equipment intended for application designed to cool products to temperatures below – 50 °C;	1 January 2020
	(b) fluorinated greenhouse gases with a GWP of 150 GWP or more for chillers 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
STATIONARY AIR-CONDITIONING EQUIPMENT AND STATIONARY HEAT PUMPS		
(8) Self-contained air-conditioning equipment and heat pumps, except chillers, that:	(a) plug-in room air-conditioning equipment which is moveable between rooms by the end user that contains HFCs with GWP of 150 or more;	1 January 2020
	(b) plug-in room air-conditioning equipment, monoblock air-conditioning equipment, other self-contained air-conditioning equipment and self-contained heat pumps, with a maximum rated capacity of up to and including 12 kW that contain fluorinated greenhouse gases with a GWP of 150 or more, except if required to meet safety requirements. If safety requirements at the site of operation would not allow using fluorinated greenhouse gases with GWP of less than 150, the GWP limit is 750;	1 January 2027
	(c) plug-in room air-conditioning equipment, monoblock air-conditioning equipment, other self-contained air-conditioning equipment and self-contained heat pumps, with a maximum rated capacity of up to and including 12 kW that contain fluorinated greenhouse gases, except if required to meet safety requirements. If safety requirements at the site of operation would not allow using alternatives to fluorinated greenhouse gases, the GWP limit is 750;	1 January 2032
	(d) monoblock and other self-contained air-conditioning equipment and heat pumps, with a maximum rated capacity of more than 12 kW but not exceeding 50 kW that contains fluorinated greenhouse gases with a GWP of 150 or more, except if required to meet safety requirements. If safety requirements at the site of operation would not allow using fluorinated greenhouse gases with GWP of less than 150, the GWP limit is 750;	1 January 2027
	(e) other self-contained air-conditioning equipment and heat pumps that contain fluorinated greenhouse gases with GWP of 150 or more, except if required to meet safety requirements. If safety requirements at the site of operation would not allow using fluorinated greenhouse gases with GWP of less than 150, the GWP limit is 750.	1 January 2030

(9) Split air-conditioning equipment and heat pumps (1):	(a) Single split systems, containing less than 3 kg of fluorinated greenhouse gases listed in Annex I, that contain, or whose functioning relies upon, fluorinated greenhouse gases listed in Annex I with GWP of 750 or more;	1 January 2025
	(b) Split air-to-water systems of a rated capacity up to and including 12 kW containing, or whose functioning relies upon, fluorinated greenhouse gases with GWP of 150 or more, except if required to meet safety requirements at the site of operation;	1 January 2027
	(c) Split air-to-air systems of a rated capacity up to and including 12 kW containing, or whose functioning relies upon, fluorinated greenhouse gases with GWP of 150 or more, except if required to meet safety requirements at the site of operation;	1 January 2029
	(d) Split systems of a rated capacity up to and including 12 kW containing, or whose functioning relies upon, fluorinated greenhouse gases, except if required to meet safety requirements at the site of operation;	1 January 2035
	(e) Split systems of a rated capacity of more than 12 kW containing, or whose functioning relies upon, fluorinated greenhouse gases with GWP of 750 or more, except if required to meet safety requirements at the site of operation;	1 January 2029
	(f) Split systems of a rated capacity of more than 12 kW containing, or whose functioning relies upon, fluorinated greenhouse gases with GWP of 150 or more, except if required to meet safety requirements at the site of operation.	1 January 2033
OTHER PRODUCTS AND EQUIPMENT		
(10) Non-confined direct evaporation systems that contain HFCs and PFCs as refrigerants.		4 July 2007
(11) Fire protection equipment:	(a) that contain PFCs;	4 July 2007
	(b) that contain HFC-23;	1 January 2016
	(c) that contain or rely on other fluorinated greenhouse gases listed in Annex I, except when required to meet safety requirements at the site of operation.	1 January 2025
(16) One-component foams, except when required to meet national safety standards, that contain fluorinated greenhouse gases listed in Annex I with GWP of 150 or more.		4 July 2008
(17) Foams:	(a) Extruded polystyrene (XPS) that contain HFCs with GWP of 150 or more, except if required to meet national safety standards;	1 January 2020
	(b) Foams other than extruded polystyrene (XPS) that contain HFCs with GWP of 150 or more, except if required to meet national safety standards;	1 January 2023
	(c) Foams that contain fluorinated greenhouse gases, except if required to meet safety requirements.	1 January 2033

Import and export of greenhouse gases / Pre-charged equipment

With the new F-Gas Regulation, a license will be required for every import and export of the F-gases listed in the Regulation. The license can be applied by presenting a corresponding quota, for which registration in the so-called European Commission's [F-Gas Portal](#) is necessary (Article 18). This also applies to manufacturers or importers of devices pre-filled with F-gases (Article 19).

Overview of some refrigerants with limits of Regulation (EU) No 2024/573 and GWPs



Certification and training

To carry out installation, maintenance or servicing, repair or decommissioning, leak testing, and recovery, at least a certificate of training for activities related to F-gases must be available (Article 10).

The certification programme and training in practical skills and theoretical knowledge shall cover:

- (a) applicable regulations and technical standards;
- (b) emission prevention;
- (c) recovery of F-gases;
- (d) safe handling of the relevant equipment;
- (e) safe handling of equipment containing flammable or toxic gases or operating under high pressure or presenting other relevant risks;
- (f) measures to improve or maintain the energy efficiency of equipment during installation or servicing and maintenance.

Restrictions on the use of refrigerants in service and maintenance

The use of F-gases in service and maintenance of refrigeration systems and heat pumps with a global warming potential of more than 2,500 or in a second stage of more than 750 will be prohibited and restricted to the use of reclaimed and recycled F-gases (Article 13).

Newly manufactured refrigerant

From 01.01.2026	Ban on the use of newly manufactured refrigerants with a GWP of over 2500 for air conditioning systems and heat pumps
From 01.01.2032	Ban on the use of newly manufactured refrigerants with a GWP of over 750 for air conditioning systems and heat pumps

Reclaimed/Recycled Refrigerant

Until 31.12.2031	Use of reclaimed and recycled refrigerant with a GWP above 2500.
From 01.01.2032	Use of reclaimed and recycled refrigerant with a GWP above 750.

Application example:

This means that from 1 January 2032, the refrigerant R134a may no longer be used as a newly manufactured refrigerant in air conditioning systems and heat pumps for service purposes. Only recycled and reclaimed R134a may be used. However, only if it is used by the company that carried out the recovery as part of maintenance or servicing. If no R134a was removed from systems, none can be reused.

Leakage checks and leak detection

Operators and manufacturers of equipment such as refrigeration and air conditioning systems, heat pumps, fire protection systems, and electrical switchgear must carry out leakage checks if they contain F-gases (Article 5). For staff certification, see EU 2024/2215.

Leak detection systems are still essential in stationary installations containing F-gases in quantities of 100 kilos or more. For installations for which leakage control is mandatory, operators must keep records of the F-gases. These records must document the time and result of the controls carried out and the time and result of the repairs carried out to any leaks (Article 6).

F-gases	Amount	Interval leak check
Fluorinated greenhouse gases according to Annex I (HFCs)	Less than 50 t CO ₂ equivalent (no more restrictions from 5 t CO ₂ eq.)	≤ 12 months without LDS ≤ 24 months with LDS
Fluorinated greenhouse gases according to Annex II (HFOs)	less than 10 kg	≤ 12 months without LDS ≤ 24 months with LDS
Fluorinated greenhouse gases according to Annex I (HFCs)	at least 50 t and less than 500 t CO ₂ equivalent	≤ 6 months without LDS ≤ 12 months with LDS
Fluorinated greenhouse gases according to Annex II (HFOs)	10 to 100 kg	≤ 6 months without LDS ≤ 12 months with LDS
Fluorinated greenhouse gases according to Annex I (HFCs)	at least 500 t CO ₂ equivalent	≤ 3 months without LDS ≤ 6 months with LDS

Fluorinated greenhouse gases according to Annex II (HFOs)	100 kg or more	≤ 3 months without LDS ≤ 6 months with LDS
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LDS means “leakage detection system”, HFOs Hydrofluoroolefins, and HFCs Hydrofluorocarbons.

Labelling / Product and equipment information

A label is required for products and equipment that contain F-gases (Article 12). The label has to contain the following information:

- Reference that the equipment contains F-gases;
- Designation of the F-gases or Chemical name;
- Quantity of F-gases expressed in weight and CO₂;
- Mention of hermetically sealed equipment (if applicable);
- Reference that the electrical switchgear has a tested leakage rate of < 0.1% per year as specified by the manufacturer.
- For further details see also EU 2024/2174.

Recovery and destruction

Operators of facilities containing F-gases in the cooling circuits of air conditioning systems and heat pumps must ensure that these substances are recovered and recycled, reclaimed or destroyed after the facilities are taken out of service. This applies to fixed installations and trains, subways and trams (Article 8).

Conclusion for the Rail Industry

The F-Gas Regulation (EU) No 2024/573 places new requirements on specific activities. However, in general, the direct impact of the F-Gas Regulation on the rail industry, compared with other industries, is minimal. However, the ongoing quota reduction will impact the market for rail vehicle refrigerants, as new high and medium GWP refrigerants will be less available in the future. There is still the risk of a complete ban on F-gases for mobile applications due to the review clause in 2027 (Article 13).

In general, the requirements of the F-Gas Regulation should be taken into account in the following activities:

- Design,
- Procurement,
- Installation,
- Warranty,
- Maintenance,
- Refurbishment.

In particular, the F-Gas Regulation must be considered when conducting those activities on systems or materials where F-gases may be found. In the rail industry, these are:

- Heating, ventilation, and air conditioning (HVAC),
- Catering systems (fridges and refrigerated cabinets),
- Battery Thermal Management System (BTMS),
- Bioreactor toilet systems,

- High voltage gear,
- Refrigeration,
- Fire protection,
- Foams.

Re-evaluation and review of F-Gas Regulation No 2024/573

The Commission will publish a report by 1 July 2027 assessing whether there are cost-effective, technically feasible, energy-efficient and reliable alternatives to replace F-gases in mobile refrigeration and air conditioning systems. In addition, the European Commission will reassess the overall impacts and benefits of the F-Gas Regulation by 2030 at the latest. This will include an assessment of the availability of cost-effective, technically feasible and sufficiently available alternatives to F-gases. The European Commission will also review by 2040 whether setting the target for phasing out HFCs by 2050 is realistic. This will consider technological developments and the availability of HFC alternatives for the relevant applications (Article 35).

Definitions

- **Chiller** is a single system whose primary function is to cool a heat transfer fluid (such as water, glycol, brine or CO₂) for refrigeration, process, preservation or comfort purposes.
- **Fluorinated greenhouse gases (F-gases)** means the hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and other greenhouse gases that contain fluorine, listed in Annex I and others of the Regulation, or mixtures containing any of those substances.
- **Global warming potential** or GWP means the climatic warming potential of greenhouse gas relative to that of carbon dioxide (CO₂), calculated in terms of the 100-year warming potential of one kilogram of a greenhouse gas relative to one kilogram of CO₂.
- **Hermetically sealed equipment** means equipment in which all parts containing F-gases are made tight during the manufacturing process at the premises of the manufacturer by welding, brazing or a similar permanent connection, which may include capped valves or capped service ports that allow proper repair or disposal, and of which the joints in the sealed system have a tested leakage rate of less than 3 grams per year under a pressure of at least a quarter of the maximum allowable pressure.
- **Hydrofluorocarbons** or HFCs are the substances listed in section 1 of Annex I of the Regulation or mixtures containing any of those substances.
- **Hydrofluoroolefins** or HFOs are unsaturated organic compounds of hydrogen, fluorine and carbon. In contrast to the traditional saturated hydrofluorocarbons (HFCs) and chlorofluorocarbons (CFCs), HFOs are alkenes (olefins).
- **Installation** means joining two or more pieces of equipment or circuits containing or designed to contain F-gases, with a view to assembling a system in the location where it will be operated, which entails joining together gas-carrying conductors of a system to complete a circuit irrespective of the need to charge the system after assembly.
- **Maintenance or servicing** means all activities, excluding recovery in accordance with Article 8 and leak checks under Article 4 and Article 10(1), first subparagraph, point (b), that entail opening the circuits or other subparts containing or designed to contain F-gases, supplying the system with F-gases, removing one or more pieces of circuit or equipment, reassembling two or more pieces of circuit or equipment, as well as repairing leaks, or adding F-gases.

- **Mixture** means a fluid composed of two or more substances, at least one of which is a substance listed in Annex I or in Annex II of the Regulation.
- **Mobile** means normally in transit during operation.
- **Perfluorocarbons** or PFCs means the substances listed in section 2 of Annex I of the Regulation or mixtures containing any of those substances.
- **Placing on the market** means supplying or making available to another party in the European Union for the first time, for payment or free of charge, or using for its own account in the case of a producer, and includes customs release for free circulation in the Union.
- **Repair** means the restoration of damaged or leaking products or equipment that contain, or whose functioning relies upon, F-gases, involving a part containing or designed to contain such gases.
- **Sulphur hexafluoride** or SF₆ means the substance listed in section 3 of Annex I of the Regulation or mixtures containing that substance.
- **Use** means the utilisation of F-gases in the production, maintenance or servicing, including the refilling of products and equipment or in other processes referred to in this Regulation.

Further Information

- **F-Gas Regulation (EU) Nr. 2024/573:** <http://data.europa.eu/eli/reg/2024/573/oj>
- **European Commission:** https://climate.ec.europa.eu/fluorinated-greenhouse-gases_en