



# EU f-Gas Regulation Guidance

## Stationary Air-conditioning and Heat Pumps

### 1. Background

This guidance is for organisations or owners affected by the 2014 EU f-Gas Regulation (517/2014). The f-Gas Regulation creates controls on the use and emissions of fluorinated greenhouse gases (f-Gases) including HFCs, PFCs and SF6. In the stationary air-conditioning and heat pump sectors, the f-Gas Regulation affects the use of HFCs as refrigerants. The 2014 EU f-Gas Regulation replaced the 2006 Regulation, strengthening all of the 2006 requirements and introducing a number of important new measures. The f-Gas Regulation is an important piece of legislation that will result in significant reductions in the emissions of f-Gases. These are very powerful greenhouse gases, with global warming impacts that are several thousand times higher than CO<sub>2</sub> (per kg of gas emitted). All EU Member States agree that it is important to reduce emissions of these gases. This Information Sheet describes the requirements that apply to stationary air-conditioning and heat pumps.

### Target audience for this Information Sheet

This Information Sheet is aimed at organisations and owners that are operators of stationary air-conditioning and heat pump equipment used in buildings of all types.

### Stationary air-conditioning and heat pumps: Compliance Checklist for EU f-Gas Regulation

#### Purchase of new equipment

Comply with various bans on the use of HFCs in new air-conditioning equipment  
Take account of HFC phase down when selecting refrigerants

#### Operation of existing equipment

Mandatory leak checks and repairs  
Use new CO<sub>2</sub> equivalent size thresholds for mandatory leak checks  
Use new size thresholds for automatic leak detection  
Keep records about air-conditioning and heat pump equipment using HFC refrigerants  
Use qualified technicians for leak checking and refrigerant handling operations

#### End-of-life requirements

Mandatory recovery of refrigerant by qualified technician

## 2. Sector description

The stationary air-conditioning and heat pump sector is a major user of HFCs. The majority of end user applications are in domestic, commercial and public sector buildings. There are 5 main categories of equipment used in the stationary air-conditioning and heat pump sector:

- a) **Single split systems.** These consist of an indoor cooling unit connected to an outdoor condensing unit (compressor and condenser). HFC 410A is dominant in new systems and refrigerant charge is typically between 1 kg and 5 kg.
- b) **Large split systems and packaged units.** This includes a range of direct expansion airconditioning systems including multi-splits, VRF systems and rooftop packaged plants. HFC 410A is dominant in new systems and refrigerant charge is typically between 5 and 50 kg.
- c) **Chiller systems.** These are usually used to cool large buildings, using chilled water as a secondary refrigerant. Large chillers often use HFC 134a and have typical refrigerant charges between 50 kg and 500 kg. Smaller chillers might use HFC 410A or HFC 407C and have charges between 5 kg and 50 kg.
- d) **Heating only heat pumps.** This includes air source, ground source and water source heat pumps for building heating. Domestic systems often use HFC 410A and typically have a refrigerant charge between 3 kg and 5 kg. Larger systems using various refrigerants are used in commercial, industrial and public buildings.
- e) **Hermetically sealed movable air-conditioning systems.** Small integral air-conditioning units that can be moved between different rooms in a building. These usually use HFC 134a or HFC 410A and have refrigerant charges of well under 1 kg.

Many stationary air-conditioning systems are “reversible”, meaning that they can operate as cooling systems in hot weather and heat pump heating systems in cold weather. VRF systems are usually designed to operate simultaneously in cooling and heating modes, for different parts of a building.

## 3. Purchase of new equipment

### HFC Bans

The rules for purchase of new equipment depend on the type and size of equipment. There are two bans on the use of HFCs in new stationary air-conditioning and heat pump systems:

Ban 1: Use of HFCs with a GWP1 above 150 will be banned in all new **hermetically sealed movable air-conditioning equipment** placed on the EU market after January 1st **2020**

Ban 2: The use of HFCs with a GWP above 750 will be banned in **single split systems** containing less than 3 kg of refrigerant placed on the EU market after January 1st **2025**

There are no HFC bans that apply to larger air-conditioning systems (including chillers and larger split systems) or to heating only heat pumps.



## Impact of the HFC Phase Down on the purchase of new equipment

When purchasing new air-conditioning and heat pump equipment you should also consider the HFC phase down. This will reduce the quantity of HFCs that can be sold in the EU – by 2030 there will be an 80% cut in HFC supply. Equipment bought now will still be operating when deep cuts in HFC supply are in force. Irrespective of the bans described above, it makes sense to always purchase equipment using refrigerants with the lowest practical GWP to minimise the future impact of the phase down.

## 4. Operation of existing equipment

The 2014 f-Gas Regulation includes a number of requirements that affect the use and maintenance of existing stationary air-conditioning and heat pump equipment containing HFC refrigerants. The rules depend on the type and size of equipment being used. The regulations affecting existing equipment relate to (a) leak prevention, (b) record keeping, and (c) the use of trained technicians.

These requirements are described below:

### Leak prevention and mandatory leak checks

The intentional release of f-Gases into the atmosphere is prohibited and operators of all stationary air-conditioning and heat pump equipment must take all measures that are technically and economically feasible to minimise leakage. Where leaks are detected operators must carry out repairs without undue delay.

Under the 2006 Regulation, the legal responsibility for preventing f-Gas releases was only given to the operator (usually the owner) of the equipment. In the 2014 Regulation there is a similar legal responsibility given to third party contractors carrying out installation, maintenance, leak checking or refrigerant recovery on behalf of operators.

Mandatory leak checks are required on all stationary air-conditioning and heat pump equipment above certain size thresholds. Under the 2014 Regulation the size thresholds are defined in terms of tonnes CO<sub>2</sub> equivalent. Refrigerants with a higher GWP (e.g. HFC 410A) have a lower size threshold than refrigerants with a lower GWP (e.g. HFC 134a). The table on page 3 shows leak testing requirements under 2014 Regulations. Example thresholds are given for HFC 410A and HFC 134a. As shown in table on page 3, the size threshold for HFC 410A is only 2.4 kg. Operators should check which of their systems are affected by the CO<sub>2</sub>e size thresholds. Most of the leak checking rules apply from 1st January 2015. However, for systems with less than 3 kg, the 5 tonnes CO<sub>2</sub>e threshold only applies from 1st January 2017. If a leak is found during a mandatory leak check it must be repaired without undue delay and the leak test repeated within one month to ensure the repair was effective.

### Size Thresholds for Mandatory Leak Checks

| Leak Check Frequency* | 2014 Regulation   |                           |                           |
|-----------------------|---|---------------------------|---------------------------|
|                       | tonnes CO <sub>2</sub> e threshold for all HFC refrigerants | kg threshold for HFC 410A | kg threshold for HFC 134a |
| Annual                | 5 tonnes CO <sub>2</sub> e**                                | 2.4 kg                    | 3.5 kg                    |
| Every 6 months        | 50 tonnes CO <sub>2</sub> e                                 | 24 kg                     | 35 kg                     |
| Every 3 months        | 500 tonnes CO <sub>2</sub> e                                | 240 kg                    | 350 kg                    |

\* Leak check frequency is halved if automatic leak detection system is installed

\*\* The threshold for annual leak checks of hermetically sealed equipment is 10 tonnes CO<sub>2</sub>e



### **Mandatory automatic leak detection**

For all stationary air-conditioning and heat pump systems containing over 500 tonnes CO<sub>2</sub>e there is a mandatory requirement for an automatic leak detection system to be fitted. This will have an impact on plants using higher GWP refrigerants.

For HFC 410A the threshold for automatic leak detection systems is 240 kg. This rule applies from 1<sup>st</sup> January 2015. However, for lower GWP refrigerants the threshold is higher. For HFC 134a, which is commonly used in large chillers, the threshold is 350 kg.

An automatic leak detection system is defined as a *“calibrated mechanical, electrical or electronic device for detecting leakage of f-Gases which, on detection, alerts the operator or a service company of any leakage”*. Automatic leak detection systems must be tested at least every 12 months to ensure proper functioning.

### **Record keeping**

Operators of stationary air-conditioning and heat pump equipment must keep records for each piece of equipment that is subject to a mandatory leak check (i.e. above the 5 tonnes CO<sub>2</sub>e threshold).

The records that must be kept are:

- a) Quantity and type of f-Gas installed
- b) Quantities of f-Gas added during installation, maintenance or when repairing a leak
- c) Whether the f-Gases used have been recycled or reclaimed (including the name and address of the recycling or reclamation facility and, where applicable, the certificate number).
- d) Quantity of any f-Gases recovered
- e) The identity of the undertaking that installed, serviced or decommissioned the equipment, including, where applicable, their certificate number
- f) Dates and results of all mandatory leak checks
- g) If the equipment was decommissioned, the measures taken to recover and dispose of the F-Gases.

Records must be kept by the plant operator for at least 5 years. Records collected by a contractor on behalf of an operator must be kept by the contractor for at least 5 years. The records shall be made available on request to the UK Government’s competent authority (i.e. the Environment Agency) or to the Commission.

### **Service Ban**

For refrigeration equipment using high GWP refrigerants there is a Service Ban. It is important to note that the Service Ban does not apply to stationary air-conditioning and heat pump systems.

### **Use of trained technicians**

All refrigerant handling operations on stationary air-conditioning and heat pump equipment containing HFC refrigerants must be carried out by suitably trained technicians holding an f-Gas handling certificate and working for an f-Gas Certificated company. This includes plant installation, leak testing, maintenance and end-of-life decommissioning.



## 5. End-of-life requirements

Any stationary air-conditioning and heat pump equipment containing HFC refrigerants being disposed of at end-of-life must undergo an HFC recovery process. The HFC refrigerant must be recovered by a certificated technician before the plant is dismantled. Modern refrigerant recovery machines should be able to remove well over 95% of the refrigerant in an old system. For hermetically sealed movable air-conditioning systems the refrigerant can be recovered before the plant is sent for disposal. Alternatively the whole unit can be sent to a specialist recovery facility where HFCs can be recovered.

All recovered f-Gases can either be:

- a) Sent for destruction by incineration at a licenced waste facility
- b) Sent to a specialist plant that can re-process the old refrigerant into a gas with properties identical to virgin refrigerant, to create “reclaimed refrigerant”
- c) Given a basic cleaning process, to create “recycled refrigerant”.

Given the HFC supply shortage that will be created by the phase down process, it is worth trying to send the old refrigerant for reclamation as it may have a good residual value. If the old refrigerant is too contaminated it cannot be reclaimed and must be sent for destruction. It is important not to mix different gases in the same recovery cylinder – as this would render them unsuitable for reclamation.