



INFORMATION

for

OPERATORS OF EQUIPMENT CONTAINING FLUORINATED GREENHOUSE GASES

STATIONARY FIRE PROTECTION SYSTEMS AND FIRE EXTINGUISHERS

Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases
and implementing acts



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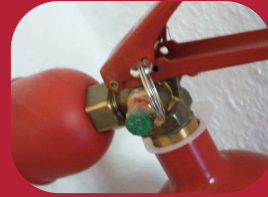
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INTRODUCTION



Under the Kyoto Protocol, the European Union has committed itself to reducing its greenhouse gas emissions by 8% compared to the base year 1990 in the period 2008-2012. The Kyoto Protocol covers the major greenhouse gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and three groups of fluorinated gases, the so called 'F-Gases': hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

To reduce emissions of these F-Gases in order to meet the EU climate change objectives and obligations under the Kyoto Protocol, the European Parliament and the Council adopted on 17 May 2006 the **Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases (F-Gas Regulation)**. This Regulation which applies as of 4 July 2007¹, lays down specific requirements for the different stages of the whole life cycle of F-Gases, from the production to end of life. Consequently, different actors along the life cycle of the F-Gases are affected by the Regulation including producers, importers and exporters of F-Gases, manufacturers and importers of certain F-Gas containing products and equipment and operators of the equipment.

The Regulation is supplemented by 10 Commission Regulations (implementing acts) defining technical aspects of certain of its provisions (see Annex I).

This brochure is for operators of **stationary fire protection systems** and **fire extinguishers** in which F-Gases are used as **fire extinguishants**.

The aim of this document is to provide information and guidance on the relevant provisions of Regulation (EC) No 842/2006 and its implementing acts and is not of a binding nature. Separate publications are available for operators of other equipment and relevant technical personnel and companies also covered by the Regulation. Requirements resulting from the F-Gas Regulation for producers, importers and exporters of F-Gases as well as manufacturers and importers of certain F-Gas containing products and equipment are summarised in a separate leaflet.

¹ Article 9 and Annex II of the Regulation came into application on 4 July 2006

GENERAL INFORMATION ON F-GASES AND THE F-GAS REGULATION

2.1 Global warming

The terms “global warming” or “greenhouse effect” are commonly used to describe the increase in the average surface temperature of the Earth over time. It is estimated that the Earth’s climate has warmed between 0.6 and 0.9 degrees Celsius over the past century. Scientists concluded that “most of the observed increase in globally averaged temperatures since the mid-twentieth century is very likely due to the observed increase in anthropogenic (man-made) greenhouse gas concentrations”². The major man-made greenhouse gases are those covered by the Kyoto Protocol: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and man-made F-Gases. Ozone-depleting substances controlled under the Montreal Protocol such as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and halons are also significant greenhouse gases.

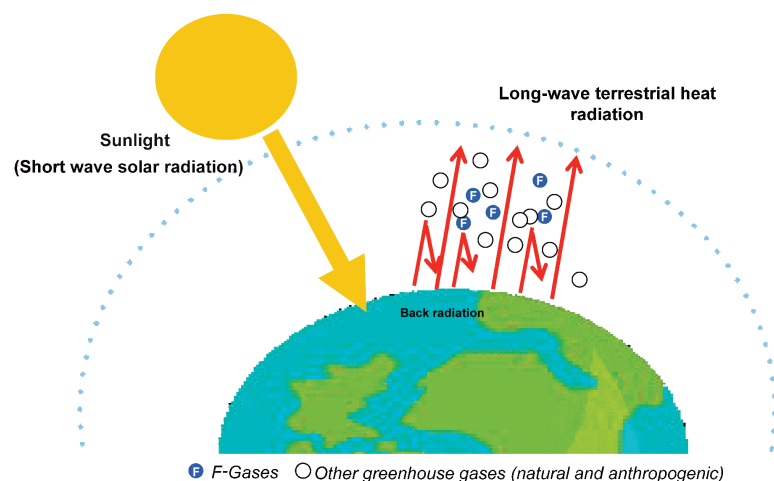


Figure 1 Simplified principle of global warming

Simplified principle of global warming

The Earth receives energy from the Sun in the form of sunlight (short-wave solar radiation) which penetrates the atmosphere relatively unhindered. About 30% of the incoming short-wave solar radiation is reflected by the atmosphere and the surface back into outer space. The remaining 70% is absorbed by the Earth’s surface (land, ocean) and the lower part of the atmosphere. When absorbed, it heats the Earth’s surface and is reradiated as long-wave (infrared) heat radiation. This infrared radiation is not able to penetrate the atmosphere as unhindered as the short-wave radiation but is reflected by clouds and absorbed by atmospheric greenhouse gases. Thus greenhouse gases trap heat within the surface-troposphere system.

² 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), <http://www.ipcc.ch/ipccreports/ar4-syr.htm>

Historically, the natural concentrations of greenhouse gases kept the Earth warm enough to support life as we know it. The more man-made greenhouse gases are in the atmosphere the more infrared radiation is reverberated to the Earth's surface. This leads to the so called "anthropogenic greenhouse gas effect" resulting in a global warming of the Earth.

2.2 What are fluorinated greenhouse gases?

F-Gases (HFCs, PFCs and SF₆) are man-made chemicals used in several different sectors and applications.

They have become popular since the 1990s as substitutes for certain ozone-depleting substances³ used at that time in most of those applications, such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), and phased-out under the Montreal Protocol.

Although F-Gases have no ozone-depleting properties most of them have a high global warming potential (GWP).

The GWP used in the context of the F-Gas Regulation is calculated in terms of the 100-year warming potential of one kilogramme of an F-Gas relative to one kilogramme of CO₂.⁴

HFCs are the most common group of F-Gases. They are used in various sectors and applications such as refrigerants in refrigeration, air conditioning and heat pump equipment, as blowing agents for foams, as fire extinguishants, aerosol propellants and solvents.

PFCs are typically used in the electronics sector (e.g. for plasma cleaning of silicon wafers) as well as in the cosmetic and pharmaceutical industry (extraction of natural products like nutraceuticals and flavours), but to a minor extent also in refrigeration as CFC replacements – often in combination with other gases. In the past PFCs were used as fire extinguishants and can still be found in older fire protection systems.

SF₆ is mainly used as an insulation gas and for extinguishing the switching arc in high-voltage switchgear and as a cover gas in magnesium and aluminium production.

Annex II of this brochure provides an overview of the substances addressed by the F-Gas Regulation, including their global warming potential and typical applications.

Global warming potential (GWP)

An index, describing the radiative characteristics of well-mixed *greenhouse gases*, that represents the combined effect of the differing times these gases remain in the *atmosphere* and their relative effectiveness in absorbing outgoing *infrared radiation*. This index approximates the time-integrated warming effect of a unit mass of a given greenhouse gas in today's atmosphere, relative to that of *carbon dioxide*.

(Source: IPCC Third Assessment Report)

³ **Ozone-depleting substances** are substances which destroy the ozone-layer of the earth. They typically contain chlorine or bromine. These substances are regulated under Regulation (EC) No 2037/2000 of the European Parliament and of the Council of 29 June 2000 on substances that deplete the ozone layer.

⁴ The 100-year GWP figures listed in Annex II are those published in the third assessment report (TAR) adopted by the Intergovernmental Panel on Climate Change (IPCC). These range from 97 for fluoromethane (HFC-41) to 22 200 for sulphur hexafluoride.

2.3 General overview of the F-Gas Regulation

The **overall objective** of the F-Gas Regulation is to reduce emissions of F-Gases, through a series of measures or actions taken throughout their life cycle.

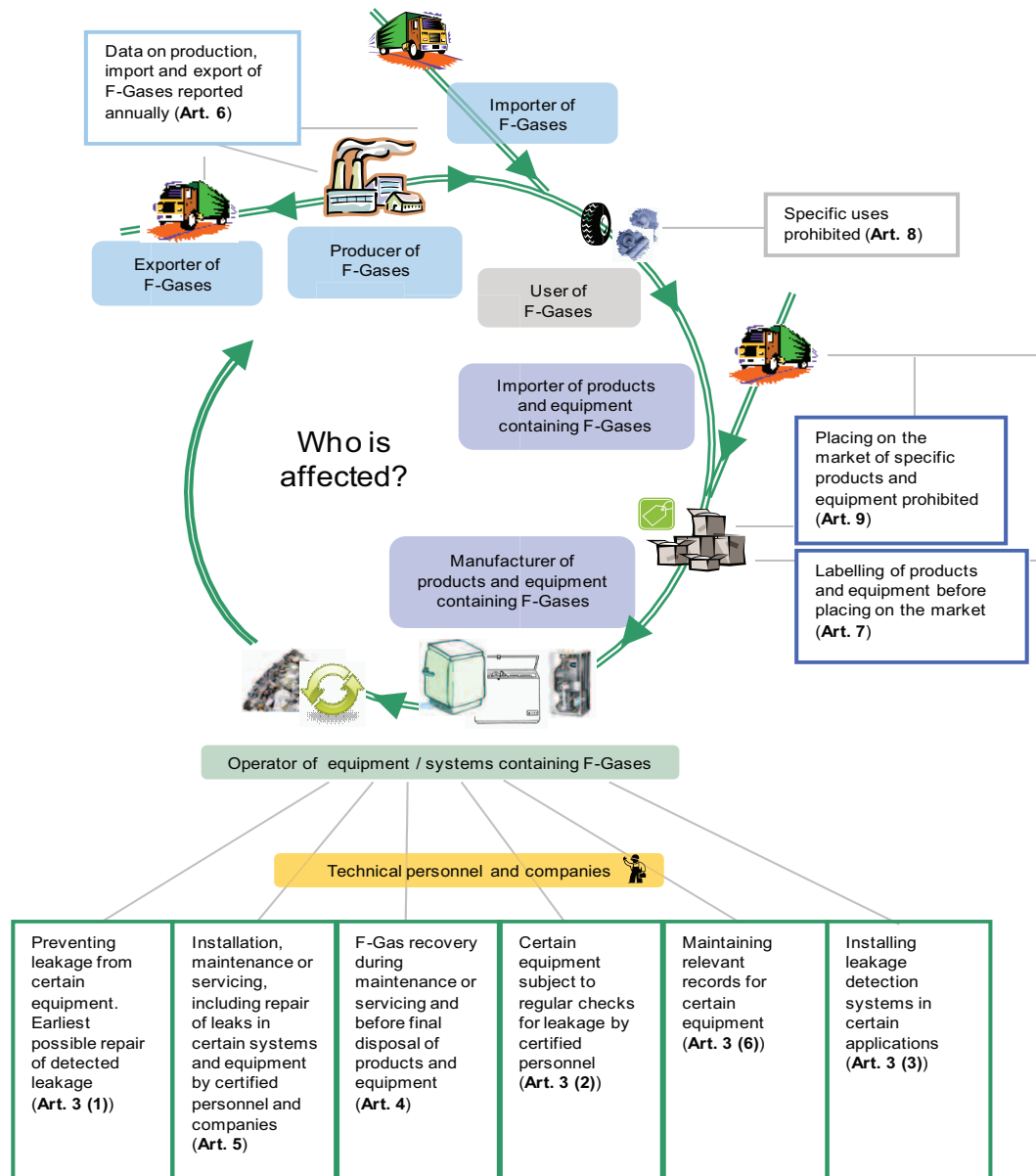


Figure 2 Overview of the main actors affected by the F-Gas Regulation and the related requirements

The requirements of the F-Gas Regulation are relevant to:

- Producers, importers and exporters of F-Gases
- Manufacturers and importers placing certain products and equipment containing F-Gases on the EU market
- Users of SF₆ in magnesium die-casting and for filling of vehicle tyres
- Operators of certain equipment and systems containing F-Gases
- Technical personnel and companies involved in certain activities relating to equipment containing F-Gases

As already described above, F-Gases are used in several areas of application. Within the F-Gas Regulation, specific obligations are defined for the **operators** of the following types of equipment:

- Stationary refrigeration, air conditioning and heat pump equipment
- **Stationary fire protection systems and fire extinguishers**
- High-voltage switchgear
- Equipment containing solvents

Other products and equipment, including mobile equipment, containing F-Gases are also addressed by the F-Gas Regulation.

WHO DOES THIS BROCHURE ADDRESS?



This brochure covers requirements laid down in the F-Gas Regulation for **operators of stationary fire protection systems** and **fire extinguishers** which contain F-Gases as extinguishants. Therefore, as a first step it has to be determined exactly who is addressed by the relevant requirements of the F-Gas Regulation and thus by this brochure.

3.1 Which types of systems and equipment are affected?

Stationary fire protection systems

Stationary fire protection systems are defined as *working or temporarily out of operation systems which consist of one or more interconnected containers including associated parts installed in response to a specific fire risk in a defined space and which are normally not in transit during their operation.*⁵

F-Gases used in stationary fire protection systems are mainly HFCs. Although the placing on the market of fire protection systems containing PFCs is prohibited as of 4 July 2007⁶, older systems containing PFCs may still be in operation. F-Gases extinguish the fire through heat absorption from the flame. They are typically installed in data processing and server rooms and to a lesser extent in air traffic control towers, museums, telecommunication centres, hospitals, banks etc.

Fire extinguishers

Fire extinguishers are portable devices, typically hand held or cart-mounted. The placing on the market of fire extinguishers containing PFCs is prohibited as of 4 July 2007⁶. Fire extinguishers containing HFCs are also not very common. Such extinguishers are typically used in special fields or conditions of application such as in computer rooms, telecommunication facilities and aircrafts. They are available in all standard sizes of fire extinguishers.

⁵ Article 2 of Regulation (EC) No 842/2006 and Article 1 of Commission Regulation (EC) No 1497/2007

⁶ Article 9 (1) of Regulation (EC) No 842/2006

3.2 How to identify fire extinguishants covered by the Regulation

The F-Gas Regulation concerns systems and equipment containing **F-Gases** listed in Annex II as well as **preparations** (commonly called “blends”) containing F-Gases.

The use of F-Gases as fire extinguishants is limited to special applications in which, typically, pure HFCs are used (no blends). In such fire protection systems HFC-227ea, HFC-125 and HFC-23 are commonly used. HFC-236fa is used in fire extinguishers. PFCs contained in older systems include perfluorobutane (PFC-31-10) and perfluoromethane (PFC-14).

The easiest way to identify the type of fire extinguishant is to check the label on the containers of the system or on the fire extinguisher. Those containing F-Gases, placed on the EU market since 1 April 2008, must have a label with the text **“Contains fluorinated greenhouse gases covered by the Kyoto Protocol”**⁷ and must also indicate the type and amount of the F-Gas. Section 7 provides an example of such a label.

Relevant information is also, in most cases, available on manuals, technical specifications and logbooks, and on extinguishant containers placed on the market before 1 April 2008, although in the latter only trade names of substances may be indicated. If no clear information on the extinguishant used is available, the supplier, manufacturer or company and personnel carrying out maintenance or servicing of the system or equipment should be asked to provide it.

⁷ Label requirements are set out in Commission Regulation (EC) No 1494/2007

3.3 Who is the operator of the system?

The F-Gas Regulation lays down that the **operator** of the system or fire extinguisher is responsible for legal compliance. The operator is defined as “the natural or legal person who exercises actual power over the technical functioning of the equipment and systems”. Under this definition, the owner of the F-Gas system is not automatically the operator of the system.

The “actual power over the technical functioning” of a piece of equipment or system would, in principle, include the following elements:

- Free access to the system, which entails the possibility to supervise its components and their functioning, and the possibility to grant access to third parties
- The control over the day-to-day functioning and running (e.g. taking the decision to switch it on or off)
- The power (including financial power) to decide on technical modifications (e.g. replacement of a component, installation of a permanent leak detector), modification of the quantities of F-Gases in the equipment or system, and to have checks (e.g. checks for leakage) or repairs carried out

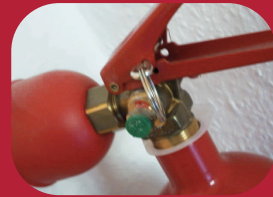
In most cases the operator of a fire protection system is a legal person (typically a company) who is responsible for giving instructions to employees as to the day-to-day technical functioning of the system. The same applies to fire extinguishers containing F-Gases since these are typically used in special industry application areas.

Due to the complexity of the installation and the importance of the proper functioning of the system, service companies are often contracted to carry out maintenance or servicing. In these cases the determination of the operator depends on the contractual and practical arrangements between the parties.



Although ownership is not a criterion for identifying the "operator", Member States may designate the owner as being responsible for the operator's obligations in defined, specific situations, even though the owner does not have actual power over the technical functioning of the system or equipment. Therefore, specific Member State conditions on implementation should be taken into consideration.

WHICH OBLIGATIONS APPLY TO THE OPERATOR?



Fire extinguishers

Operators of fire extinguishers, regardless of the amount of F-Gas extinguishant they contain, are responsible to ensure proper recovery of the extinguishant (refer directly to section 5.6).

Stationary fire protection systems

Depending on the amount contained in the application, specific obligations have to be fulfilled. The following decision tree groups systems into categories⁸ A-D and Table 1 summarises which obligations are relevant for each category.

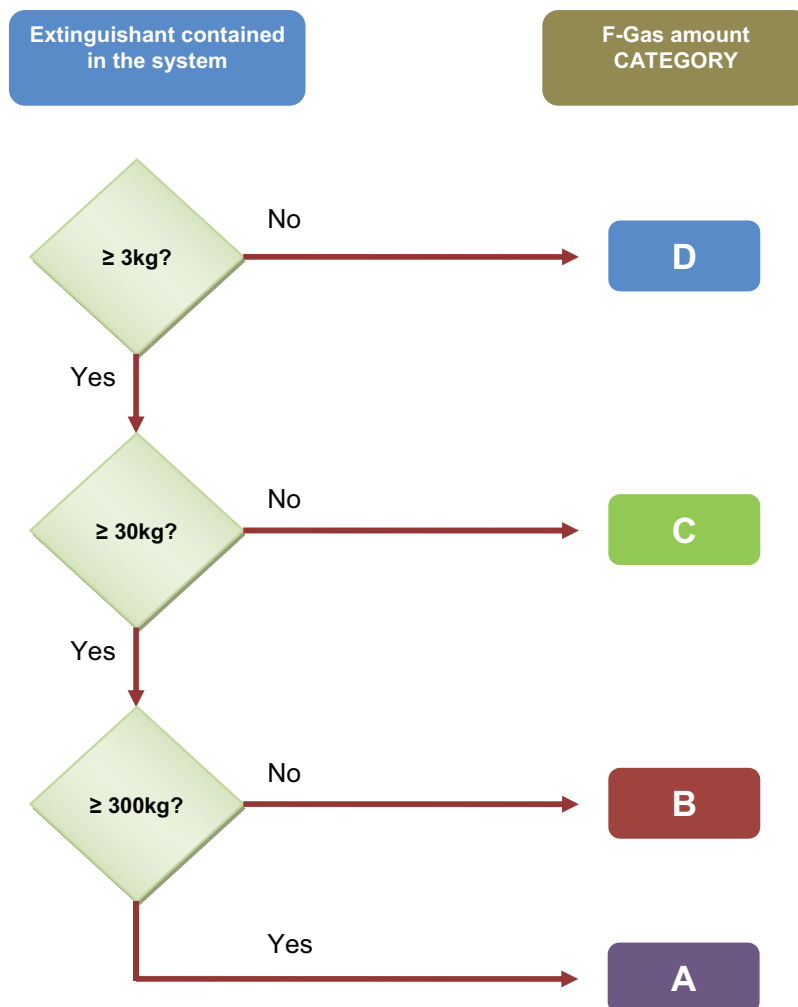


Figure 3 Decision tree to identify what has to be done

⁸ F-Gas amount categories are used in this brochure for simplicity. They are not defined as such in the Regulation.

<i>F-Gas amount category</i> <i>Obligations for the operator</i>	A (≥300kg)	B (≥30kg and < 300kg)	C (≥3kg and <30kg)	D (<3kg)
Installation, maintenance or servicing of the system by certified personnel and companies, Art. 5 (3) ⁹	✓	✓	✓	✓
Leakage prevention and repair of detected leakage as soon as possible, Art. 3 (1) ⁹	✓	✓	✓	✓
Regular leakage checks by certified personnel, Art. 3 (2) ⁹	✓	✓	✓	
Installation of a leakage detection system which must be checked at least every 12 months, Art. 3 (3) ⁹	✓			
Record keeping, Art. 3 (6) ⁹	✓	✓	✓	
Recovery of F-Gases before final disposal, and when appropriate during maintenance or servicing, by certified personnel, Art. 4 (1), (4) ⁹	✓	✓	✓	✓

Table 1 Overview of obligations for the operator depending on the F-Gas amount of the application

The difference between the requirements of categories B and C is in the frequency of leakage checks (see Table 3).

4.1 How to determine the F-Gas amount of an application

In identifying an application the Commission considers as the main criterion the technical structure, and not the location or function. An application should be understood as a set of components and pipes which form one continuous structure through which F-Gases can flow. If a molecule of F-Gas can flow through the structure from one location to another, it means that these two locations are parts of one single application.

With regard to fire protection systems, this means that if two or more interconnected extinguishant containers are installed in response to a specific fire risk in a defined space, these containers have to be regarded as a single application.

Example
<p>A site has a fire protection system with 5 containers, each containing 50kg of fire extinguishant. The extinguishant containers are interconnected to discharge through one pipe network to the nozzles. The total amount of fire extinguishant in the application is therefore 250kg.</p> <p>→ requirements for F-Gas amount category B (for systems ≥30 and <300kg) have to be fulfilled</p>

Table 2 Examples of how to determine the F-Gas amount of an application

⁹ Regulation (EC) No 842/2006

To determine the F-Gas amount, the operator should check the labels (see also section 7) and the system manual or technical specifications.

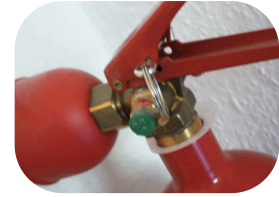
Where the F-Gas amount in the application is not indicated in the manufacturer's technical specifications or on the label but could belong to one of categories A, B, or C, it must be determined by certified personnel (see section 6).

If in doubt the operator should contact the system or equipment supplier, manufacturer or the service company.

Rule-of-thumb

The amount of F-Gas contained in fire protection systems in buildings is generally higher than 3kg.

WHAT IS THE OPERATOR RESPONSIBLE FOR?



Based on the information provided in the previous section, an allocation of applications to the different F-Gas amount categories and the resulting requirements should be possible (see Table 1 in section 4).



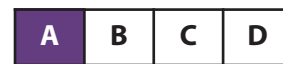
National specific requirements, especially for applications with less than 3kg F-Gas amount might apply and should be taken into consideration.

In this section, the specific requirements laid down in the F-Gas Regulation for the various categories are described in detail. In order to indicate the categories affected, the following symbols are used:

Examples:



Relevant for all F-Gas amount categories



Only relevant for F-Gas amount category A (≥ 300 kg)

5.1 Ensuring proper installation, maintenance or servicing of the system



Installation and maintenance or servicing of fire protection systems should be carried out by personnel and companies holding an appropriate certificate (see section 6).

In the context of the F-Gas Regulation

Installation means

connecting for the first time at the location in which they will operate, one or more containers containing or designed to contain fluorinated greenhouse gas extinguishant with associated components, excluding those components which do not affect the containment of the extinguishing agent prior to its release for the purpose of fire extinguishing.

Maintenance or servicing comprises

all activities that entail work on the containers containing or designed to contain fluorinated greenhouse gas extinguishing agents or on the associated components, excluding those components which do not affect the containment of the extinguishing agent prior to its release for the purpose of fire extinguishing.

5.2 Preventing and repairing leakages



All operators of stationary fire protection systems, irrespective of the quantity of extinguishant contained, must:

- prevent leakage and
- repair leakages as soon as possible after they have been detected,

through **all measures technically feasible and not entailing disproportionate costs**.¹⁰

5.3 Checking for leakage



5.3.1 Standard leakage checks

Working and temporarily out of operation systems containing 3kg or more of F-Gas fire extinguishant, have to be checked for leakage at regular intervals. The operator of the application is responsible for ensuring that this check is carried out by **certified personnel** (see section 6).

If an appropriate, properly functioning leakage detection system is installed, the frequency for leakage checking will be halved but never > 12 months (see section 5.4).

<i>F-Gas amount category</i> <i>Minimum frequency of leakage checks</i>	A (≥300kg)	B (≥30kg and <300kg)	C (≥3kg and <30kg)
Without a properly functioning appropriate leakage detection system in place	every 3 months (*)	every 6 months	every 12 months
With a properly functioning appropriate leakage detection system in place	every 6 months	every 12 months	every 12 months

(*) A leakage detection system which on detection alerts the operator is mandatory for fire protection systems containing 300kg or more of F-Gases. Fire protection systems installed before 4 July 2007 must be fitted with such systems by 4 July 2010.

Table 3 Overview of minimum frequency of leakage checking

Where an existing inspection regime is in place which meets the **ISO 14520** standard, the obligations of the Regulation are fulfilled as long as those inspections are at least as frequent.

¹⁰ Article 3 (1) of Regulation (EC) No 842/2006

5.3.2 Checks following a repair

In cases where a leak has been detected, the operator must ensure that the repair or the replacement of the container takes place as soon as possible by personnel certified to undertake the specific activity (see section 6). Prior to recharging a leakage test has to be carried out.

A follow-up check must be carried out at any time within 1 month depending on the situation and based on the judgment of the certified person. As the follow-up check has to be carried out according to the standard leakage checking requirements, the time interval for the next regular leakage check starts from this point.

5.3.3 Newly commissioned systems

In the case of a newly installed system, a check according to the standard leakage checking requirements has to be carried out, by certified personnel, immediately after it has been put into service.

5.4 Installing leakage detection systems

A	B	C	D
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Applications containing **300kg or more** of F-Gas fire extinguishant have to be equipped with a fixed leakage detection system which on detection of leakage alerts the operator. For fire protection systems which have been installed before 4 July 2007 a leakage detection system has to be fitted by **4 July 2010**. The proper functioning of the leakage detection system has to be checked **at least once every 12 months**.

"Leakage detection system" means a calibrated mechanical, electrical or electronic device for detecting leakage of fluorinated greenhouse gases which, on detection, alerts the operator.

Such systems include weight monitoring systems or pressure switches, both with automatic alarms to alert the operator in case of any leak. Other systems which monitor the existence of fluorinated greenhouse gases in the air, may also be used where appropriate. Those should be installed in the room where the F-Gas containers are installed.

In the selection of the appropriate technology and the installation location of a detection system, the operator should take into consideration all parameters which may affect its effectiveness to ensure that the system installed will detect a leakage and alert the operator.

ISO 14520 and EN 15004 standards and the standards referred to therein as well as national Regulations should be taken into consideration.

Any presumption of F-Gas leakage indicated by the fixed leakage detection system has to be followed by a check of the system (section 5.3) to identify and, if appropriate, to repair the leak.

Operators of fire protection systems containing less than 300kg of F-Gas may also install a leakage detection system. Fire protection systems with properly functioning appropriate leakage detection systems which on detection of leakage alert the operator are subject to less frequent checks (see Table 3).

5.5 Maintaining records



Operators of applications containing 3kg or more of F-Gas extinguishant have to maintain records of the system and make them available to the national competent authority or the European Commission on request.

System records (for a sample template, see Annex III) must contain the following information¹¹:

- Name, postal address, telephone number of the operator
- Information on quantity and type of F-Gas installed (if not indicated in the manufacturer's technical specifications or label it has to be determined by **certified personnel**)
- Quantities of F-Gases added (new / additional containers)
- F-Gas quantities recovered during maintenance or servicing and final disposal (removal / exchange of containers)
- Identification of company / personnel who carried out the relevant activities
- Dates and results of the regular leakage checks
- Dates and results of checks of the leakage detection system (if installed)
- Any other relevant information

5.6 Recovering the extinguishant from fire protection systems and extinguishers



Operators must make arrangements for the proper recovery, i.e. the collection and storage, by **certified personnel**, of F-Gas extinguishants from **stationary fire protection systems** and portable **fire extinguishers** to ensure their recycling, reclamation or destruction.

This activity must take place before the final disposal of the extinguishant containers and when appropriate during maintenance or servicing work. Extinguishant containers should be disconnected from a system by certified personnel. Typically, the collection of the gas from containers, the repair of leaks and refilling of containers are undertaken at manufacturers' sites for containers or associated components of fire protection systems.

¹¹ Article 3 (6) of Regulation (EC) No 842/2006 and Article 2 of Commission Regulation (EC) No 1497/2007

INFORMATION ON TECHNICAL PERSONNEL AND COMPANY CERTIFICATION



The activities indicated in Table 4, unless undertaken at the sites of manufacturers during manufacture or repair, can only be undertaken by personnel and companies holding a certificate, issued by a certification body designated by a Member State. The operator should make sure that the personnel hold a valid certificate for the foreseen activity.

Requirements specific to individual Member States should be taken into consideration.

Activity	Certified personnel	Certified companies
Installation of stationary fire protection systems	✓	✓
Maintenance or servicing of stationary fire protection systems	✓	✓
Leakage checking of stationary fire protection systems containing ≥3kg of F-Gases	✓	
Recovery of F-Gases from stationary fire protection systems and fire extinguishers	✓	

Table 4 Activities carried out by certified personnel and companies

Certificates must contain the following information¹²:

- Name of certification body, full name of holder, certificate number, date of expiry (if any)
- Activities which the holder of the certificate is entitled to perform
- Issuing date and issuer's signature

For an interim period not exceeding 4 July 2010, interim certification systems may be in place in some Member States. Member States can decide on the content of the certification and the expiry date. It is therefore important that the operator is aware of the Member State's specific conditions (National Contact points, see Annex IV).

Certificates (excluding interim certificates) are valid in all Member States, but Member States may require a translation of the certificate. The certification requirements for personnel and companies can be found in **Commission Regulation (EC) 304/2008**.

¹² Article 5 (2) of Commission Regulation (EC) No 304/2008

7

INFORMATION ON LABELS



Since 1 April 2008¹³, a manufacturer or importer who places HFC containing fire protection systems, fire extinguishers and F-Gas containers on the EU market is obliged to label them.

The label is an important source of information to find out if the system or equipment is covered by the F-Gas Regulation and which requirements apply. Specific requirements for Member States may entail labelling in a Member State's language.

The label must contain at least the type and quantity of the F-Gas contained and the sentence: "Contains fluorinated greenhouse gases covered by the Kyoto Protocol".

Example

FLASCHENTYP/NENNINHALT BOTTLE TYPE/VOLUME	
ARTIKEL-NR. PART NO.	
LÖSCHMITTEL EXTINGUISHANT	HEPTAFLUORPROPAN, CF ₃ CHF ₂ CF ₃
FÜLLMENGE CONTENTS WEIGHT	KG
GESAMTGEWICHT TOTAL WEIGHT	KG
BETRIEBSTEMPERATUR OPERATING TEMPERATURE	+ 0°C bis / to + 35°C
BETRIEBSDRUCK MIT N ₂ OPERATING PRESSURE WITH N ₂	bar bei / at 21°C
FÜLLDATUM FILLING DATE	
SERIEN-NR. SERIAL NO.	
UN-NR. UN-NO. 1058	1058 verflüssigte Gase liquefied gases
NÄCHSTER PRÜFTERMIN NEXT INSPECTION	
Contains fluorinated greenhouse gases covered by the Kyoto Protocol	

8

PENALTIES FOR NON COMPLIANCE



Penalties for infringements of any of the F-Gas Regulation provisions are laid down by each Member State individually.

¹³ Commission Regulation (EC) No 1494/2007

Annex I: List of implementing acts of Regulation (EC) No 842/2006

- **Commission Regulation (EC) No 1493/2007** of 17 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, the format for the report to be submitted by producers, importers and exporters of certain fluorinated greenhouse gases
- **Commission Regulation (EC) No 1494/2007** of 17 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, the form of labels and additional labelling requirements as regards products and equipment containing certain fluorinated greenhouse gases
- **Commission Regulation (EC) No 1497/2007** of 18 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, standard leakage checking requirements for stationary fire protection systems containing certain fluorinated greenhouse gases
- **Commission Regulation (EC) No 1516/2007** of 19 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, standard leakage checking requirements for stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases
- **Commission Regulation (EC) No 303/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of companies and personnel as regards stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases
- **Commission Regulation (EC) No 304/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of companies and personnel as regards stationary fire protection systems and fire extinguishers containing certain fluorinated greenhouse gases
- **Commission Regulation (EC) No 305/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of personnel recovering certain fluorinated greenhouse gases from high-voltage switchgear
- **Commission Regulation (EC) No 306/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of personnel recovering certain fluorinated greenhouse gas-based solvents from equipment
- **Commission Regulation (EC) No 307/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements for training programmes and the conditions for mutual recognition of training attestations for personnel as regards air-conditioning systems in certain motor vehicles containing certain fluorinated greenhouse gases
- **Commission Regulation (EC) No 308/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, the format for notification of the training and certification programmes of the Member States

Annex II: F-Gases listed in Annex I of Regulation (EC) No 842/2006

Designation	Complete name	Chemical formula	CAS number	GWP	Main Application
SF ₆	Sulphur hexafluoride	SF ₆	2551-62-4	22 200	- Insulating gas in high voltage switchgear - Blanket gas for magnesium production - Etching and cleaning gas in the semiconductors industry
Hydrofluorocarbons (HFCs)					
HFC-23	Trifluoromethane	CHF ₃	75-46-7	12 000	- Low temperature refrigerant - Fire extinguishant
HFC-32	Difluoromethane	CH ₂ F ₂	75-10-5	550	- Blend component for refrigerants
HFC-41	Fluoromethane	CH ₃ F	593-53-3	97	- Semiconductor manufacturing
HFC-43-10mee	1,1,1,2,2,3,4,5,5,5-Decafluoropentane	C ₅ H ₂ F ₁₀ (CF ₃ CHFCF ₂ CF ₃)	138495-42-8	1 500	- Solvent for specialised applications - Blowing agent for foams
HFC-125	1,1,1,2,2-Pentafluoroethane	C ₂ HF ₅ (CHF ₂ CF ₃)	354-33-6	3 400	- Blend component for refrigerants - Fire extinguishant
HFC-134	1,1,2,2-Tetrafluoroethane	C ₂ H ₂ F ₄ (CHF ₂ CHF ₂)	359-35-3	1 100	No typical applications at present
HFC-134a	1,1,1,2-Tetrafluoroethane	C ₂ H ₂ F ₄ (CH ₂ FCF ₃)	811-97-2	1 300	- Refrigerant - Blend component for refrigerants - Extraction solvent - Propellant for medical and technical aerosols - Blowing agent component for extruded polystyrene (XPS) and polyurethane (PUR) foams
HFC-152a	1,1-Difluoroethane	C ₂ H ₄ F ₂ (CH ₃ CHF ₂)	75-37-6	120	- Propellant for specialised technical aerosols - Blowing agent component for extruded polystyrene (XPS) foams - Refrigerant

Designation	Complete name	Chemical formula	CAS number	GWP	Main Application
HFC-143	1,1,2-Trifluoroethane	$C_2H_3F_3$ (CH_2FCHF_2)	430-66-0	330	No typical applications at present
HFC-143a	1,1,1-Trifluoroethane	$C_2H_2F_3$ (CH_3CF_3)	420-46-2	4 300	- Blend component for refrigerants
HFC-227ea	1,1,1,2,3,3,3-Heptafluoropropane	C_3HF_7 (CF_3CHFCF_3)	431-89-0	3 500	- Refrigerant - Propellant for medical aerosols - Fire extinguishant - Blowing agent for foams
HFC-236cb	1,1,1,2,2,3-Hexafluoropropane	$C_3H_2F_6$ ($CH_2FCF_2CF_3$)	677-56-5	1 300	- Refrigerant - Blowing agent
HFC-236ea	1,1,1,2,3,3-Hexafluoropropane	$C_3H_2F_6$ (CHF_2CHFCF_3)	431-63-0	1 200	- Refrigerant - Blowing agent
HFC-236fa	1,1,1,3,3,3-Hexafluoropropane	$C_3H_2F_6$ ($CF_3CH_2CF_3$)	690-39-1	9 400	- Fire extinguishant - Refrigerant
HFC-245ca	1,1,2,2,3-Pentafluoropropane	$C_3H_3F_5$ ($CH_2FCF_2CHF_2$)	679-86-7	640	- Refrigerant - Blowing agent
HFC-245fa	1,1,1,3,3-Pentafluoropropane	$C_3H_3F_5$ ($CHF_2CH_2CF_3$)	460-73-1	950	- Foam blowing agent for polyurethane (PUR) foams - Solvent for specialised applications
HFC-365mfc	1,1,1,3,3-Pentafluorobutane	$C_4H_5F_5$ ($CF_3CH_2CF_2CH_3$)	406-58-6	890	- Foam blowing agent for polyurethane (PUR) and phenolic foams - Blend component for solvents
Perfluorocarbons (PFCs)					
Perfluoromethane (PFC-14)	Tetrafluoromethane	CF_4	75-73-0	5 700	- Semiconductor manufacturing - Fire extinguishant
Perfluoroethane (PFC-116)	1,1,1,2,2,2-Hexafluoroethane	C_2F_6 (CF_3CF_3)	76-16-4	11 900	- Semiconductor manufacturing

Designation	Complete name	Chemical formula	CAS number	GWP	Main Application
Perfluoropropane (PFC-218)	1,1,1,2,2,3,3,3-Octafluoropropane	C ₃ F ₈ (CF ₃ CF ₂ CF ₃)	76-19-7	8 600	- Semiconductor manufacturing
Perfluorobutane (PFC-31-10)	1,1,1,2,2,3,3,4,4,4-Decafluorobutane	C ₄ F ₁₀	355-25-9	8 600	- Physics research - Fire extinguishant
Perfluoropentane	1,1,1,2,2,3,3,4,4,5,5,5-Dodecafluoropentane	C ₅ F ₁₂	678-26-2	8 900	- Precision cleaning solvent - Low-use refrigerant
Perfluorohexane (PFC-51-14)	1,1,1,2,2,3,3,4,4,5,5,6,6-Tetradecafluoro-hexane	C ₆ F ₁₄	355-42-0	9 000	- Coolant fluid in specialised applications - Solvent
Perfluorocyclobutane	1,1,2,2,3,3,4,4-Octafluorocyclobutane	c-C ₄ F ₈	115-25-3	10 000	- Semiconductor manufacturing

Annex III: Sample of a system record

System record					
Name of system operator					
Postal address					
Telephone number					
System designation ¹		Reference N°			
Description					
Location		Date of installation			
Type of extinguishant		Quantity of extinguishant installed [kg]			
Extinguishant changes					
Date	Service engineer / company ² (incl. certificate N°)	Type of extinguishant	Amount added / removed [kg]	Reason for change	
Leakage checks (including follow-up checks)					
Date	Service engineer / company ² (incl. certificate N°)	Areas checked	Result	Actions taken	Follow-up check required?
Maintenance or servicing activities					
Date	Service engineer / company ² (incl. certificate N°)	Areas concerned	Maintenance or servicing work done	Comments	
Testing of automatic leak detection system (if any)					
Date	Service engineer / company ² (incl. certificate N°)	Result		Comments	
Other relevant information					
Date					

¹ Technical identification

² Including name of engineer and company, postal address, telephone number

Annex IV: Further information

European Commission

<http://ec.europa.eu/environment/climat/fluor>

National Contact Points for F-Gases



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