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Summary Guidance for Operators of Equipment Containing SF₆¹ and Equipment Containing PFCs²

This guidance note gives the key obligations laid down in the [F-gas Regulation \(EU No 517/2014\)](#) for **operators**³ of equipment containing SF₆⁴ or PFCs⁵ which are Fluorinated Greenhouse Gases (**F-gases**). The F-gas Regulation also covers containers in which SF₆ is delivered and stored.

These Regulations are concerned with the **phase down** of F-gases and also **preventing their release** into the atmosphere.

Uses of SF₆ and PFCs

SF₆ and PFCs are generally used as an insulating medium in high-voltage electrical switchgear⁶ but have a variety of other uses including:

- As an etchant and cleaner in the semiconductor manufacturing industry (**PFC – C₂F₆**)
- As an arc interrupter in the electric power industry (**SF₆**)
- As a dielectric medium in electrical transmission and distribution equipment (**SF₆**) e.g. circuit breakers
- As a contrast agent for ultrasound imaging (**SF₆**)
- Linear accelerators in oncology treatments (**SF₆**)

¹ Sulphur hexafluoride or mixtures containing sulphur hexafluoride.

² Perfluorocarbons or mixtures containing perfluorocarbons listed in section 2 of Annex I of (EU) No. 517/2014.

³ The operator is defined in the F-gas Regulation as *“the natural or legal person exercising actual power over the technical functioning of products and equipment covered by this Regulation”*. As a starting point the owner should assume responsibility for operator obligations, unless it is confirmed that operator obligations have been transferred to a 3rd party.

⁴ The Global Warming Potential ((GWP) Global warming potential is the climatic warming potential of a greenhouse gas relative to that of carbon dioxide) of SF₆ is 22,800, which means that releasing 1 kg of SF₆ into the atmosphere is equivalent to releasing almost 23 tonnes of CO₂.

⁵ The GWP of the most common PFCs in use in Ireland ranges from 7,400 to 12,200.

⁶ Electrical switchgear means switching devices and their combination with associated control, measuring, protective and regulating equipment, and assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures, intended for usage in connection with the generation, transmission, distribution and conversion of electric energy.

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For most of the above uses, general containment obligations such as the need to avoid emissions and recovery of gases at end of life are required. However, the obligations for electrical switchgear are greater and require more attention on the part of the operator as set out below.

How to Identify SF₆ or PFC Containing Equipment

The term SF₆ is usually displayed on the equipment as a yellow triangle label (Figure 1), the equipment gauge (Figure 2) and the equipment label (Figure 3).

Similarly, equipment containing PFCs should have similar labels/gauges on which an indication of the gas type and quantity may be provided.

Figure 1: Triangle

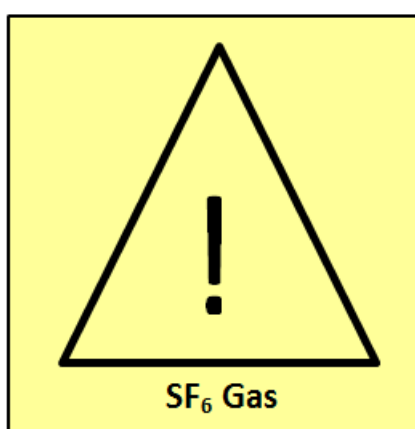


Figure 2: Gauge

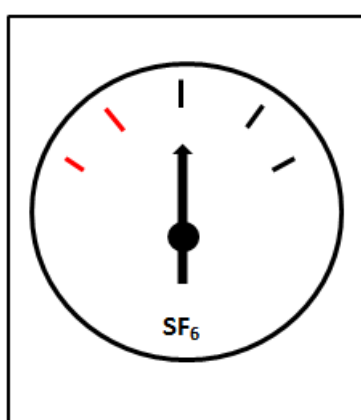


Figure 3: Equipment Label

Contains fluorinated greenhouse gases covered by the Kyoto Protocol

Unit Type: RT

Insulant: SF₆

Mass of Insulant: 50 kg

Rated Voltage: 12 kV

In cases where no relevant information is found on the label, the manual or the technical specifications of the equipment should provide information on the type of insulating medium contained in the equipment. Alternatively, the supplier, manufacturer or a service company carrying out maintenance or servicing of this equipment should be asked to provide the relevant information.

Labelling

SF₆ containing equipment placed on the EU market since 1st April 2008 must display a label with the text **“Contains fluorinated greenhouse gases covered by the Kyoto Protocol”** and an indication of the type of gas (i.e. SF₆) and amount of the gas contained within the system.

For other equipment containing either SF₆ or PFCs placed on the EU market from 1st January 2017, labels will be required to indicate the quantity of F-gas expressed in t CO₂ eq in the product or equipment, or the quantity of F-gases for which the equipment is designed, and the GWP of those gases.

Obligations of the Operator

The key obligations for operators of equipment containing F-gases include:

1. Prevent Emissions

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The intentional release of F-gases into the atmosphere is prohibited. Operators of equipment that contains F-gases shall take precautions to prevent the unintentional release of these gases. Where a leakage of F-gas is detected, the operators shall ensure that the equipment is repaired without undue delay.

2. Leak Checking

Certain electrical switchgear is **exempt** from leak checking - **subject to certain conditions**:

- It has a tested leakage rate of 0.1% per year as set out in technical specifications and is labelled accordingly
- It is equipped with a pressure or density monitoring device.

Electrical switchgear which does not meet the exemptions above must be checked for leaks and if necessary repaired. The frequency of leak checking depends on the GWP of the F-gas (expressed in t CO₂ eq) as outlined in Table 1.

Table 1: Leak checking frequency for equipment containing F-Gas

Table 3: New! Leak Checking Frequencies: F-gas

| Quantity of gas (t CO ₂ eq) | F- gas Leak Checking Frequency | |
|---|---------------------------------------|------------------------------------|
| | No leak detection equipment fitted | Leak detection equipment fitted |
| ≤ 5 | None | None |
| 5 - 50 | 12 monthly | 24 monthly |
| 50 - 500 | 6 monthly | 12 monthly |
| ≥ 500 | 3 monthly | 6 monthly |

The change from leak checking based on charge (in kg) to leak checking based on CO₂ equivalent is to encourage the use of lower GWP alternatives.

Hermetically sealed equipment containing less than 10 t CO₂ eq is not subject to leak checking provided the equipment is labelled as being hermetically sealed.

Electrical switchgear containing **500 tonnes of Carbon Dioxide (CO₂) equivalent⁷** (t CO₂ eq) or more installed from **1st January 2017** must be fitted with an **automatic leakage detection system** which must be checked at least once every 6 years to ensure its proper functioning.

3. Recovery

⁷ The CO₂ equivalent is a metric measure used to compare the emissions from various greenhouse gases based upon their GWP.

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F-gases removed from all equipment containing either SF₆ or PFCs during servicing, maintenance, repair or equipment dismantling must be recovered to ensure they are recycled or disposed of appropriately.

Refrigerant recovery equipment must be used to remove refrigerant, and the work must be carried out by appropriately qualified personnel (see **4 Training Certification** below).

4. Training Certification

The operator must ensure that personnel (whether contractor or in-house) carrying out installation, servicing, maintenance, repair or decommissioning of equipment containing either SF₆ or PFCs or recovery of F-gases from such equipment are **appropriately certified**.

While personnel and companies carrying out leak checking of electrical switchgear are not required to be certified under the F-gas Regulations, the obligation to prevent emissions requires the high level of competence that appropriate certification provides.

The Irish [Fluorinated Greenhouse Gas Regulations 2011 \(SI No. 279 of 2011\)](#) stipulate that personnel (whether contractor or in-house) working with SF₆ must have completed at least an appropriate in-house training course. The minimum requirements as to the skills and knowledge to be covered in such a training course are set out in the Annex to Commission Regulation (EC) No 305/2008.

Note: the existing provisions for training requirements under both the Irish and European Regulations mentioned above are likely to be amended and updated to reflect the requirements of the F-gas Regulation (EU) No. 517/2014; however, until this is done the current provisions should be used.

5. Control of Use

The use of SF₆ in magnesium die-casting and in the recycling of magnesium die-casting alloys is prohibited. For installations using a quantity of sulphur hexafluoride below 850 kg per year, in respect of magnesium die-casting and in the recycling of magnesium die-casting alloys, this prohibition shall only apply from 1 January 2018.

The use of SF₆ to fill vehicle tyres is prohibited.

6. Waste Management

Recovered SF₆ or PFC gas for which there is no further use is a **hazardous waste** and must be disposed of correctly⁸. Your contractor must take the gas away for treatment and they should have a valid waste collection permit in place ([NWCPO.ie](#)). You must check for this before allowing any waste gas to be removed.

7. Record Keeping

⁸ i.e. in accordance with the [Irish Waste Management Act of 1996](#).

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If switchgear or other equipment containing either SF₆ or PFCs is required to be checked for leaks (see Obligation 2 above) then there is a legal requirement to establish and maintain records relating to the equipment. Specifically an operator must:

- Establish and maintain records for each piece of equipment specifying the following information:
 - a. The quantity and type of F-gas installed.
 - b. The quantities of F-gases added during installation, maintenance or servicing due to leakage.
 - c. Whether the quantities of installed F-gases have been recycled or reclaimed, including the name and address of the recycling or reclamation facility and, where applicable, the certificate number.
 - d. The quantity of F-gases recovered.
 - e. The identity of the undertaking which installed, serviced, maintained and where applicable repaired or decommissioned the equipment, including, where applicable, the number of its certificate.
 - f. The dates and results of leak checks carried out.
 - g. If the equipment was decommissioned, the measures taken to recover and dispose of the F-gases.
- Records should be kept for at least five years and should be made available, on request, to the competent authority.

Written records must also be kept to prove that waste gas has been managed legally and that waste equipment has been disposed of according to the WEEE Regulations. **Note:** Record keeping requirements for waste gas apply to all switchgear other equipment containing either SF₆ or PFCs, whether leak checking is required or not.

Further information on the required records (and a record template) is included in [“Guidance Note for Operators of equipment containing ODS and F-gases”](#).

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