

FLUORINATED GREENHOUSE GASES

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INTRODUCTION

Aim

1. The aim of this leaflet is to deliver MOD policy requirements on the use, containment and recovery of fluorinated greenhouse gases (F gases). It also outlines the latest legislative position and the substances whose use and applications are now prohibited.

Scope

2. This leaflet applies to all personnel including Project Team Leaders, Project Sponsors, Equipment, Property and Facilities Managers and others (including Regional Prime Contractors RPCs, Private Partners and other such contractors who operate and use equipment containing fluorinated greenhouse gases. This includes those who take the role of undertakings¹ and/or a Responsible Authority² who manages such undertakings and operate equipment or facilities.

What are Fluorinated Greenhouse Gases?

3. Fluorinated Greenhouse Gases (F Gases) are a family of chemicals that contain fluorine. Most F gases are very powerful greenhouse gases that contribute to climate change and global warming if emitted to the atmosphere. Measures must therefore be taken both to control and ultimately stabilise, future concentrations of greenhouse gases. The three groups of substances known as the fluorinated greenhouse gases are hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

4. Each greenhouse gas has a different capacity to cause global warming. It's Global Warming Potential (GWP) depending on its radioactive properties, molecular weight and lifetime in the atmosphere. The GWP is defined as the warming influence over a set time period (often 100 years) of a gas relative to that of carbon dioxide, which is set at 1. The HFCs have GWPs in the "low thousands", the PFCs have GWPs in the "high thousands", and SF₆ has the highest GWP of any substance, at 22,800. So although the quantities of fluorinated greenhouse gases being emitted to, and existing in, the atmosphere are small relative to the others, their manufacture and use has a potential significant global warming impact.

Fluorinated Greenhouse Gases

Hydrofluorocarbons (HFCs)

5. HFCs are relatively inert substances with low toxicity and (mostly) low flammability. They are normally gaseous at room temperature. They are ideally suited as refrigerants in numerous applications and over a wide range of temperature applications. They were primarily developed as alternatives to the ozone depleting CFC refrigerants and halon fire extinguishants. They are also finding increased uses as solvents in both cleaning of precision components and printed circuits and metal cleaning, in the blowing of foams, and as non-flammable aerosol propellants, especially in medical applications such as metered-dose inhalers. The most common HFC refrigerant is HFC-134a. The most

¹ As defined in Regulation (EU) No 517/2014 and provided in Annexe A.

² As defined in JSP 319 Part 1 V4.0 Apr 15 5-7 Para 33 and provided in Annexe A.

common HFC fire extinguishant is HFC-227ea.

Perfluorocarbons (PFCs)

6. PFCs are inert substances with very low toxicity and flammability. The most commonly used substances are gaseous at room temperature but others in the PFC family are liquid or solid. The main use of PFC gases is in electronics production, they have found use, in relatively small quantities, as components in refrigerant blends or refrigerants in specialist applications such as supercomputers; as fire extinguishants, solvents, and tracer gases; and in medical applications such as blood substitutes.

Sulphur hexafluoride (SF₆)

7. SF₆ is an inert, non-toxic gas, with exceptional dielectric and insulating properties. It is used mainly in high- and medium-voltage electrical equipment and switchgear in the electrical transmission and distribution sector and in magnesium alloy production and casting. It is also used as a tracer gas in pressure vessel leakage tests and in occupational health studies.

MOD Uses of Fluorinated Greenhouse Gases

HFCs

8. HFCs are used by MOD mainly in:

- Naval vessel refrigeration, chilled water and air-conditioning systems;
- Armoured Fighting Vehicles (AFV) and other vehicle crew compartment cooling systems;
- Building air-conditioning systems;
- White goods, such as domestic refrigerators, cooled cabinets and water coolers;
- Cleaning and degreasing applications;
- AFV and other vehicle engine fire protection systems;
- Aircraft engine nacelle fire protection systems; and
- Building fire protection systems, such as in computer rooms and control and operations centres.

PFCs

9. No MOD uses of PFCs have been reported to the Controlled Gases Working Group (CGWG) (refer to paragraph 49).

SF₆

10. SF₆ is used by MOD:

- In high- and medium-voltage equipment and switchgear;
- In airborne radar systems on certain aircraft; and
- As a tracer gas in occupational health investigations and assessments.

International Policy – the UN Framework Convention on Climate Change (UNFCCC)

11. The international policy objective is to tackle climate change by means of international action to reduce the emissions of certain greenhouse gases responsible for global warming. The aim is to stabilise atmospheric concentrations of the greenhouse gases at levels that will prevent dangerous human-induced interference with the climate system.

12. The UNFCCC is supported by expert advisers forming the Intergovernmental Panel on Climate Change (IPCC) and, in recognising the close linkage between policies on ozone depleting substances and the fluorinated greenhouse gases, the Montreal Protocol's Technical and Economic Assessment Panel (TEAP).

13. Further information on the UNFCCC and international climate change policy, is available at:

<http://unfccc.int/2860.php>

European Union Policy

14. European policy on fluorinated gases was developed from a steering group, tasked to study the impact of fluorinated gases within the first of two parts to the EU Climate Change Programme (launched in 2000). Further the European Union is committed to reducing its emissions of the greenhouse gases in line with its legal obligations under the Kyoto Protocol, and to lead the international community's efforts in achieving the objectives of the UNFCCC. As part of this, policy on the fluorinated greenhouse gases is focused on cutting usage by 80% by 2030 as well as improved containment, controls on unnecessary uses, improved reporting of production, usage and emissions, and encouraging the development and use of lower GWP alternatives. The second part of the Programme will review the impact of this regulation and amend it if necessary to meet the objectives of the Programme.

15. Further information on the EU Climate Change Programme can be viewed at:

<http://ec.europa.eu/environment/climat/eccp.htm>

UK Government Policy

16. The Government is committed to reducing the UK's emissions of the greenhouse gases in accordance with EU and international policy.

17. As part of this commitment, it is the government's policy that:

- HFCs should only be used where other safe, technically feasible, cost effective and more environmentally acceptable alternatives do not exist;
- HFC emission reduction strategies should not undermine commitments to phase out ozone-depleting substances under the Montreal Protocol; and
- Meet the requirements of the 2014 EU F-Gas Regulation to reduce emissions and phase down F-Gas use by 80% by 2030.

18. The policy takes account of the fact that HFCs are used in a wide range of applications and that they will continue to have a role in these applications where there are no acceptable alternatives. At the same time, industry and users are being given a clear signal to look closely at all the alternatives and to select those that are more acceptable where they do exist.

19. The policy also takes account of energy efficiency. The Government recognises that, over recent years, industry has made significant improvements in the energy efficiency of equipment but it believes there are opportunities for further gains. The scope for improving energy efficiency mainly depends upon the size, design, maintenance and operation of the equipment. The choice of refrigerant, for example, can have an impact but this is normally less significant over the life of the equipment. It is noted that the use of HFCs in insulation foams can in certain applications provide higher energy savings than other types of insulation.

20. Government policy on fluorinated greenhouse gases, including the implementation of EU legislation can be viewed at:

<https://www.gov.uk/government/collections/eu-f-gas-regulation-guidance-for-users-producers-and-traders>

MOD Policy

21. It is MOD policy to minimise the Department's use and emissions to atmosphere of the fluorinated greenhouse gases, consistent with the Department's policy and the legislative constraints on its use of ozone depleting substances.

22. The policy on the fluorinated greenhouse gases forms one part of the MOD's Climate Change Strategy, which is available at:

<https://www.gov.uk/government/publications/mods-climate-change-strategy>

INTERNATIONAL AND UK LEGISLATION

International legislation – The Kyoto Protocol

23. The international legislative framework for the fluorinated greenhouse gases is provided by the Kyoto Protocol, which was adopted in 1997. The Protocol implements the provisions of the UNFCCC and sets legally binding emissions targets for industrialised countries.

24. The Kyoto Protocol tackles emissions of the six principle categories of greenhouse gas: carbon dioxide, methane, nitrous oxide, HFCs, PFCs and SF₆. Overall, the Parties of Annex I to the Framework Convention – the major industrial nations – are required to reduce their total greenhouse gas emissions by at least 5% below 1990 levels during the period 2008 to 2012. Annex B to the Protocol specifies the obligation of each individual Party. Parties may meet their obligations using means of their own choosing, and may utilise a number of flexible mechanisms enshrined in the Protocol that continue to be refined. The target applies to the “basket” of gases, and not to each gas category.

25. Further information on the Kyoto Protocol is available at:

http://unfccc.int/kyoto_protocol/items/2830.php

European Union Legislation

26. Member States of the European Union have ratified the Kyoto Protocol and have agreed to act collectively to ensure that their obligations are met. The EU as a whole must ensure that its emissions of the greenhouse gases are reduced to 8% below 1990 levels by 2008-2012. Furthermore, Member States have agreed to share out the commitment according to each country's circumstances and its ability to reduce emissions. Under this burden-sharing agreement, the UK is required to reduce its emissions by 12.5% over the implementation period [this is now historic and is left in for reference only].

27. The EU has developed a package of legislation to ensure that the Union's collective greenhouse gas emissions obligation is met. The legislative package has two elements. The first and the most relevant to defence is Regulation (EU) No 517/2014 (that repeals EC842/2006) on fluorinated gases, which entered into force on 1 January 2015. The objective of the new Regulation is to significantly reduce the production and consumption of F-gases in the EU through regulating containment, recovery, usage, production and imports of F-gases. The second is a Directive 2006/40/EC relating to emissions from air-conditioning systems in motor vehicles, which phases-out HFCs in vehicle air-conditioning systems with a GWP of more than 150.

28. The EU 517/2014 Regulation strengthens the existing measures and introduces a number of far-reaching changes. By 2030 it aims to cut the EU's F-gas emissions by two-thirds compared with 2015 levels. It also moves towards the EU's objective of cutting its overall greenhouse gas emissions by 80-95% of 1990 levels by 2050 to limit global climate change. Commission Implementing Regulations (EU) 2015/2067 and 2015/2068 are pursuant to Regulation (EU) No 517/2014; (EU) 2015/2067 concerns the minimum requirements for certification (training) for natural persons and companies, whilst (EU) 2015/2068 establishes the format for labels for products and equipment that contains fluorinated greenhouse gases.

29. Regulation (EU) No 517/2014 and Commission Implementing Regulations (EU) 2015/2067 (certification) and 2015/2068 (labelling) can be viewed at:

http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.150.01.0195.01.ENG

<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1455792619346&uri=CELEX:32015R2067>

<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1455792619346&uri=CELEX:32015R2068>

30. This Regulation applies to:

- Cooling circuits of refrigeration, air conditioning and heat pump equipment;
- Equipment containing fluorinated greenhouse gas based solvents;
- Fire protection systems and fire extinguishers; and
- Electrical Switchgear.

31. All users should refer to the Regulations for full details, however the main requirements of the Regulation are:

On Containment and Leakage

32. All users of the substances must take all measures that are technically feasible and cost effective to prevent and minimise emissions of the fluorinated greenhouse gases, to include the inspection of equipment and the maintenance of records on the quantity and type of gas installed and the amounts added and recovered during servicing. There is also a requirement to recover fluorinated greenhouse gases from all products and equipment prior to disposal unless it is not technically feasible to do so, or if the cost of doing so is disproportionate. Both service and recovery of fluorinated gases must be carried out by a person who is appropriately qualified to do so. See paragraphs 54-71 for further information on training requirements.

33. Operators of stationary equipment applications which contain fluorinated gases in quantities of 500 tonnes CO₂ equivalent or more must have a leakage detection system installed, which alerts the operator or service company to any leakage. Equivalent refrigeration and electrical switchgear applications shall have a leak detection system installed from 1 January 2017. Leak detection systems shall be checked once at least every 12 months to ensure their proper operating.

34. Operators of equipment that contains fluorinated greenhouse gases in quantities of 5 tonnes of CO₂ equivalent or more and not contained in foams shall ensure that equipment is checked for leaks. The table below indicates the frequency and reporting requirements of leakage checks required by the Regulation. By way of derogation until 31 December 2016, equipment that contains less than 3kg of fluorinated greenhouse gas, or hermetically sealed equipment which is labelled accordingly and contains less than 6kg of fluorinated greenhouse gas shall not be subject to leak checks.

Table 1 Overview of effect of Regulation on servicing requirements

Mass of charge gas (kg) or in CO ₂ equivalent (tonnes)	Leakage detection system required to be installed?	Frequency of leakage checking required		Records required
		Without leakage detection system	With leakage detection system	
m < 3 kg mass F Gas	×	N/A	N/A	N/A
m < 6 kg mass F Gas (if labelled hermetically sealed)	×	N/A	N/A	Yes, records to be kept on quantity & type of fluorinated gas installed, any quantity added & quantity recovered during servicing/maintenance & final disposal. Records should also state any other relevant info including the identification of company or technician who performed the maintenance task & results & dates of leakage tests.
5 tonnes ≤ m < 50 tonnes	×	Every 12 months	Every 24 months	
50 tonnes ≥ m < 500 tonnes	×	Every 6 months	Every 12 months	As above plus: Information identifying the separate stationary equipment with more than 50 tonnes CO ₂ equivalent of F-Gases.
m ≥ 500 tonnes	✓	Every 3 months	Every 6 months	As above plus: Information identifying the separate stationary equipment with more than 50 tonnes CO ₂ equivalent of F-Gases.

35. In the case of fire protection systems where there is an existing inspection regime in place to meet ISO 14520 standard, these checks will also fulfil the obligations of this Regulation as long as they are as frequent as those specified in the schedule contained in the Regulations.

36. Electrical switchgear shall not be subject to leak testing provided it complies with one of the following conditions: (a) it has a tested leakage rate of less than 0.1% per year as set out in the technical specification of the manufacturer and is labelled accordingly; (b) it is equipped with a pressure or density monitoring device; or (c) it contains less than 6kg of fluorinated greenhouse gases.

On Reporting

37. Operators of equipment referred to in Para 30 are required to maintain records for each leakage maintenance task carried out, in accordance with the reporting requirements described in paragraph 83 and in Table 1. Reporting requirements only apply to the relevant applications where the charge gas exceeds 3 kg in mass/>5 tonnes CO₂ equivalent.

38. Producers, importers and exporters of more than one metric tonne of fluorinated greenhouse gases, or 100 tonnes CO₂ equivalent per year must report to the Commission the quantities of gases produced, imported, exported, recycled and destroyed. In addition they will have to provide information on the likely use of the gases and estimates of expected life-cycle emissions.

Labelling

39. Products and equipment placed on the market containing fluorinated gases in any form must be appropriately labelled, as well as containers of these gases. The label must include the chemical name of any fluorinated gases present which are covered under the Kyoto protocol, using the accepted industry nomenclature, as well as the respective quantity installed. This must be clearly labelled on the product or equipment, adjacent to the service points for charging or recovering the fluorinated greenhouse gas, or on the part of the product or equipment which contains the fluorinated greenhouse gas. Hermetically sealed systems must also be labelled as such.

Use and Marketing Restrictions

40. Regulation (EU) No 517/2014 prohibits the use of sulphur hexafluoride, in any form or quantity, for the filling of vehicle tyres.

41. Production and placing on the market of certain fluorinated greenhouse gases in certain applications has been prohibited from specific dates. The full list of products and equipment covered by these restrictions, and their associated dates of prohibition can be found in Annex III of the Regulations, these can be viewed at:

http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.150.01.0195.01.ENG

42. There is an exemption for military equipment³ from annex III, and products which can be shown to be manufactured before their relevant date of prohibition are exempt from these restrictions.

³ Military equipment is defined by the Regulation as “arms, munitions and war material intended specifically for military purposes necessary for the protection of the essential interests of the security of Member States”.

Use and Marketing Restrictions relating to Vehicle Air-Conditioning Systems

43. Air-conditioning systems in passenger and light commercial vehicles using a fluorinated greenhouse gas with a GWP greater than 150 must initially meet certain leakage requirements before that class of vehicle can be placed on the market. Subsequently, between 2008-2017 air-conditioning systems that contain HFCs with a GWP above 150 will be phased-out.

UK Legislation

44. Regulation (EU) No 517/2014 on certain fluorinated greenhouse gases is directly applicable in the UK; therefore little by way of UK legislation is required to define UK member state detail. The following legislation provides further UK specific requirements for meeting the EU regulation.

45. The Fluorinated Greenhouse Gases Regulations SI 2015/310 came into force on 19 March 2015 and apply to England, Scotland and Wales. They revoke and replace the Fluorinated Greenhouse Gases Regulations SI 2009/261 and help to enforce Regulation (EU) 517/2014 on fluorinated greenhouse gases, by providing enforcement powers, setting offences and penalties and designating certification and training bodies. It is available at: http://www.legislation.gov.uk/ukSI/2015/310/pdfs/ukSI_20150310_en.pdf

47. The Fluorinated Greenhouse Gases Regulations SI 2009/261 made it an offence to work with fluorinated greenhouse gases (FGG) without holding a recognised City and Guilds statutory refrigeration, air conditioning and heat pump equipment qualification. These new Regulations update the qualification requirements, and set out details of offences (which are greatly reduced from the previous Regulations) and how they will be enforced. This will primarily be done through enforcement notices

48. The Fluorinated Greenhouse Gases Regulations (Northern Ireland) SR 2015/425 came into force on 31 January 2016 and apply to Northern Ireland only.

They revoke and replace the Fluorinated Greenhouse Gases Regulations (Northern Ireland) SR 2009/184 and help to enforce Regulation (EU) 517/2014, on fluorinated greenhouse gases. It is available at:

<http://legislation.data.gov.uk/nisr/2015/425/made/data.pdf>

PROCEDURES FOR IMPLEMENTATION OF MOD POLICY

Policy Development and Implementation Management Responsibilities

49. The management focus within the MOD for fluorinated greenhouse gas issues is the Controlled Gases Working Group (CGWG). The CGWG is responsible for supporting DE&S in the development of the Department's fluorinated greenhouse gas policies, it also co-ordinates all related activities. The CGWG is chaired by DE&S S&EP which also provides a technical secretariat. Its membership comprises representatives from all areas of MOD. For more information on the CGWG Terms of Reference and its membership please contact DESTECH-QSEPEnv@mod.uk.

50. The CGWG is also responsible for formulating policy on the use and emissions of the ozone depleting substances.

Responsibilities of Users

51. Heads of Establishment, Project Team Leaders, Project Sponsors, Equipment, Property and Facilities Managers and others, (including RPCs, Private Partners and other such contractors), who are responsible for equipment or facilities or procedures which use a hydrofluorocarbon (HFC), a perfluorocarbon (PFC) or sulphur hexafluoride (SF₆), in refrigeration, fire protection, solvent cleaning or other applications – the Responsible Authority for the activity – shall ensure that:

- All uses of the substances are identified, described and reported centrally on an annual basis⁴;
- Notify the appropriate TLB member of all events that result in a significant accidental or avoidable loss of any fluorinated greenhouse gas as listed in Paragraph 84.
- A strategy exists to minimise use and emissions of the fluorinated greenhouse gases and to ensure that more environmentally acceptable alternatives are evaluated and used wherever they are suitable;
- A plan exists and is regularly reviewed to implement the strategy in order to comply with the Department's fluorinated greenhouse gas policies and current legislation;
- Procedures are in place that mandates operators how to decant fluorinated greenhouse gases from equipment or facilities into MOD approved Recovery Cylinders safely, and in accordance with current legislation: and
- F Gas records of training, attestation and certification shall be maintained by the responsible authorities and made available on request from suppliers and/or Regulators.

Responsibilities of MOD Re-Supplier (reselling to MOD purchasers)

52. Where an MOD Authority/undertaking becomes a re-supplier of F Gases from an MOD contract it has the legal duty under Regulation (EU) 517/2014 to confirm that greenhouse gas is only be sold to and purchased by undertakings (MOD users) that employ persons holding a certificate or training attestation as listed in the section below headed Training (paragraph 54-71). The re-supplier shall establish records of relevant information on the purchasers (MOD Authorised Controlled Gases Demanders*) of fluorinated greenhouse gases including the following details:

(a) the numbers of certificates of the purchasers; and

(b) the respective quantities of fluorinated greenhouse gases purchased.

⁴ This information shall be supplied on the proforma given in Annex D to JSP 418 Leaflet 7 Ozone Depleting Substances and be compiled from the information/data which operators of equipment containing fluorinated greenhouse gases are mandated to collect and gather and make available to the competent authority and the Commission if requested.

53. They shall maintain those records for at least five years and shall make such records available, on request to the competent authority of the Member State concerned or the EU Commission.

53. The MOD re-supplier shall establish and publish procedures, and a means of assurance to discharge these duties to achieve compliance with the Regulations. This will require the provision of a signed internal letter of assurance by those wishing to become an MOD Authorised Demander, an example of such is available from the DE&S LDOC and their Delivery Partner.

*MOD Authorised Controlled Gases Demanders are those purchasers that provide a valid UIN and signed letter of assurance to the re-supplier thereby being permitted to receive gases from the supplier under the MOD contract.

Training

54. The UK transposing Statutory Instruments entitled the Fluorinated Greenhouse Gases Regulations 2015 (for Great Britain), and the Fluorinated Greenhouse Gases (for Northern Ireland) Regulations 2009 SR 184 make it an offence for personnel to undertake certain activities involving fluorinated greenhouse gases unless they are suitably qualified.

55. The information below utilises Government guidance to provide information to regulators, Responsible Authorities, Heads of Establishments (HoE) and Trade Training Sponsors (TTS), users and maintainers and contractors performing these roles on behalf of the MOD; enabling them to put in place appropriate arrangements for training and competence for personnel working with F Gases to ensure that they fulfil their duties without being in breach of legislation.

56. The following section provides guidance on MOD Policy and the minimum training requirements and certification⁵ for personnel working with F Gases. This is divided into the following equipment/activity areas:

Stationary⁶ Refrigeration, Air Conditioning and heat pump systems

Fire Protection Systems

Mobile⁷ Air Conditioning Systems (MAC)

High voltage switchgear (Electrical Switchgear)

Solvent Recovery

57. Where, by completion of a risk assessment of the task (potential for leakage) and following the completion of a training needs analysis for the tasks necessarily carried out on other transport and vehicles, there is a requirement for training (e.g. for installation, repair and maintenance, leak testing etc.), Training Authorities and Line Managers shall:

⁵ Certification where appropriate, noting that equivalent qualifications from other EU member states are recognised.

⁶ F Gas Regulation: 'stationary' means not normally in transit during operation and includes moveable room air-conditioning appliances.

⁷ F Gas Regulation: 'mobile' means normally in transit during operation.

- Align internal courses with the training need and develop and deliver to MOD and Military Staff, the training for the categories of paragraph 54-71 relevant to the specific tasks undertaken, or
- Ensure MOD and Military Staff complete the formal industry courses identified at paragraph 54-71, and
- Maintain records of training and certification and make available, on request, to MOD personnel authorised to demand F Gases or regulators.

Stationary⁸ Refrigeration, Air Conditioning and heat pump systems (RACHP)

58. Stationary RACHP includes refrigeration systems in trucks that weigh more than 3.5 tonnes and trailers designed to be towed by trucks or tractors.

59. Personnel must be qualified to carry out any of the following types of work:

- Installation.
- Maintenance.
- Leak checking.
- Recovering refrigerant gases.
- Decommissioning and disposal.

60. Personnel must hold one of the following qualifications:

- [City & Guilds F GAS and ODS⁹ Regulations certificate¹⁰](#).
- [Construction Industry Training Board Refrigeration certificate](#).

61. Qualifications to work on refrigeration or stationary air conditioning and heat pump systems have 4 different categories depending on the tasks carried out:

- Category 1 certificate holders can carry out all activities.
- Category 2 certificated holders can install, maintain, service, decommission and recover refrigerant from systems that contain less than 3kg of F gas.
- Category 3 certificate holders can recover refrigerant from systems that contain less than 3 kg of F gas.
- Category 4 certificate holders can check equipment for leaks if they do not break into the refrigeration circuit.

Fire Protection Systems

62. Personnel must hold the following qualification to work on a fire protection system that contains 3 kg or more F gas:

- [Fire Industry Association \(FIA\) F gas competency certificate](#)

Mobile¹¹ Air Conditioning Systems (MAC) [Ref 6]

⁸ F Gas Regulation: 'stationary' means not normally in transit during operation and includes moveable room air-conditioning appliances.

⁹ ODS - Ozone Depleting Substances

¹⁰ [City and Guilds Level 3 Qualification Handbook](#)

63. The MAC¹² sector is a major user of HFC type F gases. The categories of vehicles using MACs are:

- Cars and light vans, include the following class of vehicles:
 - M1, Vehicles designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat.
 - N1, Vehicles designed and constructed for the carriage of goods and having a maximum mass not exceeding 3.5 tonnes.

64. Qualifications to recover refrigerant from mobile air conditioning systems are;

- [City & Guilds mobile air conditioning certificate](#)
- Any of the following certificates from the [Institute of the Motor Industry \(IMI\) Automotive Technician Accreditation \(ATA\)](#) scheme:
 - Air conditioning refrigerant handler.
 - Service technician.
 - Diagnostic technician.
- Any of the following level 3 awards or certificates from [IMI Awards](#):
 - Automotive refrigerant handling.
 - Air conditioning and climate control.
 - Vehicle accident repair competence.
 - Vehicle accident repair principles.
 - Cargo refrigerant handling.

65. Training and certification requirements for “other transport and vehicles” (e.g. trains, aircraft, ships, submarines and military vehicles other than category M1 and N1 or refrigerated systems in trucks and trailers) are not specified in the Directive 2006/40/EC. However, there is a requirement in Regulation EU 517/2014 that appropriately qualified natural persons carry out leak testing and gas recovery in order to prevent emissions of fluorinated greenhouse gases. Therefore the objectives of the training in paragraph 60 should, as a minimum¹³, be met by either completion of the industry course or equivalent MOD internal training¹⁴.

High voltage switchgear

66. The Regulations require that personnel must be qualified to undertake the following work on high voltage switchgear that contains sulfur hexafluoride (SF₆):

- Installation.

¹¹ F Gas Regulation: ‘mobile’ means normally in transit during operation.

¹² Most MACs are small systems using HFC 134a as the refrigerant. MACs in cars are usually driven via a belt drive to the engine. In larger vehicles (e.g. buses, trains) the MAC can be electrically driven or powered by a dedicated engine.

¹³ Reference to other transport and vehicles minimum training requirement: Guidance sourced from the Environment Agency Chemical Compliance Team, who is responsible for Fluorinated Greenhouse Gas (F Gas) support services related to the F Gas Regulation.

¹⁴ This is also applicable where F Gases are used in other military equipment’s not covered by the above, and where it cannot be replaced with a suitable and adequate alternative.

- Maintenance.
- Recovering SF₆.
- Decommissioning and disposal.

67. Qualifications for working on high voltage switchgear are:

- SF₆ gas recovery certificate from [Alstom Grid UK Ltd.](#)
- SF₆ gas competence certificate from [EA Technology Limited.](#)
- SF₆ gas competence operational course from [Siemens Transmission and Distribution Limited.](#)
- Qualifications from an internal training course run by a utility company, e.g. EDF, E.ON or Scottish and Southern Energy.

68. Working without qualification for recovery of SF₆ is tolerated for up to a year before qualification as long as the work is carried out either:

- Under the supervision of a qualified person.
- The person is enrolled on one of the courses listed above, or an internal training course at a utility company.

Solvent Recovery

69. Qualifications to recover solvents from equipment:

- A solvents F gas qualification from [Fraser Technology.](#)

70. Working without qualification for recovery of solvents is tolerated for up to a year before qualification as long as the work is carried out either:

- Under the supervision of a qualified person.
- The person is enrolled on the Fraser Technology training course.

71. For further information on any of the training and qualification requirements see:

<https://www.gov.uk/guidance/qualifications-required-to-work-on-equipment-containing-f-gas>

Restrictions on new uses

72. New designs of equipment and new installations shall not use, require the use of, or incorporate, any PFC.

73. New equipment and facilities shall not use or require the use of HFCs and SF₆ where technically feasible, safe, and environmentally preferable alternatives are available. Contracts for new equipment and facilities shall not specify the use of HFCs or SF₆ and

offers by contractors of equipment that utilises or requires these substances should be challenged and a justification for an HFC or SF₆ solution obtained and evaluated.

74. The decision concerning technically feasible shall be confirmed by the MOD Project Manager or Team Leader. [In particular to safeguard resilience those seeking to utilise an SF₆ substitute or SF₆ containing equipment item in the Estates Management area shall comply with DIO policy regarding the supply and installation of electrical switchgear].

75. The decision to procure equipment for which a fluorinated greenhouse gas is but one option should take into account, amongst other things:

- Cost and performance over the full equipment life cycle;
- The total equivalent warming impact (TEWI) of feasible solutions, taking into account the warming impact of CO₂ from energy used by the equipment as well as the likely emissions of the fluorinated greenhouse gases themselves from the equipment concerned; and
- Specific uses which are prohibited by Regulation 517/2014.

Restrictions on existing uses

76. Users may continue to procure supplies of the fluorinated greenhouse gases as required to support existing applications.

77. The Responsible Authority for the activity shall ensure that the existing uses are within the remit of the current legislation and that requirements for reporting and responsible management outlined in this Leaflet are complied with.

Alternative substances and methods

78. Commercially available alternatives to the HFCs exist for many applications. For example, domestic refrigerators and small air-conditioning units utilising hydrocarbon refrigerants are readily available. Contractors and suppliers should be consulted.

Responsible management

79. In order to comply with Regulation (EU) No 517/2014 and Section 33 of the Environmental Protection Act 1990, all users of the fluorinated greenhouse gases are required to follow certain codes of practice.

80. The Responsible Authority for the activity shall ensure that:

- All practicable measures are taken to recover the substances during servicing, maintenance and decommissioning of equipment, or prior to disposal of the equipment (the only exemption to this rule is if the products or equipment's containing F gases are serving on military operations);
- All precautionary measures practicable are taken to minimise leakages and prevent avoidable emissions of the substances during equipment operation;

- All stationary refrigeration systems containing a refrigerant charge of greater than 3 Kg are monitored for leakage and appropriate records are actively maintained. The frequency of monitoring shall be linked to the installed charge of the equipment. Thus:
 - Equipment containing 500 tonnes CO₂ equivalent or more of refrigerant shall be inspected at least every 3 months,
 - Equipment containing 50 tonnes CO₂ equivalent or more of refrigerant shall be inspected at least every 6 months,
 - Equipment containing 5 tonnes CO₂ equivalent or more of refrigerant shall be inspected at least every 12 months;
- Maintenance engineers and other personnel who handle the substances are suitably trained and qualified to an appropriate standard and are competent to undertake their tasks. Minimum qualification standards are defined in the UK transposing S.I. (see paragraphs 54-71).
- Any events that result in a significant accidental or avoidable loss of any of the substances are investigated and appropriate measures taken to prevent a recurrence. A record should be provided to the DSA and CGWG and retained by the Responsible Authority detailing the investigation and actions taken.

81. The deliberate or negligent venting or discharge to atmosphere of any of the substances, as a means of disposal or in other avoidable circumstances, is a criminal offence.

Servicing and Record Keeping Requirements

82. In order to comply with the reporting requirements for the UK government, the MOD will require all technicians who work with equipment listed in paragraph 30 to record the following information each time any servicing or maintenance is carried out. This includes:

- Quantities installed and used during the year, by application category;
- An estimate of the quantities emitted to atmosphere;
- Quantities added and recovered during each period of servicing, maintenance, and disposal; and
- Identification of the company or technician who performed the servicing or maintenance, as well as the dates and results of the checks carried out.

83. Annex B lists a number of material designations and common or trade names of products that may contain these substances.

84. The undertaking and Responsible Authority responsible for the activity shall also notify the appropriate TLB member of all events that result in a significant accidental or avoidable loss of any fluorinated greenhouse gas. All such single-event discharges of greater than 25kg of any gas shall then be notified by the appropriate TLB member to DESTTECH-QSEPEnv@mod.uk. The notification of the event should include a concise

description of the circumstances, the outcome of the investigation and a description of measures taken to prevent a recurrence.

Reporting Requirements

85. The main user reporting requirements have been specified at paragraph 51 Responsibilities of Users, Paragraph 80 Responsible Management and Paragraphs 82-84 Servicing and Record Keeping Requirements.

86. Reporting is also required for entities destroying f-gas, using them as chemical feedstock and importers of equipment containing relevant gases into the EU.

87. Article 12 of the Fluorinated Greenhouse Gases Regulations (2009) requires the MOD to report to the commission on quantities over 1 metric tonne of F gases imported, exported, outside the EU, and produced during each calendar year by 31 March of the following year.

88. Any calendar year imports, exports or production of F-gases, over 1 metric tonne, by any MOD team should be reported to DE&S QSEP by Feb 28th of the following year.

Disposal of recovered and unwanted fluorinated greenhouse gases

89. Fluorinated greenhouse gases that are recovered during maintenance procedures or from decommissioned systems shall be recovered for recycling, reuse or safe disposal. If not needed by the user concerned, the substances shall be offered, in the first instance, to the DE&S LDOC Delivery Partner point of contact for recycling and possible use in support of other MOD applications. If recycling is not feasible or cost-effective, the substances will require environmentally-safe disposal, using an approved process and by an authorised contractor, with due regard for the Duty of Care. The costs of disposal shall be borne by the user area.

90. Cross contamination of containment vessels; and mixing of gases recovered during maintenance procedures shall be avoided wherever possible.

Further guidance

91. Further advice and guidance on any of the policy matters or management duties described in this section can be obtained from the appropriate CGWG member or the DE&S QSEP Team via DESTTECH-QSEPEnv@mod.uk

Annex A

DEFINITIONS

UNDERTAKING - FROM REGULATION (EU) NO 517/2014

(30) 'Undertaking' means any natural or legal person who:

- produces, uses, recovers, collects, recycles, reclaims, or destroys fluorinated greenhouse gases;
- imports or exports fluorinated greenhouse gases or products and equipment that contains such gases;
- places on the market fluorinated greenhouse gases or products and equipment that contain, or whose functioning relies upon such gases;
- installs, services, maintains, repairs, checks for leaks or decommissions equipment that contains, or whose functioning relies on such gases;
- is the operator of equipment that contains, or whose functioning relies upon, fluorinated greenhouse gases;
- procures, imports, exports, places on the market or destroys gases listed in Annex II;
- Places on the market products or equipment containing gases listed in Annex II.

RESPONSIBLE AUTHORITY - FROM JSP 319 PART 1 CHAPTER 5

(33) Project Team Leaders, Project Sponsors, Equipment, Property and Facilities Managers and others (including RPCs, Private Partners and other such contractors) responsible for equipment or facilities which use, or might use, an ozone depleting substance and other fluorinated gases in refrigeration, fire protection, or other applications – are termed the Responsible Authority. The Responsible Authority shall ensure that personnel employed on such systems using Ozone Depleted Substances and other fluorinated gases are trained and certified to an accrediting authority. Full details of mandatory training requirements and certification can be found in JSP 418 Volume 2 Leaflets 6 and 7.'

ANNEX B**PLACING ON THE MARKET PROHIBITIONS IN ACCORDANCE WITH ARTICLE 9 OF
REGULATION EC 842/2006**

Fluorinated greenhouse gases	Products and equipment	Date of prohibition
Fluorinated greenhouse gases	Non-refillable containers	4 July 2007
Hydrofluorocarbons and perfluorocarbons	Non-confined direct-evaporation systems containing refrigerants	4 July 2007
Perfluorocarbons	Fire protection systems and fire extinguishers	4 July 2007
Fluorinated greenhouse gases	Windows for domestic use	4 July 2007
Fluorinated greenhouse gases	Other windows	4 July 2008
Fluorinated greenhouse gases	Footwear	4 July 2006
Fluorinated greenhouse gases	Tyres	4 July 2007
Fluorinated greenhouse gases	One component foams, except when required to meet national safety standards	4 July 2008
Hydrofluorocarbons	Novelty aerosols	4 July 2009

Products placed on the market which can be shown to have been manufactured before their respective date of prohibition are exempt.

ANNEX C

**COMMON AND TRADE NAMES OF PRODUCTS THAT MAY CONTAIN
FLUORINATED GREENHOUSE GASES**

Controlled Chemicals	Possible Trade- and Alternative Names
HFCs	AZ-20, AZ-50 R23, R32, R125, R134a, R143a, R152a, R236fa FE-13, FE-25, FE-36, FM200 Asahiklin, Dymel, Forane, Formacel, Frigc, Genesolv, Vertrel, Genetron, Isceon, Klea, Solkane, Suva,
HFC-containing blends	R401A, R401B, R401C, R402A, R402B R404A, R407A, R407B, R407C, R408A, R410A, R410B, R411B, R413A, R415A Isceon 59, Isceon 89 RX3
PFCs	PFC or R-14, -116, -218, -318 CEA 308, CEA 410, CEA 614
PFC-containing blends	R403A, R403B, R412A R413A R508A, R508B, R509A Isceon 89 RX3
SF ₆	

- Some of these trade names may be associated with products that do not contain any of the fluorinated greenhouse gases. In most cases, the name will often be accompanied by a code or number that can be used to identify the product's composition.
- The table is for guidance only and is not intended to be a complete list of products that might contain HFCs, PFCs or SF₆.
- SME guidance and specific case by case consideration is recommended to establish precisely the nature of a substance and the management requirements within the policy and legal context.

ANNEX D

ASSURANCE QUESTIONS

The purpose of these question sets is not for delivery bodies to provide answers to each question. However, they should be useful for the delivery body in stating their assurance level. If full assurance cannot be given, a short explanation of the problem area/s and the actions which are being taken to improve the assurance level is required.

Questions

1. How are legislative requirements met and updated?
2. How are the usage, containment, recovery and marketing of the HFCs, PFCs and SF₆ fluorinated gases regulated?
3. How is the TLB/TFA managing the phase-out of HFCs in vehicle air conditioning systems with a GWP of above 150?
4. How do sites manage the containment and leaking reporting requirements of fluorinated gases?
5. How is the training of personnel managed for each of the different activities involving fluorinated gases?
6. How are accidental emissions of fluorinated gases investigated?
7. How are the responsible authorities ensuring that:
 - use and emissions of the fluorinated gases is minimised;
 - that environmentally acceptable alternatives to fluorinated gases are used where technically and economically feasible;
 - That new designs and installations do not incorporate or use PFCs, HFCs or SF₆?
8. How many sites during the last annual reporting audit period received either no assurance or limited assurance? How is this being remediated?
9. On the basis of your responses to the questions, and the guidance that is provided in JSP 418, what level of assurance do you believe applies for your compliance with this policy area?

DIA Assurance Classifications

- **Full assurance** - The frameworks of governance, risk management and control should ensure effective, efficient and economic achievement of the business objective. Risks that threaten the achievement of that objective are adequately managed.
- **Substantial Assurance** - Weaknesses identified in governance, risk management or control frameworks. Achievement of the business objective is threatened by inadequate management of medium or low category risks.

- **Limited Assurance** - Weaknesses identified in governance, risk management or control frameworks. Achievement of the business objective is threatened by inadequate management of high category risks.
- **No Assurance** - The frameworks of governance, risk management and control do not support effective, efficient and economic achievement of the business objective