

Information Guide

Maintenance and Refrigerant Regulations

ISSUE 35





Guide to Maintenance and Refrigerant regulations

This is an independent guide produced by Mitsubishi Electric to enhance the knowledge of its customers and provide a view of the key issues facing our industry today. The guide accompanies a series of seminars, all of which are CPD accredited.



Two important pieces of legislation are currently impacting on the air conditioning sector's use of certain refrigerants. These are the European Fluorinated F Gas Regulation and the Ozone Depleting Substances Regulations (ODS).
The rules cover a number of important areas, including what refrigerants can be used, inspections and leak testing, as well as qualifications for personnel working with refrigerants...

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1. The rules on refrigerants and inspections

...this means that anyone working with or operating air conditioning equipment should ensure that they are very aware of their obligations under both pieces of legislation.

In brief, the ODS Regulations were introduced in the UK in October 2000 and are designed to reduce emissions of ozone depleting substances. The F Gas Regulation came into force in the UK in July 2008, and its main focus is the containment and recovery of certain fluorinated gases. Table 1 shows some of the refrigerants affected by each piece of legislation.

Refrigerant	Type	EU F Gas Regulation	ODS Regulation
R22	HCFC	No	Yes
R408A	HCFC + HFC Blend	Yes	Yes
R134A	HFC	Yes	No
R404A	HFC Blend	Yes	No
R407C	HFC Blend	Yes	No
R410A	HFC Blend	Yes	No

Table 1: New rules on refrigerants

For clients or installers dealing with R22, the ODS Regulation covers the areas shown in Table 2.

Phase-out	Phase-out of HCFC (including R22) usage before 2010 (virgin refrigerant) and 2015 (recycled refrigerant)
Leak checks	Annual leakage checks for equipment containing 3kg or more of refrigerant.
Recovery	Refrigerant recovery during plant servicing and maintenance, and at end-of-life
Training	Use of personnel with prescribed qualifications.

Table 2: requirements under ODS

Of course, many air conditioning personnel will also be involved with use of refrigerants that fall under the F Gas Regulations, which cover the areas outlined in Table 3.

Leak checks	Regular checks for leakage required; use of automated leak detection on stationary systems above 300kg required.
Recovery	Refrigerant recovery during plant servicing and maintenance and at end-of-life.
Records	Good records kept for equipment containing 3kg or more of F gases
Training and certification	Use of appropriately qualified personnel Company certification required for companies employing personnel to work on equipment containing or designed to contain F gases (includes sole traders)
Other	Includes labeling of new equipment.

Table 3: Requirements under F Gas



The list of qualifications for relevant personnel consists of four categories, and includes an outline of what levels of certification are required for each operation: checking for leaks, refrigerant recovery, installation or servicing. The full details of these qualifications and the awarding bodies can be found at www.defra.gov.uk. It can be seen that many areas of the ODS and F Gas Regulations overlap. Inspection, maintenance, record-keeping and use of qualified personnel are all designed to reduce

the likelihood of refrigerant leakage. It should also be noted that these are not the only rules driving the requirements for inspections. Under the European Energy Performance of Buildings Directive (EPBD), heat pumps and air conditioning systems of an effective combined rated cooling output of more than 12kW should be regularly inspected. One of the most important points to note about ODS and F Gas is that responsibility for adhering to these rules has control of the equipment

containing the F gas refrigerant. It is therefore likely to be a company that has responsibility, and that organisation will therefore have to ensure that individual staff members who are handling the refrigerant are appropriately qualified. The next feature will examine what steps are required for leakage checks, as well as recommendations on long-term maintenance for efficient operation of air conditioning.

2. Inspections and maintenance for long-term efficiency

Although all building services equipment should be checked and maintained regularly, air conditioning systems now require a very prescribed regime of checks and maintenance in order to meet the F Gas rules. The key aim is to reduce leaks and promote efficient operation – and to keep records of all the equipment on any given site.

Table 4 outlines the main obligations for inspections and checking under the F Gas Regulation.

All stationary systems	Take steps to prevent F gas leakage and repair leaks as soon as possible.
Stationary systems 3kg or more (or if hermetic and labeled 6kg or more)	Check regularly for leakage
Stationary systems over 300kg	Fit automatic leak detection system
Stationary systems 3kg or more	Keep records about plant using F gases
ALL stationary systems	Use properly qualified personnel to carry out installation, servicing and maintenance and leakage checking. Have company certification if employing personnel to do any of the above on RAC systems.
ALL stationary systems	Label new equipment clearly

Table 4: Obligations under F Gas Regulation

3. Preparing for R22 phase-out

Checking for leaks is one of the most vital steps under F Gas rules. It means that the equipment or system is examined for leakage using direct or indirect measuring methods. Direct leak detection methods include use of a hand-held electronic gas detector or dye in the refrigerant. Indirect methods might include observation of running parameters such as temperatures and pressures in the refrigeration system and automated indications that can sometimes be obtained from equipment. These indirect methods can be used to spot slow leaks that develop in well ventilated areas.

Checks should focus on those parts of the equipment most likely to leak, including joints, valves, seals and parts

of the system subject to vibration. Once any repairs are made, the individual plants must be checked to ensure that the repair has been effective. Table 5 shows leak testing frequencies.

It is vital that careful records of these checks and inspections are maintained. Records on all equipment with more than 3kg of HFC refrigerant must include the quantity and type of F gas refrigerant in each system. Records

Frequency	Normal systems	Hermetically sealed systems
None	Less than 3kg	Less than 6kg
Annual	3kg to 30kg	6kg to 30kg
Six-monthly*	30kg to 300kg	30kg to 300kg
Quarterly*	Greater than 300kg	Greater than 300kg

Table 5: Leakage testing frequencies

* Half this frequency if automated leak detection is used. Equipment with 300kg or more of F gases must be fitted with automatic leak detection equipment. This detection equipment must be tested once a year.

also need to be kept of the quantity of refrigerant recovered during servicing, and any amount of refrigerants added to a system. The identity of the company or personnel who carry out any work, as well as dates and details of repair work carry out, also need to be retained.

Our next feature examines more closely the challenges of the ODS rules on refrigerants and how building occupiers can prepare for forthcoming deadlines.

Steps to prepare for inspections: Defra recommendations

- Identify the scope of your obligations: what refrigerants do you use? Do they fall under the ODS or F Gas rules?
- Identify who is responsible for compliance: this is particularly important in landlord/tenant relationships.
- Allocate director-level and operational responsibilities to ensure that obligations are being met and recorded.
- Create an inventory of all relevant equipment including type of refrigerant and quantity used.
- Ensure your personnel are correctly qualified to handle refrigerants; and that your company also has the correct certification (www.defra.gov.uk for details and approved training/certification suppliers).
- Ensure your leak testing schedule is set and adhered to.
- Fit automatic leak detectors where required (on plant using 300kg or more of F gas refrigerant)
- Prepare of HCFC phase out, including refrigerants such as R22.

The regulations on Ozone Depleting Substances have already begun to have an effect on the air conditioning market. From the 1st January 2010 it became illegal to use virgin HCFCs such as R22 in refrigeration and air conditioning equipment. This means that R22 systems must now operate on recycled or reclaimed HCFC refrigerant, or use drop in replacements

The next important deadline is 1st January 2015. At this point it will become illegal to use any HCFCs, including recycled or reclaimed refrigerants. It is important to note that the ban covers the 'use' of HCFCs in the 'production, maintenance and in particular the refilling of products or equipment'. So it is possible to use equipment that contains R22, for example, but any maintenance that involves opening refrigerant circuits is banned.

This poses a major challenge to any organisation currently using R22 or any other HCFC in their air conditioning system. Any business-critical air conditioning systems (for example in data centres) should not be using HCFC refrigerants after the 2015 deadline.

Although the next deadline is four years away, the impact of this legislation is already being seen in market prices for R22. According to market sources, only around 10% of the required levels of R22 are being returned to suppliers for recycling. As a result, reclaimed R22 is selling at three times the price of virgin R22 before the ban.

Another important issue to bear in mind is the requirement in legislation that refrigerants are only handled by correctly qualified and certified personnel. As the deadline approaches, it seems highly likely that both training courses and trained people will be more difficult to access - leading to further price rises and delays.

It would seem sensible therefore to plan ahead for the 2015 deadline, by deciding how to approach a move away from HCFC refrigerants such as R22, particularly in business-critical air conditioning and refrigeration systems. Doing nothing is not a sensible option, given the risks of rising prices and lack of certified available personnel.

There are therefore two options for dealing with R22: convert to a different refrigerant; or use the opportunity to replace older air conditioning systems.

'Drop-in' replacement refrigerant could be used. This process can be dealt with in quite a straightforward way. However, there are important long-term implications to bear in mind. The most significant of these is that drop-in refrigerants do not tend to operate as energy efficiently as the original refrigerant. Also, many manufacturers will not guarantee system performance if any other refrigerant is used other than that for which it was originally designed.

Plant converted this way may also have less capacity. If clients do take this option, they should also take care to ensure that work is carried out by qualified contractors to ensure that leakage does not increase after the conversion.

At this point, it is useful to consider replacing an older air conditioning system with more up-to-date equipment. Modern system updates



can be achieved with minimal disruption, especially with kit that utilises existing pipework. This removes the need to take down pipes and disrupt business operation.

The benefits of replacing with a new air conditioning system also include better energy efficiency and lower carbon emissions in the long-term, and this is increasingly important as building energy

efficiency rises up the agenda.

Diagram 1 shows the example of Mitsubishi Electric's replacement system compared with its equivalent product on the market ten years ago.

It can be seen that modern air conditioning systems are far more energy efficient than older models. Although replacement carries a greater capital cost, the long-term energy

efficiencies should be weighed carefully against this.

Whatever the decision, it is important that end-users start to form their strategies for dealing with HCFC phase-out now. As the four-year deadline approaches it will be important to be prepared for the change, especially where air conditioning is a business-critical system.

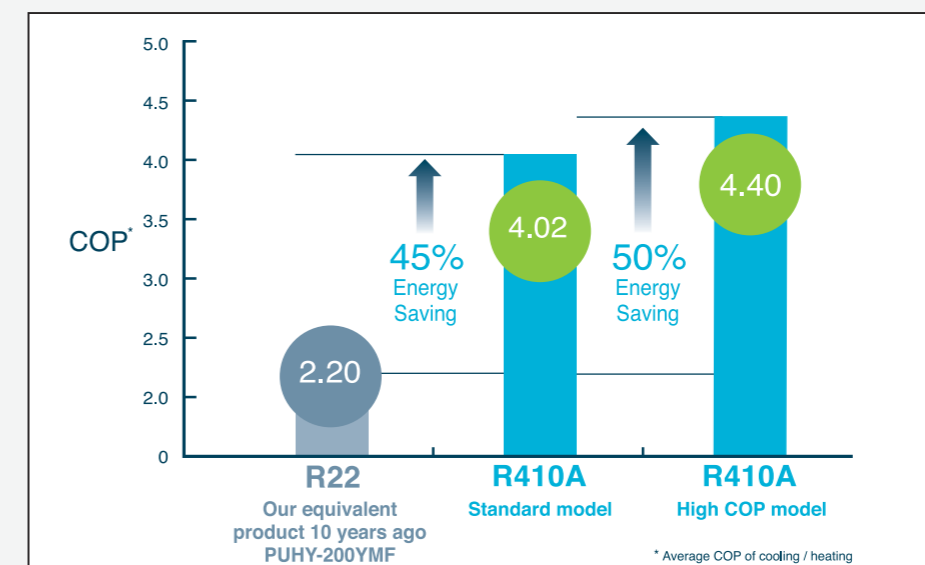


Diagram 1: Comparison of COP (energy efficiency) of a City Multi 8hp YHM-A system

HCFC Phase-out strategy: Defra recommendation

- Assess the risk by identifying all systems containing HCFCs and estimate associated business risks.
- Prioritise: identify the most business-critical systems and address these first.
- Determine the phase-out solution (drop-in refrigerants; replacing with a new system)
- Planning and budgeting: develop a phase-out plan, with phased implementation of the solutions since it's unlikely that all solutions can be carried out at once.
- Implementation: carry out the plan with monitoring and regular review
- Managed use of recycled and reclaimed HCFCs.

More information

1. www.defra.gov.uk
Defra includes many useful factsheets on the F Gas Regulations and new rules on Ozone Depleting Substances. These can be downloaded as PDF files.
2. **F Gas support helpline :**
0161 874 3663
open Monday to Friday 9am to 5pm
3. www.bis.gov.uk
Department for Business Innovation and Skills also has information on its website about Ozone Depleting Substances.
4. www.mitsubshi-aircon.co.uk
Mitsubishi Electric offers an Audit Tool for end-users and contractors to use to help make the decision regarding replacing an old R22-based system with modern equipment. The Audit Tool makes it easy to compare the relative running costs of the old system with new equipment, using simple information.

Further information

If you missed the CPD seminar on **Maintenance and Refrigerant Regulations** you can call your Mitsubishi Electric Regional sales office to arrange an in-house presentation of this information.

If you would like to receive invitations to future CPD events, please email lesmarcomms@meuk.mee.com

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