F-GAS SUPPORT
Promoting Compliance with F Gas and Ozone Regulations

The EC Ozone Regulation

Legislative Update and Strategies for HCFC Phase-out

1. Background to HCFC Phase Out

The EC Ozone Regulation (EC/2037/2000) provides the legislative framework for EU Member States to meet their obligations under the Montreal Protocol, which was the international agreement drawn up to halt the damage to the ozone layer.

The most harmful ozone-depleting substances (e.g. CFCs like R12) were banned in the 1990s. New equipment using less harmful "transitional" HCFC refrigerants like R22 was banned in 2001 (or 2004 for small air-conditioning systems). Up until the end of 2009 it is still legal to use virgin HCFCs to service and maintain existing refrigeration and air-conditioning (RAC) equipment. However, under the Ozone Regulation such use will soon be banned in EC Member States. See Information Sheet RAC 3 for details of the current legal obligations. The two key phase-out dates are:

- **From 1st January 2010** it will be illegal to use virgin HCFCs to service RAC equipment. Note, this ban applies even if HCFC was purchased before the ban date. It is illegal to stockpile and use any supplies of virgin HCFCs after the end of 2009.

- **From 1st January 2015** it will be illegal to use recycled or reclaimed HCFCs to service RAC equipment. It should be noted that supplies of recycled or reclaimed HCFCs may be very limited and very expensive. See Section 5 below for more details.

The imminent ban on the use of virgin HCFC gases represents a very real business threat to any company which uses refrigerants like R22 or R408A in their processes or air conditioning systems. R22 remains one of the most commonly used refrigerants in the UK so many organisations will be affected by the ban. Sectors at greatest risk include the food and drink industry, petro-chemicals, pharmaceuticals, health, retail, hospitality, finance and data-processing. Typical applications can vary widely, but examples include refrigeration systems in supermarkets, blast chillers, cold stores and process coolers and many types of building air-conditioning. Many of these applications are absolutely critical to the continued operation of their owner's business.

It should be noted that the bans described above refer to the "use" of HCFCs. This specifically means use for servicing and maintenance. It will remain legal to continue using RAC equipment containing HCFCs beyond the phase out dates providing they do not require maintenance that involves putting any HCFCs back into a system.

Given that most refrigeration systems leak to a certain degree, all current users of HCFC systems must develop a plan to manage their operations without virgin gas after December 2009. Doing nothing is not a sustainable option. Given the serious implications and potential costs, businesses should follow a strategic approach. This is introduced in Section 2.

The current EC Ozone Regulation has been under review during 2009. A new Regulation has been agreed by EC Member States and is due to come into force on 1 January 2010. The new Regulation slightly changes the rules for continuing use of HCFCs in RAC systems – see Section 6 for more details.

2. HCFC Phase-Out Strategy

The six point plan below provides a model for a successful phase-out strategy:

Assess the Risk – identify all systems containing HCFCs and estimate their associated business risk.

Prioritise – identify the most business-critical systems and address these first. But do not neglect all the other systems, these must also be managed.

Determine the Phase-out Solution – on a plant-by-plant basis, identify the most appropriate phase out solution. These are likely to fall within one of three main options: Replace, Convert or Leave As-Is. These are described in more detail in Section 3. Each plant must be assessed against a number of decision criteria to identify the optimum solution. These include system type, age, condition, availability and energy efficiency (see Section 4 for details).

Planning and Budgeting – develop a Phase-out Plan, with phased implementation of the Phase-out Solutions. Depending on the size of your operation, it is unlikely to be possible or desirable to carry out all the actions at once. This will need to be done in association with your refrigeration contractor, in order to ensure their own commitment.

Implementation – carry out the plan, with monitoring and regular review.

Managed Use of Recycled and Reclaimed HCFCs – due to the short period of time before the end of 2009, it is likely that many HCFC systems will still be in operation after the use of virgin HCFC gases is banned. Users of these systems should manage their own stocks of recycled HCFC gas or secure a supply of reclaimed HCFC gas (see Section 4). When systems are either replaced or converted, the recovered gas can be used to service other systems still using HCFCs (until the end of 2014). In addition, the continued use of systems containing HCFCs will be subject to regulations similar to those of the EC F gas Regulation (regular leak testing, prompt repair by qualified personnel and record-keeping) – see Section 6.

3. Phase-out Solutions

After identifying all systems using HCFC refrigerants, each one should be assessed against decision criteria and assigned one of three main Phase-out Solutions. These are:

3.1. Replace

Some old systems, including those that are in poor condition, inefficient or not meeting their current (or forecast) cooling load, should be replaced with new systems using a non-ODS refrigerant. These can include HFCs (but these must comply with the EC F gas Regulations) or a “natural” refrigerant like hydrocarbons, ammonia or carbon dioxide.

This option can have a number of important benefits, most importantly the opportunity to significantly improve energy efficiency. It may also be possible to reduce the charge of refrigerant, either by using new “critical charge” systems or by employing secondary coolants. Replacement is however likely to be the most expensive option in up-front cost terms (around 10 times more than a conversion).

3.2. Convert

For many types of RAC system, which are in good order, it will be possible to recommend a Convert Solution.

This covers a range of actions, from a relatively simple “retrofill” operation (using one of the “service” or “drop-in” HFC refrigerants that are compatible with the system’s existing mineral oil) to a more comprehensive modification to a standard HFC refrigerant (which will require a new type of oil at least, and may require additional compressor and/or heat exchanger capacity).

There are a number of “drop-in” gases offered by the main refrigerant suppliers (HFC 417A, HFC 422A, HFC 422D are some of the main ones). They are however all mixtures, with component gases which boil at slightly different temperatures and pressures – a phenomenon known as “glide”. This is common with many of the other HFC refrigerants (which are widely used in direct expansion systems) and the industry has become familiar with this property. There is not, however, a recognised “retrofill” solution for flooded or pump-circulation systems. If you have a flooded HCFC system, then you should approach your refrigeration contactor or an independent consultant as soon as possible.

Whilst a conversion is often a practical option it must be noted that a converted plant may have less cooling capacity and / or be less efficient than the original system. Also, the conversion must be carried out by expert contractors to ensure that refrigerant leakage does not get worse after the conversion.

3.3. Leave As-Is

This is not a "do nothing" option. It is only applicable if:

(a) a guaranteed stock of recycled HCFC is assured; or

(b) the system represents no business-critical risk.

Case (a) may be appropriate if it is not practical to either Replace or Convert the system. This may be true if, say for a large petro-chemical plant, shut-downs only occur every 2 years and the refrigeration system must be kept running in the meantime. This is however a risky option, since leaks are unpredictable both in frequency and scale.

Case (b) may be appropriate for say small split air-conditioning systems in non-critical offices. These systems are typically very reliable and may continue to operate without trouble for many years. They can then be replaced relatively quickly and cheaply with new systems using a non-ODS refrigerant.

4. Decision Criteria

The decision to either Replace, Convert or Leave an HCFC plant should be based on a number of criteria. There is no automatic decision algorithm and a balanced assessment must be made of each criterion for each plant. These criteria will include:

System Type – does the system use "direct expansion" or a "flooded" evaporator? Direct expansion (or DX) systems may be suitable for conversion to an HFC replacement gas, but flooded systems need further consideration. This is an important distinction and requires an assessment by an experienced refrigeration or air conditioning engineer.

Age – refrigeration and air-conditioning plant over 20 years old are likely to be approaching the end of their natural life and should probably be replaced. Systems under 10 years should probably be retrofilled. The bulk of HCFC systems will be between 10 to 20 years old and these should be assessed further. As a further guide, if a system has previously been converted from R12 or R502 to R22, then this should also be replaced and not converted a second time.

Condition – if a system has been well maintained and is in good condition, this would tend to be more suitable for a Convert solution. Records of refrigerant leakage are important indicators to the likely success of a "retrofill" operation.

Meeting Current Requirements – due to the rapid rate of change in many industries, many refrigeration systems are no longer operating within their original design specification. This is likely to impinge on operating performance, reliability and energy efficiency. The HCFC Phase Out presents an opportunity to Replace the system (or alter it) to meet the current and forecast application requirements.

Energy Efficiency – capital costs of commercial and industrial refrigeration and air-conditioning systems are typically around 20% of the total lifetime costs. The benefits of replacing an old system with a new energy-efficient system should be assessed. New options such as free-cooling can be specified to provide significant on-going savings.

Availability – system-specific characteristics must be considered to identify the correct option. Some systems are so "embedded" within the factory or building that replacement may be almost impossible. Alternatively, it may be possible to build a replacement plant alongside the existing HCFC plant and then switch-over with the minimum or disruption.

5. Availability and Permitted Use of Recycled HCFCs

The availability and price of *reclaimed* HCFC gases after the end of December 2009 are very uncertain. There are anecdotal stories of some large industrial companies reserving guaranteed stocks of *reclaimed* R22, and being prepared to pay almost any price.

Any company anticipating using *reclaimed* HCFCs to maintain systems after the end of 2009 should contact their refrigeration supplier to discuss how to meet the anticipated demand. Indeed, due to the impending deadline on the use of virgin HCFCs, suppliers are likely to run-down their stocks of virgin gases before the actual deadline, so stocks may become limited before the end of December 2009.

The current EC Ozone Regulation has been reviewed during 2009 and the proposed new legislation[1] includes an important distinction between "recycled" and "reclaimed" gases.

Recycled HCFCs – recovered HCFC gas that has been subject only to a basic cleaning process (this might include mechanical filtering and moisture removal). *Recycled* HCFCs may only be used by either the undertaking which carried out the recovery (in most cases the refrigeration contractor) or the undertaking for which the recovery was carried out (the owner). *Recycled* HCFCs may not be placed on the market – "placing on the market" means the supplying or making available to third persons within the Community for payment or free of charge. For example, the owner could use the *recycled* HCFC in RAC equipment at other sites they operate from but they cannot sell recycled HCFC to a third party.

Reclaimed HCFCs – recovered HCFC gas that has been chemically reprocessed to a specified standard. *Reclaimed* HCFCs may be placed on the wider market and used by undertakings other than the original contractor and owner. *Reclaimed* HCFCs must be held in containers labelled as such, with information on the batch number and name and address of the reclamation facility.

It is worth noting that use of recycled HCFCs is more risky than use of reclaimed HCFCs. This is because reclaimed material has been reprocessed to a specified quality that is suitable for use in a refrigeration system whereas recycled material is of an unknown quality – it might contain contaminants that could impair the performance of a refrigeration plant. As a general rule it is worth spending a bit more to get recovered refrigerant properly reprocessed into reclaimed fluid.

Where *recycled* or *reclaimed HCFCs* are used, the RAC equipment should be labelled to show:

- The quantity and type of recycled/reclaimed HCFC added in the system, and
- The label elements set out in Annex I to Regulation EC/1272/2008 for substances or mixtures classified as Hazardous to the Ozone Layer.

Those recovering *HCFCs* for *recycling* or *reclamation* should also consider the following points if intending to store the materials on site:

- The holder should ensure that cylinders used to store *recovered/recycled HCFCs* remain within their statutory pressure test validation period.
- Recovered *HCFCs* pending *recycling* or *reclamation* are hazardous waste. Therefore recovered HCFCs should be handled as hazardous waste as required under the Hazardous Waste Regulations[2]. Facilities storing recovered *HCFCs* must register with the Environment Agency as an exempt waste operation. This would allow storage of up to 18 tonnes for a maximum period of 6 months. Storage of *recycled* or *reclaimed HCFCs* does not require a permit. Any storage of recovered *HCFCs*, other than immediately prior to *recycling* or transfer for *reclamation*, requires an exemption.

[1] Proposed amendments as published by the Council of the European Union dated 30 March 2009

[2] In Scotland the Special Waste Regulations apply, contact SEPA for more details

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The new legislation also includes the following obligations on undertakings involved in the use of recycled or reclaimed HCFCs:

- Users of equipment containing over 3 kg of HCFC refrigerant shall keep a record of the quantity and type of any gases removed or added, and of the company or technician carrying out the service or maintenance.
- Undertakings using recycled or reclaimed HCFCs for service or maintenance must keep records of the undertakings which supplied the reclaimed gases and the sources of recycled gases.

Currently there are only a small number of companies in the UK with reclamation facilities. They can offer a range of solutions to their clients, including the "banking" of reclaimed R22 in their own storage facilities.

6. Other Proposed Amendments to the EC Ozone Regulation

In addition to the points described in Section 5 above, the new ozone legislation includes further obligations on the operators of HCFC systems. These are broadly similar to the requirements of the EC F gas Regulation and include the following points:

1. Undertakings shall take all precautionary measures practicable to prevent and minimise any leakages and emissions of controlled substances.

2. Leak Testing – undertakings operating RAC systems with an HCFC charge of:
   - 3 kg or more are checked for leakage at least once every 12 months; this shall not apply to equipment with hermetically sealed systems, which are labelled as such and contain less than 6 kg of HCFC;
   - 30 kg or more are checked for leakage at least once every six months;
   - 300 kg or more are checked for leakage at least once every three months;

   and that any detected leakage is repaired as soon as possible and in any event within 14 days.

   The equipment or system shall be checked for leakage within one month after a leak has been repaired to ensure that the repair has been effective.

3. Undertakings referred to in point 2 above shall maintain records on the quantity and type of HCFC added and recovered during servicing, maintenance and final disposal of the equipment. They shall also maintain records of other relevant information including the identification of the company or technician who performed the servicing or maintenance, as well as the dates and results of the leakage checks carried out. These records shall be made available on request to the competent authority and to the Commission.

4. Member States shall define the minimum qualification requirements for the personnel carrying out activities referred to in point 1.

The Commission are developing guidance to support the recast EC Ozone Regulation.

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How to Contact F-Gas Support:

Telephone Help Line: 0161 874 3663 **Website:** www.defra.gov.uk/fgas

Email: fgas-support@enviros.com **Post:** F-Gas Support, P O Box 481, Salford, M50 3UD