

Leak checking and Record Keeping under the F Gas Regulations

The following procedures and requirements were agreed at a meeting of the Commission held in October 2007 to set standard leakage checking requirements for working and temporarily out of operation stationary refrigeration, air conditioning and heat pump equipment containing 3 kg or more of fluorinated greenhouse gases. The requirement for leak checking does not apply to hermetically sealed systems, which are labelled as such and contain less than 6 kg of fluorinated greenhouse gases.

These requirements are in relation to Regulation (EC) No 842/2006, known as the Fluorinated Gases Regulation which covering systems containing HFC refrigerants.

I. Equipment Record Keeping

All systems within scope of this regulation should have an Equipment Record which includes:

- Information on the fluorinated greenhouse gas charge. Where the fluorinated greenhouse gas charge is unknown, the operator of the equipment concerned should ensure that personnel certified under the F Gas Regulations determine that charge.
- The name of the operator, their postal address and telephone number.
- Where the cause of the leakage has been identified, it shall be indicated in the equipment records

2. Leak check procedure

2.1 Before the leakage check is carried out

F Gas Regulation Certified personnel should carefully go through the information contained in the equipment records to determine any previous issues and consult previous reports. Special attention shall be paid to relevant

information on any repeating issues and problem areas. The leakage checks should focus on those parts of the equipment which are most likely to leak.

2.2 Leakage check methods

Checks can be carried out by either:

- a) direct methods (these include the use of detection devices which can determine whether the fluorinated greenhouse gas charge is escaping from the system). See Section 2 below.
- b) indirect measuring methods based on abnormal system performance and the analysis of relevant measurements. These should be used where the leakage develops very slowly and where the equipment is placed in a well ventilated environment making it difficult to detect refrigerant gases escaping from the system in the air. Direct measuring methods will still be necessary to locate the point of leakage. See Section 3 below.

The decision on the measuring method to be used should be taken by F Gas Regulation certified personnel.

2.3 Equipment to be subject to the leak check

- joints;
- valves including stems;
- seals, including seals on replaceable driers and filters;
- parts of the system subject to vibration;
- connections to safety or operational devices.

2. Direct leak checking methods

1. F Gas Regulation Certified personnel can use one or more of the following methods:

- (a) Gas detection devices adapted to the refrigerant in the system. Portable electronic gas detection devices should be checked every 12 months and should be sensitive to at concentrations of least 5 grams per year.
 - (b) Application of ultraviolet (UV) detection fluid or suitable dye in the circuit. This shall only be undertaken if the manufacturer of the equipment has approved that such detection methods are technically possible. It shall only be undertaken by personnel certified to undertake activities which entail breaking into the refrigeration circuit containing fluorinated greenhouse gases.
 - (c) Proprietary bubble solutions/ soapsuds
2. If the leak is not found other parts of the system shall be inspected.
 3. Prior to pressure testing with Oxygen Free Nitrogen (OFN) or another suitable pressure testing gas to check for leakage, fluorinated greenhouse gases shall be recovered from the whole system by personnel certified to recover fluorinated greenhouse gases from the specific type of equipment.

4. Indirect leak checking methods

1. To identify a leakage, certified personnel shall carry out a visual and manual check of the equipment and analyse one or more of the following parameters:
 - (a) pressure;
 - (b) temperature;
 - (c) compressor current;
 - (d) liquid levels;
 - (e) recharge volume.
2. The following situations may be considered indicative of leakage:
 - (a) a fixed leakage detection system indicates leakage;
 - (b) the equipment produces abnormal noises or vibration or ice formation or insufficient cooling capacity;
 - (c) indications of corrosion, oil leaks and component or material damage at possible leakage points;

- (d) indications of leakage from sight glasses or level indicators or other visual aids;
 - (e) indications of damage in safety switches, pressure switches, gauges and sensor connections;
 - (f) deviations from normal operational conditions indicated by the parameters analysed, including readings from real time electronic systems;
 - (g) other signs indicating refrigerant charge loss.
3. If there is any indication of gas leakage this should be followed by checks for leaks using the Direct methods outlined in section 3 above.

5. Repair of leaks

- The operator must ensure that the repair is carried out only by personnel certified under the F Gas Regulations to undertake that activity.
- Where necessary, refrigerant should be recovered or pumped-down before the repair is carried out.
- The cause of the leakage must be identified as far as possible, to avoid recurrence.
- Where necessary, a test with Oxygen Free Nitrogen (OFN) or another suitable pressure testing and drying gas should be carried out to ensure that the system is leak tight. This should be followed by evacuation, recharge and leakage-test.

6. Follow up checks

Once a leak has been identified and repaired, there should be a follow up check which focuses on the site of the repair and adjacent parts of the system where stress has been applied during the repair. This follow up check must take place within one month, but may be carried out immediately after the repair.

7. Leak checking new systems

Newly installed systems should be checked for leakage immediately after they have been put into service.

SOME DEFINITIONS

Hermetically Sealed Systems – This has been defined by DEFRA in the UK as This is defined as: “a system in which all refrigerant containing parts are made tight by welding, brazing or a similar permanent connection which may include capped valves and capped service ports that allow proper repair or disposal and which have a tested leakage rate of less than 3 grams per year under a pressure of at least a quarter of the maximum allowable pressure”.

Certified Personnel. The Commission is finalising its training and certification requirements for personnel handling Fluorinated gases under the Regulation which must be in place by July 2008.

Further details are expected early in January 2008. In the mean time the UK Government has specified that City and Guilds 2078 or CITB Refrigerant Handling certification is acceptable as proof of certification as an interim measure.

The Operator – This is the person or legal person (typically a company) who is responsible for giving instructions to its employees as to the day to day technical functioning of the equipment. The legal responsibility for compliance with the Regulation lies with the operator not with any contractors or agents involved in working on the equipment concerned, unless there is a clear contractual agreement for all such responsibilities to be transferred.

REFERENCES AND FURTHER INFORMATION

Full text of the Commission decision on Leak Checking Sample Equipment Record	http://www.berr.gov.uk/files/file42192.doc
Guidance on how to calculate system charge	http://www.defra.gov.uk/environment/climatechange/uk/fgas/index.htm
The F Gas Regulation	http://www.berr.gov.uk/files/file30123.pdf
DEFRA website	http://www.defra.gov.uk/environment/climatechange/uk/fgas/index.htm
ACRIB website	www.acrib.org.uk
System HSE GS4 Safety in Pressure Testing	www.hsebooks.com
EN378 (under revision) Refrigeration Safety Standard	www.bsi-global.com

**Sample Equipment Record in accordance with
EC Fluorinated Gases Regulation No 842/2006**

General Information			
Plant Name		Reference No.	
Name of Operator			
Postal address		Tel No.	
Location of plant			
Cooling loads served			
Refrigerant Type		Refrigerant Quantity (kg)	
Plant manufacturer		Year of installation	
Refrigerant Additions			
Date	Engineer	Amount Added, kg	Reason for addition
Refrigerant Removals			
Date	Engineer	Amount Removed, kg	Reason for removal. What was done with recovered refrigerant
Leak Tests (if a leak is detected and the cause of the leakage has been identified, it should be indicated here)			
Date	Engineer	Test Result	Follow up actions required
Follow-up Actions and Follow-up Check			
Date	Engineer	Related to test on	Actions Taken
Testing of Automatic Leak Detection System (if fitted)			
Date	Engineer	Test Result	Comments