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TB07: Leak Checking of F-Gas systems

1 WHY DO WE HAVE TO LEAK CHECK SYSTEMS?

The F-Gas Regulations specify that any system containing f-gases with a GWP (Global Warming Potential) of 5 tonnes CO₂ equivalent or more must be leak tested at least annually. The frequency of leak checks required is shown in the table below:

Total refrigerant charge in system (in CO ₂ tonnes Eq)	Frequency of leak checks	Frequency of leak checks if fixed leak detection is fitted
At least 5 tonnes (10 if a hermetically sealed system) but less than 50 tonnes	Annually	Annually
50 tonnes or more but less than 500 tonnes	6 monthly	Annually
500 tonnes or more*	3 monthly	6 monthly

NOTE:

Article 5 of the F-Gas Regulation mandates fixed leak detection to be fitted where a system contains 500 tonnes CO₂ or equivalent or more. Where leak detection equipment is fitted then the leak check frequency is halved, so there should never be the requirement, technically, for 3 monthly visits by mandate. The leak detection equipment itself must alert the operator or a service company of the leakage, and the leak detection equipment must be checked for operational functionality at least annually.

It is good practice, however, to regularly leak test any system regardless of refrigerant type, charge weight, or GWP designation, because low refrigerant charge makes systems inefficient and eventually leads to breakdown and expensive repair costs, rapidly reducing the expected life cycle of the equipment.

Regular leak checking is therefore not just good from the legally mandated environmental perspective, but is essential to maintaining efficiency and to prolong the life cycle of the systems.

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2 METHODS OF MANDATORY LEAK CHECK – DIRECT VS INDIRECT

F-Gas Implementing Regulation EC1516/2007 defined the methods of leak checking which were acceptable under the f-gas regulation and introduced the methodology for “direct” and “indirect” leak checking.

The definition of “**direct**” methods of leak checking is one or more of the following:

- Check of circuits and components representing a risk of leakage with gas detection devices adapted to the refrigerant in the system;
- Application of ultraviolet (UV) detection fluid or suitable dye in the circuit;
- Proprietary bubble solutions/soapsuds;
- Use of oxygen-free, sometimes referred to as “dry”, nitrogen (OFN) to pressurise the circuit after recovering the refrigerant gas.

The definition of “**indirect**” methods of leak checking is analysis of one or more of the following:

- Pressure(s);
- Temperatures;
- Compressor run current;
- Liquid level checks;
- Recharge volume where applicable;
- Visual inspection.

NOTE: Indirect methods will only be used where the parameters analysed give reliable information with regard to the refrigerant charge and the likelihood of leaks being present.

➤ **One or more of the following situations arising from a basic indirect check shall constitute a presumption of leakage demanding the further direct checks to be carried out:**

- A fixed leak detection system indicates a leak;
- The equipment produces abnormal noises or vibration;
- Ice build up or insufficient cooling capacity;
- Signs of corrosion, oil leaks or component damage – particularly at possible or likely leaks points;
- Indication of low charge via sight glass, level indicators or other visual aids;
- Deviations from normal operating parameters indicated during the analysis or by readings from real time monitoring systems/software;
- Other signs of leakage.

Where Indirect checks have proved unsatisfactory, for example where the analysis has raised a suspicion of leakage due to one or more of the parameters being out of sync with what would be expected, then the basic checks shall be followed up with a direct check as specified.

The normal procedure at this point would be to use a hand held electronic leak detector appropriate for the refrigerant being checked for, to inspect and leak test any flared connections or brazed joints in the pipe run and in or around connections to the compressor and other components in the refrigerant circuit as the most likely leakage points.

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