1 Automated Permanent Refrigerant Leak Detection Systems

1.1 Scope
Automated permanent refrigerant leak detection systems are products that are specifically designed to continuously monitor the atmosphere in the vicinity of refrigeration equipment and, in the event of detection of refrigerant, give an alarm.

1.2 Definitions
An automated permanent refrigerant leak detection system continuously monitors the atmosphere in the vicinity of refrigeration equipment, and other components or pipework that contain refrigerant. The detection system shall be permanently fixed in place at the site of the refrigeration equipment.

Detection systems may be standalone/fixed point or aspirated systems. Where standalone/fixed point systems have a sensor for each space, aspirated systems have a single master control panel which senses refrigerant concentration levels from multiple spaces by extracting air samples from each space through tubing.

The ECA Scheme aims to encourage the purchase of products that give an early warning of refrigerant leaks, to allow their early repair, and thus improve the energy efficiency of the refrigeration system and reduce carbon emissions.

Investments in automated permanent refrigerant leak detectors can only qualify for Enhanced Capital Allowances if the specific product is named on the Energy Technology Product List. To be eligible for inclusion on the Energy Technology Product List, products shall meet the eligibility requirements as set out below.

1.3 Requirements

1.3.1 Eligibility requirements
To be eligible, products shall:

- Continuously monitor the refrigeration system for refrigerant leakage.
- Detect the presence of one or more refrigerants (which shall be clearly named in the information supporting the application) and raise an audible alarm when a pre-set level of refrigerant is reached.
- Have fittings to allow permanent fixing to the wall or floor.
- Standalone systems shall be able to operate in conditions of between -25 to 50°C and relative humidity levels of up to 90%.
- Aspirated systems shall be capable of extracting air samples in conditions of between -25 to 50°C and relative humidity levels of up to 90%. The control panels of these systems shall be able to operate in conditions of between 0 to 50°C and relative humidity levels of up to 90%.
- Be CE marked.
Automated permanent refrigerant leak detectors shall be calibrated for each refrigerant named in the application. The product shall be capable of detecting at least one of the following types of refrigerant: HCFC, HFC, HC, HFO, Carbon Dioxide (CO₂) or Ammonia (NH₃).

Automated permanent leak detection systems dedicated to ammonia detection for concentration levels at which ammonia is flammable, are not eligible.

### 1.3.2 Performance requirements

To be eligible, products shall:

- Meet the relevant alarm signal threshold set out in Table 1.1 below, which varies with refrigerant type.
- Generate an alarm signal when the level of refrigerant in the atmosphere exceeds the alarm signal threshold, which may be equal to or lower than the refrigerant-specific thresholds set out in Table 1.1 below.
- Have a measurement accuracy and measurement sensitivity according to the refrigerant type, equal to or better than the levels set out in Table 1.1 at refrigerant concentrations up to the relevant alarm threshold in Table 1.1.

Table 1.1: Performance thresholds for automated permanent refrigerant leak detection systems

<table>
<thead>
<tr>
<th>Refrigerant</th>
<th>Alarm signal threshold (parts per million, ppm)</th>
<th>Measurement accuracy (ppm)</th>
<th>Measurement sensitivity (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCFC, HFC, HFO or HC</td>
<td>≤100</td>
<td>±20</td>
<td>10</td>
</tr>
<tr>
<td>CO₂</td>
<td>≤5,000</td>
<td>±500</td>
<td>100</td>
</tr>
<tr>
<td>NH₃</td>
<td>≤100</td>
<td>±20</td>
<td>10</td>
</tr>
</tbody>
</table>

“≤” means "less than or equal to" where products that can generate an alarm signal at lower refrigerant concentration levels than stated in the above Table 1.1, exceed the performance requirements.

Where:

- Measurement accuracy refers to the allowed variation between the measured and actual refrigerant level in the atmosphere.
- Measurement sensitivity refers to the change in the refrigerant concentration level that a product is able to detect. This is not the minimum refrigerant concentration level that the product is able to detect.

### 1.4 Measurement and Calculations

#### 1.4.1 Measurement standards

The test procedures set out in the following test standards can be used to demonstrate product performance:

- BS EN 14624:2005 "Performances of mobile leak detectors and of room controllers of halogenated refrigerants". (Section 11.2 – Efficiency tests of room controller).
- BS EN 14624:2012 "Performance of portable leak detectors and of room monitors for halogenated refrigerants".
1.4.2 Test Requirements
The performance of the equipment shall be tested at the concentrations stated in the performance criteria using calibration gases produced using methods that are traceable to national standards.
A calibration report shall be supplied that demonstrates the product’s sensitivity, accuracy and alarm setting using test gases.

1.5 Verification for ETL Listing
Any of the following testing routes may be used to demonstrate the conformity of products against the requirements:
- In-house testing – Self-certified
- In-house testing – Self-tested and verified or cross-checked by an independent body
- Witnessed testing
- Independent testing
- Representative testing (see clause 1.5.1)

Further information regarding the first four routes can be found in Guidance Note 5 on the ETL product testing framework.

1.5.1 Representative testing
Where applications are being made for two or more products that are constructed using a common set of sensors and electronic modules, then test data may be submitted for a representative selection of models that clearly demonstrate the performance of each type of sensor with each refrigerant, and impact on performance of using different electronic modules.

It should be noted that:
- If a manufacturer voluntarily removes the representative model from the Energy Technology Product List (ETPL) then other products linked with that representative model may or may not be permitted to remain on the ETPL.
- If any product submitted under these representative model rules is later found not to meet the performance criteria when independently tested, then all products based on the same representative model will be removed from the ETPL.

1.6 Conformity testing
Products listed on the ETL may be subject to the scheme’s conformity testing programme in order to ensure listed models continue to meet the ETL requirements.

1 https://www.gov.uk/government/publications/energy-technology-list-etl-product-testing-framework
1.7 **Scope of Claim**

Expenditure on the provision of plant and machinery can include not only the actual costs of buying the equipment, but other direct costs such as the transport of the equipment to site, and some of the direct costs of installation. Clarity on the eligibility of direct costs is available from HMRC.

1.8 **Review**

1.8.1 **Indicative review date**

This specification is scheduled for review during the 2022/23 review cycle.

1.8.2 **Illustrative future direction of the requirements**

A provisional update to the standard for measuring refrigerant concentration levels, prEN 14624:2018 for portable leak detectors has been released. It is currently under review and has not been referenced in this specification; however, future requirements will reference it. There is also a provisional standard prEN 50676 for electrical equipment used for refrigerant and SF6 detection and concentration measurement, which will be referenced in future requirements.