

Issue ID	Issue Title	No. of credits available	Minimum standards
Pol 2	Preventing Refrigerant Leaks	1	No

### Aim

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To reduce the emissions of refrigerants to the atmosphere arising from leakages in cooling plant.

### Assessment Criteria

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The following demonstrates compliance:

1. The building has no refrigerants **OR**
2. Systems using refrigerants are contained in a moderately air tight enclosure (or a mechanically ventilated plant room), and a refrigerant leak detection system is installed covering high-risk parts of the plant. **OR**
3. An automatic permanent refrigerant leak detection system is specified, which is NOT based on the principle of detecting or measuring the concentration of refrigerant in air.
4. The automatic shutdown and pump down of refrigerant occurs on the detection of high concentrations of refrigerant in the plant room/enclosure. For the majority of cases only systems in mechanically ventilated/moderately air tight plant rooms (or enclosures) comply.
5. Automatic pump-down to either a separate storage tank or into the heat exchanger is acceptable but only where automatic isolation valves are fitted to contain the refrigerant once fully pumped down.
6. The alarm threshold that triggers automatic pump down is set to a maximum of 2000ppm (0.2%), but lower levels can be set. The credit cannot be awarded for manual systems.

Compliance Notes	
<b>New Build</b>	There are no additional or different criteria to those outlined above specific to new build projects.
<b>Refurbishment</b>	There are no additional or different criteria to those outlined above specific to refurbishment projects.
<b>Extensions to existing buildings</b>	Where an existing building is being extended and it has existing building services plant and systems that will be common to both the new extension and existing building, the existing plant must be assessed against the criteria of this issue. If the extension is served by independent services, only these need be assessed against the Assessment Criteria.

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<b>Shell Only</b>	<p>If the building is designed to be fully naturally ventilated, and therefore no refrigerant using building services will be specified for the fit out, then this credit can be awarded. If the building is not designed to be naturally ventilated and the refrigerant leak detection/recovery cannot be confirmed, because its specification is the responsibility of a future tenant as part of their fit out works, then compliance with this BREEAM issue can only be demonstrated via one of the following means in shell only buildings/areas:</p> <ul style="list-style-type: none"> <li>• Option 1 – Use of a tenancy lease agreement between the developer and tenant/s (full value of available credits)</li> <li>• Option 2 – A Green Building Guide for tenant fit outs (half the value of the available credits)</li> <li>• Option 3 – Developer/Tenant collaboration (full value of available credits)</li> </ul> <p>Where compliance with the assessment criteria cannot be demonstrated the available credits must be withheld (option 4).</p> <p>Refer to the <i>Scope</i> section 2.2 <i>Types of project that can be assessed using BREEAM</i> (Shell and Core / Speculative Assessments) for further description of the above options.</p>
<b>Fit Out Only</b>	The criteria apply to any existing cooling plant and new plant specified as part of the fit out.
<b>Units without offices and untreated operational areas</b>	This issue will be filtered from the scope of assessment for industrial units designed without offices and an untreated operational area, i.e. not designed to be air conditioned.
<b>Type of refrigerant</b>	This issue is applied in instances where any type of refrigerant is present, i.e. even if the ozone depleting potential (ODP) of the refrigerant is zero and the global warming potential (GWP) is less than 5.
<b>Solid refrigerant</b>	The credit can be awarded by default where a solid refrigerant is used.
<b>CO<sub>2</sub> as a refrigerant</b>	When CO <sub>2</sub> is used as a refrigerant, the refrigerant recovery system credit can be awarded by default.
<b>Total refrigerant charge less than 5 kg</b>	The credit can be awarded by default where the total refrigerant charge used in the building is less than 5kg.
<b>Multiple split systems</b>	For installations of small multiple hermetic systems only, where the refrigerant charge in each unit is less than 5kg but the total refrigerant charge in the building is greater than 5kg, the credit can be awarded by default. This is on the basis that the risk of a large refrigerant leak is minimised and individual leaks from each system will be small i.e. <5kg.
<b>High-risk parts</b>	High-risk parts of refrigeration plant typically include the pipe work and compressor. Evaporator or condenser coils can be omitted from the coverage of the system.
<b>Manual refrigerant recovery system</b>	The provision of any manual system, including manual storage cylinders on site, does not comply with the criteria of this issue.

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<b>Cold food storage</b>	The criteria of this issue apply to cold food storage refrigeration equipment (where the charge is $\geq 5\text{kg}$ ), i.e. cold rooms and/or centralised equipment serving a group of cold storage cabinets. Cabinets and refrigerated bottle shelves with integral refrigeration plant on average have a charge of 0.3kg; therefore in most circumstances, individual or small-scale installations will not fall within the scope of this issue. However, the assessor should ask the design team to confirm that the charge is $\leq 5\text{kg}$ .
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### Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A copy of the specification clause or design plan confirming: <ul style="list-style-type: none"> <li>Absence of refrigerants in the development.</li> </ul>	Assessor's building/site inspection and photographic evidence confirming: <ul style="list-style-type: none"> <li>Absence of refrigeration plant.</li> </ul>
2&3	A copy of the specification clause or letter from the M&E engineer confirming: <ul style="list-style-type: none"> <li>Type of leak detection system(s).</li> <li>Scope of the system(s)</li> <li>Where relevant, containment strategy for such equipment.</li> </ul>	Assessor's building/site inspection and photographic evidence confirming: <ul style="list-style-type: none"> <li>Installation of leak detection system(s)</li> <li>Installation of automatic refrigerant recovery equipment</li> <li>Pre-set threshold level for automatic pump down.</li> </ul>
4,5&6	A copy of the specification clause or letter from the M&E engineer confirming: <ul style="list-style-type: none"> <li>Type, scope and operation of automatic refrigerant recovery equipment</li> <li>Details of the plant room enclosure where the refrigeration plant is installed</li> <li>Alarm threshold for triggering automatic pump down.</li> </ul>	

### Additional Information

#### Relevant definitions

**Moderately airtight enclosure:** this can be defined as an enclosure that does not produce a draught or significant fresh air ingress that would dilute any leaked refrigerant gas (dilution may prevent detection).

**Refrigerant Leak Detection:** a permanently installed multi-point sensing system; this may be aspirated or have multiple sensor heads linked to a central alarm unit or BMS. Various sensor types are available including infra-red, semi-conductor or electro-chemical. Please see below for further guidance on the coverage of refrigerant leak detection systems.

**Refrigerant Recovery:** The process of removing refrigerant from a system and storing it in an airtight container.

#### Leak detection systems/devices

- Handheld detectors (which include semi-conductor and corona discharge types) do not comply with BREEAM criteria.
- Corona discharge detectors are not suitable where flammable refrigerants are used, or in potentially explosive atmospheres.
- Indicator dyes: these consist of fluorescent or coloured dyes added to the refrigerant to show leakage sites. The use of the dye should be approved by the compressor manufacturer. Some compressor manufacturers do not approve the use of indicator dyes, in which case either an alternative type of equipment should be used, or an alternative type of leak detection specified.

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- Halide torch detectors: this type of detection is only appropriate for chlorine-based substances such as CFCs and HCFCs, and should not be used in areas where naked flames are prohibited. Compounds which do not contain chlorine, e.g. HFCs, cannot be detected by this method. When awarding this credit in instances where these detectors are in use, the assessor should confirm that the refrigerant is chlorine based.
- Electronic leak detectors: these must be designed to detect a certain type of, or multiple types of, refrigerant, i.e. CFC, HFC, HCFC, etc.
- Standing hold test: systems based on monitoring pressure drops within the pipe work are not necessarily compliant with the BREEAM criteria. There are natural fluctuations to the pressure of the refrigerant due to changes in volume and temperature of the system, and to the ambient temperature of the surroundings. Low pressure and high pressure switches, which are standard equipment on refrigerant plant, are therefore not sufficient to award the credit. Other methods exist, such as pressurising the system with a high pressure, dry nitrogen gas for a period of time and then identify whether or not the pressure drops during this time. However, this requires systems to be shut down for a period of time (usually overnight or longer).
- Systems NOT based on the principle of detecting or measuring the concentration of refrigerant in air: Such systems (for example based on sensing the presence of refrigerant vapour in liquid-carrying pipes) are now commercially available.

### Refrigerant pump down

The specification of automatic refrigerant pump down can further limit potential losses and damage to the environment and have subsequent economic benefits to the building owner. Under the United Kingdom 1990 Environmental Protection Act unwanted refrigerant and refrigerating system oil are classified as either controlled or hazardous waste. Not only is it an offence to discharge them to the environment, but there are procedures regarding transport, storage, transfer of ownership and ultimate disposal. Article 16 of EC regulation 2037/2000 specifies that used CFCs and HCFCs must be recovered for destruction or recycling/reclamation.

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