Air Source: Gas Engine Driven Split and Multi-Split (including Variable Refrigerant Flow) Heat Pumps
Date added to ETL 2004 (Revised 2018).

1. Definition of Technology

Air-source, gas engine driven (GED), heat pumps covers products that are specifically designed to transfer heat from the air in one space to the air in another space by means of a refrigeration cycle that is driven by a gas-fired internal combustion engine.

‘Split’ type heat pumps have separate heat collection and rejection units for each space known as ‘indoor’ and ‘outdoor’ units. The ‘indoor’ and ‘outdoor’ units are specifically designed to be connected together during installation by refrigerant pipework to form a single functional unit.

Variable refrigerant flow (VRF) heat pumps are specifically designed to automatically adjust the flow of refrigerant to each indoor unit so that the heat delivered is matched to the demand.

2. Technology Description

Air-source gas engine driven (GED) split and multi-split heat pumps use a gas-fired internal combustion engine driven refrigeration system to transfer heat from air outside a building to the air inside it. They can be used to provide space heating in a wide range of buildings, and some products also are able to provide cooling by reversing the refrigeration flows around the product. (These products are known as reversible gas engine driven ‘air-cooled’ air conditioning units).

Air source gas engine driven split and multi-split heat pumps are available with a wide range of efficiencies. The ECA Scheme aims to encourage the purchase of higher efficiency products.

The ECA Scheme covers four categories of products:

1. **Air source: GED single split (non-VRF) heat pumps**
   that consist of one ‘outdoor’ unit and one ‘indoor’ unit.

2. **Air source: GED dual split (non-VRF) heat pumps**
   that consist of one ‘outdoor’ unit and two ‘indoor’ units.

3. **Air source: GED multi-split (non-VRF) heat pumps**
   that consist of one ‘outdoor’ unit connected to two or more ‘indoor’ units using either individual refrigerant circuits (with the indoor units individually controlled) or using a common refrigerant circuit with the indoor units controlled as one.

4. **Air source: GED split or multi-split variable refrigerant flow (VRF) heat pumps**
   that consist of one ‘outdoor’ unit connected to one or more ‘indoor’ units using a common refrigerant circuit with the indoor units individually controlled.

Investments in air source gas engine driven split and multi-split (including variable refrigerant flow) heat pumps can only qualify for Enhanced Capital Allowances if the specific product is listed on the Energy Technology Product List. To be eligible for inclusion on the Energy Technology Product List, products shall meet the eligibility criteria as set out below.
3. Eligibility Criteria

To be eligible, products shall:

- Consist of an ‘outdoor’ unit and one or more ‘indoor’ units that are:
  - a) Factory-built sub-assemblies.
  - b) Supplied as a matched set of units.
  - c) Designed to be connected together during installation.
- Incorporate a refrigeration system that is driven by a gas-fired internal combustion engine.
- Be designed for, and include fittings for, permanent installation.
- Be CE marked.

Performance criteria

Eligible products shall meet the performance criteria set out in Table 1 below for:

- Seasonal Primary Energy Ratio in heating mode (SPERₕ) across the range of connected capacities and including 100% (full) load in heating mode.
- Seasonal Primary Energy Ratio in cooling mode (SPERₜ) across the range of connected capacities and including 100% (full) load in cooling mode, where the product is designed to provide cooling.

Table 1 Performance requirements for air source: (GED) split and multi-split heat pumps

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Heating (SPERₕ)</th>
<th>Cooling (SPERₜ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Air source: GED single split (non VRF) heat pumps.</td>
<td>&gt;=1.30</td>
<td>&gt;=1.72</td>
</tr>
<tr>
<td>2. Air source: GED dual split (non VRF) heat pumps.</td>
<td>&gt;=1.30</td>
<td>&gt;=1.72</td>
</tr>
<tr>
<td>3. Air source: GED multi-split (non VRF) heat pumps.</td>
<td>&gt;=1.30</td>
<td>&gt;=1.72</td>
</tr>
<tr>
<td>4. Air source: GED split and multi-split variable refrigerant flow (VRF) heat pumps.</td>
<td>&gt;=1.30</td>
<td>&gt;=1.72</td>
</tr>
</tbody>
</table>

“>=” means “greater than or equal to”

The performance requirements in Table 1 shall include all relevant energy inputs to the indoor unit(s) for the matched indoor and outdoor model assembly.

For the avoidance of doubt test data should be presented to 2 decimal places. As an example, an air source gas engine driven single split (non-VRF) heat pump product with a heating mode SPERₕ of 1.29 would be deemed to be a fail.
Required test procedures

All products shall be tested in accordance with the procedures laid down in the following standards:


The standard rating conditions are set out in the Table 2 below.

### Table 2 Test conditions for air source: gas engine driven (GED) split and multi-split heat pumps

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Heating mode (SPERₜₜ)</th>
<th>Cooling mode (SPERₜₜ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Air source: GED single split (non-VRF) heat pumps.</td>
<td>BS EN 16905-3:2017 Table 3</td>
<td>BS EN 16905-3:2017 Table 4</td>
</tr>
<tr>
<td>2. Air source: GED dual split (non-VRF) heat pumps.</td>
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<td>BS EN 16905-3:2017 Table 4</td>
</tr>
</tbody>
</table>

**Notes**

1. The heating standard test requires an entering air temperature on the indoor side of 20°C (Dry-bulb), and an entering air temperature on the outdoor side of 7°C (Dry-bulb) and 6°C (Wet-bulb).

2. The cooling standard test requires an entering air temperature on the indoor side of 27°C (Dry-bulb) and 19°C (Wet-bulb), and an entering air temperature on the outdoor side of 35°C (Dry-bulb).
4. Representative Testing

Where applications are being made for a range of two or more products that are variants of the same basic design, test data may be submitted for a representative selection of models, provided that all variants:

- Use the same gas engine constructional design.
- Use the same refrigerant as the representative model.
- Have the same compressor type (i.e. manufacturer, method of compression (e.g. reciprocating or scroll) and type of enclosure (e.g. hermetic or semi-hermetic) as the representative model.
- Use the same defrosting method (e.g. hot gas defrost).
- Fit within the same product category (i.e. are all low temperature air to water heat pumps, or are all air to water heat pumps (except low temperature heat pumps).
- Use multiple indoor units with the same outdoor unit.

The representative models shall be selected by dividing the range of products into groups of models with similar design characteristics, and testing a model in each group.

As a minimum, at least one complete matched outdoor and indoor unit(s) model assembly shall be tested (as per the required test procedures listed above) in each range of products. Where other variants of indoor unit(s) are applied, the performance of each representative model assembly in the group may be calculated using a validated mathematical model.

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.

5. 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 the direct costs of installation. Clarity on the eligibility of direct costs is available from HMRC.