

Air Source: Gas Engine Driven Split and Multi-Split (including Variable Refrigerant Flow) Heat Pumps

Date added to ETL 2004 (Revised 2009).

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 identified by the outdoor unit and the matching indoor unit(s) is named in the ETL Heat Pump Master List. To be eligible for inclusion on the ETL Heat Pump Master

List, products must meet the eligibility criteria as set out below AND the Heat Pump Master List Listing Mechanism.

3. Eligibility Criteria

To be eligible, products must:

- 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 must meet the performance criteria set out in Table 1 below for:

- Coefficient of Performance (COP) across the range of connected capacities and including 100% (full) load in heating mode.
- Energy Efficiency Ratio (EER) 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: gas engine driven (GED) split and multi-split heat pumps

| | Product Category | Heating mode (COP) | Cooling mode (EER) |
|----|---|--------------------|--------------------|
| 1. | Air source: GED single split (non VRF) heat pumps. | >1.30 | >1.10 |
| 2. | Air source: GED dual split (non VRF) heat pumps. | >1.30 | >1.10 |
| 3. | Air source: GED multi-split (non VRF) heat pumps. | >1.30 | >1.10 |
| 4. | Air source: GED split and multi-split variable refrigerant flow (VRF) heat pumps. | >1.30 | >1.10 |

">" means "greater than"

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 COP of 1.30 would be deemed to be a fail.

Required test procedures

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

- JIS B 8627-1: 2006, “Gas engine driven heat pump air conditioners - Part 1 General requirements”.
- JIS B 8627-2: 2000 “Gas engine driven heat pump air conditioners - Part 2: non-ducted gas engine driven heat pump air conditioners - Testing and rating for performance”.
- JIS B 8627-3: 2000 “Gas engine driven heat pump air conditioners - Part 3: Ducted gas engine driven heat pump air conditioners - Testing and rating for performance”.

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

| | Product Category | Heating mode (COP) | Cooling mode (EER) |
|---|---|---|---|
| 1. | Air source: GED single split (non-VRF) heat pumps. | JIS B 8627-1:2006 Table 1.1 Heating standard test | JIS B 8627-1:2006 Table 1.1 Cooling standard test |
| 2. | Air source: GED dual split (non-VRF) heat pumps. | JIS B 8627-1:2006 Table 1.1 Heating standard test | JIS B 8627-1:2006 Table 1.1 Cooling standard test |
| 3. | Air source: GED multi-split (non-VRF) heat pumps. | JIS B 8627-1:2006 Table 1.1 Heating standard test | JIS B 8627-1:2006 Table 1.1 Cooling standard test |
| 4. | Air source: GED split and multi-split variable refrigerant flow (VRF) heat pumps. | JIS B 8627-1:2006 Table 1.1 Heating standard test | JIS B 8627-1:2006 Table 1.1 Cooling standard test |
| Notes | | | |
| <p>1. The heating standard test requires an entering water 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).</p> <p>2. The cooling standard test requires an entering water 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).</p> | | | |

4. 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](#).