

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

Date added to ETL 2002 (Revised 2014).

1. Definition of Technology

Air source heat pumps are products that are specifically designed to transfer heat from the air in one space to the air into another space by means of a refrigeration cycle.

'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 split and multi-split heat pumps use an electrically operated 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 'air-cooled' air conditioning units).

Air source 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: single split (non-VRF) heat pumps**
that consist of one 'outdoor' unit and one 'indoor' unit.
2. **Air source: dual split (non-VRF) heat pumps**
that consist of one 'outdoor' unit and two 'indoor' units.
3. **Air source: 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: 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 split and multi-split (including variable refrigerant flow) heat pumps can only qualify for Enhanced Capital Allowances if the products meet the eligibility criteria set out below. The individual products purchased do not need to be named on the Energy Technology Product List.

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 an electrically driven refrigeration system.
- 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 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.

Except for non-VRF products with a rated cooling capacity less than, or equal to, (\leq) 12kW which must meet the performance criteria set out in Table 1 for:

- Seasonal Performance (SCOP) across the range of connected capacities.
- Seasonal Energy Efficiency Ratio (SEER) across the range of connected capacities.

Table 1 Performance requirements for air source split and multi-split heat pumps

	Rated Cooling Capacity	>12kW		\leq 12KW	
		Heating mode (COP)	Cooling mode (EER)	Heating mode (SCOP)	Cooling mode (SEER)
1.	Air source: single split (non-VRF) heat pumps	>3.70	>3.20	\geq 4.00	\geq 6.10
2.	Air source: dual split (non-VRF) heat pumps	>3.70	>3.20	\geq 4.00	\geq 6.10
3.	Air source: multi-split (non-VRF) heat pumps	>3.70	>3.20	\geq 4.00	\geq 6.10
4.	Air source: split or multi-split variable refrigerant flow (VRF) heat pumps	>3.80	>3.40	N/A	N/A

">" means "greater than" and " \geq " means "greater than or equal to"

For the avoidance of doubt test data should be presented to 2 decimal places. As an example, a 20kW air source, single split (non-VRF) heat pump product with a heating mode COP of 3.70 would be deemed to be a fail.

Required test procedures

Testing for non-VRF products with a cooling capacity greater than 12kW and all VRF products must be carried out in accordance with the procedures in BS EN 14511:2013. The standard rating conditions are set out in the Table 2 below.

Table 2 Test conditions for air source split and multi-split heat pumps >12kW and VRF

	Product Category		Heating mode (COP)	Cooling mode (EER)
1.	Air source: single split (non VRF) heat pumps		BS EN 14511:2013Table 3 Standard rating Conditions, Outdoor air/recycled air.	BS EN 14511:2013Table 4 Standard rating Conditions, Comfort Outdoor air/recycled air
2.	Air source: dual split (non VRF) heat pumps		BS EN 14511:2013Table 19 Standard rating Conditions.	BS EN 14511:2013Table 20 Standard rating Conditions.
3.	Air source: multi-split (non VRF) heat pumps		BS EN 14511:2013Table 19 Standard rating Conditions.	BS EN 14511:2013Table 20 Standard rating Conditions.
4.	Air source: split or multi-split variable refrigerant flow (VRF) heat pumps:	Single split	BS EN 14511:2013Table 3 Standard rating Conditions, Outdoor air/recycled air.	BS EN 14511:2013Table 4 Standard rating Conditions, Comfort Outdoor air/recycled air
		Multi-split	BS EN 14511:2013Table 19 Standard rating Conditions.	BS EN 14511:2013Table 20 Standard rating Conditions.

Please note that performance data obtained in accordance with the corresponding procedures and standard rating conditions laid down in BS EN 14511: 2004 or BS EN 14511: 2007 or BS EN 14511:2011 will be accepted as an alternative to testing in accordance with BS EN 14511: 2013 until further notice.

Testing for non-VRF products with a cooling capacity less than or equal to 12kW should be carried out in accordance with the procedures in BS EN 14825: 2013 under the test conditions set out in the Table 3 below.

Performance data for non-VRF products with a cooling capacity less than or equal to 12kW must be determined following the requirements of Commission Regulation (EU) No 206/2012 Annex II.

Table 3 Test conditions for air source split and multi-split heat pumps ≤12kW (Excluding VRF)

	Product Category	Heating mode (SCOP)	Cooling mode (SEER)
1.	Air source: single, dual or multi split (non VRF) heat pumps	BS EN 14825: 2013Table 6 Average heating conditions.	BS EN 14825: 2013Table 2

Please note that performance data obtained in accordance with the corresponding procedures and standard rating conditions laid down in BS EN 14825: 2012 will be accepted as an alternative to testing in accordance with BS EN 14825: 2013 until further notice.

Calculated results

Where results are determined by calculation then this should be on the basis of design and/or extrapolation from other combinations of indoor and outdoor units. In this case, details of such calculations and/or extrapolations, and of tests to verify the accuracy of the calculations undertaken (including details of the mathematical model for calculating performance of such combinations, and of measurements taken to verify this model) must be made available. Tests undertaken to verify the accuracy of the calculations must be carried out in accordance with the test procedures described above.

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.