1 Air to Domestic Hot Water Heat Pumps

<table>
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<tr>
<th>Date published</th>
<th>2019</th>
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<tbody>
<tr>
<td>Date previously reviewed</td>
<td>2016</td>
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<td>Date first launched</td>
<td>2013</td>
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<td>Former name</td>
<td>Heat Pumps for Domestic Hot Water Heating</td>
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<td>CO2 Heat pumps for domestic hot water heating</td>
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1.1 Scope

Air to Domestic Hot Water Heat Pumps are products that are specifically designed to transfer heat from the outdoor environment into a domestic hot water tank by means of a refrigeration cycle.

1.2 Definitions

Air to Domestic Hot Water Heat Pumps use an electrically operated refrigeration system to transfer heat from the ambient source into a domestic hot water system. They can be used to provide sanitary hot water in a wide range of buildings, including commercial and leisure.

Air to Domestic Hot Water heat pumps are available in a range of efficiencies. The ECA Scheme aims to encourage purchase of higher efficiency products. Air to Domestic Hot Water Heat pumps can realise substantial reductions in carbon emissions when used instead of fossil fuel based, or resistive electric, water heating.

The ECA Scheme covers various types of products, including:

1. Air Source CO₂ heat pumps for domestic hot water heating
2. Air Source non-CO₂ heat pumps for domestic hot water heating

1.3 Requirements

1.3.1 Eligibility requirements

Investments in Air to Domestic Hot Water Heat Pumps 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 criteria as set out below.

To be eligible, products shall:

- Consist either of a single factory built unit or of an ‘outdoor’ unit and one or more ‘indoor’ units that are:
  - Factory-built sub-assemblies.
  - Supplied as a matched set of units.
  - Designed to be connected together during installation.

- Incorporate an electrically driven refrigeration system that uses refrigerant which has a Global Warming Potential (GWP) of below 1,800.

- Be designed for, and include fittings for, permanent installation.

- Be designed primarily to provide domestic hot water heating

- Be CE marked.

GWP values will be those set out in Annex I to Regulation (EC) No 842/2006. For refrigerants not included in this reference, the IPCC UNEP 2010 report on Refrigeration, Air Conditioning and Heat Pumps should be used as the reference.
1.3.2 **Performance requirements**

Eligible products shall meet the performance criteria set out in Table 1.1 below for:

- Water Heating Energy Efficiency ($\eta_{wh}$) at the declared load profile.

**Table 1.1 Performance thresholds for air to domestic hot water heat pumps (all product categories)**

<table>
<thead>
<tr>
<th>Declared load profile</th>
<th>L</th>
<th>XL</th>
<th>XXL</th>
<th>3XL</th>
<th>4XL</th>
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<tr>
<td>Water Heating Energy Efficiency ($\eta_{wh}$)</td>
<td>$\geq 110%$</td>
<td>$\geq 115%$</td>
<td>$\geq 120%$</td>
<td>$\geq 125%$</td>
<td>$\geq 130%$</td>
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</table>

"$\geq$" means "greater than" or equal to"

Where:

- Water Heating Energy Efficiency ($\eta_{wh}$) is the ratio between the useful energy in the water provided and the energy required for its generation, expressed as a percentage.
- Load profile is a given sequence of water draw-offs, as specified in Annex III, Table 1 of Commission Regulation (EU) No 814/2013 “Ecodesign requirements for water heaters and hot water storage tanks”.

1.4 **Measurement and Calculations**

1.4.1 **Energy efficiency metrics**

Water Heating Energy Efficiency ($\eta_{wh}$) – means the ratio between the useful energy provided by a water heater and the energy required for its generation, expressed in %.

Reference Energy ($Q_{ref}$) means the sum of the useful energy content of water draw-offs, expressed in kWh, in a particular load profile.

Smart Control Factor (SCF) means the water heating energy efficiency gain due to smart control under the conditions.

1.4.2 **Test Requirements**

No additional testing requirements beyond the measurement standard below.

1.4.3 **Measurement standards**

The product’s performance data shall be determined in accordance with the procedures detailed in BS EN 16147:2011 “Heat pumps with electrically driven compressors - Testing and requirements for marking of domestic hot water units” and the water heating energy efficiency calculation, following the requirements of Commission Regulation (EU) No 814:2013 or Commission Regulation (EU) No 812:2013".

The load profile used for the test shall be declared by the manufacturer and shall be the maximum load profile or the load profile one below the maximum load profile for the product.

1.4.4 **Rounding**

For the avoidance of doubt test data should be presented to zero decimal places. As an example, an Air to Domestic Hot Water Heat Pump product with a declared load...
profile of XL and a water heating energy efficiency of 114.4% would be deemed to be a fail.

1.5 Verification for ETL Listing

There are five main ways that applicants can demonstrate their product’s performance:

- 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 framework¹.

1.5.1 Representative Testing

Where applications are being made for a range of products that are variants of the same basic design, test data may be submitted for a representative model, provided that all variants, i.e. models, share the following characteristic features:

- Use the same refrigerant
- Have the same compressor type (i.e. manufacturer, line of models), which should imply:
  - same method of compression (e.g. reciprocating or scroll) and
  - same type of enclosure (e.g. hermetic or semi-hermetic)
- 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 non-low-temperature air to water heat pumps.

The representative models may be selected by dividing the range of products into groups of models with similar design characteristics. The performance of each model shall be predicted using a validated mathematical model. At least one model in each group shall be tested for validation purposes. A report documenting performed model calculations, showing all significant calculation steps, shall be submitted with the application.

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 https://www.gov.uk/government/publications/energy-technology-list-etl-product-testing-framework
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.

1.7 **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 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**  
The next technical review is scheduled for 2022-23.

1.8.2 **Illustrative future direction of the requirements**  
Future changes to the Specification may include:

- Increasing performance thresholds for Water Heating Energy Efficiency ($\eta_{wh}$),
- Decreasing the maximum allowed GWP for refrigerant used,
- Adding a sub-category for exhaust air heat pumps.