ENERGY TECHNOLOGY CRITERIA LIST (2009)

June 2009

The Energy Technology List comprises the technologies that qualify for the UK government's Energy-Saving Enhanced Capital Allowance (ECA) scheme and their energy-saving eligibility criteria.

The Energy Technology List is divided into 2 parts:

- The Energy Technology Criteria List which contains details of the energy-saving criteria that must be met for each of the technology classes;
- The Energy Technology Product List which contains a list of products that have been certified as meeting those standards.

The Energy Technology Criteria List is updated and published annually. *This document is a copy of the ETCL as first published in June 2009.*

The Energy Technology Product List is published annually and is updated at the beginning of each month on the ECA website.

For the most up to date copies of the ETL and for further information about the ECA scheme please refer to the ECA website http://www.eca.gov.uk/etl/.

The ECA scheme is being developed by the Department for Energy and Climate Change (DECC) and HM Revenue and Customs and promoted by the Carbon Trust. The Carbon Trust manages the Energy Technology List.

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Air-to-Air Energy Recovery Devices

Date added to ETL 2004 (Revised 2009).

1. Definition of Technology

Air-to-air energy recovery devices are heat exchanger products that are specifically designed to recover (or salvage) waste heat from the exhaust air stream from a building ventilation system, and use it to heat the incoming air stream to the same building ventilation system.

2. Technology Description

Air-to-air energy recovery devices use heat exchanger technology to recover heat from the exhaust air of building ventilation systems that would otherwise be lost to atmosphere. The heat exchangers are incorporated into the supply air and extract air ventilation ducts. Some products may also be used to reduce the energy used by air conditioning systems by removing heat from the incoming air.

A wide range of air-to-air energy recovery devices is available. The ECA Scheme aims to encourage the purchase of products with higher levels of effectiveness in heat recovery.

The ECA Scheme covers four categories of product:

1. **Plate heat exchangers (or recuperators).**
   These products must consist of heat exchanger with alternate channels for the supply and exhaust airflows that are separated by plates through which heat is conducted. They must not contain any moving parts. This category includes both cross-flow type, and counter-current flow type, plate heat exchangers.

2. **Rotating heat exchangers (including thermal and desiccant heat wheels).**
   These products must consist of a circular heat transfer medium (or 'wheel') that is designed to slowly rotate within an airtight container, and to pass the exhaust air stream over one section of the wheel, and the supply air stream over the other section of the wheel in counter flow direction. The product may be designed to recover only sensible heat, or it may incorporate a desiccant material to enable it to recover both latent and sensible heat.

3. **Run-around coils.**
   These products must consist of a matched set of two or more air-to-water heat exchangers that are designed to be located in the supply air and exhaust air ducts, and interconnected with a pumped circuit containing water, or water and glycol.

4. **Heat pipe heat exchangers.**
   These products must consist of an array of tubes containing a working fluid that transfers heat from one end of the tubes to the other by a continuous cycle of evaporation and condensation of the working fluid.

Investments in air-to-air energy recovery devices 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

Performance criteria

Products must have:

- A net sensible effectiveness at the product's maximum rated air flow under balanced flow conditions that is greater than or equal to the values set out in Table 1 below.
- A pressure drop across each side of the heat exchanger(s) within the product at the product's maximum rated air flow that is less than the values set out in Table 1 below.

Table 1: Performance requirements for air-to-air recovery products.

	Product category	Net sensible effectiveness	Pressure drop (in pascals)
1.	Plate heat exchangers	>= 49%	< 250 Pa across each side.
2.	Rotating heat exchangers	>= 68%	< 200 Pa across each side.
3.	Run-around coils	>= 45%	<100 Pa across each air side **and** < 25 kPa across each water side.
4.	Heat pipe heat exchangers	>= 49%	<200 Pa across each side.

">=" means "greater than or equal to"
"<" means "less than"
">" means "greater than"

For the avoidance of doubt test data should be presented to zero decimal places. As an example, a plate heat exchanger with a minimum effectiveness of 48%, **or** a pressure drop of 250 pascals, would be deemed to be a fail.

Required test procedures

All products must be tested in accordance with the relevant procedures and test conditions in one of the following standards:

- BS EN 308:1997 "Heat Exchanger: Test procedures for establishing performance of air to air and flue gases heat recovery devices".
- ANSI / AHRI 1060:2005 "Performance rating of air-to-air heat exchangers for energy recovery ventilation", Air-conditioning, Heating & Refrigeration Institute.
- JIS B 8628: 2003, "Air to air heat exchanger".
- Other equivalent test standards where the resulting performance data can be scientifically proven, using the methodologies in ANSI/ASHRAE Standard 84-2008 "Method of Testing Air-to-Air Heat/Energy Exchangers", to be equivalent to that obtained under BS EN 308:1997.

Where the net sensible effectiveness should be calculated using the formulae in Appendix C3 of AHRI 1060:2005, and the test data collected when rating the product's performance in heating mode at the test conditions specified in the selected standard.

Where the product is not tested in accordance with AHRI 1060: 2005, then the Exhaust Air Transfer Ratio (EATR) may be determined using the internal exhaust air leakage rate obtained under section 5.3 of BS EN 308: 1997, or the carryover mass flow rate obtained under section 5.4 of BS EN 308: 1997 (as appropriate), or the leaking rate obtained under section 3.1.5 (b) of JIS B 8628: 2003.

For run-around coils, EATR value of zero should be used when calculating net sensible effectiveness.

Where products are too large to be been tested at their maximum rated air flow under the standard test conditions specified in AHRI 1060: 2005, BS EN 308: 1997 or JIS B 8628: 2003, then performance data obtained at other test conditions may be extrapolated using validated models (or correlations), in accordance with the methodology outlined in Appendix D of ANSI/ASHRAE Standard 84-2008.

Test results may be submitted in summary form provided:

- Sufficient data is included to confirm that product performance was determined in accordance with the procedures and test conditions laid down in the selected standard.
- Two detailed test reports are submitted per product range and per test laboratory used.
- Detailed test reports have been prepared for each product tested and are available on request for inspection, where not submitted with the application.

Representative Testing

Where applications are being made for 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 heat transfer mechanisms as the representative models.
- Are constructed from materials with same heat transfer characteristics.
- Have the same or better energy effectiveness as the representative models.

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.

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

Automatic Monitoring & Targeting (AMT)

Portable AMT Equipment

Date added to ETL 2003 (Revised 2009).

1. Definition of Technology

Portable AMT equipment covers products that are specifically designed to temporarily measure energy use in different locations, and to record, analyse and report on energy consumption.

2. Technology Description

Automatic Monitoring & Targeting (AMT) Equipment helps to save energy by identifying energy wastage and ensuring the long-term effectiveness of other energy saving investment measures.

Portable AMT equipment enables the temporary monitoring of energy use in different locations, and can be used to record energy consumption data and to highlight unusual patterns of consumption.

A wide range of portable AMT equipment is available. The ECA scheme aims to encourage the purchase of products that can measure and analyse energy consumption data, and produce reports containing energy management information that enable businesses to manage their energy use.

Investments in portable AMT equipment 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be a portable measuring instrument package that includes:

    a) An 'energy use' metering device and associated measurement transducers (or probes).
    b) A means of electronically capturing and storing energy consumption data.
    c) A means of transferring data to other computing devices or computer systems.
    d) A software or hardware based means of analysing and displaying energy consumption data, and of producing energy management reports, that can be used to identify the 'key factors' that influence energy consumption.

- Be able to meter one or more of the following:

    a) Electricity use.
    b) Gas use.
    c) Heat flow.

- Have a measurement accuracy of +/- 3% of meter reading (or better) across the product's entire operating temperature range, for all measurement ranges relevant to the metering of electricity use, gas use, or heat flow.

- Be CE marked.

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.

Component Based AMT Systems

Date added to ETL 2003 (Revised 2009).

1. Definition of Technology

Automatic Monitoring & Targeting (AMT) Equipment helps to save energy by identifying energy wastage and ensuring the long-term effectiveness of other energy saving investment measures.

2. Technology Description

A component AMT system allows energy use information to be automatically gathered so that users can gain an understanding of energy consumption. It consists of components that measure, record, transmit, analyse, report and communicate the energy management information that a business needs to manage its energy use and to highlight unusual patterns of energy consumption.

A component based AMT system consists of the following components:

- Meter(s) (component A): Meter and transducers to confirm energy consumption and the 'key factors' that influence that consumption.
- Automatic Meter Reading (component B): Some means of capturing, retrieving & storing the data electronically.
- Analytical Software (component C): Analysis, production & communication of 'consumption' management reports.

All three components (A+B+C) must be present to create a complete component based AMT system.

Investments in component based automatic monitoring and targeting (AMT) systems can only qualify for Enhanced Capital Allowances, if the Department for Energy and Climate Change (DECC) has issued a 'certificate of compliance' with the eligibility criteria as set out below. This certificate can be issued at the design stage, but subsequent design changes need to be confirmed by DECC.

Information on how to apply for a certificate is available from ECAQuestions@carbontrust.co.uk.

The individual products purchased do not need to be named on the Energy Technology Product List.

3. Eligibility Criteria

A - Requirements for Component A –Meter(s)

a) Electricity Meters:

Electricity meters must meet the Class 2 accuracy requirements of one of the following standards:

- BS EN 61036:1997, "Alternating current static watt-hour meters for active energy (classes 1 and 2)".
- BS EN62053-21:2003, "Electricity metering equipment (a.c.) – Particular requirements - Part 21:Static meters for active energy (classes 1 and 2)".
- DD 8431:2005, "Electrical static metering for secondary or sub-metering – Specification" (BSI, ISBN 0 580 451178).

b) Gas meters:

Gas meters must meet the accuracy requirements of one of the following standards:

- BS EN12261:2002, "Gas Meters - Turbine gas meters".
- BS EN12480:2002, "Gas Meters - Rotary displacement gas meters".
- BS EN1359:1999, "Gas Meters - Diaphragm gas meter".

c) Heat Meters:

Heat meters must conform to the requirements of:

- BS EN 1434-1:1997 or 2007, "Heat meters- Part 1: General requirements".

B - Requirements for Component B - Automatic Meter Reading (AMR)

Automatic Meter Reading must include the following attributes as a minimum:

- The Automatic Meter Reading component (B) must collate raw data from a combination of meters, sensors and other field devices (A) solely for the purpose of AMT.
- Automatic collection of metered data from a utility device(s) at regular intervals and transmission of data to the AMT software for processing.
- Collection intervals should be user adjustable to match the different types of meter and application requirements.
- Automatic identification of data collection failures, missing data and the failure of communication to any meter or other sensing device (this function may be carried out within the AMT software for some installations).
- Delivery of data in standard format for use in other applications (such as ASCII files or common formats for standard office applications).
- For pulse outputs from meters, the accuracy of integration and transmission should be within 0.5% of the total variable measured.
- Data other than pulse outputs shall be transmitted to the AMT software with no loss of accuracy.

C - Requirements for Component C – Analytical Software (i.e. AMT Software)

The Analytical Software (i.e. AMT software) should have the following minimum capability:

- Real-time or scheduled transfer of data into the user's AMT database.
- Store and process interval meter readings to at least a minimum of 30-minute intervals.
- Present data in both a graphical and tabular format i.e. histograms, line plots, etc. Selectable time bases with periods of 30 minutes, one day, one week, four weeks, one calendar month, and one year.
- Ability to select datasets and manipulate them by combining, comparing and calculating in order to analyse, identify and evaluate instances of energy waste.
- Regression analysis on data streams using two variables in whatever frequency the dataset obtained. Display in graphical form with correlation coefficient.
- Automatic exception reporting where period consumption is outside a selected variance from a standard or selected data set.

4. Scope of Claim

A complete component based AMT system comprises meter(s), a meter reading system and analytical software (i.e. components A, B and C). All three components must be present and comply with the eligibility criteria in order to claim an Enhanced Capital Allowance (ECA). However, in some instances, only part of the component based AMT system may be eligible for an ECA where:

- The means of capturing, retrieving & storing data electronically is not solely used to monitor energy use for energy management purposes (e.g. the AMT component B is integrated within a BEMS, an IT network or the internet), then an ECA cannot be claimed on component B. Whilst this type of component B is not eligible for an ECA, it can be used to complete a component based AMT system installation (i.e. components A, B and C are in place).
- Analysis, production & communication of 'consumption' management reports is provided by an external service provider (e.g. an internet-based service bureau), then an ECA cannot be claimed on component C. Whilst this type of component C is not eligible for an ECA, it can be used to complete a component based AMT system installation (i.e. components A, B and C are in place).
- New components are added to pre-existing, but otherwise qualifying components (i.e. components installed in a previous tax year) to create a component AMT system then only those newly installed components will be eligible for ECAs.

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.

Boiler Equipment

Automatic Boiler Blowdown Control Equipment

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Automatic boiler blowdown control equipment covers products that are specifically designed to adjust the blowdown rate from a boiler in a manner that ensures the level of dissolved solids within the water being heated by the boiler is kept below a pre-set limit, whilst avoiding unnecessary blowdown.

2. Technology Description

Automatic boiler blowdown control equipment continuously measures the level of dissolved solids in steam boilers and automatically adjusts the rate of blowdown from the boiler, so as to maintain the level of total dissolved solids (TDS) below a pre-defined limit. The automatic control of boiler blowdown valves delivers better control than using manual or simple timer based control methods. It also helps to minimise energy losses due to blowdown and use of water treatment chemicals.

Investments in automatic boiler blowdown control equipment 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must incorporate:

- A sensor that continuously measures the level of dissolved solids in the boiler water.
- A controller that automatically adjusts the rate of blowdown from the boiler, in response to changes in the level of dissolved solids in the boiler water, and maintains the level of total dissolved solids (TDS) in the boiler below a pre-defined limit.
- An actuator to control the operation of the blowdown valve.

Packaged products that also include a suitable valve to control the blowdown water flow are also eligible provided that the components meet the specific requirements set out above.

Packaged products that incorporate the sensors, actuators, and valves needed to control multiple blowdown streams with a single control unit are also eligible provided that the components meet the specific requirements set out above.

Eligible products must also:

- Conform to the requirements of the EU Pressure Equipment Directive PED 97/23/EC in respect of their design, manufacture and testing procedures.

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

Biomass Boilers and Roomheaters

Date added to ETL 2001/2003 (Revised 2009).

1. Definition of Technology

Biomass boilers are products that are specifically designed to burn solid biomass fuels in order to heat water, or to raise steam.

Biomass roomheaters are products that are specifically designed to burn solid biomass fuels to release heat, which is transferred by means of radiation and convection, to the surrounding area within a building. They may also heat water for space heating and domestic uses by means of a heat exchanger incorporated into the product.

2. Technology Description

Biomass boilers are used to heat water, or to raise steam, for process or space heating.

Biomass roomheaters are closed combustion appliances typically with a glass door to the front. They heat the space they are installed in by radiation and convection around the body of the roomheater. Some designs can also be used to supply hot water to wet heating systems and domestic hot water cylinders.

Biomass boilers and roomheaters are available with a wide range of efficiencies. The ECA scheme aims to encourage the purchase of products with the highest thermal efficiency.

The fuels used in biomass boilers and roomheaters are renewable so their use will also reduce the amount of fossil fuel that might otherwise have been consumed.

Five categories of biomass boilers and roomheaters are covered by the ECA scheme:

1. Biomass hot water boilers with a maximum continuous rated output up to and including 300kW
2. Biomass hot water boilers with a maximum continuous rated output above 300kW
3. Biomass steam boilers
4. Biomass roomheaters
5. Biomass combined roomheater and hot water boiler

Investments in biomass boilers and roomheaters 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be designed to burn solid biomass fuels derived from material of biological origin excluding material embedded in geological formation and transformed to fossil.
- Fit within one of the five categories of biomass boilers and roomheaters covered by the ECA scheme.
- Be CE Marked.

Performance criteria

Eligible products must exceed the minimum thermal efficiency set out in Tables 1 to 5 by category of product covered.

Required test procedures

All products must be tested in accordance with the procedures and test conditions set out in Tables 1 to 5 by category of product covered.

All tests must be carried out by a laboratory that is accredited by the United Kingdom Accreditation Scheme (UKAS), or other equivalent national accreditation bodies recognised via the European Co-operation for Accreditation, the International Accreditation Forum, or the International Laboratory Accreditation Co-operation (ILAC) agreements.

For the avoidance of doubt net thermal efficiency test data must be presented to one decimal place. As an example, a Biomass hot water boiler with a maximum continuous rated output above 300kW and a net thermal efficiency of 84.9% at 100% of its maximum continuous rating (MCR) would be deemed to be a fail.

Representative Testing

Where applications are being made for biomass boilers of the same constructional design (in product categories 1-3 only) to be included on the Energy Technology Product List (ETPL), the type testing procedures set out in Annex F of BS EN 303-3:1999 or section 5.1.3 of EN 303-5:1999 or Annex C.2.1 of BS EN 304:1992 (as amended) may be used to select representative models for testing and to reduce the overall number of performance tests that must be completed.

It should be noted that:

- If a manufacturer voluntarily removes a representative model from the 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 models will be removed from the ETPL.

Table 1 Category 1 - Biomass hot water boilers with a maximum continuous rated output up to and including 300kW
SECTION 1A –PERFORMANCE THRESHOLDS
To be eligible under Category 1 products must have a thermal efficiency of at least 67.0 + 6 log Nominal Heat Output based on the net calorific value of the fuel (i.e. a Class 3 rating according to EN 303-5:1999).
SECTION 1B –TEST PROCEDURES
All products in Category 1 must be tested in accordance with: EITHER ● EN 303-5:1999 “Heating boilers for solid fuels, hand and automatically fired, nominal heat output of up to 300 kW. Terminology, requirements, testing and marking”. OR (for boilers rated at or below 50kW only) EITHER ● BS EN 12809:2001 “Residential independent boilers fired by solid fuel. Nominal heat output up to 50 kW. Requirements and test methods”. OR ● BS EN 14785:2006 “Residential space heating appliances fired by wood pellets. Requirements and test methods”. The tests must be done using a biomass test fuel (designated A1, A2, B1, B2, C & D) in accordance with Table 8 of EN 303-5:1999.

Table 2	**Category 2 - Biomass hot water boilers with a maximum continuous rated output above 300kW**
SECTION 2A –PERFORMANCE THRESHOLDS	
To be eligible under Category 2 products must have a thermal efficiency of at least 85.0% based on the net calorific value of the test fuel.	
SECTION 2B –TEST PROCEDURES	
All products in Category 2 must be tested in accordance with: EITHER ● BS 845-1:1987 "Methods for assessing thermal performance of boilers for steam, hot water and high temperature heat transfer fluids: Concise procedure". OR (for shell boilers only) ● BS EN 12953-11:2003 "Shell boilers — Part 11: Acceptance tests". OR (for water tube boilers only) ● BS EN 12952-15:2003 "Water-tube boilers and auxiliary installations. Acceptance tests". OR ● Equivalent procedures within the national standards of EU member states. Where equivalent procedures are used, details of the test procedure used must be supplied in English along with a declaration of equivalence from an accredited laboratory. The tests must be done using a biomass test fuel (designated A1, A2, B1, B2, C & D) in accordance with Table 8 of EN 303-5:1999. The standard test conditions are: ● A maximum ambient air temperature of 25 degrees Centigrade. ● An excess combustion air level of 40%. ● The boiler must be operating at its maximum continuous rating (i.e. 100% MCR) during the tests.	

Table 3 Category 3 - Biomass steam boilers

SECTION 3A –PERFORMANCE THRESHOLDS

To be eligible under Category 3 products must:

EITHER (for biomass boilers with rated outputs at or below 300kW)

- Have a thermal efficiency at Maximum Continuous Rating (MCR) of at least 67.0 + 6 log Nominal Heat Output based on the net calorific value of the fuel (i.e. a Class 3 rating according to EN 303-5:1999).

OR (for biomass boilers with rated heat outputs in excess of 300kW)

- Have a thermal efficiency at Maximum Continuous Rating (MCR) of at least 82.0% based on the net calorific value of the test fuel.

SECTION 3B –TEST PROCEDURES

All products in Category 3 must be tested in accordance with:

EITHER

- BS 845-1:1987 "Methods for assessing thermal performance of boilers for steam, hot water and high temperature heat transfer fluids: Concise procedure".

OR (for shell boilers only)

- BS EN 12953-11:2003 "Shell boilers — Part 11: Acceptance tests".

OR (for water tube boilers only)

- BS EN 12952-15:2003 "Water-tube boilers and auxiliary installations. Acceptance tests".

OR

- Equivalent procedures within the national standards of EU member states. Where equivalent procedures are used, details of the test procedure used must be supplied in English along with a declaration of equivalence from an accredited laboratory.

The tests must be done using a biomass test fuel (designated A1, A2, B1, B2, C & D) in accordance with Table 8 of EN 303-5:1999.

The standard test conditions must be:

- A maximum ambient air temperature of 25 degrees Centigrade.
- An excess combustion air level of 40%.
- The boiler must be operating at its maximum continuous rating (i.e. 100% MCR) during the tests.

Table 4 Category 4 - Biomass roomheaters
SECTION 4A –PERFORMANCE THRESHOLDS
To be eligible in Category 4 products must have a thermal efficiency at Maximum Continuous Rating (MCR) of at least 70.0% based on the net calorific value of the fuel.
SECTION 4B –TEST PROCEDURES
All products in Category 4 must be tested in accordance with: EITHER ● EN 13240:2001 "Roomheaters fired by solid fuel. Requirements and test methods"; AND (for mechanically fed appliances only): ● The test fuel and test period must be in accordance with EN303-5:1999. OR ● BS EN 14785:2006 "Residential space heating appliances fired by wood pellets. Requirements and test methods".

Table 5 Category 5 - Biomass combined roomheater and hot water boilers
SECTION 5A –PERFORMANCE THRESHOLDS
To be eligible in Category 5 products must have a thermal efficiency at Maximum Continuous Rating (MCR) of at least 70.0% based on the net calorific value of the fuel.
SECTION 5B –TEST PROCEDURES
All products in Category 5 must be tested in accordance with: ● EN 13240:2001 "Roomheaters fired by solid fuel. Requirements and test methods". AND (for mechanically fed appliances only) ● The test fuel and test period must be in accordance with EN303-5:1999.

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

Burners with Controls

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Burners with Controls covers products that are specifically designed to create and burn air and fuel mixtures in a safe, efficient and controlled manner, and to direct the heat released through combustion into a pressurised vessel (or other combustion chamber).

2. Technology Description

Burners with controls are used to provide heat for hot water, steam and thermal oil boilers, heaters and processes. They are widely used in industry and commerce.

A wide range of burners is available, and these are fitted with combustion controls that offer different levels of precision and repeatability of control. The ECA Scheme aims to encourage the purchase of products that are able to accurately control combustion and maintain their efficiency over a specified turn down range.

Six different categories of burners with controls are covered:

1. Gas fired and dual fuel burners rated up to, and including, 400 kW.
2. Gas fired and dual fuel burners rated between 400 kW and 1,200 kW.
3. Gas fired and dual fuel burners rated in excess of 1,200 kW.
4. Oil fired burners rated up to, and including, 400 kW.
5. Oil fired burners rated between 400 kW and 1,200 kW.
6. Oil fired burners rated in excess of 1,200 kW.

Products that are designed to use liquid or gaseous biofuels are also covered by these categories.

Investments in burners with controls 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be gas and/or oil fired.
- Be a forced draught burner.
- Be fitted with air dampers that fully close on burner shutdown.
- Automatically respond to changes in heat demand by modulating their output:
    a) Across the minimum specified turndown ratio set out in Table 1 below.
    b) In a continuous manner (or alternatively for oil-fired burners rated up to and including 400kW only, in a step-wise manner across at least three stages of output).

c) Whilst adjusting the ratio of air and fuel fed to the product's burner in a manner that maintains combustion efficiency across the required turndown range and complies with the maximum permitted levels of oxygen and carbon monoxide in the product's exhaust gases, as set out in Table 1.

- Conform to the requirements of the Pressure Equipment Directive 97/23/EC in respect of their design, manufacture and testing procedures, or be CE Marked.
- **Not** use any form of mechanical linkage between the product's modulating fuel valve, and its air damper or air control valve, to adjust the product's air to fuel ratio.

In addition, products with a thermal output in excess of 400kW must:

- Incorporate a microprocessor based burner control system.
- Use a precision servomotor to adjust any mechanical airflow dampers and/or modulating gas valves that are used to control the air-fuel ratio of the product's burner(s). Each precision servomotor must be controlled by a positional or flow based feedback mechanism that automatically adjusts its operation to correct for mechanical wear, valve stiction and hysteresis.
- Where the product is a gas fired or dual fuel burner, use a variable speed motor controller (or variable speed drive) to operate its forced draught fan.

In addition, gas fired and dual fuelled burners with a thermal output up to, and including, 400kW must incorporate pneumatic or electronic air fuel ratio controls that permit the oxygen levels in the exhaust gases to be adjusted at each of the test points specified in Table 1.

Performance criteria

Products must not exceed the maximum permitted levels of oxygen (O_2) and carbon monoxide (CO) in their exhaust gas at each of test points specified in Table 1.

Table 1 Minimum performance requirements for burners with controls.

	Product category	Minimum turndown ratio	Maximum O_2 level at test point			Maximum CO level
			High	Mid	Low	All test points
1.	Gas fired and dual fuel burners rated up to, and including, 400 kW	3.33:1	3%	4%	4.8%	20 ppmv
2.	Gas fired and dual fuel burners rated between 401 kW and 1,200 kW	4:1	3%	4%	5.0%	20 ppmv
3.	Gas fired and dual fuel burners rated in excess of 1,200 kW	4:1	3%	4%	5.0%	20 ppmv
4.	Oil fired burners rated up to, and including, 400 kW	3.33:1	3%	4%	4.8%	20 ppmv
5.	Oil fired burners rated between 401 kW and 1,200 kW	3.33:1	3%	4%	4.8%	20 ppmv
6.	Oil fired burners rated in excess of 1,200 kW	4:1	3%	4%	5.0%	20 ppmv

Where the required test points are:

- **High**: the burner is operating at 100% of its maximum continuous rating.
- **Mid**: the burner is operating at 50% of its maximum continuous rating.
- **Low**: the burner is operating at a level corresponding to the specified minimum turndown, which is 25% of maximum continuous rating for 4:1 and 30% for 3.33:1.

And:

- Dual fuel means that the product can separately burn both gas **and** oil.

Required test procedures

All products must be tested in accordance with the procedures, test conditions and type testing provisions set out in the following standards:

- BS EN 676:2003 "Automatic forced draught burners for gaseous fuels".
- BS EN 267:1999 "Forced draught oil burners - Definitions, requirements, testing, marking".

Where the product's turndown ratio is greater than the minimum required, performance at the low and mid test points may be calculated by linear interpolation of the test results.

For the avoidance of doubt oxygen levels in the product's exhaust should be presented to 1 decimal place, and carbon monoxide levels to zero decimal places. As an example, a gas fired burner rated in excess of 1,200 kW and whose exhaust gases contain oxygen levels of 3.1%, or carbon monoxide levels of 21 ppmv, at 100% of its maximum continuous rating, would be deemed to be a fail.

Representative Testing

Where applications are being made for 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:

- Are designed to burn the same fuel(s) as the representative models.
- Have the same basic constructional design as the representative models.
- Use the same burner control system / mechanisms as the representative models.
- Have the same or better energy efficiency as the representative models.

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.

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

Combustion Trim Controls

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Combustion trim controls covers products that are specifically designed to continuously monitor combustion processes and to automatically adjust, either directly or indirectly, the ratio of air to fuel fed to the burner(s) in a manner that optimises energy efficiency.

2. Technology Description

Combustion trim controls monitor combustion processes and use feedback control to adjust the amount of air and/or fuel fed to the burner(s), so as to maintain excess air levels at the preset minimum value. They are used to correct burner operation for changes in ambient conditions, fluctuations in the calorific value of fuel supply, and mechanical wear; and enable the burner to operate at lower levels of excess air, thus improving efficiency.

The ECA Scheme aim to encourage the purchase of combustion trim controls that enable the precise control of excess air levels across the entire modulating range of the burner.

The ECA Scheme covers three categories of products:

1. **Standalone control units** that are self-contained control units that are designed to incorporate combustion trim control to any suitable burner control system.
2. **'Add-on' control modules** that are not self-contained units, but are designed to incorporate combustion trim control into particular burner control systems.
3. **'Upgrade packages'** that consist of a combustion monitoring sensor (or sensors) and any other components (e.g. sensor drive unit, software, licence 'key' etc.) needed to retrofit combustion trim control to a specific burner control unit.

Investments in combustion trim controls 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Include one or more sensors that are capable of monitoring the levels of oxygen (O_2), carbon monoxide (CO) and/or carbon dioxide (CO_2) in the exhaust gases from a gas and/or oil fired burner (or associated combustion plant) to an accuracy of at least +/- 1.0%, and a repeatability of at least +/- 0.5%, of full scale output.

- Generate an analogue or digital signal that can be used to automatically adjust the flow of air and/or fuel to the burner (or burners) being controlled.
- **Not** be designed to automatically control burner start-up or shutdown.
- **Not** incorporate any form of control valve, actuator, or variable speed drive.
- Be CE Marked, or conform with the EU EMC Directive 89/336/EEC (as amended) or its replacement EU EMC Directive 2004/108/EC in respect of their design, manufacturer and testing procedures.

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.

Condensate Pumping Equipment

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Condensate pumping equipment is specifically designed to actively pump condensate to the boiler feed water system under a wide range of steam system operating conditions.

2. Technology Description

The indirect use of steam produces condensate, which contains useful heat. This condensate can be returned to the boiler house and used to heat the boiler feed water supply and to reduce the amount of make up water needed. This increases the overall efficiency of the steam system, and reduces water treatment costs.

Investments in condensate pumping equipment 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

Eligible products must incorporate:

- A powered pumping mechanism whose operation is not solely reliant on steam pressure at the condensate inlet.
- A control mechanism that automatically prevents live steam entering the condensate return line.
- A valve that prevents reverse flow of condensate through the product.

Eligible products must also:

- Conform with the requirements of the EU Pressure Equipment Directive PED 97/23/EC in respect of their design, manufacture and testing procedures.

Performance criteria

All products must be able to return condensate to the boiler house when the pressure at the product's condensate inlet does not exceed 0 barg and there is a backpressure on the product's condensate outlet of at least 1 barg.

Required test procedures

Product pumping performance must be confirmed at 2% and 100% of design flow capacity using measuring equipment whose calibration is traceable to national standards.

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

Condensing Economisers

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Condensing Economisers are products specifically designed to improve boiler net thermal efficiency by recovering both sensible and latent heat from boiler flue gases.

2. Technology Description

Condensing economisers are a type of heat exchanger that enables some of the sensible heat and latent heat from boiler flue gases to be recovered. This heat is normally used to preheat the boiler's feedwater and to supply low grade heating requirements. Typically a condensing economiser will improve boiler net thermal efficiency (expressed in percentage terms) by at least 9 points (i.e. a boiler with efficiency of 84.0% is improved to at least 93.0%).

Investments in condensing economisers 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

Performance criteria

The product must increase the net thermal efficiency of the boiler system to which it is designed to be fitted by at least 9.0 %, when the boiler system is operating at the test points set out in Table 1.

Table 1 – Performance test points for condensing economisers

Test point % MCR	Increase in net thermal efficiency of boiler system.
30	>= 9.0 %

50	>= 9.0 %
100	>= 9.0 %

">=" means "greater than or equal to"

Where MCR is the maximum continuous rating (MCR) of the boiler system for which the product is designed.

For the avoidance of doubt the increase in net thermal efficiency of the boiler system must be presented to one decimal place. As an example, a condensing economiser that delivers an increase in net thermal efficiency of 8.9% at 100% of the maximum continuous rating (MCR) of the boiler system for which the product is designed would be deemed to be a fail.

Required test procedures

The required minimum performance must be demonstrated using Method A or Method B, as set out in Table A and Table B below:

TABLE A METHOD A - INDIRECT MEASUREMENT

Under this test method, product performance must be demonstrated by measuring the improvement in net thermal efficiency of a test boiler resulting from the addition of the condensing economiser. Net thermal efficiency must be measured at test points that are equivalent to 30%, 50% and 100% of the maximum continuous rating (MCR) of the boiler system for which the product is designed.

Boiler net thermal efficiency must be measured in accordance with the procedures set out in BS 845:Part 1:1987, BS EN 303-3:1999 or BS EN 304:1992.

Where BS 845:Part 1:1987 is used, the standard test conditions are: a maximum ambient air temperature of 25 degrees Centigrade and an excess combustion air level of 15%.

TABLE B METHOD B - DIRECT MEASUREMENT

Under this test method, product performance must be demonstrated by calculating the improvement in boiler net thermal efficiency that will occur at 30%, 50% and 100% of the maximum continuous rating (MCR) of the boiler system for which the product is designed. This calculation must be based on an assessment of the transfer of heat power that will occur at each of these test points.

The assessment of transfer of heat power must be done in accordance with the procedures set out in EN 305:1997, EN 306:1997 and/or EN308:1997.

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

Flue Gas Economisers

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Flue Gas Economisers are products that are specifically designed to improve boiler net thermal efficiency by recovering sensible heat from boiler flue gases.

2. Technology Description

Flue gas economisers are a type of heat exchanger that enables some of the sensible heat in boiler flue gases to be recovered. This heat is normally used to preheat the boiler's feedwater. Typically a flue gas economiser will increase boiler net thermal efficiency (expressed in percentage terms) by at least 3 points (i.e. a boiler with efficiency of 84.0% is improved to at least 87.0%).

Investments in flue gas economisers 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

Performance criteria

The product must increase the net thermal efficiency of the boiler system to which it is designed to be fitted by at least 3.0%, when the boiler system is operating at the test points set out in Table 1.

Table 1 – Performance test points for flue gas economisers

Test point % MCR	Increase in net thermal efficiency of boiler system.
30	>= 3.0 %
50	>= 3.0 %
100	>= 3.0 %

">=" means "greater than or equal to"

Where MCR is the maximum continuous rating (MCR) of the boiler system for which the product is designed.

For the avoidance of doubt the increase in net thermal efficiency of the boiler system must be presented to one decimal place. As an example, a flue gas economiser that delivers an increase in net thermal efficiency of 2.9% at 100% of the maximum continuous rating (MCR) of the boiler system for which the product is designed would be deemed to be a fail.

Required test procedures

The required minimum performance must be demonstrated using Method A or Method B, as set out in Table A and Table B below:

TABLE A METHOD A - INDIRECT MEASUREMENT
Under this test method, product performance must be demonstrated by measuring the improvement in net thermal efficiency of a test boiler resulting from the addition of the flue gas economiser. Net thermal efficiency must be measured at test points that are equivalent to 30%, 50% and 100% of the maximum continuous rating (MCR) of the boiler system for which the product is designed. Boiler net thermal efficiency must be measured in accordance with the procedures set out in BS 845:Part 1:1987, BS EN 303-3:1999 or BS EN 304:1992. Where BS 845:Part 1:1987 is used, the standard test conditions are: a maximum ambient air temperature of 25 degrees Centigrade and an excess combustion air level of 15%.

TABLE B METHOD B - DIRECT MEASUREMENT
Under this test method, product performance must be demonstrated by calculating the improvement in boiler net thermal efficiency that will occur at 30%, 50% and 100% of the maximum continuous rating (MCR) of the boiler system for which the product is designed. This calculation must be based on an assessment of the transfer of heat power that will occur at each of these test points. The assessment of transfer of heat power must be done in accordance with the procedures set out in EN 305:1997, EN 306:1997 and/or EN308:1997.

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

Gas-fired Condensing Water Heaters

Date added to ETL 2004.

1. Definition of Technology

Gas-fired condensing water heaters are products that are specifically designed to continuously provide hot water either by the direct heating of water as it passes through the product, or the heating of water contained in an integral storage vessel.

2. Technology Description

Gas-fired condensing water heaters are used to provide hot water for domestic purposes or process heating, and offer an energy efficient method of generating hot water. They can be installed close to the point of use, or in a central plant room.

Gas-fired condensing water heaters are described as 'storage' type products if they generate hot water by heating water stored within the product itself. Other types of gas-fired condensing water heaters are described as 'non-storage' type products, and can be divided into products that are designed to instantaneously generate hot water directly from cold water, and those that heat water as it is circulated round a loop (which may also include buffer vessels).

Gas-fired condensing water heaters are available in a range of different efficiencies**.** The ECA Scheme aims to encourage the purchase of higher efficiency products.

The ECA scheme covers three categories of gas-fired condensing water heaters:

1. Storage type, gas-fired condensing water heaters not exceeding 150KW and built in accordance with BS EN 89:2000.
2. Non-storage – instantaneous type, gas-fired condensing water heaters not exceeding 45KW that are built in accordance with BS EN 26:1998.
3. Non-storage – circulator type, gas-fired condensing water heaters.

Investments in gas-fired condensing water heaters 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible products, must:

- Be gas-fired.
- Be included in the Water Regulations Advisory Scheme's Water Fittings and Materials Directory, or otherwise demonstrate compliance with the requirements of the Water Supply (Water Fittings) Regulations 1999, the Water Byelaws 2000 Scotland and the Water Regulations in Northern Ireland.
- Conform to the requirements of the Pressure Equipment Directive 97/23/EC in respect of their design, manufacture and testing procedures, or be CE Marked.

In addition, non-storage – circulator type, gas-fired condensing water heaters must:

- Use an appropriately matched forced draught burner (or burners).
- Automatically respond to changes in hot water demand by modulating their output in a continuous manner across a minimum turndown ratio of 3.33:1, without initiating a purge cycle.

- Products with a thermal output in excess of 400kW must **either** use burners from the "burners with controls" part of the Energy Technology Product List **or**:

    - Incorporate a microprocessor based burner control system.
    - Use a variable speed motor controller (or Variable Speed Drive) to operate each forced draught fan incorporated into the product.
    - Use a precision servomotor to adjust any mechanical airflow dampers and/or modulating gas valves that are used to control the air-fuel ratio of the product's burner(s). Each precision servomotor must be controlled by a positional or flow based feedback mechanism that automatically adjusts its operation to correct for mechanical wear, valve stiction and hysteresis.

Performance criteria

Eligible products must meet or exceed the minimum net thermal efficiencies set out in Table 1 below, which depend on product category:

Table 1 Minimum net thermal efficiency for gas-fired condensing water heaters

	Product category	Test standard	Test conditions	Net thermal efficiency %
1	Storage type	BS EN 89:2000		>= 102.0 %
2	Non storage – instantaneous type	BS EN 26:1998		>= 102.0%
3	Non storage – circulator type	BS EN 303:1999 (or other applicable British or European standards)	At 100% load, flow/return temperatures of 80/60°C	>= 93.0 %
			At 30% load, return temperature of 30°C	>= 102.0%

" >=" means "greater than or equal to"

For the avoidance of doubt, all net thermal efficiency test data should be presented to one decimal place. As an example, a non-storage type gas fired condensing water heater with a net thermal efficiency of 92.9% at the full load condition would be deemed to be a fail.

Required test procedures

All products must be tested in accordance with the standard test procedures and test conditions specified in Table 1 above, which depend on product category. Please note that non-storage type, gas-fired condensing water heaters must meet or exceed the minimum net thermal efficiencies at both full and part load test conditions.

Representative Testing

Where applications are being made for gas fired condensing water heaters of the same constructional design to be included on the Energy Technology Product List (ETPL), the type testing procedures set out in Annex F of BS EN 303-3:1999 may be used to select representative models for testing and to reduce the overall number of performance tests that must be completed.

It should be noted that:

- If a manufacturer voluntarily removes a representative model from the 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 models will be removed from the ETPL.

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

Heat Recovery from Condensate and Boiler Blowdown

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Heat recovery from condensate and boiler blowdown covers products that are specifically designed to recover heat from steam condensate and / or water from boiler blowdown, by means of heat exchangers and/or flash steam recovery vessels.

2. Technology Description

Significant amounts of heat can be recovered from the water extracted during boiler blowdown and from steam condensate. However this water can contain significant levels of contaminants that reduce the efficiency of the heat recovery process.

The ECA Scheme encourages the use of heat exchangers that are designed for ease of cleaning so that fouling from contaminants in the water can be easily removed, thus maintaining the efficiency of heat recovery from condensate and boiler blowdown.

Heat can also be recovered from 'flash steam', i.e. steam which is generated when the boiler blowdown and steam condensate is depressurised. However droplets of water entrained with flash steam reduce the efficiency of heat recovery.

The ECA Scheme encourages the use of flash steam recovery equipment that is designed to minimise droplet entrainment while maximising flash steam formation.

The ECA Scheme covers three categories of product:

1. **Flash steam recovery vessels or packages**
   with associated control and safety devices
2. **Heat exchanger units or packages**
   with associated control and safety devices
3. **Flash steam vessel with heat exchanger packages**
   with associated control and safety devices

Where packages may include the following components necessary for operation of the equipment: pressure gauges, vacuum breakers, vent heads, valves and steam traps.

Investments in equipment for heat recovery from condensate and boiler blowdown 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible products, must incorporate:

- Heat exchangers that are specifically designed to be dismantled for cleaning.

AND / OR

- Flash steam recovery vessels designed with maximum vapour velocities that minimise droplet carry-over with the flash steam and include de-entrainment sections.

Eligible products must also:

- Conform to the requirements of the EU Pressure Equipment Directive PED 97/23/EC in respect of their design, manufacture and testing procedures.

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

Hot Water Boilers over 400kW

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Hot water boilers are products that are specifically designed to heat water by means of a heat exchanger that transfers heat from combustion into the water as it passes through the product. Over 400kW means products that have a rated output in excess of 400kW.

2. Technology Description

Hot water boilers are used to produce hot water for space heating, process heating and domestic uses. They are available in a wide range of different designs and efficiencies.

The ECA scheme aims to encourage the purchase of the higher efficiency, modulating, gas and oil fired hot water boilers (at rated outputs over 400kW), including products that are designed to use liquid and gaseous biofuels.

Investments in Hot Water Boilers over 400kW 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be gas and/or oil fired.
- Use an appropriately matched forced draught burner (or burners).
- Have a nominal rated output in excess of 400kW.
- Automatically respond to changes in hot water demand by modulating their output in a continuous manner across a minimum specified turndown ratio, as set out in the performance criteria below, without initiating a purge cycle.
- Conform to the requirements of the Pressure Equipment Directive 97/23/EC in respect of their design, manufacturer and testing procedures, or be CE Marked.

In addition, products must **either** use burners from the "burners with controls" part of the Energy Technology Product List **or**:

- Incorporate a microprocessor based burner control system.
- Use a precision servomotor to adjust any mechanical airflow dampers and/or modulating gas valves that are used to control the air-fuel ratio of the product's burner(s). Each precision servomotor must be controlled by a positional or flow based feedback mechanism that automatically adjusts its operation to correct for mechanical wear, valve stiction and hysteresis.
- Where the product is gas fired or duel fuelled, use a variable speed motor controller (or variable speed drive) to operate each forced draught fan incorporated into the product.

Performance criteria

Products must have a minimum net thermal efficiency of 93.0% at the full load and part load conditions set out in Table 1 below.

Table 1 – Performance test points for hot water boilers over 400kW

Fuel Type	Turndown ratio	Test point (% of Maximum Rated Output)	Net thermal efficiency %
Gas fired or dual fuelled	3.33:1	30	>= 93.0 %
		50	>= 93.0 %
		100	>= 93.0 %
Oil fired	2:1	50	>= 93.0 %
		100	>= 93.0 %

">=" means "greater than or equal to"

For the avoidance of doubt net thermal efficiency test data must be presented to 1 decimal place. As an example, a product with a net thermal efficiency of 92.9% at 100% of its maximum rated output would be deemed to be a fail.

Products must also have a standby loss of less than 0.02 kW per kW of maximum rated output.

Required test procedures

The required minimum performance must be demonstrated using Method A or Method B, as set out in Tables A and B below.

Method A must only be used, where all the burners incorporated in the product are listed on the "burners with controls" part of the Energy Technology Product List.

Method B must be used to demonstrate the performance of modular boilers, or where any of the burners incorporated in the product are **NOT** listed on the "burners with controls" part of the Energy Technology Product List. A modular boiler is defined as an assembly of two or more similar (but not necessarily identical) modules, each with their own a heat exchanger, burner, and control and safety devices. The assembly has common water feed and return connections, but the water flow to, and flow from each module is independently controlled.

Representative Testing

Where applications are being made for hot water boilers over 400kW of the same constructional design to be included on the Energy Technology Product List (ETPL), the type testing procedures set out in Annex F of BS EN 303-3:1999 or Annex C.2.1 of BS EN 304:1992 (as amended) may be used to select representative models for testing and to reduce the overall number of performance tests that must be completed.

It should be noted that:

- If a manufacturer voluntarily removes a representative model from the 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 models will be removed from the ETPL.

TABLE A METHOD A - SEPARATE TESTING OF BOILERS AND BURNERS

Under this test method:

1. Boiler and burner performance are demonstrated separately.
2. Boiler performance can be assessed using any burner (or burners) that can provide the heat input and operational stability needed to complete the test.
3. There is no requirement to measure the net thermal efficiency at part loads or standby losses, since these are inferred from burner perfomance requirements.

Boiler performance must be demonstrated by measuring its net thermal efficiency at 100% of product's maximum rated output in accordance with the procedures set out in one of the following standards:

- BS 845:Part 1:1987 'Methods for Assessing thermal performance of boilers for steam, hot water and high temperature heat transfer fluids — Part 1: Concise procedure'.
- BS EN 303:1999 'Heating boilers — Part 3: Gas-fired central heating boilers — Assembly comprising a boiler body and a forced draught burner'.
- BS EN 304:1992 'Heating boilers — Test code for heating boiler for atomising oil burners' (as amended).
- BS EN 12953-11:2003 "Shell boilers — Part 11: Acceptance tests".
- BS EN 12952-15:2003 "Water-tube boilers and auxiliary installations. Acceptance tests".

OR:

- Equivalent procedures for assessing net thermal efficiency within applicable British or European Standards, or the national standands of EU members states.

Where BS 845:Part 1:1987 is used, the standard test conditions that must be used are: a maximum ambient air temperature of 25 degrees Centigrade and an excess combustion air level of 15%.

TABLE B METHOD B- INTEGRATED TESTING AT FULL AND PART LOADS
Under this test method, overall product performance must be demonstrated by: 1. Measuring the net thermal efficiency at the test points specified in Table 1, in accordance with the procedures set out in one of the following standards: ● BS 845:Part 1:1987 'Methods for Assessing thermal performance of boilers for steam, hot water and high temperature heat transfer fluids — Part 1: Concise procedure'. ● BS EN 303-3:1999 'Heating boilers — Part 3: Gas-fired central heating boilers — Assembly comprising a boiler body and a forced draught burner'. ● BS EN 303-7:2006 'Heating boilers — Part 7: Gas-fired central heating boilers equipped with a forced draught burner of nominal heat output not exceeding 1,000 kW'. ● BS EN 304:1992 'Heating boilers — Test code for heating boiler for atomising oil burners' (as amended). ● BS EN 12953-11:2003 "Shell boilers — Part 11: Acceptance tests". ● BS EN 12952-15:2003 "Water-tube boilers and auxiliary installations. Acceptance tests". OR: ● Equivalent procedures for assessing net thermal efficiency within applicable British or European Standards, or the national standands of EU members states. Where BS 845:Part 1:1987 is used, the standard test conditions that must be used are: a maximum ambient air temperature of 25 degrees Centigrade and an excess combustion air level of 15%. 2. Estimating the standby loss rate from the amount of fuel required to restore the output water temperature to its starting point after a suitable shutdown period, or from the amount of energy that must be supplied by an auxiliary source to maintain the boiler water temperature in a steady state condition, during a shutdown period.

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

Hot Water Boilers up to 400kW

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Hot water boilers are products that are specifically designed to heat water by means of a heat exchanger that transfers heat from combustion into the water as it passes through the product. Up to 400kW means products that have a rated output up to, and including, 400kW.

2. Technology Description

Hot water boilers are used to produce hot water for space heating, process heating and domestic uses. They are available in a wide range of different designs and efficiencies.

The Enhanced Capital Allowance scheme aims to encourage the purchase of higher efficiency, condensing, gas and oil fired hot water boilers, including products that are designed to use liquid and gaseous biofuels.

Investments in hot water boilers up to, and including 400kW 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be gas-fired and/or oil-fired.
- Have a nominal maximum rated output less than or equal to 400kW.
- Conform with the requirements of Boiler (Efficiency) Regulations 1993, as amended by the Boiler (Efficiency) (Amendment) Regulations 1994.

Performance Criteria

Products must have the minimum net thermal efficiencies at the full and part load conditions as set out in Table 1 below, which depend on the type of fuel used.

Table 1 Performance test points for hot water boilers up to 400kW

Fuel	Test point (% of Maximum Rated Output)	Net thermal efficiency %
Gas	100	>= 95.0 %
	30	>= 105.0 %
Oil	100	>= 95.0 %
	30	>= 101.0 %

">=" means "greater than or equal to"

For the avoidance of doubt test data should be presented to 1 decimal place. As an example a product with a net thermal efficiency of 94.9% at 100% of its rated output would be deemed to be a fail.

Required test procedures

Products performance must be demonstrated in accordance with the Boiler (Efficiency) Regulations 1993, as amended by the Boiler (Efficiency) (Amendment) Regulations 1994.

Note

The Boiler (Efficiency) Regulations 1993 (as amended) implements the EU Boiler Efficiency Directive 92/42/EEC within the United Kingdom.

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

Localised Rapid Steam Generators

Date added to ETL 2003 (Revised 2009).

1. Definition of Technology

Localised rapid steam generators are products that are specifically designed to convert water into pressurised steam by means of a burner that converts fuel into heat and a heat exchanger that transfers the heat into the water as it passes through the product, and to achieve full operating steam pressure within a few minutes of being turned on, from a cold condition.

2. Technology Description

Localised rapid steam generators are steam boilers with a low water capacity that are designed to be installed close to the point of use, thereby avoiding the thermal losses associated with steam distribution from a central boiler-house. Their low thermal inertia means that they can respond rapidly to changes in demand.

Localised rapid steam generators are available in a range of different designs and efficiencies. The ECA scheme aims to encourage the purchase of the higher efficiency gas and oil fired localised rapid steam generators.

Investments in localised rapid steam generators 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be gas and/or oil fired.
- Use an appropriately matched forced draught burner (or burners).

- Automatically respond to changes in steam demand by modulating their output in a continuous manner across a minimum specified turndown ratio, as set out in the performance criteria below, without initiating a purge cycle.
- Conform to the requirements of the Pressure Equipment Directive 97/23/EC in respect of their design, manufacturer and testing procedures, or be CE Marked.

In addition, products with a thermal output in excess of 400kW must **either** use burners from the "burners with controls" part of the Energy Technology Product List **or**:

- Incorporate a microprocessor based burner control system.
- Use a precision servomotor to adjust any mechanical airflow dampers and/or modulating gas valves that are used to control the air-fuel ratio of the product's burner(s). Each precision servomotor must be controlled by a positional or flow based feedback mechanism that automatically adjusts its operation to correct for mechanical wear, valve stiction and hysteresis.
- Where the product is gas fired or dual fuelled, use a variable speed motor controller (or variable speed drive) to operate each forced draught fan incorporated into the product.

Performance criteria

Products must have a minimum net thermal efficiency of 88.0% at the full load and part load conditions set out in Table 1 below.

Table 1 – Performance test points for localised rapid steam generators

Fuel Type	Turndown ratio	Test point % MCR	Net thermal efficiency %
Gas fired or dual fuelled	3.33:1	30	>= 88.0 %
		50	>= 88.0 %
		100	>= 88.0 %
Oil fired	2:1	50	>= 88.0 %
		100	>= 88.0 %

">=" means "greater than or equal to"

Where MCR is the product's maximum continuous rating (MCR).

For the avoidance of doubt net thermal efficiency test data must be presented to 1 decimal place. As an example, a product with a net thermal efficiency of 87.9% at 100% of its maximum continuous rating (MCR) would be deemed to be a fail.

Products must also:

- Have a standby loss of less than 0.02 kW per kW of thermal rating.
- Be capable of achieving maximum working pressure in less than eight minutes starting with a water temperature of less than 25 degrees Centigrade.

Required test procedures

The required minimum performance must be demonstrated using Method A or Method B, as set out in Table A and Table B below.

Method A must only be used, where the all burners incorporated in the product are listed on the "burners with controls" part of the Energy Technology Product List.

Method B must be used to demonstrate the performance of modular boilers, or where any of the burners incorporated in the product are **NOT** listed on the "burners with controls" part of the Energy Technology Product List. A modular boiler is defined as an assembly of two or more similar (but not necessarily identical) modules, each with their own a heat exchanger, burner, and control and safety devices. The assembly has common water feed and steam output connections, but the water flow to, and steam flow from each module is independently controlled.

Representative Testing

Where applications are being made for localised rapid steam generators of the same constructional design to be included on the Energy Technology Product List (ETPL), the type testing procedures set out in Annex F of BS EN 303-3:1999 or Annex C.2.1 of BS EN 304:1992 (as amended) may be used to select representative models for testing and to reduce the overall number of performance tests that must be completed.

It should be noted that:

- If a manufacturer voluntarily removes a representative model from the 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 models will be removed from the ETPL.

TABLE A METHOD A - SEPARATE TESTING OF STEAM GENERATORS AND BURNERS

Under this test method:

1. Steam generator and burner performance are demonstrated separately.
2. Steam generator performance can be assessed using any burner (or burners) that can provide the heat input and operational stability needed to complete the test.
3. There is no requirement to measure the net thermal efficiency at part loads or standby losses, since these are inferred from burner perfomance requirements.

Steam generator performance must be demonstrated by measuring its net thermal efficiency at 100% of the product's maximum continuous rating (MCR) in accordance with the procedures set out in one of the following standards:

- BS 845:Part 1:1987 'Methods for Assessing thermal performance of boilers for steam, hot water and high temperature heat transfer fluids — Part 1: Concise procedure'.
- BS EN 12952-15:2003 'Water-tube boilers and auxiliary installations — Part 15: Acceptance tests'.

The standard test conditions that must be used are: a maximum ambient air temperature of 25 degrees Centigrade and an excess combustion air level of 15%.

TABLE B METHOD B - INTEGRATED PRODUCT TESTING AT FULL AND PART LOADS

Under this test method, overall product performance must be demonstrated by:

1. Measuring the net thermal efficiency at the test points specified in Table 1, in accordance with the procedures set out in one of the following standards:

   - BS 845:Part 1:1987 'Methods for Assessing thermal performance of boilers for steam, hot water and high temperature heat transfer fluids — Part 1: Concise procedure'.
   - BS EN 12952-15:2003 'Water-tube boilers and auxiliary installations — Part 15: Acceptance tests'.

   The standard test conditions that must be used are: a maximum ambient air temperature of 25 degrees Centigrade and an excess combustion air level of 15%.

2. Estimating the standby loss rate from the amount of fuel required to restore the output steam pressure to its starting pressure after a suitable shutdown period.

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

Optimising Controls for Wet Heating Systems

Date added to ETL 2003 (Revised 2009).

1. Definition of Technology

Optimising controls for wet heating systems are products that are specifically designed to control heat generation and distribution within a wet heating system in an energy efficient manner that reflects weather conditions, occupation schedules and user requirements.

2. Technology Description

Optimising controls for wet heating systems realise fuel savings by adapting boiler firing and heat distribution patterns to match variations in heat demand and user requirements.

A wide range of optimising controls is available for wet heating systems including products designed to control space heating within both zoned and un-zoned buildings. The ECA Scheme aims to encourage the purchase of products that automatically adapt to changes in weather conditions, and thermal response time of the building and/or wet heating system.

The ECA Scheme covers three categories of optimising controls for wet heating systems:

1. **Standalone units** that are self-contained control units that are designed to directly control the operation of, and to be directly connected to, the external control inputs of the boilers/burners, pumps and control valves in a wet heating system.
3. **'Add-on' modules** that designed to be incorporated into other control systems, and to either directly, or indirectly, control the operation of wet heating systems.
3. **Packaged products** that consist of two or more control modules or units that are designed to be connected together during installation, and to either directly, or indirectly, control the operation of wet heating systems.

Investments in optimising controls for wet heating systems can only qualify for Enhanced Capital Allowances if the product is named on the Energy Technology Product List. To be eligible for inclusion on the Energy Technology Product List, products must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

1. Incorporate a microprocessor based controller that is pre-programmed to:
   a) Automatically control heat generation and heat distribution within a wet heating system, in a manner that reflects weather conditions and building occupation schedules.

b) Automatically switch between operating modes, in accordance with the predefined weekly occupation schedule of the space (or spaces) being heated.

c) Maintain the temperature of the space or spaces being heated within preset limits, by modulating the heat flow around each heating circuit, in response to the output of one or more temperature sensors.

2. Be designed to have at least three different operating modes, including:

a) A “normal” operating mode in which the wet heating system is operated in a manner consistent with the building being occupied, or prepared for occupation.

b) An “economy” mode where the wet heating system operated at a reduced level to reflect, for example, the fact that the building is unoccupied, or reduced levels of activity in the building.

c) A “holiday” mode where the wet heating system is completely switched off, or operated at frost, fabric or equipment protection levels.

3. Incorporate:

a) An optimum start mechanism that monitors external and/or internal temperatures, and calculates when boilers need to be switched on in order to just reach pre-set temperatures by the start of the next occupancy period.

b) A “self-learning” algorithm that automatically monitors the accuracy of the optimum start mechanism and periodically updates the heating curve that the mechanism uses, to reflect changes in building characteristics.

c) A “self-adaptive weather compensation” mechanism that automatically saves energy during milder weather conditions, by reducing the temperature set-point of the boiler water circuit as the external temperature rises, and also the temperature of, or heat flow through, any individual zone heating circuits controlled.

d) A “frost protection” mechanism that monitors internal or external temperatures (or pipework temperatures), and switches on boilers and heating circuits (as required), in order to prevent equipment and pipework from “freezing up”.

e) A building fabric protection mechanism that monitors external or internal temperatures and switches heating on to prevent condensation occurring.

f) A mechanism that prevents the boilers supplying the heating system from “dry cycling” (i.e. switching on and off), when there is no change in heat demand.

g) Interlock and inhibit mechanisms that can be used to prevent simultaneous heating and cooling, and space heating when windows have been opened.

h) An anti-tampering mechanism that prevents the product’s control strategy and configuration settings from being modified and automatic control from being disabled, except during commissioning, maintenance or testing.

4. Provide facilities that enable building managers to:

a) Define the normal occupation times for the building and for each zone controlled (to within five minutes), for each day of the week, including at least two periods of occupation per day (i.e. at least 14 different occupation period per week).

b) Define the temperature set-points for each operating mode to +/- 0.5 degrees centigrade, and separate set-points for each space heating circuit controlled.

c) Define periods or circumstances throughout the year when the wet heating system should be placed into economy, holiday or other energy saving modes.

d) Define a separate seven-day schedule for the operation of any domestic hot water (DHW) system controlled, including at least two periods of operation per day.

e) "Temporarily override" or manually adjust the degree (or amount) of weather compensation applied to each heating circuit controlled.

5. Provide facilities that enable building users to:

a) "Temporarily override" the pre-set time when the heating is scheduled to be switched off for a predefined period not exceeding 24 hours per override.

b) Only adjust the temperature set-points in the space (or spaces) being heated for a limited period of time, or by a limited amount (or allow no user adjustment).

c) Switch the wet heating system into economy or other energy saving operating mode for the remaining portion of a pre-set occupation period.

6. Conform with the requirements of the EU EMC Directive 89/336/EEC (as amended) or its replacement EU EMC Directive 2004/108/EC, or be CE Marked.

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.

Retrofit Burner Control Systems

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Retrofit burner control systems are products that are specifically designed to automatically control in an energy efficient manner, the operation of industrial and commercial burners, and the matching of burner heat production with heat demand.

2. Technology Description

Burners are used to provide heat for hot water, steam and thermal oil boilers, heaters and processes. They are widely used in industry and commerce. Traditionally adjustable cams and mechanical linkages have been used to control the fuel valves and air dampers that modulate burner heat output. These mechanisms are susceptible to mechanical wear and hysteresis, and are progressively being replaced by more accurate burner control systems.

A range of retrofit burner control systems is available, and these offer different levels of precision and repeatability of control. The ECA Scheme aims to encourage the purchase of microprocessor-based products that are able to accurately control combustion and maintain burner efficiency over a specified turn down range.

As installers assemble retrofit burner control systems on site from standard components from different manufacturers, which reflect the specific requirements of the installation, only the retrofit burner control units are listed the Energy Technology Product List (ETPL).

Investments in retrofit burner control systems 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Incorporate a microprocessor based control system.
- Be designed to:
  a) Control one or more forced draught, gas and/or oil fired burners.
  b) Use a precision servomotor to adjust any mechanical airflow dampers and/or modulating gas valves that control the air-fuel ratio of the burners controlled. Each precision servomotor must be controlled by a positional or flow based feedback mechanism that automatically adjusts its operation to correct for mechanical wear, valve stiction and hysteresis.
  c) Where the burners being controlled are gas fired or dual fuelled, use a variable speed motor drive or controller to operate the burners' forced draught fans.
  d) Fully close the air dampers of the burners being controlled on shutdown.
- Automatically respond to changes in heat demand by modulating burner output:
  a) In a continuous manner across a minimum specified turndown ratio of 4:1
  b) Whilst adjusting the ratio of air and fuel fed to the burner in a manner that maintains combustion efficiency across the required turndown range and complies with the maximum permitted levels of oxygen and carbon monoxide in the burner's exhaust gases, as set out in Table 1.
- Be CE Marked, or conform with the EU EMC Directive 89/336/EEC (as amended) or its replacement EU EMC Directive 2004/108/EC in respect of their design, manufacturer and testing procedures.
- **Not** depend on any form of mechanical linkage between a modulating gas valve, and air damper or air control valve, when adjusting the air fuel ratio of a burner.
- **Not** incorporate any form of control valve, actuator, or variable speed drive.

Performance criteria

Products must be able to control all categories of burners for which they are designed in a manner that does not exceed the maximum permitted levels of oxygen (O_2) and carbon monoxide (CO) in the burners' exhaust gas at each of test points specified in Table 1.

Table 1 Minimum performance requirements for retrofit burner control systems

Maximum O_2 level at test point			Maximum CO level
100% MCR	50% MCR	25% MCR	All test points
3.0%	4.0%	5.0%	20 ppmv

Where MCR is the product's maximum continuous rating.

Required test procedures

All products must be fitted to an appropriate burner, and tested in accordance with the procedures and test conditions set out in the one of the following standards:

- BS EN 676:2003 "Automatic forced draught burners for gaseous fuels".
- BS EN 298:2003 "Automatic gas burner control systems for gas burners and gas burning appliances with or without fans".

Where the product's turndown ratio is greater than the minimum required, performance at the low and mid test points may be calculated by linear interpolation of the test results.

For the avoidance of doubt, the oxygen levels in the test burner's exhaust should be presented to 1 decimal place, and carbon monoxide levels to zero decimal places. As an example, where the test burner's exhaust gases contain oxygen levels of 3.1%, or carbon monoxide levels of 21 ppmv, at 100% of the test burner's maximum continuous rating, the product would be deemed to be a fail.

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

Sequence Controls

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Sequence controls are products that are specifically designed to control the manner in which boilers and/or burners are switched on and off, and/or modulated, to meet the heat load placed on the overall boiler system.

2. Technology Description

Sequence controls realise fuel savings by optimising the combination of boilers used, and / or burner firing rates, to meet the heat demand placed on the multiple boiler systems commonly used for industrial process heating, and for space heating in larger buildings.

A wide range of sequence controls is available for multiple boiler systems. The ECA Scheme aims to encourage the purchase of products that automatically ensure that the most energy efficient combination of boilers and/or burner firing rates is used to meet demand.

The ECA Scheme covers three categories of sequence controls:

1. **Standalone units** that are self-contained control units that are designed to directly control the operation of, and to be directly connected to, boilers and/or burners

2. **'Add-on' modules** that are designed to be incorporated into other control systems, and to either directly, or indirectly, control the operation of boilers, or burners.

3. **Packaged products** that consist of two or more control modules or units that are designed to be connected together during installation, and to either directly, or indirectly, control the operation of boilers, or burners.

Investments in sequence controls can only qualify for ECAs if the product is named on the Energy Technology Product List. To be eligible for inclusion on the Energy Technology Product List, products must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

1. Be able to automatically control the operation, and firing sequence, of:
    a) At least two boilers, of different thermal ratings (in terms of kW of heat output), whose output is connected into a single heat distribution system.
    b) A combination of modulating and non-modulating boilers (i.e. consisting of one or more modulating boilers and one or more non-modulating boilers).

2. Incorporate a microprocessor based controller is pre-programmed to:
    a) Automatically match boiler heat output with heat demand, whilst maintaining boiler output within a specified temperature and/or pressure range.
    b) Prioritise the use of more efficient boilers and/or burners over less efficient ones, whilst making optimal use of any modulating boilers being controlled.

3. Provide facilities that enable operators to:
    a) Schedule the times of the week (to within 5 minutes), when the boiler system should be switched on and off, and be operated at a reduced pressure.
    b) Schedule at least two different operating set-points for the boiler system (to enable for example operation at a reduced level at off peak times).

4. Provide facilities that enable commissioning engineers to:
    a) Define the relative operating priority of each boiler and burner controlled, and the operating set-points at which each boiler should be switched on and off.
    b) Where automatic boiler rotation is employed, to exclude individual boilers from automatic rotation, or to divide the boilers into two or more rotational groups.

5. Incorporate an anti-tampering mechanism that prevents the product's control strategy and configuration settings from being modified, and automatic control from being disabled, except during commissioning, maintenance or testing.
6. Conform with the requirements of the EU EMC Directive 89/336/EEC (as amended) or its replacement EU EMC Directive 2004/108/EC, or be CE Marked.

Products that are designed to optimise the overall operation of wet heating systems, and include facilities such as optimum start and weather compensation, are not eligible.

Products that are designed to directly adjust burner air-fuel ratios are not eligible.

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.

Steam Boilers

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Steam boilers are products that are specifically designed to convert water into pressurised steam by means of a burner that converts fuel into heat and a heat exchanger that transfers the heat into the water as it passes through the product.

2. Technology Description

Steam boilers are used to produce steam for process heating, space heating and water heating. They consist of a burner, a pressure vessel containing a heat exchanger, and associated burner control systems and boiler control equipment.

Steam boilers are available in a range of different designs and efficiencies. The ECA scheme aims to encourage the purchase of the higher efficiency gas and oil fired steam boilers, including products that are designed to use liquid and gaseous biofuels.

Investments in steam boilers 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be gas and/or oil fired.
- Use an appropriately matched forced draught burner (or burners).
- Automatically respond to changes in steam demand by modulating their output in a continuous manner across a minimum specified turndown ratio, as set out in the performance criteria below, without initiating a purge cycle.
- Conform to the requirements of the Pressure Equipment Directive 97/23/EC in respect of their design, manufacturer and testing procedures, or be CE Marked.

In addition, products with a thermal output in excess of 400kW must **either** use burners from the "burners with controls" part of the Energy Technology Product List **or**:

- Incorporate a microprocessor based burner control system.

- Use a precision servomotor to adjust any mechanical airflow dampers and/or modulating gas valves that are used to control the air-fuel ratio of the product's burner(s). Each precision servomotor must be controlled by a positional or flow based feedback mechanism that automatically adjusts its operation to correct for mechanical wear, valve stiction and hysteresis.
- Where product is gas fired or dual fuelled, use a variable speed motor controller (or variable speed drive) to operate each forced draught fan incorporated into the product.

Performance criteria

Products must have a minimum net thermal efficiency of 92.0% at the full load and part load conditions set out in Table 1 below.

Table 1 – Performance test points for steam boilers

Fuel Type	Turndown ratio	Test point % MCR	Net thermal efficiency %
Gas fired or dual fuelled	3.33:1	30	>= 92.0 %
		50	>= 92.0 %
		100	>= 92.0 %
Oil fired	2:1	50	>= 92.0 %
		100	>= 92.0 %

">=" means "greater than or equal to"

Where MCR is the product's maximum continuous rating (MCR).

For the avoidance of doubt net thermal efficiency test data must be presented to 1 decimal place. As an example, a product with a net thermal efficiency of 91.9% at 100% of its maximum continuous rating (MCR) would be deemed to be a fail.

Products must also have a standby loss of less than 0.02 kW per kW of thermal rating.

Required test procedures

The required minimum performance must be demonstrated using Method A or Method B, as set out in Tables A and B below.

Method A must only be used, where the all burners incorporated in the product are listed on the "burners with controls" part of the Energy Technology Product List.

Method B must be used to demonstrate the performance of modular boilers, or where any of the burners incorporated in the product are **NOT** listed on the "burners with controls" part of the Energy Technology Product List. A modular boiler is defined as an assembly of two or more similar (but not necessarily identical) modules, each with their own a heat exchanger, burner, and control and safety devices. The assembly has common water feed and steam output connections, but the water flow to, and steam flow from each module is independently controlled.

Representative Testing

Where applications are being made for steam boilers of the same constructional design to be included on the Energy Technology Product List (ETPL), the type testing procedures set out in Annex F of BS EN 303-3:1999 or Annex C.2.1 of BS EN 304:1992 (as amended) may be used to select representative models for testing and to reduce the overall number of performance tests that must be completed.

It should be noted that:

- If a manufacturer voluntarily removes a representative model from the 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 models will be removed from the ETPL.

TABLE A METHOD A - SEPARATE TESTING OF BOILERS AND BURNERS
Under this test method: 1. Boiler and burner performance are demonstrated separately. 2. Boiler performance can be assessed using any burner (or burners) that can provide the heat input and operational stability needed to complete the test. 3. There is no requirement to measure the net thermal efficiency at part loads or standby losses, since these are inferred from burner prefomance requirements. Boiler performance must be demonstrated by measuring its net thermal efficiency at 100% of product's maximum continuous rating (MCR) in accordance with the procedures set out in one of the following standards: ● BS 845:Part 1:1987 'Methods for Assessing thermal performance of boilers for steam, hot water and high temperature heat transfer fluids — Part 1: Concise procedure'. ● BS EN 12953-11:2003 'Shell boilers — Part 11: Acceptance tests'. The standard test conditions that must be used are: a maximum ambient air temperature of 25 degrees Centigrade and an excess combustion air level of 15%.

TABLE B METHOD B - INTEGRATED TESTING AT FULL AND PART LOADS
Under this test method, overall product performance must be demonstrated by: 1. Measuring the net thermal efficiency at the test points specified in Table 1, in accordance with the procedures set out in one of the following standards: ● BS 845:Part 1:1987 'Methods for Assessing thermal performance of boilers for steam, hot water and high temperature heat transfer fluids — Part 1: Concise procedure'. ● BS EN 12953-11:2003 'Shell boilers — Part 11: Acceptance tests'. The standard test conditions that must be used are: a maximum ambient air temperature of 25 degrees Centigrade and an excess combustion air level of 15%. 2. Estimating the standby loss rate from the amount of fuel required to restore the output steam pressure to its starting pressure after a suitable shutdown period.

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

Combined Heat and Power

Combined Heat and Power is the simultaneous generation of heat and power (usually electricity) in a single process. CHP Schemes are by there nature bespoke and approval of a given CHP manufacturer or product would not provide sufficient assurance of environmental benefit. With CHP, case by case Certification is needed to ensure support is provided for 'good quality' CHP. Certification is achieved using the CHP Quality Assurance programme (CHPQA). Further information about CHP eligibility criteria and the CHPQA programme can be found at www.chpqa.com.

Compact Heat Exchangers

Date added to ETL 2004.

1. Definition of Technology

The purpose of heat exchangers is to transfer heat from one fluid (either gas or liquid) to another. Compact heat exchangers (CHEs) have a significantly greater surface area per unit volume than more conventional types of heat exchanger. For the purposes of the ECA Scheme, a CHE is defined as a heat exchanger with a surface to volume ratio of > 200 m^2/m^3.

2. Technology Description

CHEs are characterized by a high surface area per unit volume, which can result in a higher efficiency than conventional heat exchangers, in a significantly smaller volume (typically CHEs can achieve efficiencies of over 95% cf. 80% for non-compact heat exchangers). Hence CHEs transfer more energy in a cost-effective manner than other heat exchangers and save more energy when compared to standard technology.

Three types of compact heat exchanger are covered by the ECA Scheme. These are:

1. Plate heat exchangers.
2. Plate-fin heat exchangers.
3. Compact heat exchangers with precision formed surfaces.

Investments in CHEs 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Have a surface area to volume ratio greater than 200m^2 / m^3, based on the dimensions of the heat transfer surface alone, and not including other components of the heat exchanger (for example end plates used solely for structural purposes, or flanges and headers).
- Have a minimum design efficiency of at least 85% at 100% capacity.
- Be described by a detailed technical specification or sales brochure, clearly showing individual model numbers/exchanger name.
- Conform with the requirements of the EU Pressure Equipment Directive PED 97/23/EC.

- Be one of the following types:

    1. Plate heat exchangers:
        - Gasketed plate units.
        - Brazed plate units.
        - Partially welded plate units.
        - Welded plate units (including laser-welded types).

    2. Plate-fin heat exchangers:
        - Brazed units.
        - Welded units.

    3. Compact heat exchangers with precision formed surfaces:
        - Brazed units.
        - Welded units.
        - Diffusion bonded units.
        - Metal foam heat exchangers.

Performance criteria

Products must have a minimum design efficiency (E) of at least 85.0% for at least one fluid stream when the CHE unit is operating at 100% capacity.

The design efficiency is defined as follows:

$$E = \frac{\text{Quantity of heat extracted from or added to a stream}}{\text{Theoretical maximum amount of heat that could be extracted from or added to the stream}}$$

For the avoidance of doubt test data should be presented to 1 decimal place. As an example a minimum design efficiency (E) of 84.9% would be deemed to be a fail.

Required test procedures

The method used to calculate the design efficiency must be validated by testing selected products in accordance with BS EN 305:1997 and BS EN 306:1997.

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

Compressed Air Equipment

Energy Saving Controls for Desiccant Air Dryers

Date added to ETL 2002 (Revised 2009).

1. Definition of Technology

Energy saving controls for desiccant air dryers covers products that are specifically designed to control the operation of desiccant air dryers in a manner that eliminates unnecessary desiccant regeneration cycles.

2. Technology Description

Desiccant air dryers use a desiccant material to remove moisture from compressed air and this material has to be regenerated when it becomes saturated. The regeneration cycle of a desiccant air dryer is an energy intensive process that is often controlled by a timer that wastes energy by initiating unnecessary regeneration cycles under varying load conditions.

These unnecessary regeneration cycles can be eliminated by fitting energy saving controls that measure the moisture content of the desiccant, or the air leaving the dryer, and only initiate a regeneration cycle when the desiccant is no longer able to remove sufficient moisture to enable the desiccant air dryer to deliver air at the required dryness.

Investments in energy saving controls for desiccant air dryers 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- **Either** be pre-configured for installation on a specified desiccant air dryer or range of desiccant air dryers, **or** be capable of being installed on any desiccant air dryer with a suitable control interface through the application of a clearly defined commissioning procedure.
- Incorporate a sensor that is capable of measuring the moisture content of the compressed air leaving a desiccant air dryer, or the moisture content of the desiccant material within a desiccant air dryer.
- Incorporate a controller that automatically adjusts the regeneration cycle of the desiccant air dryer to which it is fitted, in a manner that:
  a) Ensures that the desiccant in the desiccant air dryer is only regenerated when it is unable to remove sufficient moisture to allow the desiccant air dryer to deliver air at the required dryness; and
  b) Reduces the energy consumption of the desiccant air dryer, or the amount of air purged by the desiccant air dryer, when the load on the dryer is reduced.

- Incorporate a software or hardware based anti-tamper protection mechanism that prevents operators from permanently disabling the controller's ability to automatically adjust the regeneration cycle.
- Conform to the requirements of the EU EMC Directive 89/336/EEC or its replacement EU EMC Directive 2004/108/EC, or be CE Marked.

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

Flow Controllers

Date added to ETL 2008.

1. Definition of Technology

Flow controllers are products that are specifically designed to regulate the pressure in compressed air systems in a manner that maintains a set pressure regardless of volumetric changes caused by a fluctuating compressed air demand.

2. Technology Description

Flow controllers can be used, in conjunction with appropriate air storage capacity, to reduce the pressure fluctuations that normally occur in compressed air distribution systems when machines turn on and off, or compressed air demand is variable. This enables compressed air generation systems to be operated closer to the minimum required air distribution pressure, thereby realising energy savings.

Investments in flow controllers 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Incorporate a pressure transducer that has a measurement accuracy of at least (i.e. <=) +/- 0.5% of full scale output across its rated operating pressure range and across a rated temperature range of –25 to 80 degrees Centigrade.
- Incorporate one or more precision control valves and associated valve positioning devices that do not vent more than 10 standard litres per minute (SLPM at 20 degrees Centigrade) of compressed air to atmosphere during normal operation.
- Incorporate a microprocessor based controller that is pre-programmed to:
    a) Define the downstream air pressure set-point in intervals not exceeding 0.1 bar.
    b) Calibrate the operation of the product's control valve(s) and associated valve positioner(s) to ensure correct operation across the product's turn down range.
    c) Tune the controller operation to eliminate controller hunting, minimise valve overshoot, and compensate for valve hysteresis and/or stiction.

- Be able to automatically regulate the air pressure downstream of the product, to within +/- 0.1 bar of a set-point, across a minimum turn down range of 5:1, as air demand varies between the product's minimum and maximum rated air flows.
- Incorporate an anti-tampering mechanism that prevents automatic control from being disabled, except during commissioning, maintenance or testing.
- Conform with the requirements of the EU Pressure Equipment Directive (PED) 97/23/EC, and be CE Marked.
- **Not** incorporate facilities to directly control the operation of air compressors.

Where the product provides facilities for users to temporarily override automatic control, the product must automatically reset the override within 24 hours.

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

Master Controllers

Date added to ETL 2008 (Revised 2009).

1. Definition of Technology

Master controllers are products that are specifically designed to control the operation of multiple air compressors in a manner that maintains the operating pressure of the compressed air system within a narrow band, thereby minimising energy consumption.

2. Technology Description

Master controllers are microprocessor-based controllers that can be used to improve the control of compressed air systems with two or more compressors. They realise energy savings by reducing the pressure fluctuations that are normally present in compressed air systems when simple cascade or sequence controls are used to maintain system pressure, and by allowing users to schedule compressor operations that reflect working patterns.

Investments in master controllers 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be able to automatically control the operation of:
    a) At least two air compressors.
    b) Both fixed speed and variable speed compressors.
    c) Any positive displacement compressor that is capable of accepting a remote load/unload control signal via a volt-free switching circuit or electromechanical

pressure switch, or in the case of variable speed drives capable of accepting a speed control signal or a remote pressure set point adjustment.

- Incorporate a microprocessor based controller that is pre-programmed to provide facilities for users to:
    a) Prioritise the use of more efficient compressors over less efficient ones, whilst making optimal use of any variable speed compressors being controlled.
    b) Schedule the times of the week (to within five minutes), when compressed air system should be switched on and off, and be operated at a reduced pressure.
    c) Schedule at least two different operating pressures for the compressed air system (to enable for example operation at lower pressure at off peak times).
    d) Define the minimum and maximum limits for the operating pressure (or pressure band) that the controller must maintain the compressed air system within.
- Incorporate an anti-tampering mechanism that prevents automatic control from being disabled, except during commissioning, maintenance or testing.
- Incorporate a pressure transducer that has a measurement accuracy of at least (i.e. <=) +/- 0.5% of full scale across its rated operating pressure range and across a rated temperature range of –25 to 80 degrees Centigrade.
- Incorporate automatic control algorithms that monitor rate of change in system air pressure/flow and prevent compressors from being brought on load or unloaded in response to small fluctuations in demand.
- Be capable of automatically regulating the operating pressure of the compressed air system (where all compressors in the system are situated at a single location), based on the output of a single pressure transducer, to within +/-0.2 bar of the operating pressure set-point, as air demand varies between 10% and 100% of the maximum combined, continuous, rated output of air compressors being controlled.
- Conform with the requirements of the EU EMC Directive 89/336/EEC (as amended) or its replacement EU EMC Directive 2004/108/EC, and be CE Marked.

Where products provide facilities for operators to override automatic control, they must be pre-programmed to return to automatic control at the next scheduled time for system switch off / on, and to automatically reset the override within 24 hours.

Where products are also designed to control desiccant air dryers, they must also satisfy the eligibility criteria for ‘energy saving controls for desiccant air dryers’.

Automatic control may be implemented either directly by means of an analogue or digital signal connection, or indirectly by means of another control device or network. Where products are designed to indirectly control variable speed compressors, they must be capable of monitoring the operating speed of the variable speed compressors, and of remotely adjusting the speed or pressure set points (or pressure or speed range limits) within the variable speed compressor’s control device.

Products that cannot directly control the speed (or speed range) of a variable speed compressor, or indirectly control their speed of operation by adjusting their pressure set points, are not eligible.

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

Refrigerated Air Dryers with Energy Saving Controls

Date added to ETL 2003 (Revised 2009).

1. Definition of Technology

Refrigerated air dryers are products that are specifically designed to extract water vapour from industrial compressed air systems by means of cooling with a refrigeration cycle.

2. Technology Description

Refrigerated air dryers are commonly fitted to compressed air systems to prevent moisture from condensing within pipe work and equipment. They work by cooling the air to a desired dewpoint temperature, thus forcing moisture to condense out of the air. This resulting condensate is then drained from the compressed air system.

A refrigerated air dryer typically increases the energy used in compressed air generation by between 2% and 5% depending on the type of product selected and how it is controlled. The pressure drop across the refrigerated air dryer is also a key factor in the amount of additional energy consumed as a result of the use of refrigerated air dryers. The aim of the ECA scheme is to encourage the purchase of higher efficiency models, which have low pressure drops across them.

Investments in refrigerated air dryers with energy savings controls 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Incorporate energy saving controls that automatically reduce the cooling output of the refrigerated air dryer as the average flow rate and temperature of the inlet air decreases in a manner that reduces the energy consumption of the product.
- Modulate their output between 20% to 100% in response to changes in the flow rate and/or temperature of the inlet air and/or outlet air.
- **Not** exceed the limits set out in the performance criteria below for pressure drop corrected composite specific energy consumption (SEC) at 50%, 75% and 100% load (i.e. rated air flow).
- Conform with the requirements of the EU Pressure Equipment Directive PED 97/23/EC in respect of their design, manufacture and testing procedures, or be CE Marked.

Performance criteria

Products must not exceed the values for pressure drop corrected composite specific energy consumption (SEC) set out in the Table 1 below at the specified percentage of full load.

Table 1 Maximum Allowable Composite SEC in kWh/m^3/min

Percentage of full load (i.e. rated air flow)	Maximum allowable Composite SEC (kWh/m3/min)
50 %	0.36
75 %	0.48
100 %	0.60

The pressure drop-corrected composite SEC should be calculated as follows:

$$SEC = \frac{P + (1.67 \times \Delta p \times Q)}{Q}$$

Where:

P = Total electrical power consumed by air dryer, kW
Δp = Pressure drop across air dryer, bar
Q = Flow rate of air, m^3/min

Required test procedures

All products must be tested in accordance with the procedures and test conditions laid down in ISO7183:1986, which specifies how to measure the electrical power consumed by the product at full load, the pressure drop across the dryer and the flow rate of air through the product. The test results should be presented in the format laid down in Annex A of ISO7183-2:1996.

Products must also meet the Class 4, Class 5 or Class 6 specifications for moisture removal in BS ISO8573-1:2001, "Table 3 Humidity Classes".

In addition, manufacturers should use the above procedures to evaluate the pressure drop corrected composite SEC of their products at two part load conditions (50% and 75%).

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

Heat Pumps

Air Source: Air to water heat pumps

Date added to ETL 2009.

1. Definition of Technology

Air to water heat pumps are products that are specifically designed to transfer heat from the air outside a building to a water-based heating system, by means of a refrigerant cycle.

2. Technology Description

An air to water heat pump uses an electrically driven refrigeration system to transfer heat from outside air into a water-based heating system. 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 refrigerant flows around the product.

Air to water heat pumps are available with a wide range of efficiencies and the ECA Scheme aims to encourage the purchase of higher efficiency products.

The ECA Scheme covers two categories of products:

1. **Single split air to water heat pumps**
   that consist of one 'outdoor' unit and one 'indoor' unit.
2. **Packaged air to water heat pumps**
   that consist of a single factory assembled unit.

Investments in air to 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Incorporate an electrically driven refrigeration system.
- Be designed for, and include fittings for, permanent installation.
- Be CE marked.

In addition, single split products must consist of an 'outdoor' unit and one 'indoor' unit that are:

- Factory–built sub-assemblies.
- Supplied as a matched set of units.
- Designed to be connected together during installation.

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 thresholds for air to water heat pumps

	Product Category	Heating Capacity (kW)	Heating mode (COP)	Cooling mode (EER)
1.	Single split air to water heat pumps	<= 20kW	> 4.00	> 3.10
		> 20kW	> 3.80	> 3.00
2.	Packaged air to water heat pumps	<= 20kW	> 4.00	> 3.10
		> 20kW	> 3.80	> 3.00

">" means "greater than"
"<=" means "less than or equal to"

For the avoidance of doubt test data should be presented to two decimal places. As an example, a single split air to water heat pump with a cooling mode COP of 4.00 would be deemed to be a fail.

Required test procedures

All products must be tested in accordance with the procedures in BS EN 14511:2007 (or BS EN 14511:2004). The standard rating conditions are set out in the Table 2 below.

Table 2 Test conditions for air to water heat pumps

	Product category	Heating mode (CoP)	Cooling mode (EER)
1.	Single split air to water heat pumps	BS EN 14511-2:2007 Table 9 Standard rating conditions, Outdoor air (for floor heating or similar application)	BS EN 14511-2:2007 Table 10 Standard rating conditions, water (for floor cooling or similar application)
2.	Packaged air to water heat pumps	BS EN 14511-2:2007 Table 9 Standard rating conditions, Outdoor air (for floor heating or similar application)	BS EN 14511-2:2007 Table 10 Standard rating conditions, water (for floor cooling or similar application)

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

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

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).
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).

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.

Air Source: Packaged Heat Pumps

Date added to ETL 2002 (Revised 2009).

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.

'Packaged' type heat pumps are single factory assembled units that incorporate all the elements of the refrigeration system and air distribution mechanisms for space heating.

2. Technology Description

Air source packaged 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 packaged heat pumps are available with a wide range of efficiencies. The ECA Scheme aims to encourage the purchase of higher efficiency products.

Investments in air source packaged 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Consist of a single factory–built unit.
- 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 below for:

- Coefficient of Performance (COP) at 100% (full) load in heating mode.
- Energy Efficiency Ratio (EER) at 100% (full) load in cooling mode, where the product is designed to provide cooling.

Table 1 Performance requirements for air source: packaged heat pumps

Product Category	Heating mode (COP)	Cooling mode (EER)
Air source: packaged heat pumps	>3.20	>2.80

">" means "greater than"

For the avoidance of doubt test data should be presented to 2 decimal places. As an example, a product with a heating mode COP of 3.20 would be deemed to be a fail.

Required test procedures

All products must be tested in accordance with the procedures in BS EN 14511:2007 (or BS EN 14511:2004). The standard rating conditions are set out in the Table 2 below.

Table 2 Test conditions for air source packaged heat pumps

Product Category	Heating mode (COP)	Cooling mode (EER)
Air source: packaged heat pumps	BS EN 14511-2:2007 Table 3 Standard rating Conditions, Outside air/recycled air	BS EN 14511-2:2007 Table 4 Standard rating Conditions, Comfort Outside air/recycled air

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.

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

Date added to ETL 2002 (Revised 2009).

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 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 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 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 split and multi-split heat pumps

	Product Category	Heating mode (COP)	Cooling mode (EER)
1.	Air source: single split (non-VRF) heat pumps	>3.60	>3.20
2.	Air source: dual split (non-VRF) heat pumps	>3.60	>3.20
3.	Air source: multi-split (non-VRF) heat pumps	>3.60	>3.20
4.	Air source: split or multi-split variable refrigerant flow (VRF) heat pumps	>3.70	>3.30

">" means "greater than"

For the avoidance of doubt test data should be presented to 2 decimal places. As an example, an air source, single split (non-VRF) heat pump product with a heating mode COP of 3.60 would be deemed to be a fail.

Required test procedures

All products must be tested in accordance with the procedures in BS EN 14511:2007 (or BS EN 14511:2004). 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

	Product Category		Heating mode (COP)	Cooling mode (EER)
1.	Air source: single split (non VRF) heat pumps		BS EN 14511-2:2007 Table 3 Standard rating Conditions, Outside air/recycled air.	BS EN 14511-2:2007 Table 4 Standard rating Conditions, Comfort Outside air/recycled air
2.	Air source: dual split (non VRF) heat pumps		BS EN 14511-2:2007 Table 13 Standard rating Conditions.	BS EN 14511-2:2007 Table 14 Standard rating Conditions.
3.	Air source: multi-split (non VRF) heat pumps		BS EN 14511-2:2007 Table 13 Standard rating Conditions.	BS EN 14511-2:2007 Table 14 Standard rating Conditions.
4.	Air source: split or multi-split variable refrigerant flow (VRF) heat pumps:	Single split	BS EN 14511-2:2007 Table 3 Standard rating Conditions, Outside air/recycled air.	BS EN 14511-2:2007 Table 4 Standard rating Conditions, Comfort Outside air/recycled air.
		Multi-split	BS EN 14511-2:2007 Table 13 Standard rating Conditions.	BS EN 14511-2:2007 Table 14 Standard rating Conditions.

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.

Ground Source: Brine to Water Heat Pumps

Date added to ETL 2004 (Revised 2009).

1. Definition of Technology

Ground source brine to water heat pumps are products that are specifically designed to transfer heat from the ground to a water-based heating system by means of a refrigeration cycle.

The heat is collected from the ground by circulating a solution of water and anti-freeze (known as 'brine') through a buried, closed-loop, ground heat exchanger.

2. Technology Description

Ground source brine to water heat pumps use an electrically operated refrigeration system to transfer heat from the ground into a water-based heating system. They can be used to provide space heating in a wide range of buildings, and some products may be also able to provide cooling by reversing the refrigerant flows around the product.

The ECA Scheme aims to encourage purchase of higher efficiency ground source brine to water heat pumps, which can be used to realise substantial reductions in carbon emissions.

Investments in ground source brine to 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Consist of a single factory built unit.
- Incorporate an electrically driven refrigeration system.
- Be designed to use an indirect, closed-loop ground heat exchanger.
- 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) at 100% (full) load in heating mode.
- Energy Efficiency Ratio (EER) at 100% (full) load in cooling mode, where the product is designed to provide cooling.

Table 1 Performance thresholds for ground source brine to water heat pumps

Product Category	Heating mode (COP)	Cooling mode (EER)
Ground source brine to water heat pumps	>4.00	>3.20

">" means "greater than"

For the avoidance of doubt test data should be presented to two decimal places. As an example, a product with a heating mode COP of 4.00 would be deemed to be a fail.

Required test procedures

All products must be tested in accordance with the procedures in BS EN 14511:2007 (or BS EN 14511:2004). The standard rating conditions are set out in the table 2 below.

Table 2 Test conditions for ground source brine to water heat pumps

Product Category	Heating mode (COP)	Cooling mode (EER)
Ground source brine to water heat pumps	BS EN 14511-2:2007 Table 7 Standard rating Conditions, Brine (for floor heating or similar application)	BS EN 14511-2:2007 Table 8 Standard rating Conditions, Water to water and brine to water (for floor heating or similar application)

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.

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

Date added to ETL 2002 (Revised 2009).

1. Definition of Technology

Water source heat pumps are products that are specifically designed to transfer heat from water (in an internal water loop) into the air within the space to be heated 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

Water source split and multi-split heat pumps use an electrically operated refrigeration system to transfer heat from an internal water loop into the air within the space to be heated. 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 'water cooled' air conditioning units).

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

The ECA Scheme covers four categories of products:

1. **Water source: single split (non-VRF) heat pumps**
   that consist of one 'outdoor' unit and one 'indoor' unit
2. **Water source: dual split (non-VRF) heat pumps**
   that consist of one 'outdoor' unit and two or more 'indoor' units.
3. **Water 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. **Water 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 water source 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 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 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 including 100% (full) load, where the product is designed to provide cooling.

Table 1 Performance thresholds for water source split and multi-split heat pumps

	Product Category	Heating mode (COP)	Cooling mode (EER)
1.	Water source: single split (non-VRF) heat pumps	>3.70	>3.30
2.	Water source: dual split (non-VRF) heat pumps	>3.70	>3.30
3.	Water source: multi-split (non-VRF) heat pumps	>3.70	>3.30
4.	Water source: split and multi-split variable refrigerant flow (VRF) heat pumps	>4.10	>3.50

">" means "greater than"

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

Required test procedures

All products must be tested in accordance with the procedures in BS EN 14511:2007 (or BS EN 14511:2004). The standard rating conditions are set out in the Table 2 below.

Table 2 Test conditions for water source split and multi-split heat-pumps

	Product Category		Heating mode (COP)	Cooling mode (EER)
1.	Water source: single split (non-VRF) heat pumps		BS EN 14511-2:2007 Table 5 Standard rating Conditions, Water loop.	BS EN 14511-2:2007 Table 6 Standard rating Conditions, Comfort.
2.	Water source: dual split (non-VRF) heat pumps		BS EN 14511-2:2007 Table 16 Standard rating Conditions, Water loop.	BS EN 14511-2:2007 Table 17 Standard rating Conditions.
3.	Water source: multi-split (non-VRF) heat pumps		BS EN 14511-2:2007 Table 16 Standard rating Conditions, Water loop.	BS EN 14511-2:2007 Table 17 Standard rating Conditions.
4.	Water source: split and multi-split variable refrigerant flow (VRF) heat pumps:	Single split	BS EN 14511-2:2007 Table 5 Standard rating Conditions, Water loop.	BS EN 14511-2:2007 Table 6 Standard rating Conditions, Comfort.
		Multi-split	BS EN 14511-2:2007 Table 16 Standard rating Conditions, Water loop.	BS EN 14511-2:2007 Table 17 Standard rating Conditions.

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.

Heat Pump Dehumidifiers

Date added to ETL 2008 (Revised 2009).

1. Definition of Technology

Heat pump dehumidifiers are products that are specifically designed to remove water vapour from moist air using an electrically driven refrigeration cycle.

2. Technology Description

Heat pump dehumidifiers are widely used to improve personal comfort, to protect building fabric and stored goods or materials, and to dry industrial products. They work by circulating the moist air over the evaporator of the refrigeration system. This reduces the temperature of the air, which causes the water vapour to condense. The resulting condensate can be then drained away.

Heat pump dehumidifiers are available in a range of different designs and efficiencies. The ECA scheme aims to encourage the purchase of the higher efficiency products that recover both sensible and latent heat released during dehumidification, and use it to heat the air as it leaves the product or for other useful purposes, such as water heating.

Investments in heat pump dehumidifiers 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- **Either** be a single packaged unit **or** consist of two or more factory built sub-assemblies that are designed to be connected together during installation.
- Incorporate an electrically driven refrigeration system that is designed to remove water vapour from the surrounding atmosphere, as the air is recirculated through the product.
- Recover both sensible and latent heat released during dehumidification, and use it to heat the air as it leaves the product and/or for other useful purposes (such as water heating).
- Incorporate a control system that monitors the relative humidity of the surrounding atmosphere, and automatically switches off dehumidification, or modulates the rate of dehumidification, when the relative humidity falls below a preset value.
- Be designed for, and include fittings for, permanent installation within a building.
- Have a dehumidification capacity that is greater than or equal to (>=) 0.625 litres per hour.
- **Not** be designed to be connected to compressed air systems.
- Be CE marked.

Performance criteria

Products must have a dehumidification efficiency ratio (DER) equal to or greater than the thresholds set out in Table 1 below, which depend on the dehumidification capacity (C) of the product.

Table 1 – Performance test points for heat pump dehumidifiers

Dehumidification capacity (C) (Litres/hour)	**Dehumidification efficiency ratio (DER)** (Litres/kWh)
>= 0.625 and < 1.5	>= 1.40
>= 1.5 and < 2.3	>= 1.80
>= 2.3	>= 2.30

">=" means "greater than or equal to"

Where the product's dehumidification capacity and dehumidification efficiency ratio are defined in sections 3.5 and 3.6 (respectively) of BS EN 810:1997 "Dehumidifiers with electrically driven compressors. Rating tests, marking, operational requirements and technical data sheet".

For the avoidance of doubt, test data should be presented to 2 decimal places. As an example, a DER of 1.39 litres/kWh for a heat pump dehumidifier with a dehumidification capacity of 1.2 litres per hour would be deemed to be a fail.

Required test procedures

All products must be tested in accordance with the procedures laid down in BS EN 810:1997.

The dehumidification capacity must be determined at the appropriate rating test conditions for the type of product (or intended application) as set out in Tables 2, 3 and 4 of BS EN 810:1997.

The dehumidification efficiency ratio must be determined at an air inlet temperature of 27 degrees Centigrade (dry bulb) and 21 degrees Centigrade (wet bulb) and, where applicable, include the corrections for the power input of fans and water pumps specified in section 4.1 of BS EN 810:1997.

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

Heating, Ventilation and Air Conditioning (HVAC) Equipment

Close Control Air Conditioning Equipment

Date added to ETL 2009.

1. Definition of Technology

Close control air conditioning equipment covers products that are specifically designed to provide the cooling needed to maintain the air temperature, and optionally the relative humidity, in rooms that contain equipment or processes with high sensible heat loads.

2. Technology Description

Close control air conditioning equipment is used to control of temperature (and optionally humidity) in rooms and enclosures containing heat generating equipment, such as servers, computers or telecommunications devices, and in some types of manufacturing process (e.g. clean rooms). The equipment typically operates continuously and has a much higher unit floor area cooling load requirement than conventional air conditioning.

Close control air conditioning equipment is available with a wide variety of efficiencies. The ECA Scheme aims to encourage the purchase of higher efficiency products.

The ECA Scheme covers five categories of product:

1. DX air cooled close control air conditioning equipment (without free cooling coil).
2. DX air cooled close control air conditioning equipment with integral chilled water free cooling coil(s).
3. DX water cooled close control air conditioning equipment (without free cooling coil).
4. DX water cooled close control air conditioning equipment with integral chilled water free cooling coil(s).
5. Chilled water (CHW) close control air conditioning equipment.

Where DX stands for 'direct expansion' and refers to products that effect cooling, or partial cooling, of the air by evaporating a refrigerant in their indoor heat exchangers.

Investments in close control air conditioning equipment 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- **Either** be a single packaged unit **or** consist of two or more factory built sub-assemblies that are designed to be connected together during installation.
- **Either** incorporate an electrically powered compressor (or compressors) **and / or** incorporate a chilled water cooling coil with fittings for connection to an external chilled water circuit.
- Have a ratio of sensible cooling capacity to the total cooling capacity (i.e. sensible heat ratio) that is greater than or equal to (>=) 0.9 at the standard rating condition.
- Be CE marked.

Performance criteria

Products must have an energy efficiency ratio (EER), and a free cooling capacity (where applicable) that is greater than or equal to the values set out in Table 1 below.

Table 1 Performance thresholds for close control air conditioning equipment

	Product category	EER	Free cooling capacity
1.	DX air cooled (without free cooling).	>= 2.70	
2.	DX air cooled with integral chilled water free cooling coil(s).	>= 2.50	Free cooling coil cooling capacity >= 90% of cooling capacity in DX operating mode at the standard rating condition (BS EN 14511-2:1007 Table 6, close control)
3.	DX water cooled (without free cooling).	>= 3.00	
4.	DX water cooled with integral chilled water free cooling coil(s).	>= 2.70	Free cooling coil cooling capacity >= 90% of cooling capacity determined at the standard rating condition in DX operating mode (BS EN 14511-2:2007 Table 6, close control)
5.	Chilled water (CHW).	>= 16.70	

'>=' means 'greater than or equal to'.

Where EER is the ratio of cooling capacity (Watts) to the electric power absorbed by the unit (P_{elec}).

For the avoidance of doubt test data should be presented to 2 decimal places. As an example an EER of 2.69 for a DX air cooled product would be deemed a fail.

Required test procedures

All products must be tested in accordance with the procedures and test conditions laid down in the standards specified in Table 2 below.

Table 2 Required test procedures for close control air conditioning equipment

	Product category		Standard	Rating condition
1.	DX air cooled (without free cooling).		BS EN 14511:2007	BS EN 14511-2:2007, Table 4, Standard rating conditions, Close control
2.	DX air cooled with integral chilled water free cooling coil(s).	DX refrigeration part	BS EN 14511:2007	BS EN 14511-2:2007, Table 4, Standard rating conditions, Close control
		Free cooling coil	BS 4856-3:1975 (if ducted) BS 4856-1:1972 (if not ducted) or BS EN 1397:1999	Liquid side conditions inlet/outlet 7/12°C Indoor heat exchanger BS EN 14511-2: 2007, Table 4, Standard rating conditions, Close control
3.	DX water cooled (without free cooling).		BS EN 14511:2007	BS EN 14511-2:2007, Table 6, Standard rating conditions, Close control
4.	DX water cooled with integral chilled water free cooling coil(s).	DX refrigeration part	BS EN 14511:2007	BS EN 14511-2:2007, Table 6, Standard rating conditions, Close control
		Free cooling coil	BS 4856-3:1975 (if ducted) BS 4856-1:1972 (if not ducted) or BS EN 1397:1999	Liquid side conditions inlet/outlet 7/12°C Indoor heat exchanger BS EN 14511-2: 2007, Table 4, Standard rating conditions, Close control
5.	Chilled water (CHW).		BS 4856-3:1975 (if ducted) BS 4856-1:1972 (if not ducted) or BS EN 1397:1999	Liquid side conditions inlet/outlet 7/12°C Indoor heat exchanger BS EN 14511-2: 2007, Table 4, Standard rating conditions, Close control

Where an external static pressure of at least (>=) 20 Pascals must be used for testing downflow units with ducted outlets.

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

Heating, Ventilation and Air Conditioning (HVAC) Zone Controls

Date added to ETL 2004 (Revised 2009).

1. Definition of Technology

HVAC zone controls are products that are specifically designed to automatically control in an energy efficient manner, the amount of heating, cooling, ventilation or air conditioning that is applied to individual rooms or defined areas within a building, known as "zones".

Where "HVAC" is the collective term used to refer to the combination of heating, cooling, ventilation, or air conditioning, that is specifically employed within a particular building.

2. Technology Description

HVAC zone controls are used to control the environmental conditions (i.e. temperature, ventilation rate and/or air condition) in individual zones (i.e. rooms or areas) within a building. They can be programmed to maintain these environmental conditions within preset limits in a manner that reflects occupation schedules or occupation status, weather conditions, and specific operating requirements.

A wide range of HVAC zone controls is available. The ECA scheme aims to encourage the purchase of products that automatically minimise the energy consumption of building heating, cooling, ventilation, or air conditioning equipment, and associated distribution systems.

The ECA Scheme covers four categories of products:

1. **Standalone control units** that are self-contained zone control units that are designed to control one or more zones, but not centralised HVAC plant.
2. **Centralised control units** that are self-contained central control units that are designed to control two or more zones, and centralised HVAC plant.
3. **Packaged control products** that consist of two or more control modules or units that are designed to be connected together during installation, and that are designed to control one or more zones. They may also control centralised HVAC plant, provided they are also designed to control at least two zones.
4. **'Add-on' control modules** that are not self-contained units, but are designed to incorporate zone control facilities into HVAC control units or equipment.

Investments in HVAC zone controls can only qualify for Enhanced Capital Allowances if the product is named on the Energy Technology Product List. To be eligible for inclusion on the Energy Technology Product List, products must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

1. Incorporate a microprocessor based controller that is pre-programmed to:

a) Automatically control the individual environmental conditions in one or more zones within a building, in an energy efficient manner that reflects the occupation status in each zone and/or predefined zone occupation schedules.

b) Automatically switch between pre-defined operating modes, in accordance with the predefined occupation schedule or occupation status of the zones being controlled.

2. Be able to automatically control the operation of the equipment:

   a) Heating and/or cooling the zones being controlled; and/or:

   b) Ventilating and/or air-conditioning the zones being controlled.

3. Be designed to have at least three different zone operating modes, including:

   a) A "normal" operating mode where zone environmental conditions are maintained within predefined levels consistent with zone occupation.

   b) An "economy" mode where zone environmental conditions are maintained at reduced levels to reflect, for example, the fact that the zone is unoccupied.

   c) A "holiday" mode where zone heating, cooling, ventilation and air-conditioning is switched off, or operated solely for fabric, frost and equipment protection.

4. Incorporate an anti-tampering mechanism that prevents the product's control strategy and configuration settings from being modified, and automatic control from being disabled, except during commissioning, maintenance or testing.

5. Comply with the relevant requirements for particular type of zone control and type of HVAC plant controlled, as set out in Tables 1 to 6 below, for products that:

   a) Control zone temperature (see Table 1).

   b) Control zone ventilation rate or air condition (see Table 2).

   c) Control based on zone occupation status (see Table 3).

   d) Control based on zone occupation schedules (see Table 4).

   e) Control centralised HVAC plant (see Table 5).

   f) Control wet heating systems (see Table 6).

6. Products that are designed to control any type of heating or cooling equipment (including centralised heating or cooling plant) must control zone temperature.

7. Products that are designed to control centralised HVAC plant must be able to control zone environmental conditions based on zone occupation schedules.

8. Conform with the requirements of the EU EMC Directive 89/336/EEC (as amended) or its replacement EU EMC Directive 2004/108/EC, or be CE Marked.

Table 1 CONTROL OF ZONE TEMPERATURE
All products that are designed to control zone temperature must: 1. Be designed to directly measure zone temperature by means of a temperature sensor, and automatically adjust heat flow into, or out of, the zone to maintain temperature within the predefined temperature limits for the operating mode. 2. Provide facilities that enable building managers to define the temperature set-points for each operating mode in each zone to within +/- 0.5 degrees centigrade, including separate set-points for zone heating and cooling. 3. Limit the ability of building users to adjust the temperature set-point within individual zones, so any adjustments are restricted in terms of duration. 4. Incorporate a mechanism that prevents simultaneous zone heating and cooling.
Notes
5. Products that solely rely on an external thermostatic device (for example, a digital thermostat) to determine when additional heating or cooling is required within a zone, are not eligible. 6. Products must automatically reset temperature set-point adjustments made by building users either after a pre-defined time interval (that may be fixed or defined by the building manager), or where zone control is based on occupation schedule, at the next scheduled switching time.

Table 2 CONTROL OF ZONE VENTILATION RATES OR AIR CONDITION
All products that are designed to control zone ventilation rate or air condition must: 1. Be designed to monitor zone ventilation rate or air conditionby means of a presence detector or sensor (see note 23), and automatically adjust the airflow into, or out of, the zone to maintain zone ventilation rates or air condition within the predefined limits for the operating mode. 2. Incorporate a mechanism that automatically minimises ventilation rates in unoccupied zones, and in zones operating in economy or holiday modes.
Notes
3. Products that solely rely on an electronic or mechanical ‘timing out’ mechanism (for example, a spring loaded button) to determine when a zone is unoccupied are not eligible. 4. Products must not allow building users to adjust ventilation rate set-points, but may incorporate facilities that enable them to temporarily override ventilation rates for a limited period.

Table 3 CONTROL BASED ON ZONE OCCUPATION STATUS
All products that are designed to control zones based on occupation status must: 1. Be able to monitor zone occupation status by means of presence detector or sensor, and automatically adjust zone-operating mode to maintain environmental conditions within the predefined limits for the zone occupation status. 2. Provide facilities that enable building users to manually switch the zone into economy, holiday or other energy saving modes, without disabling automatic zone controls.
Notes
3. The product may monitor zone occupation status by means of one or more presence detectors, or sensors, which may include for example, CO_2 level monitors, heat or motion detectors, moisture sensors etc. However, manually operated devices (for example, push buttons or electronic touch buttons) are not considered to be presence detectors.

Table 4 CONTROL BASED ON ZONE OCCUPATION SCHEDULES
All products that are designed to control zones based on occupation schedules must: 1. Automatically switch zones between operating modes, in accordance with the predefined and individual weekly occupation schedule for each zone controlled. 2. Provide facilities that enable building managers to define the normal occupation times in each zone (to within five minutes) for each day of the week, including at least two periods of occupation per day (i.e. at least 14 different occupation periods a week). 3. Provide facilities that enable building users to temporarily override the predefined schedules and/or to cancel the remaining portion of a pre-defined occupation period. In addition, products that also control zone heating and cooling must: 4. Incorporate a zone “optimum start” mechanism that monitors external and/or internal temperatures, and calculates when heating or cooling needs to begin in the zone in order to reach the pre-set temperature by the start of the next occupancy period. 5. Provide facilities that enable building managers to define different temperature set-points for each scheduled period of normal occupation throughout the day and week.
Notes
6. Products that control domestic hot water (DHW) systems must provide facilities that enable building managers to define a separate operating schedule for the operation of DHW systems. 7. Products must automatically reset overrides, either after a pre-defined time interval (which may be fixed or defined by the building manager) or at the next scheduled switching time.

Table 5 CONTROL OF CENTRALISED HVAC PLANT
Where products control the operation of centralised HVAC plant, they must: 1. Incorporate a mechanism that enables the building's HVAC systems to be easily switched into economy mode, for example, when a scheduled activity finishes early. In addition, products that control central heating or cooling systems must: 2. Monitor internal temperatures and automatically switch zone heating circuits on or cooling circuits off, to stop condensation occurring and to protect building fabric. 3. Incorporate an overall "optimum start" mechanism that monitors external or internal temperatures, and calculates when the heating or cooling system needs to be switched on in order to reach pre-set temperatures by the start of the next occupancy period, after taking account of the requirements of each zone.
Notes
4. Products that control centralised HVAC plant must be designed to control at least two zones.

Table 6 CONTROL OF WET HEATING SYSTEMS
Where products control the overall operation of wet heating systems, they must: 1. Incorporate a "self-adaptive weather compensation" mechanism that automatically saves energy during milder weather conditions, by reducing the temperature set-point of the boiler water circuit as the external temperature rises, and also the temperature of, or the heat flow through, the individual heating circuits for each zone controlled. The mechanism must be able to 'learn' the thermal characteristics of the zone(s) and to automatically optimise the amount of weather compensation applied to each zone. 2. Incorporate a "frost protection" mechanism that monitors external temperatures (or pipework temperatures), and switches on boilers and heating circuits as required to prevent equipment and pipework from "freezing up". 3. Provide facilities for building managers to "temporarily override" or manually adjust the degree (or amount) of weather compensation applied to each zone controlled.
Notes
4. The requirements in Table 5 also apply to products that control wet heating systems.

Where:

- Automatic control may be implemented either directly by means of an analogue or digital signal connection, or indirectly by means of another control device or network.
- A mechanism is defined as "any sequence of pre-defined actions that performs a given function, where an action can be defined in hardware and/or software".
- An algorithm is defined as "a mechanism that is defined in software".

- The product's control strategy is the combination of automatic control functions, mechanisms and facilities specified for particular type of zone control or HVAC plant controlled. In this context, products may be pre-programmed in one of the following ways:
    a) One or more fixed control strategies that are designed to control specific type of zone, or set of equipment (or plant), and that can be selected during commissioning.
    b) One or more flexible control strategies that can be configured to control different types of zones, and equipment, as part of a clearly defined commissioning procedure.
- Products that incorporate control strategies that are not designed to control zone heating, ventilation or air conditioning, or associated centralised HVAC plant, are not eligible.

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

Lighting

High Efficiency Lighting Units

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

High efficiency lighting units are products that are specifically designed to illuminate efficiently particular activities or features of a business.

2. Technology Description

High efficiency lighting units (HELUs) are a combination of a light fitting (or luminaire), one or more lamps, and associated control gear that have been assembled into a single packaged unit that can be readily deployed in any sector of industry or business. Neither light fitting, lamp or control gear alone can be said to 'comply with the ETL'.

HELUs have been included in the Enhanced Capital Allowance (ECA) scheme because they offer substantial energy and carbon savings. A wide variety of products are available with a range of performance levels. The ECA scheme aims to encourage the purchase of higher efficiency products that meet certain minimum design and performance standards.

Six different categories of HELUs are covered by the ECA scheme:

1. Triphosphor compact fluorescent lamps (CFL) and lighting fittings with associated electronic control gear.
2. T8 triphosphor linear fluorescent lamp(s) and lighting fittings with associated electronic control gear.
3. T5 triphosphor linear fluorescent lamp(s) and lighting fittings with associated electronic control gear
4. High-pressure Sodium 'Plus' lamps, or Metal Halide lamps, and high-bay, low-bay or horticultural lighting fittings with associated control gear.
5. High-pressure Sodium 'Plus' tubular lamps or Metal Halide lamps and Floodlight fittings or Post-mounted lanterns for exterior lighting with associated control gear.
6. Metal Halide lamps and Accent or Display lighting fittings with associated control gear.

Investments in high efficiency lighting units (HELUs) can only qualify for Enhanced Capital Allowances if the product meets the eligibility criteria as 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 comply with specific eligibility criteria for the relevant category of High Efficiency Lighting Unit as set out in Tables 1 to 6.

Tables 1 to 6 include separate criteria for each component of a HELU: namely: the light fitting (or luminaire), lamps and associated control gear. For a product to be eligible, the HELU and each of its components must comply with all relevant eligibility criteria.

Performance criteria

Products must deliver the minimum nominal initial lumens per lamp value for the relevant category of High Efficiency Lighting Unit as set out in Tables 1 to 6, whilst not exceeding the corresponding maximum Lighting Fitting Efficiency Code (LFEC) value.

Products must also comply with all relevant performance requirements in respect of their component light fitting, lamps or associated control gear, as set out in Tables 1 to 6.

Appendix 1 explains how the LFEC value can be determined.

Required test procedures

All products must be tested in accordance with the procedures and test conditions in the standards for the category of High Efficiency Lighting Unit as set out in Tables 1 to 6.

Photometry must be undertaken in compliance with BS EN 13032-1:2004 (or BS 5225-1:1975). Lamp lumens are those obtained when operated with the specified control gear.

Table 1 High Efficiency Lighting Units comprising triphosphor compact fluorescent lamps and lighting fittings with associated electronic control gear.

SECTION 1A –ELIGIBILITY CRITERIA

To be eligible under this category of High Efficiency Lighting Unit:

- All CFLs must comply with BS EN 61199:2000 (safety) and BS EN 60901:1996 (as amended) (performance).
- Lamps must have a Colour Rendering Index that is greater than, or equal to, Ra80.
- Light fittings must comply with BS EN 60598-1:2004 and the relevant Part 2 of BS EN 60598.
- Light fittings installed indoors must comply with the glare requirements of HSG 38 (1998).
- High frequency (HF) control gear must be fitted.

The high frequency (HF) control gear must be either 'dimmable' (regulating) or non-dimmable 'warm start' types. If non-dimmable then `warm start` versions of HF electronic control gear must be used.

Where fitted, 'warm start' high-frequency control gear must comply with BS EN 61347-2-3:2001 (safety). It must also conform to the appropriate CELMA Class A1, A2 or A3 requirement for maximum input power, if it is included in the current CELMA Guide (2005).

SECTION 1B –PERFORMANCE THRESHOLDS					
Triphosphor lamps				**Lighting fitting**	
Type	**Watts as labelled**	**Actual lamp watts when using HF control gear**	**Required minimum nominal initial (100h) lumens per lamp**	**Maximum LFEC value**	
				General lighting fittings	**Amenity, display & accent lighting fittings**
Compact 2 tubes	18W	16W	1,150	*n/a*	F2
	24W	22W	1,750	F0	F3
	36W	32W	2,800	F1	F4
	40W	40W	3,500	F1	F4
	55W	55W	4,800	F1	F4
	80W	80W	6,000	*n/a*	F2
Compact 4 tubes flat	18W	16W	1,100	*n/a*	F2
	24W	22W	1,700	*n/a*	F2
	36W	32W	2,800	F1	F4
Compact 4 tubes	10W	9.5W	600	*n/a*	F1
	13W	12.5W	900	*n/a*	F1
	18W	16.5W	1,200	*n/a*	F1
	26W	24W	1,800	*n/a*	F2
Compact 6 & 8 tubes	18W	16W	1,200	*n/a*	F1
	26W	24W	1,800	*n/a*	F2
	32W	32W	2,400	*n/a*	F2
	42W	42W	3,200	*n/a*	F2
	57W	57W	4,300	*n/a*	F2
	70W	70W	5,200	*n/a*	F2
Compact 2D	10W	9W	590	*n/a*	F1
	16W	14W	950	*n/a*	F1
	21W	19W	1,250	*n/a*	F1
	28W	25W	1,850	F0	F3
	38W	34W	2,580	F0	F3
	55W	55W	3,900	F0	F3

SECTION 1C –NOTES

n/a (not achievable) indicates that the lighting unit is not sufficiently efficient to be eligible. for use in general lighting installations

1. Some fluorescent lamps are labelled and branded with the wattage (power) consumed when operated on standard 50Hz (i.e. not high-frequency) control gear. When operated on high-frequency control gear the watts consumed are less (see columns 2 & 3 of Table).

2. These High Efficiency Lighting Units comprise non-integral compact fluorescent lamps (i.e. those types that do not incorporate the control gear in the lamp cap) and lighting fittings with high frequency (HF) electronic control gear contained in the lighting fitting or accompanying enclosure.

3. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and 'presence' controls are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 1 above.

Table 2 High Efficiency Lighting Units comprising T8 triphosphor linear fluorescent lamp(s), and lighting fittings with associated electronic control gear.

SECTION 2A –ELIGIBILITY CRITERIA

To be eligible under this category of High Efficiency Lighting Unit:

- Light fittings must comply with BS EN 60598-1:2004 and the relevant Part 2 of BS EN 60598.
- Light fittings installed indoors must comply with the glare requirements of HSG 38 (1998).
- Lamps must comply with BS EN 61195:2000 (safety) and BS EN 60081:1998 (performance).
- Lamps must have a Colour Rendering Index that is greater than, or equal to, Ra80.
- High frequency (HF) control gear must be fitted.

The high frequency (HF) control gear must be either 'dimmable' (regulating) or non-dimmable 'warm start' types. If non-dimmable, then `warm start` versions of HF electronic control gear must be used.

Where fitted, 'warm start' high-frequency control gear must comply with BS EN 61347-2-3:2001 (safety) and BS EN 60929:2006 (performance). It must also conform to the appropriate CELMA Class A1, A2 or A3 requirement for maximum input power, if it is included in the current CELMA Guide (2005).

SECTION 2B –PERFORMANCE THRESHOLDS

T8 Triphosphor fluorescent lamps					Lighting fittings
Watts as labelled	**Actual lamp watts when used with HF control gear**	**Length (m)**	**Tube diameter (mm)**	**Required minimum nominal initial (100h) lumens per lamp**	**Maximum value of LFEC**
18	16	0.6	26	1,350	F1
36	32	1.2	26	3,200	F3
58	50	1.5	26	5,000	F3
70	60	1.8	26	6,000	F3

SECTION 2C –NOTES

1. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and 'presence' controls are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 2 above.

Table 3 High Efficiency Lighting Units comprising T5 triphosphor linear fluorescent lamp(s), and lighting fitting with associated electronic control gear.

SECTION 3A –ELIGIBILITY CRITERIA

To be eligible under this category of High Efficiency Lighting Unit:

- Light fittings must comply with BS EN 60598-1:2004 and the relevant Part 2 of BS EN 60598.
- Light fittings installed indoors must comply with the glare requirements of HSG 38 (1998).
- Lamps must have a Colour Rendering Index that is greater than, or equal to, Ra80.
- Lamps must comply with BS EN 61195:2000 (safety) and BS EN 60081:1998 (performance).
- High frequency (HF) control gear must be fitted.

The high frequency (HF) control gear must be either 'dimmable' (regulating) or non-dimmable 'warm start' types.

Where fitted, 'warm start' high-frequency control gear must comply with BS EN 61347-2-3:2001 (safety) and BS EN 60929:2006 (performance). It must also conform to the appropriate CELMA Class A1, A2 or A3 requirement for maximum input power, if it is included in the current CELMA Guide (2005).

SECTION 3B –PERFORMANCE THRESHOLDS

T5 Triphosphor fluorescent lamps				Lighting fittings
Lamp watts as labelled and when used with electronic HF control gear	**Length (m)**	**Tube diameter (mm)**	**Minimum required nominal initial (100h) lumens per lamp @25°C**	**Maximum value of LFEC**
14	0.55	16	1,200	F1
24	0.55	16	1,750	F0
21	0.85	16	1,900	F2
39	0.85	16	3,100	F1
28	1.15	16	2,600	F2
54	1.15	16	4,450	F1
35	1.45	16	3,300	F2
49	1.45	16	4,300	F1
80	1.45	16	6,150	F1

SECTION 3C –NOTES

1. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and 'presence' controls are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 3 above.

Table 4 High Efficiency Lighting Units comprising High-pressure Sodium 'Plus' lamps or Metal Halide lamps and high-bay, low-bay or horticultural lighting fittings with associated control gear.

SECTION 4A –ELIGIBILITY CRITERIA

To be eligible under this category of High Efficiency Lighting Unit:

- Light fittings must comply with BS EN 60598-1:2004 and the relevant Part 2 of BS EN 60598.
- Light fittings installed indoors must comply with the glare requirements of HSG 38 (1998).
- Lamps must comply with BS EN 62035:2000 (safety).

Where standard 50 Hz control gear is fitted:

- Ballasts must comply with BS EN 60923:2005 (performance) and BS EN 61347-2-9:2001 (safety).
- Capacitors must comply with BS EN 61049:1993 (performance) and BS EN 61048:2006 (safety).
- Starting devices must comply with BS EN 60927:2007 (performance and BS EN 61347-2-1:2001 (safety).

Electronic control gear (where fitted) must comply with BS EN 55015:2006, EN61000-3-2:2006, BS EN 61547:1996, BS EN 61347-2-1:2001, BS EN 61347-2-12:2005, and BS EN 60927:2007.

SECTION 4B –PERFORMANCE THRESHOLDS

Lamps			Lighting fittings
Type(s)	**Watts as labelled**	**Minimum required nominal initial (100h) lumens per lamp**	**Maximum value of LFEC**
High-pressure sodium 'Plus' versions	150	16,000	F2
	250	30,500	F2
	400	52,000	F2
	600	90,000	F2
Metal Halide	150	12,000	F1
	250	17,000	F1
	400	30,500	F1

SECTION 4C –NOTES

1. Lighting fittings with either standard 50Hz control gear or electronic control gear are eligible.

2. The lamp control gear may be incorporated in the lighting fitting or in a separate accompanying enclosure.

3. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and photoelectric controls are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 4 above.

Table 5 High Efficiency Lighting Units comprising High-pressure Sodium 'Plus' tubular lamps or Metal Halide lamps and Floodlight fittings or Post-mounted lanterns for exterior lighting with associated control gear.

SECTION 5A –ELIGIBILITY CRITERIA

To be eligible under this category of High Efficiency Lighting Unit:

- Light fittings must comply with BS EN 60598-1:2004 and the relevant Part 2 of BS EN 60598.
- Lamps must comply with BS EN 62035:2000 (safety).

Where standard 50 Hz control gear is fitted:

- Ballasts must comply with BS EN 60923:2005 (performance) and BS EN 61347-2-9:2001(safety).
- Capacitors must comply with BS EN 61049:1993 (performance) and BS EN 61048:2006 (safety).
- Starting devices must comply with BS EN 60927:2007 (performance and BS EN 61347-2-1 :2001 (safety).

Electronic control gear (where fitted) must comply with BS EN 55015:2006, EN61000-3-2:2006, BS EN 61547:1996, BS EN 61347-2-1:2001, BS EN 61347-2-12:2005, and BS EN 60927:2007.

SECTION 5B –PERFORMANCE THRESHOLDS

Lamps			Floodlight or Post-top lantern
Type	**Watts as labelled**	**Minimum required nominal initial (100h) lumens per lamp**	**Maximum value of LFEC**
High-pressure sodium 'Plus' tubular lamps	70	6,500	F3
	100	10,000	F3
	150	17,500	F3
	250	33,000	F3
	400	56,500	F3
Metal halide lamps	70	5,300	F2
	150	12,000	F2
	250	17,000	F2
	400	30,500	F2

SECTION 5C –NOTES

1. Lighting fittings with either standard 50Hz control gear or electronic control gear are eligible.
2. The lamp control gear may be incorporated in the lighting fitting or in a separate accompanying enclosure.
3. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and photoelectric controls are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 5 above.

Table 6 High Efficiency Lighting Units comprising Metal Halide lamps and Accent or Display lighting fittings with associated control gear.

SECTION 6A –ELIGIBILITY CRITERIA

To be eligible under this category of High Efficiency Lighting Unit:

- Light fittings must comply with BS EN 60598-1:2004 and the current Part 2 of BS EN 60598.
- Lamps must comply with BS EN 62035:2000 (safety).
- Lamps identified as 'Ra>=90' must have a Colour Rendering Index that is greater than, or equal to, Ra90. Other lamps must have a Colour Rendering Index that is greater than, or equal to, Ra80.

Where standard 50 Hz control gear is fitted:

- Ballasts must comply with BS EN 60923:2005 (performance) and BS EN 61347-2-9:2001 (safety).
- Capacitors must comply with BS EN 61049:1993 (performance) and BS EN 61048:2006 (safety).
- Starting devices must comply with BS EN 60927:2007 (performance and BS EN 61347-2-1:2001 (safety).

Electronic control gear (where fitted) must comply with BS EN 55015:2006, EN61000-3-2:2006, BS EN 61547:1996, BS EN 61347-2-1:2001, BS EN 61347-2-12:2005 and BS EN 60927:2007.

Lamps with integral reflectors (PAR) automatically comply with the LFEC requirements.

SECTION 6B –PERFORMANCE THRESHOLDS

Lamps			**Lighting fittings**
Type	**Watts** as labelled	**Minimum required nominal initial (100h) lumens per lamp**	**Maximum value of LFEC**
Metal Halide, including ceramic types	20	1,650	F2
	35 (Ra >= 90)	3,000	F1
	35 (Ra < 90)	3,300	F2
	70 (protected)	5,800	F1
	70 (Ra >= 90)	5,900	F1
	70 (Ra < 90)	6,200	F2
	150 (protected)	13,000	F2
	150 (Ra>=90)	12,700	F2
	150 (Ra < 90)	14,000	F3

SECTION 6C –NOTES

1. 'Protected' lamps must incorporate a hardened glass envelope to allow the lamp to be used safely in an open fitting. The envelope must be in place when the nominal initial (100h) lumens per lamp value is measured.
2. Lighting fittings with either standard 50Hz control gear or electronic control gear are eligible.
3. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 6 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.

APPENDIX 1 - Determining the Lighting Fitting Efficiency Code (LFEC)

AP1.1 For indoor lighting fittings from the Utilisation Factor

The Lighting Fitting Efficiency Code (LFEC) of a lighting fitting is determined from the Utilisation Factor (UF) normally provided by the manufacturer for a standard room of surface reflectance of 0.7 (ceiling), 0.5 (walls) and 0.2 (floor), and a Room Index of 3.0.

Table AP1.1 gives values of LFEC for different ranges of UF.

Table AP1.1 Lighting Fitting Efficiency Codes (LFEC)

LFEC Code	'K' or UF
F0	>0.89
F1	0.80 - 0.88
F2	0.72 - 0.79
F3	0.65 - 0.71
F4	0.59 - 0.64
F5	0.53 - 0.58

AP1.2 If the manufacturer or supplier of the lighting fitting is unable to provide data in the form of a Utilisation Factor Table.

For some types of lighting fitting a manufacturer may be unable to provide a UF table, e.g. recessed 'downlight' 'wall-washer' and amenity lighting fittings as well as outdoor lighting fittings, including floodlights. In such cases they will state, or can provide, what are known as the Light Output Ratios, i.e.

ULOR = Upward light output ratio	This is the portion of the light produced by the lamp(s) that is emitted from the lighting fitting in an upward direction.
DLOR = Downward light output ratio	This is the portion of the light produced by the lamp(s) that is emitted from the lighting fitting in a downward direction.
LOR = Light output ratio	This is the portion of the light produced by the lamp(s) that is emitted from the lighting fitting in all directions.

ULOR + DLOR = LOR which will be less than 1.0 because the lighting fitting does not emit all of the light produced by the lamp(s).

The LFEC can be determined by using this information to calculate an approximation (denoted as 'K') of the UF for reflectance of 0.70, 0.50 & 0.20 and a Room Index of 3.0 in one of the following manners:

For directable (i.e. adjustable) flood lighting or spot lighting in Tables 1B, 5B and 6B:

K = LOR;

For post-mounted lanterns in Table 5B:

K = DLOR;

For all other luminaire types including wall washers and recessed downlights:

K = DLOR + (0.5 x ULOR)

The result of this calculation is used to obtain the LFEC by referring to table AP1.1.

Examples:

If DLOR = 0.5 & ULOR = 0.2, then K = 0.5 + (0.5 x 0.2) = 0.6 (LFEC = F4)

If DLOR = 0.75 & ULOR = 0, then K = 0.75 + (0.5 x 0) = 0.75 (LFEC = F2)

AP1.3 Outdoor lighting fittings

Floodlights are unlikely to be positioned as indoor lighting fittings, i.e. pointing straight down, therefore the ULOR and DLOR value cannot be defined. For floodlight fittings it is acceptable to assume that 'K' = the light output ratio **(LOR)** value, which is normally quoted for such lighting fittings.

For example, the LOR for a floodlight fitting is stated to be 0.68.

Referring to table AP1.1 shows that the LFEC is **F3**

Post top outdoor lighting fittings: DLOR values are quoted for such fittings, therefore **'K'** can be calculated by the same method as defined in section AP1.2, above.

Lighting Controls

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Lighting controls are products that are specifically designed to switch artificial lighting on or off, and/or to dim its output.

2. Technology Description

Lighting controls switch lighting on and off and enable artificial lighting levels within specific areas to be adjusted, as and when required by changes in daylight or occupancy, or individual activities.

A wide variety of lighting control products are available, and these range from simple manual switches to fully automatic control systems that adjust artificial lighting levels to reflect planned operating hours, occupation levels and the availability of daylight in specific areas.

The Enhanced Capital Allowance scheme aims to encourage the purchase of lighting controls that realise energy savings by automatically switching or dimming lighting in these ways.

Five different categories of lighting controls are covered by the ECA scheme:

1. Time controllers that automatically switch off lighting, or dim it down, at predetermined times.
2. Presence detectors with associated switching controllers that monitor occupancy or movement of personnel, and automatically switch off lighting, or dim it down, when the area is unoccupied.
3. Daylight detectors with associated switching controllers that monitor daylight availability, and automatically switch off lighting when daylight is sufficient to illuminate the area.
4. Daylight detectors with associated dimming controllers that monitor daylight availability, and automatically dim lighting, by reducing its power consumption, to the level needed to sufficiently illuminate the area.
5. Central control units that provide the facility to manage the overall operation of artificial lighting installations that include some or all of the categories of lighting controls above.

The above categories of lighting controls may be installed either individually or in combination.

Investments in lighting controls can only qualify for Enhanced Capital Allowances if the product meets the criteria as 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:

- Incorporate one or more of the categories of lighting controls set out in Tables 1 to 5 below, and comply with the specific eligibility criteria in the relevant table(s).
- Be CE Marked.

Products may also incorporate the facility that permits the automatic switching of lights to be overridden on a central basis for maintenance or security purposes, or to ensure the safety of occupants during particular events or activities.

Table 1 Time Controllers
SECTION 1A –ELIGIBILITY CRITERIA
To be eligible under this category of Lighting Controls: • The product must automatically switch the lighting off, or dim it down, at predetermined times of the day or week. Where automatic dimming controls are used, they must be capable of reducing the power consumption of the controlled lamps by at least 50%. Where fluorescent lighting is being dimmed, it must incorporate high frequency control gear with dimmable ballasts. Other forms of lighting may incorporate either mains frequency or high frequency control gear with dimmable ballasts.
SECTION 1B –Notes
1. The product may also be set to automatically switch on the lighting at predetermined times. 2. Products may incorporate the facility for local users to manually switch on and off lighting in a local area and thus to override the predetermined lighting levels at that particular time. However products that allow local users to locally override subsequent predetermined times for the lighting to be automatically switched off, or dimmed down, are not eligible.

Table 2 Presence detectors with associated switching controllers
SECTION 2A –ELIGIBILITY CRITERIA
To be eligible under this category of Lighting Controls: • The product must automatically switch off the lighting, or dim it down, after the area has become unoccupied. Where automatic dimming controls are used, they must be capable of reducing the power consumption of the controlled lamps by at least 50%. Where fluorescent lighting is being dimmed, it must incorporate high frequency control gear with dimmable ballasts. Other forms of lighting may incorporate either mains frequency or high frequency control gear with dimmable ballasts.
SECTION 2B –Notes
1. The product may also automatically switch on the lighting when the space becomes occupied. Alternatively local users may manually switch on the lighting at the start of occupancy. 2. Products may incorporate the facility for local users to manually override the presence detector/controller and to switch the lighting off at any particular instance. However products that allow local users to override the ability of the presence detector/controller to automatically switch off the lighting, or dim it down are not eligible.

Table 3 Daylight detectors with associated switching controllers
SECTION 3A –ELIGIBILITY CRITERIA
To be eligible under this category of Lighting Controls: • The product must monitor the availability of daylight and automatically switch the lighting off when sufficient daylight is available to illuminate the area.
SECTION 3B –Notes
1. The product may also automatically switch on the lighting when daylight has fallen below the required level. Alternatively local users could be allowed to switch on the lighting manually, when daylight has fallen below the required level. 2. Products may incorporate the facility for local users to manually override daylight detector/controller and switch the lights off at any particular instance. However products that allow local users to override the ability of the daylight detector/controller to automatically switch off the lighting are not eligible.

Table 4 Daylight detectors with associated dimming controllers
SECTION 4A –ELIGIBILITY CRITERIA
To be eligible under this category of Lighting Controls: • The product must monitor the availability of daylight and automatically dim the artificial lighting to the level just needed to sufficiently illuminate the area. • The product must be able to reduce the power consumption of the lamps being controlled by at least 50% through dimming. Where fluorescent lighting is being controlled, it must incorporate high frequency control gear with dimmable ballasts. Other forms of lighting may incorporate either mains frequency or high frequency control gear with dimmable ballasts.
SECTION 4B –Notes
1. The product may also automatically switch on the lighting when daylight has fallen below the required level. Alternatively local users could be required to switch on the lighting manually, as and when needed. 2. Products may incorporate the facility for local users to manually override the dimming controller at any particular instance and to set the lighting to a lower level than it would be under automatic control, or switch it off. However products that allow local users to override the ability of the daylight detector/controller to automatically dim the lighting are not eligible.

Table 5 Central control units (for lighting)
SECTION 5A –ELIGIBILITY CRITERIA
To be eligible under this category of Lighting Controls: • The product must be able to manage the overall operation of the artificial lighting installation that includes some or all of the categories of lighting controls set out in Tables 1 to 4 above.
SECTION 5B –Notes
1. The product may make use of pre-programmed "scenes" that configure the lighting levels in different areas for a particular activity or daylight level or occupancy status in the most energy efficient manner. However products that are only capable of manual scene setting are not eligible.

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

White Light Emitting Diode Lighting Units for Amenity, Accent and Display Lighting

Date added to ETL 2008 (Revised 2009).

1. Definition of Technology

White light emitting diode lighting units are products that are specifically designed to provide white light by means of solid-state lighting devices, for use in amenity, accent and display lighting.

2. Technology Description

White light emitting diodes (LEDs) are solid-state lighting devices that can be used to efficiently provide the levels of light output generally needed for amenity, accent and display lighting.

White LED lighting units are products that consist of one or more white LEDs, a light fitting (or luminaire) and associated electrical drive gear. The luminaire generally also include an optical system that reflects and/or focuses the product's light output onto the item(s) being illuminated.

A wide variety of LED lighting units are available in a range of designs with different performance levels. The ECA scheme aims to encourage the purchase of higher efficiency products.

The ECA Scheme covers six categories of products:

1. Recessed down lighting units
2. Spot lighting units
3. Task lighting units
4. Other directable lighting units

5. Linear display cabinets lighting units
6. Exterior flood lighting units

Investments in products containing white light emitting diode lighting units for amenity, accent and display lighting 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:

- Include one or more solid-state LED devices, luminaire and associated electrical drive gear.
- Provide white light with colour rendering index that is greater than, or equal to, Ra 70.
- Emit at least (>=) 95% of their light output in a forward direction.
- Use electrical drive gear that complies with BS EN 61347-2-13:2006 and BS EN 62384:2006.
- Have a power factor that is greater than, or equal to, 0.7 at all levels of product light output.
- **Not** consume electricity when the LED unit is switched off.
- Be CE Marked.

Performance criteria

All products must:

- Provide a light output (i.e. level of illumination) when tested after 100 hours of continuous operation that is greater than, or equal to, the thresholds set out in Table 1 below, which vary with product category.
- Have an efficacy (i.e. lighting efficiency) that is greater than, or equal to, the thresholds set out in Table 1 below, when tested after 100 hours of continuous operation.
- Be able to provide a light output (in lumens) after 4000 hours of continuous operation that is not less than 96% of their light output (in lumens) after 100 hours of continuous operation.

Table 1 – Performance thresholds for white LED lighting units for amenity, accent and display lighting

	Category of Product	Minimum required light output (Lumens) after 100 hours	Minimum efficacy (Lumens/watt)
1	Recessed down lighting units	>= 200	>= 46
2	Spot lighting units	>= 100 per head	>= 46
3	Task lighting units	>= 100	>= 46
4	Other directable lighting units	>= 200	>= 46
5	Linear display cabinets lighting units	>= 125 per linear foot	>= 46
6	Exterior flood lighting units	>= 200	>= 46

">=" means "greater than or equal to"

Where:

- Efficacy is defined in terms of lumens of light output per watt of electrical power consumed.
- The electrical power consumed is defined as the total power consumed by the whole lighting unit from main circuit connection point to 'lamp', including losses in the power supply and constant current source, and losses due to the effects of temperature. It is not the 'rated wattage' of the LED chip.
- The product must perform at the minimum required efficacy at each drive current for which the product is designed to operate, when tested after 100 hours of continuous operation.

For the avoidance of doubt test data should be presented to zero decimal places. As an example, an efficacy of 45 Lumens per watt for a task light unit would be deemed to be a fail.

Required test procedures

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

- BS EN 13032-1:2004 'Light and lighting. Measurement and presentation of photometric data of lamps and luminaires. Measurement and file format'.

The following test conditions must be observed:

- All testing must be conducted on the complete product (i.e. solid state LED device(s), luminaire and associated electrical drive gear) and under normal operating conditions.
- Measurements of product light output must be taken after 100 hours and 4000 of continuous operation at the designed maximum drive current and with all optical components in situ.
- Measurements of product light output after 4000 hours must be made at the same drive current and junction temperature as measurements of product light output after 100 hours.

- Measurements of the product's light output and electrical power consumption at different drive currents must be taken after the junction temperature has stabilised to a constant level after selecting the particular drive current.

Where the product's light output after 4000 hours is calculated by measurement of light output after a longer period than 4000 hours, a linear degradation in light output (lumens) with respect to time, relative to product light output after 100 hours of continuous operation, must be assumed.

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

Motors and Drives

Single Speed Motors

Date added to ETL 2001 (Revised 2009).

1. Definition of the Technology

Single speed motors covers products that are specifically designed to convert electrical power into mechanical power, and to rotate a drive shaft at a fixed speed that is directly related to the frequency of the electrical power supply, by means of standard, three phase, ac induction motor.

2. Technology Description

Single speed motors are used to drive plant and machinery throughout industry and commerce, and a wide range 'general purpose' products are available in internationally agreed, standard designs with different power ratings, frame sizes, fixed operating speeds, and energy efficiency ratings.

The ECA scheme aims to encourage the purchase of higher efficiency single speed motors.

The ECA scheme covers two categories of product:

1. 2 and 4 pole single speed motors with power ratings between 1.1 kW and 400 kW.
2. 6 and 8 pole single speed motors with power ratings between 5.5 kW and 315 kW.

Investments in single speed motors 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 must meet minimum performance criteria as set out below.

3. Eligibility Criteria

To be eligible products must:

- Be a totally enclosed, squirrel cage type, three-phase, ac induction motor that has:

  a) A rated operating voltage between 200 and 700 Volts ac.

  b) A starting performance that can be classified as design "N" or "NY" according to Section 5 of BS EN 60034-12: 2002, *"Rotating electrical machines - Part 12: Starting performance of single-speed three-phase cage induction motors*".

  c) A built in cooling fan that uses a cooling method that is classified as "IC 411" according to BS EN 60034-6:1994, "*Rotating electrical machines. Methods of cooling (IC Code).*

  d) Dimensions and a power rating that conform with the requirements of:

     (i) BS EN 50347:2001 (as amended), "General purpose three induction motors having standard dimensions and outputs – Frame numbers 56 to 315 and flange numbers 65 to 740"

OR:

(ii) BS 4999-141: 2004, "General requirements for rotating electrical machines – Part 141: Specification for standard dimensions" **and** the preferred rated outputs according to the primary or secondary series defined in Table 7 of IEC 60072-1: 1991-02 (sixth edition), "Dimensions and output series for rotating electrical machines – Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080".

- Be CE Marked.

Performance Criteria

Products must have an efficiency at 100% of their maximum continuous rating (i.e. full load) that is greater than or equal to the values shown in Table 1 below, which vary with power rating, number of poles and test method used. If the product's specific power rating is not shown in Table 1, then the performance threshold for the next highest power rating should be used to determine eligibility.

Table 1 Performance thresholds for single speed motors

	Efficiency at 100% of maximum continuous rating (i.e. full load)							
	Summation of losses method as defined by BS EN 60034-2:1999 (as amended)				A low uncertainty method according to Table 2 of BS EN 60034-2-1:2007			
Power Rating (kW)	2 Pole	4 Pole	6 Pole	8 Pole	2 Pole	4 Pole	6 Pole	8 Pole
1.1	>= 82.8	>= 83.8			>= 79.6	>= 81.4		
1.5	>= 84.1	>= 85.0			>= 81.3	>= 82.8		
2.2	>= 85.6	>= 86.4			>= 83.2	>= 84.3		
3.0	>= 86.7	>= 87.4			>= 84.6	>= 85.5		
4.0	>= 87.6	>= 88.3			>= 85.8	>= 86.6		
5.5	>= 88.6	>= 89.2	>= 86.0	>= 86.0	>= 87.0	>= 87.7	>= 86.0	>= 86.0
7.5	>= 89.5	>= 90.1	>= 89.0	>= 89.0	>= 88.1	>= 88.7	>= 87.2	>= 87.2
11.0	>= 90.5	>= 91.0	>= 89.0	>= 89.0	>= 89.4	>= 89.8	>= 88.7	>= 88.7
15.0	>= 91.3	>= 91.8	>= 90.0	>= 90.0	>= 90.3	>= 90.6	>= 89.7	>= 89.7
18.5	>= 91.8	>= 92.2	>= 90.0	>= 90.0	>= 90.9	>= 91.2	>= 90.4	>= 90.4
22.0	>= 92.2	>= 92.6	>= 91.5	>= 91.5	>= 91.3	>= 91.6	>= 90.9	>= 90.9
30.0	>= 92.9	>= 93.2	>= 92.0	>= 92.0	>= 92.0	>= 92.3	>= 91.7	>= 91.7
37.0	>= 93.3	>= 93.6	>= 93.0	>= 93.0	>= 92.5	>= 92.7	>= 92.2	>= 92.2

45.0	>= 93.7	>= 93.9	>= 93.4	>= 93.4	>= 92.9	>= 93.1	>= 92.7	>= 92.7
55.0	>= 94.0	>= 94.2	>= 93.8	>= 93.8	>= 93.2	>= 93.5	>= 93.1	>= 93.1
75.0	>= 94.6	>= 94.7	>= 94.3	>= 94.3	>= 93.8	>= 94.0	>= 93.7	>= 93.7
90.0	>= 95.0	>= 95.0	>= 94.5	>= 94.5	>= 94.1	>= 94.2	>= 94.0	>= 94.0
110.0	>= 95.0	>= 95.1	>= 94.8	>= 94.8	>= 94.3	>= 94.5	>= 94.3	>= 94.3
132.0	>= 95.0	>= 95.5	>= 95.0	>= 95.0	>= 94.6	>= 94.7	>= 94.6	>= 94.6
150.0	>= 95.8	>= 95.7	>= 95.5	>= 95.5	>= 94.7	>= 94.9	>= 94.7	>= 94.7
160.0	>= 95.9	>= 95.8	>= 95.5	>= 95.5	>= 94.8	>= 94.9	>= 94.8	>= 94.8
185.0	>= 96.1	>= 95.9	>= 95.6	>= 95.6	>= 95.0	>= 95.1	>= 94.9	>= 94.9
200.0	>= 96.0	>= 95.8	>= 95.5	>= 95.5	>= 95.0	>= 95.1	>= 95.0	>= 95.0
250.0	>= 96.0	>= 96.0	>= 95.9	>= 95.9	>= 95.0	>= 95.1	>= 95.0	>= 95.0
280.0	>= 96.3	>= 96.3	>= 96.0	>= 96.0	>= 95.0	>= 95.1	>= 95.0	>= 95.0
315.0	>= 96.4	>= 96.4	>= 96.0	>= 96.0	>= 95.0	>= 95.1	>= 95.0	>= 95.0
355.0	>= 96.4	>= 96.5			>= 95.0	>= 95.1		
400.0	>= 96.5	>= 96.5			>= 95.0	>= 95.1		

">=" means "greater than or equal to"

Where the power rating is the 'rating for continuous duty' (class S1) as defined in Section 4.2.1 of BS EN 60034-1: 1998 (as amended) "Rotating electrical machines – Part 1: Rating and performance".

For the avoidance of doubt test data should be presented to 1 decimal place. As an example, a 4 pole, single speed motor with a rated power output of 45.0 kW, and an efficiency at full load of 93.8% when tested under BS EN 60034-2:1999 (as amended) would be deemed to be a fail.

Required test procedures

Product efficiency at 100% of maximum continuous rating must be determined according one of the following test standards:

- The summation of losses method outlined in Section 9.1 of BS EN 60034-2:1999 (as amended) "Rotating electrical machines – Part 2: Methods for determining losses and efficiency of rotating electrical machinery from tests (excluding machines for traction vehicles)".

- A low uncertainty method according to Table 2 (Induction Machines) of BS EN 60034-2-1:2007 "Rotating electrical machines – Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)".

Products must be operated from a 400 Volt ac, 50Hz electrical power supply during testing.

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

Variable Speed Drives

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

A variable speed drive is specifically designed to drive an ac induction motor in a manner that rotates the motor's drive shaft at a variable speed dictated by an external signal.

2. Technology Description

A variable speed drive is essentially an electronic power converter that generates a multi-phase, variable frequency output that can be used to drive a standard ac induction motor, and to modulate and control the motor's speed, torque and mechanical power output.

Variable speed drives may be purchased either as a stand-alone product or purchased as part of another item of plant or machinery. They are included on the Energy Technology Product List because they can realise substantial energy savings when used to control the speed of non-positive-displacement type machinery, instead of traditional methods of flow regulation such as mechanical dampers or throttle valves.

Investments in variable speed drives 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

Eligible products must:

- Incorporate an electronic VSD that generates a controlled variable frequency, variable voltage, 3 phase power output (with each phase displaced by approximately 120 degrees) that is suitable for operating a 3 phase ac induction motor.
- Provide an adjustable variable-voltage, variable-frequency output that can be matched to the torque-speed characteristic of the load (being driven by the motor), including both loads with a quadratic torque-speed and linear torque-speed characteristics. The relationship between the voltage and frequency of the product's output must either be:

    a) Predefined prior to sale to match a number of specific motor loads, which can be selected during commissioning; OR

    b) Programmed into the product during installation using a multi-point approximation as part of a clearly defined commissioning procedure; OR

    c) Determined during commissioning by a self tuning algorithm that automatically minimises the energy consumption of the drive; OR

d) Automatically adjusted during operation in a manner that ensures the product's output matches the characteristics of the motor and its load; OR

e) Any combination of (a) to (d) above.

- Be able to automatically vary, in response to an external control signal, the frequency of its output between 5% (or less) and 100% (or greater) of the frequency of its alternating current supply.
- Be configured for direct connection to the UK public electricity supply system, or a private alternating current supply of nominally fixed frequency and voltage.
- Be CE Marked, or otherwise demonstrate conformity with the requirements of the EU EMC Directive 89/336/EEC, or its replacement EU EMC Directive 2004/108/EC.
- **Not** incorporate any type of mechanical apparatus that derives its motive force from the product's variable frequency output, including any form of electric motor or fluid movement mechanism, except for fans or pumps incorporated solely for the purpose of product cooling.

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

Switched Reluctance Drives

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

A switched reluctance drive is specifically designed to drive a switched reluctance motor (also referred to as a variable reluctance motor) in a manner that rotates the motor's drive shaft at a variable speed dictated by an external signal.

2. Technology Description

A switched reluctance drive is a type of electronic variable speed drive (VSD) that is specifically designed to drive a switched reluctance motor (also referred to as variable reluctance motor) by sequentially activating a series of stator coils arranged around the rim of the motor. The motor's rotor consists of iron laminates that rotate to align with the activated stator coil. By changing the rate at which stator coils are switched on and off, motor speed can be varied. These products are included on the Energy Technology Product List because they can realise substantial energy savings when used to control fluid movement, instead of traditional methods of flow regulation such as mechanical dampers and throttle valves.

Investments in switched reluctance drives 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

Eligible products must:

- Incorporate an electronic variable speed drive that generates a controlled variable frequency output suitable for operating a variable or switched reluctance motor.
- Be configured for direct connection to the UK public electricity supply system, or a private alternating current supply of nominally fixed frequency and voltage.
- Be able to automatically vary, in response to an external control signal, the frequency of its output between 20% (or less) and 100% of its maximum output frequency.
- Be CE Marked, or otherwise demonstrate conformity with the requirements of the EU EMC Directive 89/336/EEC or its replacement EU EMC Directive 2004/108/EC.
- **Not** incorporate any type of mechanical apparatus that derives its motive force from the product's variable frequency output, including any form of electric motor or fluid movement mechanism, except for fans or pumps incorporated solely for the purposes of product cooling.

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

Integrated Motor Drive Units

Date added to ETL 2001 (Revised 2009)

1. Definition of Technology

An integrated motor drive unit is a product that is specifically designed to rotate a drive shaft and vary its speed in a controlled manner in response to an external signal, by means of an electronic variable speed drive (VSD) and 3 phase ac induction motor. The VSD and motor are permanently mechanically and electrically connected in a manner that does not require an external connection to be made between the VSD and the motor prior to use.

2. Technology Description

An integrated motor drive unit is a combination of an electronic variable speed drive (VSD) and an ac induction motor. The VSD is physically mounted on the motor, and is specifically designed to drive that particular motor and thus is optimally matched to it. This makes an integrated motor drive unit easier to deploy than purchasing two separate components.

An integrated motor drive unit may be purchased as a stand-alone product or purchased as part of another item of plant or machinery. These products are included on the Energy Technology Product List because they can realise substantial energy savings when used to control the speed of non-positive-displacement type machinery, instead of traditional methods of flow regulation such as mechanical dampers and throttle valves.

Investments in integrated motor drive units 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

Eligible products must:

- Incorporate a 3 phase ac induction motor.
- Incorporate an electronic VSD that generates a controlled variable frequency, variable voltage, 3 phase power output (with each phase displaced by approximately 120 degrees) that is suitable for operating the 3 phase ac induction motor.
- Be configured for direct connection to the UK public electricity supply system, or a private alternating current supply of nominally fixed frequency and voltage.
- Provide an adjustable, controlled variable-torque output that can be matched to the torque-speed characteristic of the load (being driven by the product's motor), including both loads with a quadratic torque-speed and linear torque-speed characteristics. The relationship between the speed of the product's output and the torque applied to the load must either be:
    a) Predefined prior to sale to match a number of specific motor loads, which can be selected during commissioning; OR
    b) Programmed into the product during installation using a multi-point approximation as part of a clearly defined commissioning procedure; OR
    c) Determined during commissioning by a self tuning algorithm that automatically minimises the energy consumption of the drive; OR
    d) Automatically adjusted during operation in a manner that ensures the product's output matches the characteristics of the motor and its load; OR
    e) Any combination of (a) to (d) above.
- Be able to automatically vary, in response to an external control signal, the frequency of its output between 5% (or less) and 100% (or greater) of the frequency of its alternating current supply.
- Be CE Marked.
- **Not** incorporate any type of mechanical apparatus that derives its motive force from the product's motor, except for fans or pumps incorporated solely for the purpose of product cooling or lubrication.

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

Pipework Insulation

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Pipework insulation covers products that are specifically designed to be applied to the outer circumference of a pipe with the primary objective of reducing thermal flow into or out of the pipe.

2. Technology Description

Pipework insulation is used to reduce the amount of heat lost from pipework containing hot fluids, and the amount of heat gained by pipework containing cold and chilled fluids, thus reducing the amount of energy wasted on maintaining the temperature of the fluids.

The ECA Scheme covers five categories of pipework insulation:

1. Refrigeration pipework.
2. Chilled water pipework.
3. Non-domestic heating & hot water services.
4. 'Domestic' heating & hot water services (excluding insulation within individual dwellings).
5. Process pipework.

Investments in pipework insulation can only qualify for Enhanced Capital Allowances if the installation meets the eligibility criteria set out below. Individual products used in an installation do not need to be named on the Energy Technology Product List.

3. Eligibility Criteria

To be eligible, installations of pipework insulation must:

- Comply with the relevant clauses, tables and annexes of BS 5422: 2009 as set out in Table 1 below, which form the basis for determining the required minimum environmental thickness for each category of pipework insulation.

Table 1. The relevant clause, table(s) and annex in BS 5422:2009 for each category of pipework insulation

	Category	Relevant Clause	Relevant Table(s)	Relevant Annex
1.	Refrigeration pipework.	6	None	F
2.	Chilled water pipework.	7	10 & 11	A
3.	Non-domestic heating & hot water services.	8	15 to 18	A
4.	'Domestic' heating & hot water services.	9	19 & 20	A
5.	Process pipework.	10	21	A

Where:

- If the thermal conductivity of the chosen insulation material, or pipe diameter, differs from the parameters used to generate these tables, then linear interpolation methods may be used to calculate the required minimum environmental thickness.
- If the parameters of the specific installation are outside the scope of these tables (e.g. different ambient air temperature, or linear interpolation is not possible) then the required minimum environmental thickness of insulation must be calculated from first principles using the methodology set out in Annex A of BS 5422: 2009.
- The methodology set out in Annex F of BS 5422: 2009 must be used to calculate the required minimum environmental thickness for refrigeration pipework insulation needed to comply with clause 6.3.2 of BS 5422: 2009.

4. Scope of Claim

Expenditure on the provision of plant and machinery can include not only the actual costs of buying the pipework insulation products, but other direct costs such as the transport of the equipment to site, and some of the direct costs of installation. Clarity on the eligibility of direct costs is available from HMRC.

Radiant and Warm Air Heaters

Radiant Heating Equipment

Date added to ETL: 2003 (Revised 2009).

1. Definition of Technology

Radiant heating equipment covers products that are specifically designed to heat people or objects in the space below them by infrared radiation without heating the surrounding air directly, and optimising controllers that ensure radiant heating systems operate in an efficient manner.

2. Technology Description

Radiant heaters are widely used to provide space heating for warehouses, retail sheds, sports centres, factories, and other buildings containing similarly large spaces. Radiant heaters contain a gas or oil fired burner that is used to heat a tube, cone or plaque that emits infrared radiation when hot. This infrared radiation is focussed and directed downwards by reflectors within the product.

Radiant heaters are available in a range of different types and efficiencies. The ECA Scheme encourages the purchase of higher efficiency radiant heaters. It also encourages the purchase of optimising controllers that ensure that radiant heating products and systems operate in an energy efficient manner that reflects weather conditions, occupation schedules and user requirements.

The ECA Scheme covers five categories of product:

1. Unitary radiant tube heater units and packages.
2. Multi burner radiant tube heater units and packages.
3. Continuous radiant tube heater units and packages.
4. Radiant plaque and cone heater units and packages.
5. Optimising controllers for radiant heating systems.
   (including both standalone unit and add-on module type products).

Where packages consist of a combination of radiant heater units, and an optimising controller.

Investments in radiant heating equipment 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, all products must comply with the relevant requirements set out below:

1. All products incorporating radiant heaters must:
   - Be gas or oil fired.
   - Be designed to be permanently mounted above head height.
   - Be CE marked.

2. All products incorporating radiant tube type heaters must incorporate a reflector (with end caps) that directs the radiated heat downards.
3. All products that incorporate optimising controllers must:
    - Incorporate a microprocessor based controller that is pre-programmed to:
        a) Automatically control the temperature in one or more zones within a building in an energy efficient manner that reflects predefined zone occupation schedules.
        b) Automatically switch radiant heating equipment on and off in accordance with the predefined occupation schedule for each of the zones being controlled.
    - Incorporate the following automatic control mechanisms:
        a) A frost protection mechanism that monitors internal air temperature, and switches on the radiant heaters to prevent equipment and/or pipework from freezing up.
        b) A building fabric protection mechanism that monitors external or internal temperatures and switches heating on to prevent condensation from occurring.
        c) An anti-tampering mechanism that prevents the product's control strategy from being modified, and the specified automatic control mechanisms from being disabled, except during commissioning, maintenance or testing.
    - Provide facilities that enable building managers to:
        a) Define the normal occupation times for the building and for each zone controlled (to within five minutes), for each day of the week, including at least two periods of occupation per day (i.e. at least 14 different occupation period per week).
        b) Define the temperature set-points for each zone to +/- 1 degrees centigrade.
    - Provide facilities that enable building users to "temporarily override" the pre-set times when the radiant heating is scheduled to be switched off within an individual zone.
    - Conform with the requirements of the EU EMC Directive 89/336/EEC (as amended) or its replacement EU EMC Directive 2004/108/EC, or be CE Marked.

Where:

- A mechanism is defined as "any sequence of pre-defined actions that performs a given function, where an action can be defined in hardware and/or software terms".
- Products that incorporate control strategies that are specifically designed to control other types of equipment (other than warm air or radiant heaters) are not eligible.

Performance criteria

All products that incorporate radiant heaters must have a radiant efficiency, and a net thermal efficiency, when operating at 100% of their maximum continuous rating (MCR) that is greater than or equal to the values set out in Table 1 below.

Table 1 Performance requirements for radiant heating equipment.

	Product category	Radiant efficiency %		Net thermal efficiency %
1.	Unitary radiant tube heater units and packages.	> 60.0 %	**AND**	> 86.0 %
2.	Multi burner radiant tube heater units and packages.	> 60.0 %	**OR**	> 90.0%
3.	Continuous radiant tube heater units and packages.	N/A		> 90.0%
4.	Radiant plaque and cone heater units and packages.	> 60.0 %		N/A

">=" means "greater than" and "N/A" means "not applicable".

For the avoidance of doubt net thermal efficiency test data must be presented to 1 decimal place. As an example, an unitary radiant tube heaters with a radiant efficiency of 60.0% or a net thermal efficiency of 86.0%, at 100% of its maximum continuous rating (MCR) would be deemed to be a fail.

Required test procedures

The radiant efficiency of the heating units within the product must be determined in accordance with the relevant procedures and test conditions in the following standards:

- BS EN 416-2:2006, "Single burner gas-fired overhead radiant tube heaters for non-domestic use – Part 2: Rational use of energy".
- BS EN 419-2:2006, "Non-domestic gas-fired overhead luminous radiant heaters – Part 2: Rational use of energy".

The net thermal efficiency of the product must be determined in accordance with the procedure and test conditions in:

- Section 6.4 of BS EN 1020:1998, "Non-domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW, incorporating a fan to assist transportation of combustion air and/or combustion products" (as amended).

The product must be tested with the minimum possible length of flue that is consistent with the product's design specification, and where the product is supplied in several parts that must be connected together during installation, with the minimum possible interconnecting pipework.

If the test report has not been prepared by an independent body, then evidence must be provided that a representative sample of product test data has been independently verified or cross-checked.

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

Warm Air Heating Equipment

Date added to ETL 2003 (Revised 2009).

1. Definition of Technology

Warm air heating equipment covers products that are specifically designed to provide space heating by using the heat generated by a burner to raise the air temperature in the space(s) being heated, and optimising controllers that ensure warm air heating systems operate in an efficient manner.

2. Technology Description

Warm air heaters are widely used to provide space heating for warehouses, retail sheds, sports centres, factories, and other buildings containing similarly large spaces. Warm air heaters contain a gas or oil fired burner that is used to heat the air in the space directly, or indirectly by means of heat exchanger. A fan is used to distribute the warm air throughout the space(s) being heated.

Warm air heaters are available in a range of different types and efficiencies. The ECA Scheme encourages the purchase of higher efficiency warm air heaters. It also encourages the purchase of optimising controllers that ensure that warm air heating products and systems operate in an energy efficient manner that reflects weather conditions, occupation schedules and user requirements.

The ECA Scheme covers four categories of product:

1. **Indirect fired packaged warm air heater units**
   including both condensing and non-condensing type products.
2. **Indirect fired packaged air heater modules**
   including both condensing and non-condensing type products.
3. **Direct fired packaged warm air heaters**
   that are designed to vent combustion products into the space being heated.
4. **Optimising controllers for warm air heating systems**
   including both standalone unit and add-on module type products.

Investments in warm air heating equipment 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, all products must comply with the relevant requirements set out below:

1. All products incorporating warm air heaters must:
   - Be gas or oil fired.
   - Be designed to be permanently installed in one of the following ways:
     a) As a suspended, wall mounted or floor-standing unit.
     b) As a heating module within an air handling unit.

- Incorporate a fan to distribute warm air within the heated space, unless they are warm air heating modules that are specifically designed to be installed in an air handling unit.
- Be CE marked.

2. All direct-fired units must:
   - Incorporate a microprocessor-based controller that monitors product's outlet air temperature, and adjusts the product's operation to maintain pre-set temperature(s).
   - Use modulating burners with a turn down ratio that is greater than, or equal to, 10:1.
   - Be fitted with a variable speed fan controller, or a variable air volume control system, that can vary the fresh air flow through the product by a factor of at least two to one.

3. All products that incorporate optimising controllers must:
   - Incorporate a microprocessor based controller that is pre-programmed to:
     a) Automatically control the air temperature in one or more zones within a building in an energy efficient manner that reflects predefined zone occupation schedules.
     b) Automatically switch warm air heating equipment on and off in accordance with the predefined occupation schedule for each of the zones being controlled.
   - Incorporate the following automatic control mechanisms:
     a) A frost protection mechanism that monitors internal air temperature, and switches on the warm air heaters to prevent equipment and/or pipework from freezing up.
     b) A building fabric protection mechanism that monitors external or internal temperatures and switches heating on to prevent condensation from occurring.
     c) An anti-tampering mechanism that prevents the product's control strategy from being modified, and the specified automatic control mechanisms from being disabled, except during commissioning, maintenance or testing.
   - Provide facilities that enable building managers to:
     a) Define the normal occupation times for the building and for each zone controlled (to within five minutes), for each day of the week, including at least two periods of occupation per day (i.e. at least 14 different occupation period per week).
     b) Define the temperature set-points for each zone to +/- 1 degree centigrade.
   - Provide facilities that enable building users to "temporarily override" the pre-set times when the warm air heating is scheduled to be switched off within an individual zone.
   - Conform with the requirements of the EU EMC Directive 89/336/EEC (as amended) or its replacement EU EMC Directive 2004/108/EC, or be CE Marked.

Where:

- A mechanism is defined as "any sequence of pre-defined actions that performs a given function, where an action can be defined in hardware and/or software terms".

- Products that incorporate control strategies that are specifically designed to control other types of equipment (other than warm air or radiant heaters) are not eligible.

Performance criteria

All indirect fired products must have a net thermal efficiency when operating at 100% of their maximum continuous rating (MCR) that is greater than the value set out in Table 1 below.

Table 1 Performance requirements for warm air heating equipment.

	Product category	Net thermal efficiency %
1.	Indirect fired packaged warm air heater units	> 91.0 %
2.	Indirect fired packaged air heater modules	> 91.0 %
There are no efficiency requirements for direct gas-fired warm air heaters.		

">" means "greater than"

For the avoidance of doubt net thermal efficiency test data must be presented to 1 decimal place. As an example, an indirect fired packaged warm air heater unit with a net thermal efficiency of 91.0% at 100% of its maximum continuous rating (MCR) would be deemed to be a fail.

Required test procedures

All indirect fired products must be tested in accordance with the relevant procedures and test conditions in the following standards:

- BS EN 1020:1998, "Non-domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW, incorporating a fan to assist transportation of combustion air and/or combustion products".
- BS EN 13842:2004, "Oil fired forced convection air heaters. Stationary and transportable for space heating".
- BS EN 1196:1998, "Domestic and non-domestic gas-fired air heaters. Supplementary requirements for condensing air heaters".
- BS 5991:2006, "Specification for indirect gas fired forced convection air heaters with rated heat inputs greater than 330 kW but not exceeding 2 MW for industrial and commercial space heating. Safety and performance requirements (excluding electrical requirements) (2nd family gases)".

If the test report has not been prepared by an independent body, then evidence must be provided that a representative sample of product test data has been independently verified or cross-checked.

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

Refrigeration Equipment

Absorption & Other Heat Driven Cooling & Heating Equipment

This category only covers products installed as part of a CHP scheme that has been awarded a certificate from the CHP Quality Assurance (CHPQA) programme. The absorption chiller's useful chilling effect must be driven by heat derived from the CHP plant. The absorption plant is assessed with the CHP plant under CHPQA programme - for further information go to www.chpqa.com.

Air-Cooled Condensing Units

Date added to ETL 2004 (Revised 2009).

1. Definition of Technology

Air-cooled condensing units covers products that are specifically designed to provide cooling to other equipment and systems that incorporate evaporators (and associated expansion valve control systems). Air-cooled condensing units are factory-assembled units that consist of an air-cooled condenser, one or more compressors, and interconnecting pipe work. They may include liquid receivers, filter driers, oil separators, shut off valves and related controls, and a weatherproof housing.

2. Technology Description

An air-cooled condensing unit is a factory-assembled, packaged unit that consists of a refrigeration compressor, an air-cooled condenser and various ancillary components. This packaged unit does not contain a complete refrigeration system, but is designed to provide a convenient method for cooling a cold room or other equipment fitted with an evaporator that is controlled by an expansion valve.

Air-cooled condensing units are used in a variety of commercial and industrial cooling applications, including cold rooms, refrigerated display cabinets, back-bar equipment, temperature controlled food preparation areas, and for air conditioning systems.

Air-cooled condensing units are available in a range of different designs and efficiencies. The ECA Scheme aims to encourage the purchase of the higher efficiency products.

The ECA Scheme covers products in three temperature categories:

- High temperature units.
- Medium temperature units.
- Low temperature units.

These categories are defined in terms of the product performance at a particular temperature rating point. Products may be submitted under more than one category.

Investments in air-cooled condensing units 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be designed to operate with one or more clearly identified standard refrigerants.
- Be a factory assembled unit that incorporates at least the following components:
    a) Air-cooled refrigerant condenser.
    b) One or more electrically driven refrigeration compressors.
    c) A control system that controls the product's compressor(s) and cooling fan(s).

- Conform to the requirements of the Pressure Equipment Directive 97/23/EC in respect of their design, manufacture and testing procedures.

Performance Criteria

Products must have a coefficient of performance (COP) that is greater than the values shown in Table 1 below at the specified UK rating points.

Table 1. Performance thresholds for air-cooled condensing units at the UK rating points

Temperature Category	Evaporating temperature (Dew Point)	Ambient (condenser air-on) temperature	Compressor suction gas temperature	COP threshold
High temperature units	+5˚C	20˚C	20˚C	>=3.9
Medium temperature units	-10˚C	20˚C	20˚C	>=2.8
Low temperature units	-35˚C	20˚C	20˚C	>=1.6

">=" means "greater than or equal to"

Where COP = refrigerating capacity / power absorbed including the compressor and the condenser fans (and any other power use associated with the ACCU).

The refrigerating capacity and power absorbed are as defined in EN13215:2000 "*Condensing units for refrigeration – Rating conditions, tolerances and presentation of manufacturer's performance data"*, and the power absorbed must be measured at full load, without condenser pressure control and must include the fan power.

For the avoidance of doubt test data should be presented to 1 decimal place. As an example, a product in the high temperature category with a COP of 3.9 would be deemed to be a fail.

Required test procedures

Product performance can either be calculated using Method A or measured using Method B.

Method A

Under method A:

- The product's coefficient of performance (COP) at relevant UK rating point (as specified in Table 1) must be calculated with the method used to generate its published performance over the standard range of air temperature and evaporating temperature conditions.
- The accuracy of these calculations must be confirmed in the following manner:
    a) Actual product performance should be determined at three test conditions within +/- 1^{o}C of the temperatures in Table 1 by measuring key parameters in the refrigeration system. The test conditions need not include the actual standard UK rating point.
    b) The level of uncertainty (at 95% confidence) in the calculated values for COP at the relevant UK rating point must be determined using standard statistical methods.
- To be eligible, the product's COP at the relevant UK rating point must exceed the threshold specified in Table 1 by at least the level of uncertainty in the calculations.
- The test report must include (or be accompanied by):
    a) Details of the calculation method used to determine product performance.
    b) A copy of the published performance data for the product.
    c) Manufacturer's design data for the product and its key components, including type of refrigerant used, condenser fan motor power, and product's compressor.
    d) The following information on the product's compressor:
        i. Refrigerating capacity and COP at the appropriate standard rating point specified in EN 12900: 2005, and at the relevant UK rating point specified in the eligibility criteria for 'refrigeration compressors'.
        ii. Where applicable, evidence that it is listed on the Energy Technology Product List, or that its performance has been independently verified.
        iii. A copy of the manufacturer's published performance data.
    e) The following test data, which must be obtained with the product operating under stable conditions at full load:
        i. Condensing and evaporating pressures and dew temperatures at the compressor inlet and outlet.
        ii. Superheat and sub-cooling at the compressor's inlet and the unit's outlet.
        iii. Condenser air inlet temperature.
        iv. Compressor input power in kW (where the compressor is not listed on the Energy Technology Product List, or its performance independently verified).

Method B

Under method B, product performance must be demonstrated by testing the product in accordance with the following standard: *BS EN13771-2: 2007 "Compressor and condensing units for refrigeration. Performance testing and test methods. Part 2: Condensing units"*.

The refrigerant properties used in the analysis of compressor performance must be obtained from one of the following sources:

- The US National Institute of Standards & Technology (NIST) Standard Reference Database 23 Thermodynamic and Transport Properties of Refrigerants and Refrigerant Mixtures Database: Version 6.0 or later. See http://fluidproperties.nist.gov/ or http://www.nist.gov/.
- The ASERCOM properties database as defined in the ASERCOM Compressor Certification scheme, which is based closely on the NIST database (see http://www.asercom.org/).

For the high temperature category only, data for a suction gas temperature of 20°C may be obtained by the thermodynamic translation of data physically tested at 10K superheat.

A test report must be provided and include a statement of achieved performance at the required UK rating point. Data on refrigerating capacity and COP at the 32°C ambient temperature standard reference point specified in EN13215:2000 for air cooled condensing units must also be included in the test report to enable the test results at the UK rating point to be cross-checked against the manufacturers published rating data for the product.

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 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.
- Have the same sub cooling arrangement as the representative model.
- Fit within the same product category (e.g. are all split systems).

The representative models must be selected by dividing the range of products into groups of models with similar design characteristics, and testing a model in the lowest quartile of predicted performance in each group. The performance of each model in the group must be predicted using a validated mathematical model. As a minimum, at least two models must be tested in each range of products and in each laboratory used for product testing.

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.

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

Automatic Air Purgers

Date added to ETL 2001.

1. Definition of Technology

Automatic air purgers are products that are specifically designed to remove air and other non-condensable gases from an industrial or commercial refrigeration system, with minimum loss of refrigerant.

2. Technology Description

Air and other non-condensable gases leak into refrigeration systems through faulty equipment, particularly seals, and during maintenance operations, especially charging of the refrigerant. In addition, slow breakdown of the refrigerant can also add to the build-up of non-condensable gases.

The presence of air and other non-condensable gases in the condenser and receiver increases system head pressure, which results in excessive compressor power consumption and reduces refrigeration system capacity.

Automatic air purgers remove air and other non-condensable gases from the refrigeration system, resulting in substantial energy savings.

Investments in automatic air purgers 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be designed for permanent connection to a refrigeration system.
- Automatically extract air and other non-condensable gases from a refrigeration system.
- Incorporate a means to separate any entrained refrigerant from the extracted air and non-condensable gases.
- Incorporate a control mechanism that actively minimises the amount of refrigerant lost with the extracted air and non condensable gases.
- Conform with the requirements of the EU Pressure Equipment Directive PED 97/23/EC in respect of their design, manufacture and testing procedures.

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

Automated Permanent Refrigerant Leak Detection Systems

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Automated permanent refrigerant leak detection systems are products that are specifically designed to continuously monitor the atmosphere in the vicinity of refrigeration equipment and, in the event of detection of refrigerant, give an alarm.

2. Technology Description

An automated permanent refrigerant leak detection system continuously monitors the atmosphere in the vicinity of refrigeration equipment, and other components or pipework that contains refrigerant. The detection system must be permanently fixed in place at the site of the refrigeration equipment.

The ECA Scheme aims to encourage the purchase of products that give an early warning of refrigerant leaks, to allow their early repair, and thus improve the energy efficiency of the refrigeration system and reduce carbon emissions.

Investments in automated permanent refrigerant leak detectors 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Continuously monitor the refrigeration system for refrigerant leakage.
- Detect the presence of one or more refrigerants (which must be clearly named in the information supporting the application) and raise an audible alarm when a pre-set level of refrigerant is reached.
- Have fittings to allow permanent fixing to the wall or floor.
- Be able to operate in conditions of between 0 to 50oC and humidities of up to 90%.
- Meet the minimum level of performance set out in the performance criteria below.
- Be CE marked.

Automated permanent refrigerant leak detectors must be calibrated for each refrigerant named in the application. The product must be capable of detecting at least one of the following types of refrigerant: CFC, HCFC, HFC, HC or Carbon Dioxide (CO_2).

Automated permanent leak detection systems dedicated to ammonia detection are not eligible.

Performance criteria

To be eligible, products must:

- Generate an alarm signal when the level of refrigerant in the atmosphere exceeds the relevant threshold set out in Table 1 below, which varies with refrigerant type.
- Have a measurement accuracy of +/- 20 ppm and be able to detect the presence of 10ppm of refrigerant in the atmosphere.

Table 1 – Performance thresholds for automated permanent refrigerant leak detection systems

Refrigerant	**Alarm signal threshold** (parts per million, ppm)
CFC, HCFC, HFC or HC	>=100
CO_2	>=1,500

">=" means "greater than or equal to"

Required test procedures

The performance of the equipment must be tested at the concentrations stated in the performance criteria using calibration gases produced using methods that are traceable to national standards.

A calibration report must be supplied that demonstrates the product's sensitivity, accuracy and alarm setting using test gases.

The following test procedures can be used to demonstrate product performance:

- BS EN 14624:2005 "Performances of mobile leak detectors and of room controllers of halogenated refrigerants". (Section 11.2 – Efficiency tests of room controller).
- Gas Detector Selection and Calibration Guide, SIRA, 2005, ISBN 10: 1856092976 ISBN 13: 9781856092975

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

Cellar Cooling Equipment

Date added to ETL 2003 (Revised 2009).

1. Definition of Technology

Cellar cooling equipment covers products that are specifically designed to maintain, by means of a refrigeration system, an indoor environment at a condition suitable for the storage of chilled beverages below 12°C.

2. Technology Description

Cellar cooling equipment is permanently installed and uses the standard refrigeration cycle of evaporation, compression and condensation to cool a cellar or other storage space.

Cellar cooling equipment is available in a range of different designs and efficiencies. The ECA Scheme aims to encourage the purchase of higher efficiency products.

The ECA scheme covers three categories of cellar cooling equipment:

- **Packaged units** where all components mounted on one base for "through the wall" installation.
- **Split systems** with the equipment supplied in two parts (evaporator and condensing unit) to be connected on installation.
- **Remote systems** with equipment supplied in three parts (evaporator, compressor/receiver, and condenser) to be connected on installation.

Investments in cellar cooling equipment 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 must meet minimum eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Have a cooling capacity of between 2 kW and 12 kW at the standard rating conditions for ambient air temperature of 32°C and a cellar air temperature of 10°C.
- **Either** be a single packaged unit, **or** consist of two or three factory-built sub-assemblies that are designed to be connected together during installation.
- Conform with the requirements of EU Pressure Equipment Directive PED 97/23/EC.

Performance Criteria

Products must have a coefficient of performance (COP) equal to or greater than the figures shown in Table 1 below.

Table 1 Performance thresholds for cellar cooling equipment

Cooling capacity	COP
Less than 8 kW	>= 2.90
8 kW and over	>= 3.20

">=" means "greater than or equal to"

For the avoidance of doubt test data should be presented to 2 decimal places. As an example, a COP of 2.89 for a unit with a cooling capacity of less than 8 kW would be deemed to be a fail.

Required test procedures

Testing must be carried out in accordance with:

- BSI Publicly Available Specification PAS 57:2003 "Cellar cooling equipment – Procedure for determining performance and calculating energy efficiency".

Test reports must be submitted and contain a statement of achieved performance at the required rating points and the information specified in section 8 of PAS 57:2003.

If the test report has not been prepared by an independent body, then evidence must be provided that a representative sample of product test data has been independently verified or cross-checked.

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 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.
- Have the same sub cooling arrangement as the representative model.
- Fit within the same product category (e.g. are all split systems).

The representative models must be selected by dividing the range of products into groups of models with similar design characteristics, and testing a model in the lowest quartile of predicted performance in each group. The performance of each model in the group must be predicted using a validated mathematical model. As a minimum, at least two models must be tested in each range of products and in each laboratory used for product testing.

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.

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

Commercial Service Cabinets

Date added to ETL 2003 (Revised 2009).

1. Definition of Technology

Commercial service cabinets are products that are specifically designed to store, but not to display, chilled and frozen foodstuffs.

2. Technology Description

Commercial service cabinets are widely used in the catering industry to store frozen or chilled foodstuffs, but a door, lid or drawer must be opened to view or access the contents of the cabinet.

Commercial service cabinets are available in a range of different designs and efficiencies. The ECA scheme aims to encourage the purchase of higher efficiency products.

The ECA Scheme covers three categories of product:

- Single door commercial service cabinets.
- Double door commercial service cabinets.
- Under counter and counter commercial service cabinets with solid doors or drawers.

Investments in commercial service cabinets 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 must meet the eligibility criteria as set out below. The ECA scheme aims to encourage the purchase of higher efficiency products.

3. Eligibility Criteria

To be eligible, products must:

- Be designed to store chilled or frozen foodstuffs, whilst maintaining them within prescribed temperature limits.
- Be fitted with solid-faced lids, drawers or doors that:

    a) Are normally kept closed, but can be opened to access the contents.

    b) Obscure the contents of the cabinet from view when closed.

    c) Enable users to access the contents of any part of the interior without stepping into the refrigerated space.

- Be a ‘plug in’ type cabinet with an integral refrigeration system (i.e. incorporating a compressor and condensing unit).
- Have a gross internal volume equal to that specified in Table 1; where the gross internal volume is defined as the volume within the inside walls of the cabinet without internal fittings and with all doors (and drawers) closed.
- Be CE marked.

Performance Criteria

Products must have an Energy Efficiency Index (EEI) that is less than, or equal to, the thresholds set out in Table 1 below, which depend on the type of cabinet.

Table 1 Performance thresholds for commercial service cabinets

		EEI performance threshold (kWh/48hrs/m^3)	
Type	Gross internal volume (litres)	Chilled (M1)	Frozen (L1)
Single door commercial service cabinets	400 and 600 (+/-15%)	<= 16.0	<= 38.0
Double door commercial service cabinets	1,300 (+/-15%)	<= 12.0	<= 34.0
Under counter and counter commercial service cabinets with solid doors or drawers	150 to 800 (+/-15%)	<= 21.6	<= 40.0

"<=" means "less than or equal to"

Where the Energy Efficiency Index (EEI) is defined as the Total Electrical Energy Consumption (in kWh) of the product over a 48 hour test period divided by the product's Net Volume (in m^3), and:

- Net Volume equals: shelf (or drawer base) area x loading height.
- Total Electrical Energy Consumption is as defined in BS EN 441-9:1995.

For the avoidance of doubt test data should be presented to 1 decimal place. As an example, a frozen, single door commercial service cabinet with an EEI of 38.1 would be deemed to be a fail.

Required test procedures

All cabinets must be tested in a test room conforming to BS EN 441:1995/1996.

All cabinets must conform to the following temperature classifications (as defined in BS EN 441-6:1995) when tested to BS EN 441:1995/1996 in climate class IV (30°C, 55% RH):

- For chilled cabinets: M1 (all measurement packs must be between –1 and 5°C).
- For frozen cabinets: L1 (the highest temperature of the warmest measurement pack must be less than or equal to –15°C and the lowest temperature of the warmest measurement pack must be less than or equal to –18°C).

All cabinets must be tested according to the requirements for closed refrigerated cabinets contained in BS EN 441:1995/1996 with the following test conditions:

- **Loading**: as described in BS EN 441-5:1996. Cabinets with shelves, to be fitted with a minimum of 1 shelf per 300 mm of open height at equal distances apart. For upright units this equates to a minimum of 4 shelves and for under counter units to a minimum of 2 shelves. The lowest height shelf should be located at the lowest available height fitting.
- **Temperature** test: as described in BS EN 441-5:1996, specifically section 3.6.

- The **Total Electrical Energy Consumption** of cabinets fitted with integral condensing units must be measured in accordance with sections 4.1 and 5 of BS EN 441-9:1995, and to the accuracy specified in section 4.4.6 of BS EN 441-4:1995.

If the test report has not been prepared by an independent body, then evidence must be provided that a representative sample of product test data has been independently verified or cross-checked.

Representative Testing

Where applications are being made for two or more cabinet models that are variants of the same basic design, test data may be submitted for a single 'representative model'. The rules in Table 2 must be used to select the representative model that should be performance tested.

Table 2 Rules for selecting the representative model for performance testing

Variation between models	Selection rule
Cosmetic differences to the exterior	Any model may be selected to be the representative model.
Heaters (door, trim etc.), fans, defrosts, lighting and other accessories	The model with the greatest energy consumption must be the representative model.
Cabinets with the same refrigeration system components but different refrigerants	The model with the greatest energy consumption must be the representative model.
Two or more of the above variations	The rules set out above must be combined when selecting the representative 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.

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

Curtains, Blinds, Sliding Doors and Covers for Refrigerated Display Cabinets

Date added to ETL 2001.

1. Definition of Technology

Curtains, blinds, sliding doors and covers (for refrigerated display cabinets) covers products that are specifically designed to reduce the infiltration of ambient air into a refrigerated display cabinet.

2. Technology Description

Curtains, blinds, sliding doors and covers are flexible or rigid barriers that can be used to reduce the infiltration of ambient air (and heat flow) into refrigerated display cabinets, thereby reducing the energy consumption of the cabinet.

The ECA Scheme covers four categories of products:

1. **Strip curtains** that consist of transparent, flexible strips hung adjacent to each other, and fastened at both ends to neighbouring strips, in a manner that allows temporary openings to be made in the curtain for the purpose of removing items from the cabinet.
2. **Night blinds** that consist of a flexible fabric mounted on a roller mechanism that enables the blind to be deployed across the display window of the cabinet when the retail outlet is closed. The blind may also incorporate a motorised control system.
3. **Transparent chest freezer covers** (or 'bubble lids') that consist of a rigid transparent material that fits across the display window of the cabinet, and incorporates access holes that enable items to be removed from the cabinet without removing the cover.
4. **Transparent sliding doors** that consist of glass doors with a heat reflective coating, mounted in a mechanism (that is designed to be installed in the window of the cabinet) that enables the doors to be opened when items need to be removed from the cabinet.

Investments in curtains, blinds, sliding doors and covers for refrigerated display cabinets 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Provide a flexible or rigid barrier that can be used to reduce the infiltration of ambient air (and heat flow) through the open display window of a refrigerated display cabinet.
- Be designed to fit one or more specific types or models of refrigerated display cabinet in a manner that ensures there is no air gap around the edges of products based on rigid barriers, and an air gap of less than 20mm around the edges of products based on flexible barriers.

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

Evaporative Condensers

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Evaporative Condensers are specifically designed to cool and condense high-pressure refrigerant vapour by means of a heat exchanger that has a continuously wetted external surface across which air is blown by a fan.

2. Technology Description

Evaporative condensers allow refrigeration systems to operate with lower head pressures and higher efficiencies than can be achieved using air-cooled condensers or water-cooled condensers. They use evaporative cooling to remove heat from the refrigerant vapour.

Evaporative condensers are generally used in larger refrigeration systems and the ECA Scheme aims to encourage their purchase as an alternative to lower efficiency solutions.

Investments in evaporative condensers can only qualify for Enhanced Capital Allowances if the product is named on the Energy Technology Product List. To be eligible for inclusion on the Energy Technology Product List, products must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Incorporate:
    a) A heat exchanger that is designed to cool and condense refrigerant vapour.
    b) A fan that blows air over the heat exchanger.
    c) A mechanism that continually wets the external surface of the heat exchanger that includes a water pump and a water storage tank.
    d) A means of measuring total dissolved solids content of the water in the storage tank.
    e) A blow down facility for the water storage tank to enable total dissolved solids content of the water in the storage tank to be controlled.

- Conform with the requirements of the EU Pressure Equipment Directive PED 97/23/EC in respect of its design, manufacture and testing procedures, or be CE marked.

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

Forced Air Pre-Coolers

Date added to ETL 2003 (Revised 2009).

1. Definition of Technology

Forced air pre-coolers are products that are specifically designed to cool water or process liquid by means of a heat exchanger, over which air is forced by a fan, prior to transfer to a refrigeration system.

2. Technology Description

Forced air pre-coolers (or 'air-blast pre-coolers') normally consist of a finned tube heat exchanger and a cooling fan. The cooling fan is used to force air over the heat exchanger, and to cool water and other process liquids as they passed through the heat exchanger.

Forced air pre-coolers can be used to reduce load on refrigeration systems by cooling water and other process liquids, prior to their transfer into the refrigeration system.

The ECA Scheme encourages the purchase of forced air pre-coolers that are free standing and incorporate a by-pass mechanism that automatically redirects the water or other process liquid being cooled around the pre-cooler, and turns off the cooling fan when ambient air temperature is higher than water or process liquid inlet temperature.

Forced air pre-coolers that are sold as an integrated part of a mechanical chiller are not included in this category, but are covered by the 'Packaged Chillers' sub-technology of the ETL.

Investments in forced air pre-coolers 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Incorporate a heat exchanger designed to cool water or other process liquids.
- Incorporate a fan which forces air over the heat exchanger.
- Incorporate a series of control valves (or "by-pass mechanism") that re-direct the water or other process liquid around the pre-cooler in response to a control signal.
- Incorporate a controller that operates the by-pass mechanism and controls the fan at times when the ambient air temperature is higher than the water/process liquid inlet temperature.
- Conform with the requirements of the EU Pressure Equipment Directive PED 97/23/EC in respect of its design, manufacture and testing procedures, or be CE marked.

Performance criteria

Eligible products must have:

- A minimum energy efficiency rating (EER) that is greater than or equal to (>=) 2.9, across the range of operating conditions where it is designed to provide cooling.

Where EER = net cooling capacity (kW) / effective power input (kW).

Required test procedures

Product performance must be demonstrated by assessing the variation in net cooling capacity and electricity consumption with ambient temperature and inlet water/process liquid temperature, and calculating the product's minimum energy efficiency rating. This calculation must take account of the electricity used by both the fan and the controller.

The performance of the product's heat exchanger must be measured in accordance with the procedures set out in EN 305:1997 and EN 306:1997.

Representative Testing

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

- Use air to liquid heat exchangers of the same constructional design.
- Have the same general arrangement of fans and heat exchangers.
- Are constructed from materials with same heat transfer characteristics.
- Have the same (+/- 5%) or better energy efficiency as the representative models.

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.

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

Liquid pressure amplification units

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Liquid pressure amplification units are products that are specifically designed to raise the pressure of liquid refrigerant at the inlet to refrigeration circuit expansion valves.

2. Technology Description

Liquid pressure amplification units are used to raise the pressure of liquid refrigerant at the inlet to refrigeration circuit expansion valve and enable refrigeration systems to operate at lower head pressures. They are electrically driven, but use less power than a compressor would need to achieve the same pressure increase at the inlet to the expansion valve. The ECA Scheme aims to encourage purchase of liquid pressure amplification units.

Investments in liquid pressure amplification can only qualify for Enhanced Capital Allowances if the product is named on the Energy Technology Product List. To be eligible for inclusion on the Energy Technology Product List, products must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must be:

- A sealed unit containing an electrically powered, glandless, refrigerant pump.
- Capable of operating at liquid refrigerant pressures above 4 barg.
- Capable of raising liquid refrigerant pressure by at least 10bar.
- CE marked.

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

Packaged Chillers

Date added to ETL 2003 (Revised 2009).

1. Definition of Technology

Packaged chillers covers products that are specifically designed to cool liquid by means of a refrigeration system that is packaged within a single factory assembled unit.

2. Technology Description

Packaged chillers generate chilled water that can be used to provide space cooling in summer in large air-conditioned buildings. They can also be used to generate chilled water or brine needed by industrial process cooling. Reverse cycle packaged chillers are able to provide space heating in winter, as well as space cooling.

Packaged chillers are available in a wide range of different designs and efficiencies. The ECA Scheme aims to encourage the purchase of the higher efficiency products.

The ECA Scheme covers four categories of products:

1. Air-cooled packaged chillers that provide cooling only and have a cooling capacity that is less than or equal to 1,500kW.

2. Air-cooled, reverse cycle, packaged chillers that provide heating and cooling and have a cooling capacity that is less than or equal to 750kW.

3. Water-cooled packaged chillers that provide cooling only and have a cooling capacity that is less than or equal to 2,000kW.

4. Water-cooled, reverse cycle, packaged chillers that provide heating and cooling and have a cooling capacity that is less than or equal to 2,000kW.

Investments in packaged chillers 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Incorporate the following items of equipment:
    a) One or more electrically powered compressors.
    b) One or more air-cooled or water-cooled condensers.
    c) One or more evaporators.
    d) A control system that ensures the safe, reliable and efficient operation of the product.
- Be CE Marked.

Where the product incorporates an integral free-cooling mechanism, it must be:

- Fully integrated into the packaged chiller unit during product manufacturing.
- Directly controlled by the product's control system in a manner that maximises the use of free cooling for outside air, dry bulb temperatures between 2.0 and 15.0°C.
- Able to provide a cooling capacity at an outside air, dry bulb temperature of 2.0°C and an outlet water temperature of 7.0°C that is at least (=>) 50% of the cooling capacity obtained at the standard rating condition specified in Table 2 below.

Performance Criteria

Products must have a cooling energy efficiency rating (EER) that is equal to or greater than the values set out in Table 1, which vary with product category. In addition, reverse cycle products must have a coefficient of performance (COP) equal to or greater than the values set out in Table 1.

Table 1 Performance thresholds for packaged chillers

Product Category			Cooling Capacity (kW)	Performance thresholds	
				Cooling EER	Heating COP
1.	Air-cooled packaged chillers that provide cooling only.	**without** integral free cooling mechanism.	Up to 100kW	>= 2.60	
			Over 100 to 500 kW	>=2.60	
			Over 500 to 750 kW	>= 2.70	
			Over 750 to 1,500 kW	>= 2.80	
		with integral free cooling mechanism.	Up to 100kW	>= 2.50	
			Over 100 to 500 kW	>= 2.50	
			Over 500 to 750 kW	>= 2.60	
			Over 750 to 1,500 kW	>= 2.70	
2.	Air-cooled, reverse cycle, packaged chillers that provide heating and cooling.		Up to 100kW	>= 2.70	>= 2.70
			Over 100 to 500 kW	>= 2.70	>= 2.70
			Over 500 to 750 kW	>= 2.80	>= 2.80
3.	Water-cooled packaged chillers that provide cooling only.		Up to 100kW	>= 4.10	
			Over 100 to 500 kW	>= 4.10	
			Over 500 to 750 kW	>= 4.50	
			Over 750 to 2,000 kW	>= 5.00	
4.	Water-cooled, reverse cycle, packaged chillers that provide heating and cooling.		Up to 100kW	>= 4.10	>= 3.70
			Over 100 to 500 kW	>= 4.10	>= 3.70
			Over 500 to 750 kW	>= 4.50	>= 4.10
			Over 750 to 2,000 kW	>= 4.60	>= 4.20

">=" means "greater than or equal to"

Where:

- EER = net cooling capacity (kW) / effective power input (kW) in cooling mode.
- COP = net heating capacity (kW) / effective power input (kW) in heating mode.

For the avoidance of doubt test data should be presented to 2 decimal places. As an example, a water-cooled, reverse cycle, packaged chiller with a refrigeration capacity of 100kW, and a cooling EER of 4.49, or a heating COP of 4.09, would be deemed to be a fail.

Required test procedures

All products must be tested in accordance with the procedures set out in:

- BS EN 14511: 2004 or 2007, "Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling".

The product's cooling capacity (kW), EER and COP must be determined at the standard rating conditions set out in Table 2 below, which vary by product category.

Table 2 Standard rating conditions for Packaged Chillers

Product category		Cooling EER AND Cooling capacity (kW)	Heating COP
1.	Air-cooled packaged chillers that provide cooling only.	BS EN 14511: 2004 or 2007 Table 10, Standard rating conditions, Water	
2.	Air-cooled, reverse cycle, packaged chillers that provide heating and cooling.	BS EN 14511: 2004 or 2007 Table 10, Standard rating conditions, Water	BS EN 14511: 2004 or 2007 Table 9, Standard rating conditions, Outdoor air.
3.	Water-cooled packaged chillers that provide cooling only.	BS EN 14511: 2004 or 2007 Table 8, Standard rating conditions, Water to water	
4.	Water-cooled, reverse cycle, packaged chillers that provide heating and cooling.	BS EN 14511: 2004 or 2007 Table 8, Standard rating conditions, Water to water	BS EN 14511: 2004 or 2007 Table 7, Standard rating conditions, Water
Note: The standard rating conditions "for floor cooling or similar application" must not be used.			

If the test report has not been prepared by an independent body, then evidence must be provided that a representative sample of product test data has been independently verified or cross-checked.

Test results may be submitted in summary form provided that:

- Sufficient data is included to confirm that the cooling capacity (kW), EER and COP of each product was determined in accordance with the test procedures and standard rating conditions in BS EN 14511:2004 or 2007 as outlined in Table 2.
- At least two detailed test reports are submitted for each range of products and for each laboratory used. The data that must be recorded in a detailed test report is defined in Table 6 of BS EN 14511:2004 or 2007. The test report must include details of the data recording period and duration of performance measurement.
- Detailed test reports have been prepared for each product tested and are available on request for inspection, where not submitted with the application.

Please note that performance data obtained in accordance with the procedures and standard rating conditions laid down in EN 12055, EN 255 will be accepted as an alternative to testing in accordance with BS EN 14511:2004 or 2007 until further notice.

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 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.
- Fit within the same product category (e.g. are all water cooled packaged chillers).

The representative models must be selected by dividing the range of products into groups of models with similar design characteristics, and testing a model in the lowest quartile of predicted performance in each group. The performance of each model in the group must be predicted using a validated mathematical model. As a minimum, at least two models must be tested in each range of products and in each laboratory used for product testing.

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.

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

Refrigeration Compressors

Date added to ETL 2002 (Revised 2009).

1. Definition of Technology

Refrigeration compressors are products that are specifically designed to raise the pressure, temperature and energy level of a refrigerant vapour by mechanical means as part of a standard "vapour-compression" refrigeration cycle.

Economiser packages consist of a refrigeration compressor, an expansion device, and an economiser that capable of increasing refrigerant sub-cooling and refrigeration cycle efficiency.

2. Technology Description

Refrigeration compressors are at the heart of every refrigeration system that employs a vapour-compression refrigeration cycle. They range in size from those used in refrigerated display cabinets used in shops and supermarkets, to those used in large industrial refrigeration systems in breweries.

Refrigeration compressors are available in a range of different designs and efficiencies, and can be manufactured as fully hermetic, semi-hermetic or open products. The ECA scheme aims to encourage the purchase of the higher efficiency products.

The categories of refrigeration compressor and economiser package covered are:

- High temperature with R407C.
- Medium temperature with R404A.
- Low temperature with R404A.

These categories are defined in terms of the specific refrigerant and the product performance at a particular temperature rating point. Products may be submitted under more than one category.

Investments in refrigeration compressors 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Use the refrigerant specified by the product category.
- Be **either** a refrigeration compressor **or** an economiser package.
- Incorporate a positive displacement type, hermetic or semi hermetic compressor (with integral electric motor) that has a displacement greater than 9 cubic metres per hour.
- Be subject to quality assurance procedures that ensure consistency of performance between one production item and any other.

Performance Criteria

Products must have a coefficient of performance (COP) that is greater than the values shown in Table 1 below at the specified UK rating points.

Table 1 Performance thresholds for refrigeration compressors at the UK rating points

Category	Evaporating temperature (Dew Point)	Condensing temperature (Dew Point)	Compressor suction gas temperature	Liquid sub-cooling	COP threshold
High temperature with R407C	+5°C	35°C	20°C	0 K	> 5.20
Medium Temperature with R404A	-10°C	30°C	20°C	0 K	> 3.36
Low Temperature with R404A	-35°C	25°C	20°C	0 K	> 1.94

">" means "greater than"

Where COP must be calculated in the manner specified in EN12900:2005 “Refrigerant compressors – Rating conditions, tolerances and presentation of manufacturer’s performance data”.

For the avoidance of doubt test data should be presented to 2 decimal places. As an example, a product in the high temperature with R407C category with a COP of 5.20 would be deemed to be a fail.

Required test procedures

All products must be tested in accordance with one of the following standards:

- BS EN13771-1:2003 "Compressor and condensing units for refrigeration. Performance testing and test methods. Part 1: Refrigerant compressors".
- ANSI/ASHRAE Standard 23-2005 "Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units".

The refrigerant properties used in the analysis of compressor performance must be obtained from one of the following sources:

- The US National Institute of Standards & Technology (NIST) Standard Reference Database 23 Thermodynamic and Transport Properties of Refrigerants and Refrigerant Mixtures Database: Version 6.0 or later. See http://fluidproperties.nist.gov/or http://www.nist.gov/.
- The ASERCOM properties database as defined in the ASERCOM Compressor Certification scheme, which is based closely on the NIST database (see http://www.asercom.org/).

For the high temperature category only, data for a suction gas temperature of 20°C may be obtained by the thermodynamic translation of data physically tested at 10K superheat.

Where necessary some liquid sub-cooling may be used during testing to ensure the correct operation of the test apparatus, provided the results are corrected back to a liquid sub-cooling of 0 K.

A test report must be submitted in accordance with the formats specified in EN13771-1:2003.
This must include a statement of achieved performance at the required UK rating point. Data on refrigerating capacity and COP at the appropriate standard rating point specified in EN12900:2005 must also be submitted to enable the test results at the UK rating point to be cross-checked against the manufacturers published rating data for the product.

If the test report has not been prepared by an independent body, then evidence must be provided that a representative sample of product test data has been independently verified or cross-checked.

Products that depend on an external motor for compressor operation (i.e. 'open' type compressors) are not eligible.

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

Refrigeration System Controls

Date added to ETL 2001 (Revised 2009).

1. Definition of Technology

Refrigeration system controls are products that are specifically designed to automatically optimise the operating temperatures and/or pressures within a distributed commercial refrigeration system in a manner that minimises the system's energy consumption, whilst maintaining the spaces or equipment being refrigerated within predefined temperature limits.

2. Technology Description

Refrigeration system controls are used to control the temperatures and pressures within a distributed, commercial refrigeration system, and to automatically adjust the refrigeration system operation to reflect changes in load, weather conditions, and operating requirements.

A wide range of refrigeration system control products is available. The ECA scheme aims to encourage the purchase of products that automatically optimise the operation of a distributed, commercial refrigeration system and minimise its energy consumption.

The ECA Scheme covers two categories of products:

- **System management units or packages** consisting of one or more control units or modules that are designed to optimise an entire refrigeration system, including the operation of refrigeration compressor(s), evaporator(s) and condenser(s).
- **'Add-on' controllers** that are designed to be used in conjunction with a specific system management unit or package, and enable the operation of additional refrigeration compressors, evaporators and condensers to be optimised.

Investments in refrigeration controls can only qualify for Enhanced Capital Allowances if the product is named on the Energy Technology Product List. To be eligible for inclusion on the Energy Technology Product List, products must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

1. Incorporate a microprocessor based controller that is pre-programmed to automatically control the rate of flow of refrigerant through, and/or operating temperature of, at least one of the following types of refrigeration equipment:
    a) Evaporators.
    b) Condensers.
    c) Compressors.

2. Be one of the following:
    a) A system management unit or package that:

- Automatically adjusts system operating set points in a manner that minimises the refrigeration system's energy consumption under different operating loads, weather conditions and surrounding air temperatures.
- Is pre-programmed to undertake one or more of the following:

    i. Monitor temperatures and/or pressures around the refrigeration system, and automatically initiate defrost cycles, or inhibit (or delay) scheduled defrost cycles, within individual parts of the refrigeration system, as required, to optimise the overall performance of the refrigeration system.

    ii. Monitor refrigeration system energy input (kWh) and generate a visual or audible alarm when system power consumption exceeds a pre-defined limit, or when system efficiency degradation is preventing automatic adjustment.

    iii. Automatically in accordance with a pre-defined weekly time schedule, turn off, or turn down, ancillary power loads around the refrigeration system (such as lighting in display cabinets, trim heaters or fans), or activate night blinds, in order to reduce system energy consumption.

- Provides facilities that enable system managers to define the default set points, and alarm limits, for each item of refrigeration equipment controlled.

b) An add-on controller that:

- Automatically accepts instructions from the system manager to change its operating set points or alarm limits, or to initiate or inhibit a defrost cycle.
- Automatically transmits data on operating temperatures, pressures, or flow rates to the system manager at intervals not exceeding 10 minutes.

3. Comply with the relevant requirements, as set out in Tables 1 to 3 below, for products that directly control by means of an analogue or digital signal connection:
    a) Evaporators (see Table 1).
    b) Condensers (see Table 2).
    c) Compressors (see Table 3).

4. Incorporate an anti-tampering mechanism that prevents the product's control strategy and configuration settings from being modified, and automatic control from being disabled, except during commissioning, maintenance or testing.
5. Conform to the requirements of the EU EMC Directive 89/336/EEC (as amended) or its replacement EU EMC Directive 2004/108/EC, or be CE Marked.
6. **Not** incorporate any form of variable speed drive, fan, pump, heat exchanger or valve, except where incorporated solely for the purposes of cooling electronic circuitry.

Table 1 Control of evaporators

All products that directly control evaporators must:

1. Be designed to directly measure evaporator pressure or temperature by means of a sensor, and automatically adjust the flow of refrigerant through the evaporator to maintain the refrigerated space within pre-defined operating limits.

2. Automatically terminate its defrost cycle when:
   - The temperature of the evaporator or refrigerated space exceeds a preset value.
   - A maximum defrost time consistent with sensor failure has been exceeded.

3. Provide facilities that enable system managers to define separate temperature set points and alarm limits for each evaporator being controlled.

4. Provide facilities that enable system managers to take the equipment out of service for cleaning or maintenance.

5. Generate an alarm signal when the temperature of the refrigerated space is in danger of straying outside, or has strayed outside, it's pre-defined safe operating limits.

Table 2 Control of condensers

All products that directly control condensers must:

1. Be designed to directly measure condenser pressure or temperature by means of a sensor, and automatically adjust the airflow across the condenser(s) in a manner that maintains condensation at the rate required to maintain the thermal balance of the refrigeration system under different operating loads and weather conditions.

2. Allow the compressor discharge (head) pressure to "float" with ambient temperature down to the minimum safe level for the particular refrigeration system.

3. Provide facilities that enable system managers to define separate temperature set points and alarm limits for each condenser being controlled.

4. Generate an alarm signal when the condensing pressure or temperature is in danger of straying outside, or has strayed outside, the predefined safe limits.

Table 3 Control of compressors
All products that are designed to directly control compressors must:
1. Be able to control the operation of at least two refrigeration compressors.
2. Incorporate automatic control algorithms that monitor rate of change in system suction pressure or refrigerant temperature to prevent compressors from unnecessarily being controlled to load or unload in response to small fluctuations in cooling demand.

Where:

- Automatic control may be implemented either directly by means of an analogue or digital signal connection, or indirectly by means of another control device or network.
- A mechanism is defined as "any sequence of pre-defined actions that performs a given function, where an action can be defined in hardware and/or software".
- An algorithm is defined as "a mechanism that is defined in software".
- The product's control strategy is the combination of automatic control functions, mechanisms and facilities specified for the particular equipment controlled. In this context, products may be pre-programmed in one of the following ways:
  a) One or more fixed control strategies that are designed to control a specific set of equipment that can be selected during commissioning.
  b) One or more flexible control strategies that can be configured to control different equipment, as part of a clearly defined commissioning procedure.
- Products that incorporate control strategies that are designed to control any type of equipment that is not directly related to refrigeration systems are not eligible.

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

Refrigerated Display Cabinets

Date added to ETL 2004 (Revised 2009).

1. Definition of Technology

Refrigerated display cabinets are products that are specifically designed to store and display chilled and/or frozen foodstuffs.

2. Technology Description

Refrigerated display cabinets are used to maintain foodstuffs and drinks at chilled and frozen temperatures. There are many different designs of refrigerated display cabinets, but all enable the customer to view the foodstuff stored in the cabinet, either through an opening in the cabinet, or through a transparent door or lid.

Refrigerated display cabinets are available in a range of different designs and efficiencies. The ECA scheme aims to encourage the purchase of higher efficiency products.

The ECA Scheme covers two categories of products:

- 'Plug in' refrigerated display cabinets with integral refrigeration systems (i.e. incorporating a compressor and condensing unit).
- 'Remote' refrigerated display cabinets that are designed to work with a non-integral refrigeration system (i.e. where the compressor and condenser, or all or parts of the refrigeration system are located at a different location from the cabinet).

Investments in refrigerated display cabinets 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be designed to display chilled and/or frozen foodstuffs, whilst maintaining them within prescribed temperature limits.
- Conform to one of the temperature classifications in Table 1 when tested to BS EN ISO 23953-2:2005 in climate class III (25°C, 60% RH).
- Be classified in accordance with the precise 5 digit classification system set out in Annex A of BS EN ISO 23953-1:2005.
- Be CE marked.

Table 1. Classification according to temperature

Class	The highest temperature θ_{ah} of the warmest M-package equal to or lower than °C	The lowest temperature θ_b of the coldest M-package equal to or higher than °C	The lowest temperature θ_{al} of the warmest M-package equal to or lower than °C
L1	-15	-	-18
L3	-12	-	-15
M0*	+4	-1	-
M1	+5	-1	-
M2	+7	-1	-
H1	+10	+1	-
H2	+10	-1	-

*Note: All classes are as described in BS EN ISO 23953-2:2005, except M0, which is based upon recommendations from the British Refrigeration Association.

Performance Criteria

Products must have an Energy Efficiency Index (EEI) that is less than, or equal to, the threshold shown in Table 2 for the relevant temperature class and type of cabinet.

Table 2. Performance thresholds for refrigerated display cabinets

Classification according to temperature	EEI performance threshold (kWh/day/m^2)	
	Integral Type	Remote Type
L1	<= 19.10	<= 23.50
L3	n/a	<= 21.00
M0	<= 12.50	<= 11.75
M1	<= 11.95	<= 11.45
M2	<= 10.55	<= 10.85
H1	n/a	<= 8.00
H2	<= 9.20	<= 9.20

"<=" means "less than or equal to"

Where the Energy Efficiency Index (EEI) is defined as the ratio of the product's Total Energy Consumption (TEC) to Total Display Area (TDA) i.e. EEI = TEC/TDA, and:

- TEC is calculated according to BS EN ISO 23953-2:2005 section 5.3.6.3.4.
- TDA is calculated according to BS EN ISO 23953-2:2005 Annex A.

For the avoidance of doubt test data should be presented to 2 decimal places. As an example, a remote type M0 cabinet with an EEI performance threshold of 11.76 would be deemed to be a fail.

Required test procedures

All cabinets must be tested in a test room conforming to BS EN ISO 23953-2:2005.

During testing the cabinet shall comply with the conditions defined in BS EN ISO 23953-2:2005 with the following specifications:

- Section 5.3.2.7 – Lighting and night covers – section (b). Test data must not include tests with night blinds.
- Section 5.3.6 - Heat extraction rate measurement when condensing unit is remote from cabinet shall be calculated according to section 5.3.6.3.1, section (b) and 5.3.6.3.2 method $^{\emptyset}$run75.

The test report must be prepared in accordance with specification in BS EN ISO 23953-2:2005.

If the test report has not been prepared by an independent body, then evidence must be provided that a representative sample of product test data has been independently verified or cross-checked.

Representative Testing

Where applications are being made for two or more cabinet models that are variants of the same basic design, test data may be submitted for a single 'representative model' provided that have same precise 5 digit classification according to Annex A of BS EN ISO 23953-1:2005. The rules in Table 3 must be used to select the representative model that should be performance tested.

Table 3. Rules for selecting the representative model for performance testing

Variation between models	Selection rule
Cosmetic differences to the exterior	Any model may be selected to be the representative model.
Heaters (door, trim etc.), fans, defrosts, lighting and other accessories	The model with the greatest direct electrical energy consumption (DEC) must be the representative model.
Temperature level	The model with the lowest temperature setting must be the representative model.
Length	The representative model must be either 2.44 or 2.5 metres in length. This length of model can only be used to represent models between 1.8 m and 5m in length; and separate data must be submitted for each model outside of these limits.
Cabinet depth	The model with the greatest cabinet depth must be the representative model.
Shelves	The model with the lowest number of shelves must be the representative model.
Front-opening height (throat):	The model with the largest front-opening height (throat) must be the representative model.
Two or more of the above variations	The rules set out above must be combined when selecting the representative 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.

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

Solar Thermal Systems

Date added to ETL 2002 (Revised 2009).

1. Definition of Technology

Solar thermal systems are products that are specifically designed to capture solar energy and convert it to useful heat for water heating applications.

2. Technology Description

Solar thermal systems are an energy saving product that reduces the amount of fossil fuel consumed by conventional water heating plant. They are built around a solar collector that has a dark coloured absorbing surface, which traps solar radiation and converts it into heat. This heat is then transferred to a storage vessel by means of a circulating fluid, or in some instances, the solar collector could be directly connected into the heating circuit.

A solar thermal system either may be assembled by an installer using standard components from different suppliers, or a complete system may be purchased in kit form direct from a single manufacturer. To cover these options, the ECA Scheme covers two categories of product:

- Individual solar collectors for use in installer-assembled solar thermal systems.
- Complete, ready to install, fixed configuration, solar thermal systems.

Investments in solar thermal systems 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 must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must either:

- Use collectors that comply with the requirements of BS EN 12975-1:2006 “Thermal solar systems and components. Solar collectors. General requirements”; or
- Be sold as a complete, ready to install, fixed configuration, solar thermal system that complies with the requirements of BS EN 12976-1:2006 “Thermal solar systems and components. Factory made systems. General requirements”.

Where a solar thermal system may include the following components:

- One or more solar collectors.
- One or more appropriately sized storage vessels (where required).
- The pipework and valves forming the connection loop between the solar collector(s) and storage vessel(s), including any non-return valves, control valves, pressure relief valves, air bleed valves etc, as required for the effective operation of the product.
- Circulation pumps (where required).
- Any controls or sensors (and their associated power supplies) needed to:

  a) Stop circulation when the yield is low.

b) Ensure compliance with Health & Safety Executive (HSE) requirements.
c) Operate a drain down or a frost protection strategy (where required).

The following items shall not be considered to be part of a solar thermal system unless they are required to deliver the functionality outlined above:

- The pipework from the storage vessel(s) to the point of use.
- Any auxiliary tanks used to provide back-up heating to the solar thermal system.
- Any cold water tanks and associated pipework used to replace the water being consumed at the point of use.
- Any re-enforcement to roof or structure required to mount the solar thermal system.

Performance criteria

The solar collector within the product must:

- Achieve a minimum instantaneous efficiency of 50% for operating conditions of T*m = 0.05 (i.e. ambient temperature of 20°C, collector temperature 60°C and solar radiation 800W/m^2), where T*m is as defined in BS EN 12975-2:2006.
- Pass the reliability tests detailed in the standards specified in Table 1 below:

Table 1 – Requirements for reliability tests

Product Category	Applicable Standard
Individual solar collectors	BS EN 12975-2:2006 "Thermal Solar Systems and Components – Solar Collectors – Part 2 test methods"
Complete, ready to install, fixed configuration, solar thermal systems	BS EN 12976-2:2006 "Thermal solar systems and components — Factory made systems — Part 2: Test methods".

Required test procedures

All products must be tested in accordance with the procedures and test conditions laid down in the standards specified in the performance criteria 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 some of the direct costs of installation. Clarity on the eligibility of direct costs is available from HMRC.

Uninterruptible Power Supplies

Date added to ETL 2009.

1. Definition of Technology

Uninterruptible power supplies are products that are specifically designed to maintain the continuity and quality of a power supply to electrical appliances or electrically driven equipment. When the mains electricity supply is operating, they charge up an energy storage device, which can be used to provide electrical power for a defined period when the mains electricity supply is interrupted.

2. Technology Description

Uninterruptible power supplies are used to allow electrical equipment to continue operating when the mains power supply is interrupted for a period, or the quality of the power supply deteriorates. They are widely used throughout industry and commerce to maintain the safety critical and business critical systems located in process control stations, computer rooms, data centres and server areas.

Uninterruptible power supplies are available with a wide range of different efficiencies. The ECA Scheme aims to encourage the purchase of products with the highest efficiency.

The ECA Scheme covers two categories of products:

- Static uninterruptible power supply units or packages.
- Rotary uninterruptible power supply units or packages.

Investments in uninterruptible power supplies can only qualify for Enhanced Capital Allowances if the specific product is named on the Energy Technology Product List, and in order to be eligible for inclusion on the List, products must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

- Be one of the following categories of product:
    a) A static uninterruptible power supply as defined in BS EN 62040-3:2001.
    b) A rotary uninterruptible power supply as defined in IEC 88528-11: 2004.

- Include the following components (within the unit or package):
    a) An electronic control system that controls the operation of the product.
    b) Voltage inverter and rectifier devices.
    c) One or more energy storage devices.
    d) One or more power supply filters.
    e) A bypass switch (where required)
    f) A motor generator set (for rotary uninterruptible power supplies only).

- Be designed to be connected to, and to provide electrical power backup to, a three-phase electricity supply of nominally fixed frequency and voltage.
- Have an input power factor that is greater than or equal to (i.e. >=) 0.93 (lagging relative to unity).
- Have an input total harmonic distortion (THD) that is less than or equal to (i.e. <=) 5%.
- Be CE Marked.

Performance criteria

Eligible products must meet or exceed the minimum efficiencies at full and part load conditions set out in Table 1 below, which depends on the product category.

Table 1: Performance thresholds for uninterruptible power supplies

Product Category	Power range (kVA)	% of rated maximum power (i.e. % full load)			
		25%	50%	75%	100%
Static uninterruptible power supply units or packages	>10 and <= 200	>=92.5	>=93.5	>=93.5	>=93.5
	>200	>=90.4	>=93.0	>=93.8	>=93.5
Rotary uninterruptible power supply units or packages	>100	>=88.0	>=92.0	>=94.0	>=95.0

"<=" means "less than or equal to"
">" means "greater than"
">=" means "greater than or equal to"

For the avoidance of doubt, test data should be presented to one decimal place. As an example, a rotary uninterruptible power supply product with an efficiency of 91.9% when operating at 50% of its rated maximum power would be deemed to be a fail.

Required test procedures

Product performance must be tested in accordance with the procedures and standard rating conditions laid down in the following standards, depending on product category:

a) Static uninterruptible power supply units and packages.

- BS EN 62040-3:2001 (or IEC 62040-3:1999): "Uninterruptible power systems (UPS). Method of specifying the performance and test requirements".
- The performance tests must be carried out in accordance with Section 6, "Electrical tests for UPS" and using a non-linear test load as specified in Annex E, "Reference non-linear load". The test load must have a power factor that is greater than or equal to (>=) 0.8 lagging relative to unity.

b) Rotary uninterruptible power supply units and packages.

- IEC 88528-11: 2004, "*Reciprocating internal combustion engine driven alternating current generating set, Part 11: Rotary uninterruptible power systems, Performance requirements and test methods Rotary Uninterruptible Power Systems – Performance requirements and test methods, first edition 2004-03*".

- The performance tests must be carried out in accordance with Section 11.2.1 "Efficiency" and using a non-linear test load. The test load must have a power factor that is greater than or equal to (>=) 0.8 lagging relative to unity.

For both static and rotary uninterruptible power supplies, the package tested must exclude additional isolation transformers that are not physically incorporated into the uninterruptible power supply unit or package, switchgear and low voltage switchboards, or the generation set. Any static bypass switches fitted must be in the 'open' position.

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

Appendices: Claim Values

Air to Air Energy Recovery Devices

The claim values for air to air energy recovery are:

Plate heat exchangers	
Air flow rate m3/second	**Claim value**
< 1	£2,070
1 to 5	£1,800 per m^3/second
5 to 10	£1,660 per m^3/second
>10	£1,520 per m^3/second

Thermal wheels	
Air flow rate m3/second	**Claim value**
< 1	£2,480
1 to 5	£2,480 per m3/second
5 to 10	£2,070 per m3/second
>10	£1,520 per m3/second

Run around coils	
Air flow rate m3/second	**Claim value**
< 1	£1,520
1 to 5	£1,520 per m3/second
5 to 10	£1,240 per m3/second
>10	£970 per m3/second

Boiler Equipment

Automatic Boiler Blowdown Control Equipment

The claim values for automatic boiler blowdown control equipment are:

Product type	Claim value
Automatic boiler blowdown control equipment	£2,500 plus £2,500 per blowdown valve controlled.

Burners with Controls

The claim values for burners with controls are:

Maximum Rating kW	Claim value £
100	1,100
200	3,100
300	4,600
400	5,700
500	6,600
600	7,200
700	7,800
800	8,300
900	8,700
1,000	9,100
1,100	9,500
1,200	9,800
1,300	10,100
1,400	10,300
1,500	10,600
2,000	11,600
2,500	12,400
3,000	13,100
3,500	13,700
4,000	14,100
4,500	14,600
5,000	15,000
5,500	15,400
6,000	15,700
6,500	16,000
7,000	16,300
7,500	16,600
8,000	16,800
8,500	17,100
9,000	17,300
9,500	17,600
10,000	17,800
11,000	18,200
12,000	18,600
13,000	18,900
14,000	19,200

Maximum Rating kW	Claim value £
15,000	19,500
16,000	19,800
17,000	20,100
18,000	20,400
19,000	20,600
20,000	20,900
21,000	21,100
22,000	21,300
23,000	21,600
24,000	21,800
25,000	22,000
26,000	22,200
27,000	22,400
28,000	22,500
29,000	22,700
30,000	22,900
31,000	23,100
32,000	23,200
33,000	23,400
34,000	23,500
35,000	23,700
36,000	23,900
37,000	24,000
38,000	24,100
39,000	24,300
40,000	24,400
41,000	24,600
42,000	24,700
43,000	24,800
44,000	25,000
45,000	25,100
46,000	25,200
47,000	25,300
48,000	25,400
49,000	25,600
50,000	25,700

Where the specific product rating (in net thermal output terms) is not listed in the table above, purchasers should use the claim value for the nearest available rating.

Combustion Trim Controls

The claim values for combustion trim controls are:

Product category	Claim value
Standalone control units	£4,000 plus £1,000 per oxygen, carbon dioxide, or carbon monoxide sensor installed in burner exhaust gases (flue)
'Add-on' control modules	£2,500 plus £1,000 per oxygen, carbon dioxide, or carbon monoxide sensor installed in burner exhaust gases (flue).
Upgrade packages	£2,500 plus £1,000 per oxygen, carbon dioxide, or carbon monoxide sensor installed in burner exhaust gases (flue).

Gas-Fired Condensing Water Heaters

Maximum Duty (kW)	Claim Value
Up to 25	£1,700
Over 25 to 50	£3,300
Over 50 to 100	£5,600
Over 100 to 150	£6,800
Over 150 to 200	£9,600
Over 200 to 250	£12,600
Over 250 to 300	£14,700
Over 300 to 400	£18,000
Over 400 to 500	£21,600
Over 500 to 600	£24,600
Over 600 to 700	£28,600
Over 700 to 800	£29,900
Over 800 to 900	£30,700
Over 900 to 1,000	£32,800
Over 1,000 to 2,000	£60,000
Over 2,000 to 3,000	£70,600
Over 3,000 to 4,000	£81,300
Over 4,000 to 5,000	£82,000
Over 5,000 to 6,000	£88,800
Over 6,000 to 7,000	£94,000
Over 7,000 to 8,000	£105,100
Over 8,000 to 9,000	£109,900
Over 9,000 to 10,000	£115,600
Over 10,000 to 11,000	£123,000
Over 11,000 to 12,000	£129,700
Over 12,000 to 13,000	£136,300
Over 13,000 to 14,000	£143,000
Over 14,000 to 15,000	£149,600
Over 15,000 to 16,000	£156,400
Over 16,000 to 17,000	£163,000
Over 17,000 to 18,000	£169,700
Over 18,000 to 19,000	£176,400
Over 19,000 to 20,000	£183,000
Over 20,000 to 21,000	£189,700
Over 21,000 to 22,000	£196,300
Over 22,000 to 23,000	£203,000

Over 23,000 to 24,000	£209,600
Over 24,000 to 25,000	£216,400
Over 25,000 to 26,000	£223,000
Over 26,000 to 27,000	£229,700
Over 27,000 to 28,000	£236,300
Over 28,000 to 29,000	£243,000
Over 29,000 to 30,000	£249,700
Over 30,000 to 31,000	£256,300
Over 31,000 to 32,000	£263,000
Over 32,000 to 33,000	£269,600
Over 33,000 to 34,000	£276,400
Over 34,000 to 35,000	£283,000
Over 35,000 to 36,000	£289,700
Over 36,000 to 37,000	£296,300
Over 37,000 to 38,000	£303,000
Over 38,000 to 39,000	£309,700
Over 39,000 to 40,000	£316,300
Over 40,000 to 41,000	£323,000
Over 41,000 to 42,000	£329,600
Over 42,000 to 43,000	£336,400
Over 43,000 to 44,000	£343,000
Over 44,000 to 45,000	£349,700
Over 45,000 to 46,000	£356,300
Over 46,000 to 47,000	£363,000
Over 47,000 to 48,000	£369,600
Over 48,000 to 49,000	£376,300
Over 49,000 to 50,000	£383,000

Hot Water Boilers Over 400 kW

The claim values for hot water boilers over 400kW are:

Rated thermal output (kW)	Claim value
Over 400 to 500	£21,600
Over 500 to 600	£24,600
Over 600 to 700	£28,600
Over 700 to 800	£29,900
Over 800 to 900	£30,700
Over 900 to 1,000	£32,800
Over 1,000 to 2,000	£60,000
Over 2,000 to 3,000	£70,600
Over 3,000 to 4,000	£81,300
Over 4,000 to 5,000	£82,000
Over 5,000 to 6,000	£88,800
Over 6,000 to 7,000	£94,000
Over 7,000 to 8,000	£105,100
Over 8,000 to 9,000	£109,900
Over 9,000 to 10,000	£115,600
Over 10,000 to 11,000	£123,000
Over 11,000 to 12,000	£129,700
Over 12,000 to 13,000	£136,300
Over 13,000 to 14,000	£143,000
Over 14,000 to 15,000	£149,600
Over 15,000 to 16,000	£156,400
Over 16,000 to 17,000	£163,000
Over 17,000 to 18,000	£169,700
Over 18,000 to 19,000	£176,400
Over 19,000 to 20,000	£183,000
Over 20,000 to 21,000	£189,700
Over 21,000 to 22,000	£196,300

Over 22,000 to 23,000	£203,000
Over 23,000 to 24,000	£209,600
Over 24,000 to 25,000	£216,400
Over 25,000 to 26,000	£223,000
Over 26,000 to 27,000	£229,700
Over 27,000 to 28,000	£236,300
Over 28,000 to 29,000	£243,000
Over 29,000 to 30,000	£249,700
Over 30,000 to 31,000	£256,300
Over 31,000 to 32,000	£263,000
Over 32,000 to 33,000	£269,600
Over 33,000 to 34,000	£276,400
Over 34,000 to 35,000	£283,000
Over 35,000 to 36,000	£289,700
Over 36,000 to 37,000	£296,300
Over 37,000 to 38,000	£303,000
Over 38,000 to 39,000	£309,700
Over 39,000 to 40,000	£316,300
Over 40,000 to 41,000	£323,000
Over 41,000 to 42,000	£329,600
Over 42,000 to 43,000	£336,400
Over 43,000 to 44,000	£343,000
Over 44,000 to 45,000	£349,700
Over 45,000 to 46,000	£356,300
Over 46,000 to 47,000	£363,000
Over 47,000 to 48,000	£369,600
Over 48,000 to 49,000	£376,300
Over 49,000 to 50,000	£383,000
For each additional 1,000kW	Add £6,500 to above claim value

Hot Water Boilers Up To 400 kW

The claim values for hot water boilers up to 400 kW are:

Rated thermal output (kW)	Claim value
Up to 25	£1,700
Over 25 to 50	£3,300
Over 50 to 100	£5,600
Over 100 to 150	£6,800
Over 150 to 200	£9,600
Over 200 to 250	£12,600
Over 250 to 300	£14,700
Over 300 to 400	£18,000

Localised Rapid Steam Generators

The claim values for localised rapid steam generators are:

Rated thermal output (kW)	Claim value
Up to 100	£14,000
Over 100 to 150	£14,600
Over 150 to 200	£15,700
Over 200 to 250	£16,900
Over 250 to 300	£18,200
Over 300 to 350	£19,600
Over 350 to 400	£21,200
Over 400 to 450	£22,800
Over 450 to 500	£32,600
Over 500 to 600	£33,800
Over 600 to 700	£35,000
Over 700 to 800	£36,300
Over 800 to 900	£37,600
Over 900 to 1,000	£49,600
Over 1,000 to 1,500	£50,400
Over 1,500 to 2,000	£51,600
Over 2,000 to 2,500	£52,800
Over 2,500 to 3,000	£54,100
Over 3,000 to 3,500	£55,300
Over 3,500 to 4,000	£56,500
Over 4,000 to 4,500	£57,800
Over 4,500 to 5,000	£59,000
Over 5,000 to 6,000	£60,800
Over 6,000 to 7,000	£63,300
Over 7,000 to 8,000	**£65,800**
Over 8,000 to 9,000	£68,200

Over 9,000 to 10,000	£70,700
For each additional 1,000kW	Add £2,500 to above claim value.

Optimising Controls for Wet Heating Systems

The claim values for optimising controls for wet heating systems are:

Product category	Claim value
Standalone units	£1,000 plus £500 per zone controlled
'Add-on' modules	£500 plus £500 per zone controlled
Packaged products	£1,000 plus £500 per zone controlled

Retrofit Burner Control Systems

The claim values for retrofit burner control systems are:

Product category	Claim value
Retrofit burner control systems	£4,000 plus £250 per precision control valve or modulating fuel valve fitted.

Claim values for variable speed drives are published separately.

Sequence Controls

The claim values for sequence controls are:

Product category	Claim value
Standalone units	£5,000 plus £1,000 per boiler directly controlled
'Add-on' modules	£2,500 plus £1,000 per boiler directly controlled
Packaged products	£5,000 plus £1,000 per boiler directly controlled

Steam Boilers

The claim values for steam boilers are:

Rated thermal output (kW)	Claim value
Up to 25	£11,400
Over 25 to 50	£11,900
Over 50 to 100	£12,800
Over 100 to 150	£13,700
Over 150 to 200	£14,500
Over 200 to 250	£15,400
Over 250 to 300	£16,200
Over 300 to 400	£17,800
Over 400 to 500	£19,400
Over 500 to 600	£21,000
Over 600 to 700	£22,500
Over 700 to 800	£24,000
Over 800 to 900	£25,400
Over 900 to 1,000	£26,900
Over 1,000 to 2,000	£40,300
Over 2,000 to 3,000	£52,500
Over 3,000 to 4,000	£63,900
Over 4,000 to 5,000	£74,800
Over 5,000 to 6,000	£85,300
Over 6,000 to 7,000	£95,400
Over 7,000 to 8,000	£105,200
Over 8,000 to 9,000	£114,800
Over 9,000 to 10,000	£124,100
Over 10,000 to 11,000	£133,200
Over 11,000 to 12,000	£142,200
Over 12,000 to 13,000	£151,000

Over 13,000 to 14,000	£159,600
Over 14,000 to 15,000	£168,100
Over 15,000 to 16,000	£176,500
Over 16,000 to 17,000	£184,800
Over 17,000 to 18,000	£193,000
Over 18,000 to 19,000	£201,100
Over 19,000 to 20,000	£209,100
Over 20,000 to 21,000	£217,000
Over 21,000 to 22,000	£224,800
Over 22,000 to 23,000	£232,600
Over 23,000 to 24,000	£240,300
Over 24,000 to 25,000	£247,900
Over 25,000 to 26,000	£255,400
Over 26,000 to 27,000	£262,900
Over 27,000 to 28,000	£270,300
Over 28,000 to 29,000	£277,700
Over 29,000 to 30,000	£285,000
Over 30,000 to 31,000	£292,200
Over 31,000 to 32,000	£299,400
Over 32,000 to 33,000	£306,600
Over 33,000 to 34,000	£313,700
Over 34,000 to 35,000	£320,800
Over 35,000 to 36,000	£327,800
Over 36,000 to 37,000	£334,700
Over 37,000 to 38,000	£341,700
Over 38,000 to 39,000	£348,600
Over 39,000 to 40,000	£355,400
Over 40,000 to 41,000	£362,200
Over 41,000 to 42,000	£369,000
Over 42,000 to 43,000	£375,800

Over 43,000to 44,000	£382,500
Over 44,000 to 45,000	£389,100
Over 45,000 to 46,000	£395,800
Over 46,000 to 47,000	£402,400
Over 47,000 to 48,000	£409,000
Over 48,000 to 49,000	£415,500
Over 49,000 to 50,000	£422,100
For each additional 1,000 kW	Add £6,500 to above claim value

Compressed Air Equipment

Energy Saving Controls for Desiccant Air Dryers

The claim values for energy saving controls for desiccant air dryers are:

Product category	Claim value
Standalone type energy savings controls for desiccant dryers sold with own power supply	£2,000
Other types of energy savings controls for desiccant dryers, including add-on modules	£1,500

Master Controllers

The claim values for master controllers are:

Product category	Claim value
Master controllers	£3,400 plus £560 per variable speed compressor controlled AND £330 per fixed speed compressor controlled.

Heating, Ventilation and Air Conditioning (HVAC) Equipment

Heating, Ventilation and Air Conditioning (HVAC) Zone Controls

The claim values for HVAC zone controls are:

Product category	Claim value
Standalone zone control units	£500 per zone controlled
Centralised zone control units	£1,500 plus £500 per zone controlled AND £1,000 per item of centralised HVAC plant controlled (for example: boilers, chillers and air handing units).
Packaged zone control products	£500 per zone controlled plus £1,000 per item of centralised HVAC plant controlled (for example: boilers, chillers and air handing units).
'Add-on' zone control modules	£500 plus £500 per zone controlled

Motors and Drives

Single Speed Motors

The claim values for single speed motors are:

Electrical power rating (kW)	Claim value							
	STANDARD				FLAMEPROOF (EEx d or EEx de)			
	2 pole	4 pole	6 pole	8 pole	2 pole	4 pole	6 pole	8 pole
1.1 kW	£283	£256			£771	£601		
1.5 kW	£316	£298			£798	£669		
2.2 kW	£376	£353			£935	£768		
3 kW	£456	£422			£1,040	£956		
4 kW	£543	£486			£1,256	£1,106		
5.5 kW	£704	£615	£1,042	£1,575	£1,576	£1,410	£2,074	£2,962
7.5 kW	£842	£823	£1,585	£2,223	£1,900	£1,753	£2,739	£3,841
11 kW	£1,260	£1,197	£2,075	£3,244	£2,543	£2,366	£3,588	£5,335
15 kW	£1,498	£1,424	£2,748	£3,570	£2,783	£2,769	£4,727	£6,195
18.5 kW	£1,744	£1,719	£3,044	£4,174	£3,216	£3,406	£5,376	£7,121
22 kW	£2,112	£1,953	£3,380	£4,706	£3,809	£3,694	£5,759	£9,162
30 kW	£2,683	£2,395	£4,758	£5,830	£4,705	£4,734	£7,610	£10,090
37 kW	£3,114	£3,379	£5,527	£7,027	£6,049	£5,969	£9,067	£11,794
45 kW	£4,321	£3,936	£5,946	£7,993	£7,776	£7,511	£10,785	£15,106
55 kW	£4,933	£4,518	£7,353	£9,180	£9,748	£8,973	£13,756	£16,470
75 kW	£6,089	£5,578	£8,958	£10,427	£12,550	£10,025	£15,551	£18,642
90 kW	£7,476	£6,862	£10,052	£11,466	£15,770	£12,825	£17,971	£19,886
110 kW	£9,008	£8,177	£11,328	£14,094	£18,453	£14,382	£19,085	£24,823
132 kW	£9,910	£9,007	£13,473	£16,985	£21,153	£16,652	£22,222	£28,586
150 kW	£10,044	£9,152	£13,719	£16,214	£21,861	£16,913	£24,130	£34,023
160 kW	£11,988	£10,316	£14,040	£17,064	£22,918	£17,363	£26,028	£39,863
185 kW	£13,428	£11,538	£15,590	£20,780	£25,771	£19,993	£28,813	£39,436
200 kW	£14,359	£12,802	£16,404	£23,525	£27,804	£21,990	£30,631	£37,639
250 kW	£18,118	£14,553	£19,963	£26,877	£33,942	£26,835	£37,096	£45,258
280 kW	£20,081	£16,303	£20,613		£37,901	£29,806	£40,953	£48,735
315 kW	£21,803	£18,408	£22,415		£41,950	£32,870	£45,041	£54,900
355 kW	£24,255	£19,048			£43,583	£35,820	£49,590	£61,830
375 kW	£26,554	£19,691			£47,666	£38,070	£53,460	
400 kW	£28,852	£20,334			£51,750	£40,320	£57,330	

Where the specific electrical power rating of the product is not listed in the table above, purchasers should use the claim value for nearest available rating above the product's rating.

Variable Speed Drives

The claim values for variable speed drives are:

Single phase input	
Electrical power rating (kW)	**Claim value**
Up to 0.37	£197
0.55	£218
0.75	£254
1.1	£302
1.5	£330
2.2	£418

Three phase input		
Electrical power rating	**Electricity supply voltage**	
kW	**Up to 690 Volts**	**Over 690 Volts**
Up to 0.75	£462	
1.1	£533	
1.5	£533	
2.2	£655	
2.2	£655	
3	£748	
4	£878	
5.5	£1,181	
7.5	£1,587	
11	£1,854	
15	£2,432	
18.5	£3,002	
22	£3,502	
30	£3,956	
37	£4,698	
45	£5,242	
55	£6,999	
75	£7,899	
90	£9,642	
110	£10,570	
132	£12,157	
150	£14,538	
160	£14,538	

250	£19,481	
315	£24,155	
500	£27,899	£64,300
750	£30,156	£73,300
1,000	£32,229	£86,600
1,250	£38,327	£99,400
1,500	£48,743	£114,100
1,750	£53,996	£125,100
2,000	£66,027	£134,000
2,250	£75,387	£146,700
2,500	£86,668	£160,600
3,000		£176,100
3,500		£190,000
4,000		£209,000
4,500		£229,100
5,000		£251,100
5,500 or above		£261,700

Where the specific electrical power rating of the product is not listed in the table above, purchasers should use the claim value for nearest available rating to the product's rating.

Switched Reluctance Drives

The claim values for switched reluctance drives are:

Electrical power rating (kW)	Claim value
1.1	£830
1.5	£863
2.2	£1,048
3	£1,223
4	£1,443
5.5	£1,915
7.5	£2,470
11	£3,162
15	£3,992
18.5	£4,823
22	£5,704
30	£6,740
37	£7,932
45	£9,697
55	£12,111
75	£14,191
90	£17,365
110	£19,849
132	£22,379
150	£24,955
160	£31,968
185	£33,408
200	£34,339
250	£42,892
280	£44,855
315	£50,417
355	£52,869
375	£55,168
400	£57,466
For each additional kW	Add £150 to above claim value

Where the specific electrical power rating of the product is not listed in the table above, purchasers should use the claim value for nearest available rating above the product's rating.

Integrated Motor Drive Units

The claim values for integrated motor drive units are:

Single phase input	
Electrical power rating (kW)	**Claim value**
Up to 0.25	£390
0.37	£420
0.55	£520
0.75	£559
1.1	£619
1.5	£690
2.2	£837

Three phase input	
Electrical power rating (kW)	**Claim value**
Up to 0.55	£650
0.75	£699
1.1	£774
1.5	£863
2.2	£1,047
3	£1,210
4	£1,466
5.5	£1,728
7.5	£2,034
11	£2,410
15	£2,995
18.5	£3,740
22	£4,330.
For each additional kW	Add £175 to above claim value

Where the specific electrical power rating of the product is not listed in the table above, purchasers should use the claim value for nearest available rating above the product's rating.

Radiant and Warm Air Heaters

Radiant Heating Equipment

The claim values for radiant heating equipment are:

Product category	Claim value
Standalone unit type optimising controllers for radiant heating systems	£1,000 plus £500 per zone controlled
'Add-on' module type optimising controllers for radiant heating systems	£500 plus £500 per zone controlled

Warm Air Heating Equipment

The claim values for warm air heating equipment are:

Product category	Claim value
Standalone unit type optimising controllers for warm air heating systems	£1,000 plus £500 per zone controlled
'Add-on' module type optimising controllers for warm air heating systems	£500 plus £500 per zone controlled

Refrigeration Equipment

Automatic Air Purgers

The claim values for automatic air purgers are:

Number of purge points	Claim value
1	5,000
2	6,100
3	7,200
4	8,300
5	9,600
6	10,600
7	12,000
8	13,100
9	14,200
10	15,300
11	16,200
12	16,900
13	17,400
14	18,000
15	18,500
16	19,000
For each additional purge point	Add £500 to above claim value

Automated Permanent Refrigerant Leak Detection Systems

The claim values for automated permanent refrigerant leak detection systems are:

Product type	Claim value
Stand alone single sensor system	£700
Central controller with 2 to 16 sensor probes	£8,000
Central controller with up to 32 sensor probes	£16,000
For each additional sensor probe	Add £500 to above claim value

Curtains, Blinds, Sliding Doors and Covers for Refrigerated Display Cabinets

The claim values for curtains, blinds, sliding doors and covers for refrigerated display cabinets are:

<table>
<tr><th>Product type</th><th colspan="4">Claim value</th></tr>
<tr><td>Strip curtains</td><td colspan="4">£60 per metre wide</td></tr>
<tr><td>Electrically operated night blinds</td><td colspan="4">£150 per metre wide</td></tr>
<tr><td>Manually operated night blinds</td><td colspan="4">£50 per metre wide</td></tr>
<tr><td>Chest freezer transparent covers</td><td colspan="4">£135 for a 1.5 metre long freezer
£200 for a 2 metre long freezer</td></tr>
<tr><td rowspan="4">Transparent sliding doors</td><td rowspan="2">Length (metres)</td><td colspan="3">Width (metres)</td></tr>
<tr><td>0.5-1</td><td>1.1-1.5</td><td>1.6-2</td></tr>
<tr><td>1.5-2</td><td>£390</td><td>£475</td><td>£555</td></tr>
<tr><td>2.1-3</td><td>£475</td><td>£610</td><td>£720</td></tr>
<tr><td></td><td>3.1-4</td><td>£555</td><td>£720</td><td>£970</td></tr>
</table>

Evaporative Condensers

The claim values for evaporative condensers are:

Heat rejection capacity (kW)*	Claim value
Up to 200	£15,500
Over 200 to 500	£23,000
Over 500 to 1,000	£28,500
Over 1,000 to 1,500	£33,750
Over 1,500 to 2,000	£39,000
Over 2,000 to 2,500	£45,125
Over 2,500 to 3,000	£51,250
Over 3,000 to 3,500	£57,500
Over 3,500 to 4,000	£63,500
Over 4,000 to 4,500	£67,375
Over 4,500 to 5,000	£71,250
Over 5,000 to 5,500	£75,125
Over 5,500 to 6,000	£79,000
For each additional 500 kW	Add £3,500 to above claim value

Note: Heat rejection capacity as measured at a rating condition of 40°C condensing temperature and 25°C wet bulb ambient temperature.

Liquid Pressure Amplification

The claim values for liquid pressure amplification are:

Electrical rating of drive motor (W)	Claim value
Up to 30	£4,800
Over 30 to 100	£5,500
Over 100 to 130	£6,300
Over 130 to 250	£7,500
Over 250 to 370	£9,400
Over 370 to 500	£11,400

Refrigeration Compressors

The claim values for refrigeration compressors are:

Reciprocating and Screw Compressors		
Compressor Displacement (m3/hr)	**Claim value for hermetically sealed reciprocating compressors**	**Claim value for semi-hermetic compressors and semi-hermetic economiser packages**
Over 9 to 18	£700	£1,800
Over 18 to 58		**£3,900**
Over 58 to 100		£6,600
Over 100 to 160		£9,600
For each additional 1 m3/h		Add £60 to above claim value

Scroll Compressors		
Compressor Displacement (m3/hr)	**Claim value for hermetic scroll compressors**	**Claim value for hermetic scroll economiser packages**
Over 9 to 16	£900	£1,000
Over 16 to 55	£2,100	£2,300
Over 55 to 65	£3,300	£3,600
Over 65	£4,500	£5,000

Refrigeration System Controls

The claim values for refrigeration system controls are:

Product category	Claim value
System management units or packages	£10,000 plus: £500 per compressor pack controlled AND £250 per evaporator controlled AND £500 per condenser controlled AND £250 per energy meter monitored AND £100 per refrigerated case/cabinet/cold room configured for defrost on demand control
'Add-on' controllers	£500 per compressor pack controlled AND £250 per evaporator controlled AND £500 per condenser controlled

Refrigerated Display Cabinets

The claim values for refrigerated display cabinets are:

Product type	Claim value
Integral chilled semi-vertical (IVC1x)	£1,435 per metre length
Integral chilled multi-deck (IVC2x)	£1,435 per metre length
Integral chilled vertical glass door (IVC4x)	£1,800 per metre width
Remote chilled semi-vertical (RVC1x)	£1,640 per metre length
Remote chilled multi-deck (RVC2x)	£1,640 per metre length
Remote chilled vertical glass door (IRVC4x)	£1,800 per metre width

Uninterruptible Power Supplies

The claim values for uninterruptible power supplies are:

Static Uninterruptible Power Supplies	
Rating (kVA)	**Claim value**
10	£3,415
20	£6,831
30	£7,536
40	£8,241
50	£10,302
60	£12,362
70	£14,422
80	£16,483
90	£18,543
100	£13,211
110	£14,533
120	£15,854
130	£17,175
140	£18,496
150	£19,817
160	£21,138
170	£22,459
180	£23,780
190	£25,102
200	£22,674
210	£23,807
220	£24,941
230	£26,075
240	£27,208
250	£28,342
260	£29,476
270	£30,609
280	£31,743
290	£32,877
300	£34,010

Rotary Uninterruptible Power Supplies	
Rating (kVA)	**Claim value**
200	£79,794
210	£83,784
220	£87,773
230	£91,763
240	£95,753
250	£99,742
260	£103,732
270	£107,722
280	£111,712
290	£115,701
300	£119,691
310	£123,681
320	£127,670
340	£135,650
350	£139,639
360	£143,629
370	£147,619
380	£151,608
390	£155,598
400	£159,588
410	£163,578
420	£167,567
430	£171,557
440	£175,547
450	£179,536
460	£183,526
470	£187,516
480	£191,505
490	£195,495
500	£199,485

Where the specific rating of the product is not listed in the table above, purchasers should use the claim value for nearest available rating to the product's rating.