CARBON TRUST

Radiant heating equipment

A guide to equipment eligible for Enhanced Capital Allowances

Contents

Introduction

Enhanced Capital Allowances (ECAs) are a straightforward way for a business to improve its cash flow through accelerated tax relief. The scheme encourages businesses to invest in energy saving plant or machinery specified in the Energy Technology List (ETL) to help reduce carbon emissions, which contribute to climate change.

The ETL is a register of products that may be eligible for 100% tax relief under the ECA scheme for energy saving technologies[1]. The Carbon Trust manages the list and promotes the ECA scheme on behalf of government.

This leaflet gives an overview of radiant heating equipment specified on the ETL and illustrates the reductions in energy bills that can be realised by investing in qualifying ETL energy saving equipment over non-qualifying equipment.

Background

The ETL comprises two lists: the Energy Technology Criteria List (ETCL) and the Energy Technology Product List (ETPL). The ETCL defines the performance criteria that equipment must meet to qualify for ECA scheme support; the ETPL is the list of products that have been assessed as being compliant with ETCL criteria.

Setting the scene

Typically 35% of the heated air in commercial buildings is lost through ventilation and air infiltration[2]. In large industrial buildings with high ventilation rates, the proportion can be even higher, particularly where there is local exhaust ventilation for fume control. Radiant heating reduces these energy losses by heating the occupants, not the air. This means that the air temperature, and hence the energy lost through ventilation, is significantly lower than in a building heated by fan convectors or low temperature radiators.

Typical applications for radiant heating include retail sheds (particularly DIY outlets), sports centres, warehouses, factories, workshops and animal houses.

Did you know?

As a rule of thumb, every 1°C reduction in air temperature through the use of radiant heating will produce a 5% to 10% reduction in annual energy consumption.

Benefits of purchasing ETL listed products

To be listed in the ETL, radiant heating products must meet minimum efficiency criteria that are verified by independent test laboratories. This means that listed products are more energy efficient than products that do not meet this criteria.

When replacing equipment, businesses are often tempted to opt for that with the lowest capital cost; however, such immediate cost savings can prove to be a false economy. Considering the life cycle cost before investing in equipment can help reduce costs and improve cash flow in the longer term.

The ECA scheme provides businesses with 100% first year tax relief on their qualifying capital expenditure. This means that businesses can write off the whole cost of the equipment against taxable profits in the year of purchase. This can provide a cash flow boost and an incentive to invest in energy saving equipment which normally carries a price premium when compared to less efficient alternatives.

This leaflet also illustrates the reductions in energy consumption, carbon emissions and energy bills that can be realised by investing in qualifying ETL energy saving equipment over non-qualifying equipment.

Important

Businesses purchasing equipment must check the ETPL at the time of purchase in order to verify that the named product they intend to purchase is designated as energy saving equipment. Radiant heating equipment that meets ETL eligibility criteria but is not listed on the Energy Technology Product List (ETPL) at the time of purchase is not eligible for an ECA.

Radiant heating equipment eligible under the ECA scheme[3]

There are two types of radiant heating equipment that are covered by the ECA scheme:

- Radiant tube heaters, including:
  - Unitary radiant tube heaters
  - Multi-burner radiant tube heaters
  - Continuous radiant tube heaters
- Radiant plaque and cone heaters.

Plus optimising controllers to ensure radiant heating systems operate in an efficient manner.

Using the baseline scenario below, the potential financial (£), energy (kWh) and carbon savings (tonnes CO_2) have been calculated for comparison unless otherwise indicated:

- The ECA product is 5% more efficient than the standard product but 10% more expensive to purchase.
- Replacement of a conventional factory air heating system with a radiant tube heater rated at 800kW.
- The gas price is 3p/kWh.
- Gas consumption is based on single shift working (10 hours per day during the heating season).

Radiant tube heaters

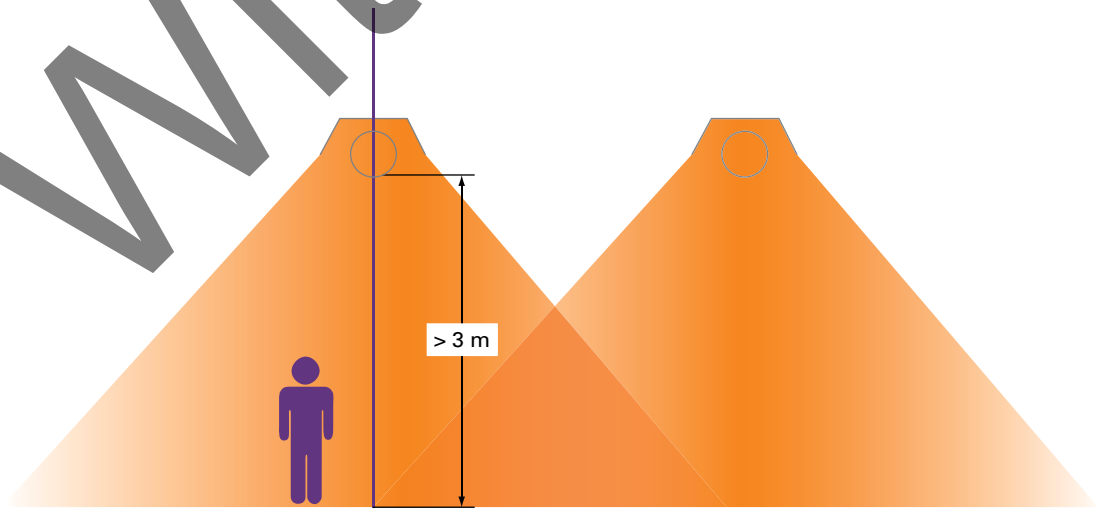
A radiant tube heater consists of a steel tube with a gas burner at one end of the tube and a flue gas fan at the other. The tube is surmounted by a metal reflector to produce a cone of radiant heat, as shown in Figure 1. As gas is burned, the temperature of the tube increases (up to 500ºC) and it radiates heat. This heat radiation is directed downwards to heat the occupants of the space, much in the same way as light from a fluorescent tube. The radiant heater tubes are usually mounted on the ceiling and must be designed to be mounted above head height to be eligible for an ECA.

Did you know?

If your building is subject to high ventilation rates then installing an ETL listed radiant heating system could help reduce your heating costs by up to 20% compared with conventional air heating systems[4].

Within the radiant tube heater category, there are three basic types of radiant tube heating included on the ETL. These are described on the next page.

Figure 1 Schematic showing cone of radiant heat produced from radiant tube heaters

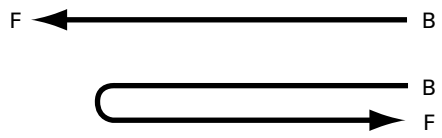


Source: Radiant tube heating, BSRIA

Unitary radiant tube heaters

These consist of a single tube with one burner (13kW to 50kW input) and one fan. They are either linear or bent into a U-shape (so that the burner and flue gas fan are at the same end). Different tube lengths correspond to different heat outputs. Up to 20 unitary radiant tubes are commonly used to heat a space, but more may be used.

Figure 2 Plan view of unitary radiant tube heater (not to scale)



B= Burner, F=Flue fan

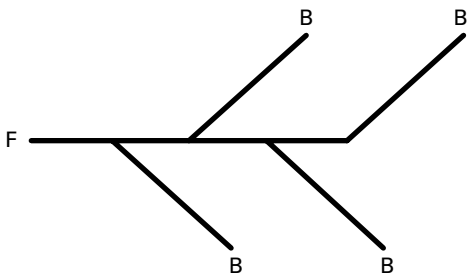
Figure 3 U-shaped unitary radiant tube heater

Source: Ambirad, Unitary radiant tube heater

Multi-burner radiant tube heaters

This is an assembly of radiant tubes, each with its own burner but connected to a common flue system. The component tubes and burners are commonly of the same structure as for unitary radiant tube products.

Figure 4 Plan view of multi-burner radiant tube heaters (not to scale)



B= Burner, F=Flue fan

Continuous radiant tube heaters

These consist of a long radiant tube fitted with several burners along its length and a common flue gas fan at the end. The multiple burners ensure that the tube's working temperature is maintained along its entire length, which may be more than 100 metres. The tube can be straight or bent in the horizontal plane to fit the space. In some cases, multiple branches of continuous radiant tube may be connected to a single flue gas fan.

Figure 5 Plan view of continuous radiant tube heater (not to scale)

B= Burner, F=Flue fan, and V= Air vent

Figure 6 Continuous radiant tube heaters along the length of a large building

Source: Ambirad, Continuous radiant tube heater

Installing an ETL listed radiant tube system with a cost of £40,975 rather than a non-specified product with a cost of £37,250, with respective annual running costs of £26,676 and £28,080, the potential annual savings are:

- £1,404.
- 46,800kWh.
- 8.6 tonnes CO_2.

Radiant plaque and cone heaters

For radiant plaque and cone heaters, a radiant emission is generated by an exposed flame passing over a catalytic matrix, the 'radiant matrix'. This becomes extremely hot (up to 950°C) resulting in an intense radiant source that is used mainly for local or spot heating.

Plaque heaters (8kW to 40kW input) have a plaque shaped radiant matrix (see below). They can be suspended or fixed to walls or pillars surrounding the occupied space.

Cone heaters (6kW-12kW input) have a cone shaped radiant matrix, surmounted by a circular reflector. They are designed for suspension from the roof.

***Figure 7** Radiant plaque heater*

Source: BSRIA

Installing 100kW of ETL listed radiant plaque heaters at a cost of £5,500 rather than a non-specified product with a cost of £5,000, with a respective annual running cost of £3,335 and £3,510 the potential annual savings are:

- £175.
- 5,833kWh.
- 1.1 tonnes CO_2.

***Figure 8** Radiant cone heater*

Source: BSRIA

Optimising controllers

These include both standalone unit and add-on module type products and ensure radiant heating systems operate in an efficient manner. These are pre-programmed to control the temperature in zones based on occupancy schedules and to switch the units off when their zones are unoccupied.

Information for purchasers

For further information about the ECA scheme, the Energy Technology List (ETL) and other Technology Information Leaflets in the series please visit http://etl.decc.gov.uk/etl or contact the Carbon Trust on +44 (0)300 330 0657 or email ECAQuestions@carbontrust.co.uk.

Go online to get more

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We have a library of free publications detailing energy saving techniques for a range of sectors and technologies. **www.carbontrust.com/resources**

↘ SME Network

An online community for SMEs with the aim of increasing the sharing of best practice between SMEs looking to reduce carbon emissions from their estate and operations. **http://smenetwork.carbontrust.com**

* Subject to terms and conditions.

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The Enhanced Capital Allowance Scheme for energy saving equipment is run by the Carbon Trust on behalf of Government.

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