



Department for  
Business, Energy  
& Industrial Strategy



**Energy Technology List**

## **Refrigeration Equipment: Commercial & Retail**

A guide to energy efficient equipment listed on the Energy Technology List (ETL)



# Contents

---



- 1. Introduction**
- 2. Setting the scene**
- 3. Commercial refrigeration equipment on the Energy Technology List**
  - Cellar cooling equipment
  - Professional refrigerated storage cabinets
  - Refrigerated display cabinets
  - Curtains, blinds, doors and covers for refrigerated display cabinets
  - Refrigeration compressors
  - Refrigeration system controls
- 4. Further information**



# Introduction



The ETL is a government register of energy saving products. When you select products from the list you are choosing from amongst the most energy efficient products in the marketplace.

When replacing equipment, businesses are often tempted to opt for equipment with the lowest capital cost. However, such immediate cost savings may prove to be a false economy. Considering higher energy efficient products, means that life cycle costs are reduced, improving cash flow in the longer term.

Businesses can also claim accelerated tax relief through the Annual Investment Allowance (AIA) for investments in plant and machinery equipment. The AIA has been temporarily increased to £1 million from January 2019.

**This leaflet illustrates the benefits of investing in commercial and retail refrigeration equipment which qualifies for the ETL.**

The ETL comprises two lists:

- **Energy Technology Criteria List:** defines the performance criteria that equipment must meet to qualify for the ETL;
- **Energy Technology Product List:** is the list of products that have been assessed as being compliant with ETL criteria.

Eligible refrigeration products on the ETL can be searched at:

[https://etl.beis.gov.uk/engetl/fox/live/ETL\\_PUBLIC\\_PRODUCT\\_SEARCH](https://etl.beis.gov.uk/engetl/fox/live/ETL_PUBLIC_PRODUCT_SEARCH)



# Setting the scene



## Definition

Refrigeration is the process of mechanically cooling or reducing the temperature of a space, a product or a process.

There are two primary applications of commercial refrigeration equipment:

- Cooling, freezing and temperature maintenance during storage of food and drink products
- Air conditioning systems

Retail food outlets in the UK, for example, are responsible for around 9% of total UK electrical energy consumption and 2.5% of total energy use, with retail outlets responsible for over eleven million tonnes of CO<sub>2</sub> emissions annually. A large proportion of these emissions can be attributed to refrigeration. Therefore improving the efficiency of refrigeration units can provide significant carbon savings.

### Further information

For more information see:  
[Carbon Trust's Refrigeration systems technology guide \(CTG046\).](#)



Refrigeration system controls - © Parasense



# Setting the scene

## Energy Technology List

There are six sub-technologies within the industrial refrigeration category of the Energy Technology List:

- Cellar cooling equipment
- Professional refrigerated storage cabinets
- Refrigerated display cabinets
- Curtains, blinds, doors and covers for refrigerated display cabinets
- Refrigeration compressors
- Refrigeration system controls



Cellar Cooling - © Hubbard Products Ltd

**ETL listed refrigeration equipment must meet defined energy efficiency levels under various load conditions. In this document, the baseline scenario below, has been used to calculate the potential financial (£), energy (kWh) and carbon savings (tonnes CO<sub>2</sub>) unless otherwise indicated:**

- Refrigeration equipment operates continuously, 8,760 hours a year
- Price for electricity\* 11.14p/kWh
- Carbon emissions\* for electricity 0.35156 kgCO<sub>2</sub>/kWh
- ETL listed products are within the top 25% of most efficient products in the marketplace

\* BEIS 2017

# Cellar cooling systems on the Energy Technology List



## Cellar Cooling Systems

Cellar cooling systems maintain an indoor (cellar) environment at 10-12°C – suitable for the storage of chilled beverages. They are used in pubs, restaurants and hotels, and can be packaged, split or remote. The equipment listed on the ETL has a capacity between 2kW and 12kW, and therefore encompasses most cellar applications.

There are two types of cellar cooling system eligible for the ETL:

- Split systems with the evaporator in the cellar and the condensing unit external (usually outside) are the most common type.
- Dual split systems, comprising two evaporators and one condensing unit.

In addition, free cooling units, which use a fan to draw in outdoor air to provide “free cooling” when the ambient temperature is sufficiently low are also eligible for the ETL. Packaged cellar cooling units systems (fitted through the wall or window) and remote systems (with separate evaporator, condenser and compressor) are no longer listed on the ETL.

**Example: By installing an ETL listed 7.3kW cellar cooling system in place of a non-listed system of the same size the potential annual savings are calculated as:**

- £540
- 4,900 kWh
- 1.7 tonnes CO<sub>2</sub>

**With a typical additional capital cost of £400 and lifetime energy and AIA benefits of around £5,700 at today's prices, the financial benefit of choosing an ETL listed product is over 14 times the additional cost. Furthermore with a potential AIA of approximately £840 in year 1 plus additional energy savings, the extra capital cost is recovered within 1 year of purchase.**

\*Non ETL equipment assumed to be 25% less efficient, with purchase price of ~£4,040

# Professional Refrigerated Storage Cabinets on the Energy Technology List:



## Professional Refrigerated Storage Cabinets

- Professional refrigerated storage cabinets (PRSCs) are appliances which have one or two solid doors and are typically used for the storage of food and beverages in commercial kitchens. They hold chilled food at between -1°C and 5°C and frozen food at between -18°C and -15°C.
- Professional refrigerated storage cabinets are usually self contained (integral 'plug in') systems. The evaporator is either inside the cabinet, or immediately above it so that the cooled air flows directly into the cabinet. The evaporator is coupled to the condensing unit which is usually located at the top of the cabinet.
- Cabinets with single and double doors, larder and chest type, counter and under counter models for the storage of chilled and frozen food are listed on the ETL. PRSCs are fitted with solid faced lids, doors or drawers and are not used for displaying food (see instead refrigerated display cabinets section).
- To be eligible for listing on the ETL, products must have an energy efficiency index which is lower than the thresholds laid out in the ETL criteria, representing best performing products.

By installing an ETL listed single door cabinet for chilled food in place of a non-listed system of the same size the potential annual savings are calculated as:

- £60
- 580 kWh
- 200kg CO<sub>2</sub>

With a typical additional capital cost of £50 and lifetime energy and AIA benefits of around £720 at today's prices, the financial benefit of choosing an ETL listed product is over 15 times the additional cost. Furthermore with a potential AIA of approximately £320 in year 1 plus additional energy savings, the extra capital cost is recovered within 1 year of purchase.

\*Assumed non-ETL cabinet cost of £1,650, and annual energy use of 2,300 kWh.

# Refrigerated display cabinets on the Energy Technology List



## Refrigerated Display Cabinets

- Refrigerated display cabinets exhibit food and beverages to best effect for retail purposes.
- The cabinet incorporates one or more evaporator/expansion device combinations which are either supplied by liquid refrigerant from an integral condensing unit, or from a remote system.
- All the common types of cabinet are listed on the ETL, including multi decks, chest freezers, upright freezers with glass doors and serve-over cabinets.
- They cover a wide range of storage temperatures from frozen food at  $-18^{\circ}\text{C}$ , to chilled food at  $5^{\circ}\text{C}$  and at  $10^{\circ}\text{C}$ .

**Example: By installing an ETL listed 2.5m open-fronted chilled food cabinet in place of a non-listed system of the same size the potential annual savings are calculated as:**

- £220
- 2,000 kWh
- 0.7 tonnes  $\text{CO}_2$

**With a typical additional capital cost of £460 and lifetime energy and AIA benefits of around £2,400 at today's prices, the financial benefit of choosing an ETL listed product is over 5 times the additional cost. Furthermore with a potential AIA of approximately £670 in year 1 plus additional energy savings, the extra capital cost is recovered within 1 year of purchase.**

\* Assumes an ETL listed cabinet costs £3,500, and annual energy use of 4,500 kWh



# Curtains, blinds, doors and covers for refrigerated display cases on the Energy Technology List

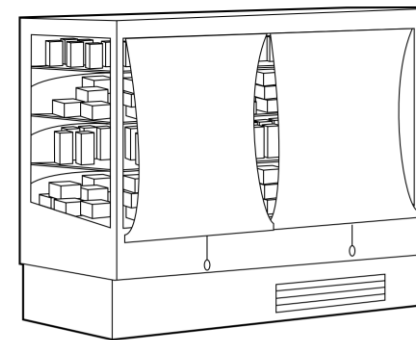


## Curtains, blinds, doors and covers for refrigerated display cases

Many refrigerated display cases are open-fronted, which significantly increases the heat load on the refrigeration system. There are various components available that can be added to reduce the heat load. These include:

- Strip curtains – Overlapping, transparent plastic strips that fit permanently to the open front of display cases. With a typical cost of £170 per blind, the payback period could be as little as 7 months.
- Doors – Sliding or hinged transparent doors that fit permanently to the open front of display cases.
- Covers (bubble lids) – rigid plastic covers that fit permanently to the top of open freezers.
- Blinds – roller-type blinds fitted to the front of open cabinets and may incorporate a motorised control system.
- Enhanced air flow management devices – these enhance the descending air curtain at the front of an open cabinet to reduce infiltration of ambient air.

The use of curtains, doors and covers reduces the heat load on the system, and variation in product temperature will be less. To be effective in reducing the heat load, and therefore improving energy efficiency, care should be taken to ensure they are fitted correctly.



# Refrigeration compressors on the Energy Technology List



## Refrigeration Compressors

The compressor in a refrigeration system compresses the refrigerant gas from the lower pressure of the evaporator to a higher pressure so that it can subsequently condense, thus rejecting heat to ambient air or water in the condenser.

The ETL covers the following types of refrigeration compressors:

- High temperature with HFC or HC refrigerant.
- Medium temperature with HFC or HC refrigerant.
- Low temperature with HFC or HC refrigerant.
- Medium temperature transcritical/subcritical with R744 refrigerant.
- Low temperature transcritical/subcritical with R744 refrigerant.
- Low temperature subcritical cascade with R744 refrigerant.

To be eligible for listing on the ETL, products must have a Coefficient of Performance (COP) which is higher than the thresholds laid out in the ETL criteria, representing best performing products.

**By installing an ETL listed compressor instead of a market average unit, the potential annual savings are calculated as:**

- £330
- 2,970 kWh
- 1,040 kg CO<sub>2</sub>

**With a typical additional capital cost of £200 and lifetime energy and AIA benefits of around £3,400 at today's prices, the financial benefit of choosing an ETL listed product is over 16 times the additional cost. Furthermore with a potential AIA of approximately £230 in year 1 plus additional energy savings, the extra capital cost is recovered within 1 year of purchase.**

\* Assumes an ETL capital cost of £1,200 for product with average cooling capacity of 12kW operating 7,300 hours per year. With a 15% efficiency saving and 20% cost premium for an ETL product.

# Refrigeration system controls on the Energy Technology List



## Refrigeration System Controls

Refrigeration system controllers vary enormously in function and complexity. The simplest control is a thermostat which simply controls the temperature of the cooled space. More complex refrigeration systems, such as those with multiple compressors, ideally require more sophisticated control. When used in the right way, these controls can significantly reduce the amount of energy a refrigeration system uses.

### The ETL currently includes:

- 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.

The potential annual savings achieved as a result of selecting ETL listed refrigeration system controls, at a commercial site running 8 evaporators and one cold room are calculated as:

- £2,900
- 26,200 kWh
- 9.2 tonnes CO<sub>2</sub>

With a typical additional capital cost of £3,600 and additional lifetime energy and AIA benefits of around £31,000 at today's prices, the financial benefit of choosing an ETL listed product is over 8 times the additional cost. Furthermore with a potential AIA of approximately £6,400 in year 1 plus additional energy savings, the extra capital cost is recovered within 1 year of purchase.

\* Assume controls lead to 10% saving for a system using 262MWh/yr



# Where can I find more information?



## Energy Technology List



For information about the ETL please visit: <https://www.gov.uk/guidance/energy-technology-list> and see our [Information for Purchasers](#) factsheet. Or contact the ETL Help Line on 0300 330 0657; email [ETLQuestions@carbontrust.com](mailto:ETLQuestions@carbontrust.com)



For more information on the ETL:

To search for a product on the ETL please visit:

[https://etl.beis.gov.uk/engetl/fox/live/ETL\\_PUBLIC\\_PRODUCT\\_SEARCH](https://etl.beis.gov.uk/engetl/fox/live/ETL_PUBLIC_PRODUCT_SEARCH)



This pack has been prepared by the Carbon Trust for BEIS. Whilst reasonable steps have been taken to ensure the information contained within this publication is correct, BEIS, the Carbon Trust, its agents, contractors and sub-contractors give no warranty and make no representation as to its accuracy and accept no liability for any errors or omissions.

© Crown copyright 2020

You may re-use this information (not including logos) free of charge in any format or medium, under the terms of the Open Government Licence.

To view this licence, visit [www.nationalarchives.gov.uk/doc/open-government-licence/](http://www.nationalarchives.gov.uk/doc/open-government-licence/) or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: [psi@nationalarchives.gsi.gov.uk](mailto:psi@nationalarchives.gsi.gov.uk).