services limited

Action Sheet

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# Reduced Energy Guide

**Simple steps to reduce our impact on the environment and save money across our students' union shops and bars**

# Bottle Coolers

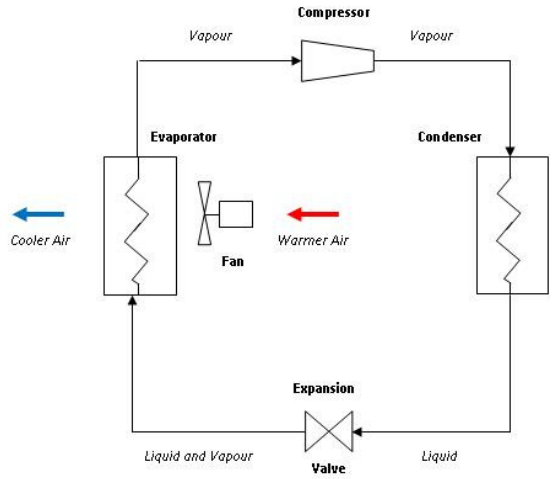
## What is a bottle cooler?

A bottle cooler, or commercial service cabinet, is more commonly known in the hospitality industry as a bottle fridge. It comprises a chilled storage space, which contains *gravity shelving** and has a glass door at the front. In common use, they vary in size from around 20 litres to 600 litres in capacity.

*Double door back bar bottle cooler*

## How does it work?

The process of refrigeration takes place to remove heat from an enclosed space or from an object. The heat is then transferred to another place. The purpose is to lower the temperature and then maintain it at a 'target' temperature. This target temperature can be set on some refrigeration units with digital *thermostats*, but is normally set on a scale of colder to hotter with analogue *thermostats*.




*The vapour compression refrigeration cycle*

Refrigeration operates in a cyclical manner, and to cool an enclosed space it is not always necessary for the refrigeration process to be active. As a consequence, a refrigeration unit's energy demand is characterised by a series of peaks and troughs. The ability of the appliance to maintain temperature without need for extra cooling is essential to ensuring fewer peaks which is why insulation is so important.

## How much energy does a bottle cooler use?

Throughout our research in students' unions across the UK, a variety of bottle coolers were assessed. The indicative energy consumption for a selection of common bottle coolers has been provided below. The lighting in a modern bottle cooler typical accounts for approximately 18W per door.

| Bottle cooler type | Example absolute volume (litres) | Indicative TEC (kWh/24hrs) |
|---|---|---|
| Small advertising cooler | 20 | 1.68 |
| Single door back bar cooler | 100 | 3.12 |
| Double door back bar cooler | 200 | 3.84 |
| Tall single door back bar cooler | 300 | 6.24 |

## When do they use energy?

Refrigeration uses energy in a cyclical manner to correspond to the nature of the refrigeration cycle.

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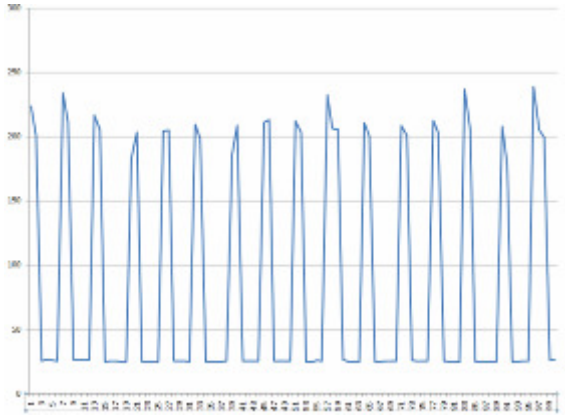
The energy consumption of the fridge increases massively when the cycle starts, with a typical double door back bar bottle cooler will using only around 30 watts during the downtimes, but around 225 watts during uptimes.

The ability of the fridge to stay at a temperature is vital to how energy efficient that fridge will be. As such, fridges that are used more often and hence have their doors open for a longer time, will have an increased energy demand.



*Example energy consumption of a refrigeration unit*

**What features indicate an energy efficient bottle cooler?**

It is suggested that a 15-20% energy saving could be achieved by the selection of efficient refrigerated cabinets[1]. These savings come from variation in the lighting, fans and other features within the appliance. Unlike domestic fridges which benefit from the EU energy labelling scheme, non-domestic fridges have to be evaluated on their individual specifications. An excellent standard of cabinet would contain the following features that can be easily investigated:

- Double or triple glazed, preferably with an inert gas filling
- Well insulated, with limited deficiencies in the insulation level
- Lit by low energy lighting, commonly fluorescent, although *LEDs** are more energy efficient

**General guidance on energy efficient operation**

- Switch lights off overnight

*Fridge with lights switched off*

- Ensure that doors are closed properly
- Check seals regularly to ensure that they are secure and undamaged
- Make sure that ventilation grilles are unobstructed
- Re-stock at the end of trading rather than the start to allow stock to chill in a closed, more efficient environment
- Fully stocked fridges should improve energy efficiency when the fridge door is opened regularly.

**Shutdowns**

Generally, after a bottle cooler is switched on, it can take up to a day to return to serve temperature. In the time it takes most bottle coolers to cool back down to serving temperatures they will commonly use 3 or 4 days worth of energy. It is therefore recommended that bottle coolers are only switched off when the shutdown period is 4 days or greater (i.e. over Christmas and Easter and any bars that are only occasionally open).

1 – Evans JA, Scarcelli S, and Swain MVL, *Temperature and energy performance of refrigerated retail display and commercial catering cabinets under test conditions*, International Journal of Refrigeration, 2007.

**Thermostatic control**

If a refrigeration unit is set to lower temperatures, it requires a greater electrical demand to achieve this. If the temperature of a fridge is raised it should use less energy.

It is advised that thermostats be set no higher than 5°C. Energy efficient thermostat settings are considered to be 5°C for fridges, and -18°C for freezers. Typical savings are around 8% per degree increase in temperature. Most bottle coolers are set by a motor speed control, in most cases the higher the number selected, the lower the temperature the fridge will seek to achieve. Please refer to guidance on the particular model you are using to check this.


*An eCube*

**eCube**

eCube is a wax based product imitation device that is used to reduce the energy consumption of refrigeration units. The wax device is intended to mimic the product in the fridge and was originally designed to mimic food, although it can be used in environments where drinks are cooled.

The air temperature in a fridge is detected by a sensor which tells the fridge whether it needs to remove heat, and therefore start up the refrigeration cycle. The eCube is placed over the sensor and therefore the fridge responds closer to product temperature rather than air temperature. This is useful in environments where the air temperature can fluctuate due to the fridge being opened and closed regularly.

The units cost £89 (ex.vat) and should be fitted by a refrigeration engineer at a cost of around £30 (ex.vat) for each unit.

An average saving of 20.65% was found in coolers using eCubes in the Marston's Estate (a major UK pub chain). Using the data that we have regarding double door back bar bottle coolers, it is estimated that fitting an eCube would save 289 kWh/ annum. This would lead to an estimated saving of £32/annum. We therefore estimate that the fitting of eCubes to double door back bar bottle coolers would have around a 4 year payback period. A longer payback is likely in smaller coolers, while a shorter payback period could be achieved in larger coolers.

**Energy Controls**

*Examples of motor energy controls (EnviroStart)*

These are units which are designed to improve energy efficiency by synchronising the energy input to the demand in motor driven devices. Due to the nature of these products they also have a positive impact on the life of the machine as they lead to less wear in motors.

This type of device is available through various suppliers. The devices work by reducing the voltage or the current or both that is delivered to the motor. It is important to note that this type of device will deliver poorer paybacks on sites that have had a voltage correction device fitted (e.g. powerperfector).

Most equipment supplied by Coca-Cola Enterprises uses its own energy controller called EMS – 55. It operates differently from the systems described above to achieve greater savings. It enables soft and sequenced starts of multiple loads within the equipment, acts as a precise electronic thermostatic control, triggers defrosts by continuous monitoring, checks sales and learns sales patterns to switch to reduced power when not in use and uses an audible alarm to indicate when the condenser system blocks sufficiently to cause an increase in running costs or that doors, where fitted, have been left open.

*Please see glossary for *definitions and disclaimer.*