

# Free Cooling



## The existing air conditioning system

The majority of cooling and heating installations are based on re-circulated air systems, where air at variable ambient and return temperatures enters via ducts and fans to one or more air handling units.

The air is then filtered and cooled/heated (when necessary), by refrigeration compressors and boilers and finally returned to the public areas.

Irrespective of what is happening to the temperature outside of the building, the cooling system will always operate in this manner and the compressors will run whenever there is a cooling demand to maintain the set point of 22°C. Increasing or decreasing the store operating temperature by 1°C will result in a 4% increase in energy consumption and costs.

The solution to breaking this cycle is simply to increase the amount of fresh air being brought into the building, thus employing a process known as free cooling.

## The Free Cooling Solution...

Free Cooling offers vastly improved air quality. It is triggered when the external ambient air is at a lower temperature than the internal temp, drawing 'fresh air' into the conditioned area through the ventilation system. This results in

significant energy savings, reduced energy bills and lower maintenance. The improved air quality subsequently delivers a more positive experience to staff, public and customers.

## What is Free Cooling?

It provides a means of maintaining or reducing the internal temperature without the need to run the compressor part of the cooling system

Free cooling can occur when the temperature of the external ambient air is less than that of the indoor air and this cooler external air is transferred into the building envelope, either directly or indirectly. Free cooling can be applied to either chilled water (glycol) or air/air systems.

Free cooling may be used with mixed outside air and recirculation systems by the use of ID HVAC's automated air mixing system. Dampers are provided on the outside air intake ductwork, exhaust air ductwork and the recirculation ductwork.

When the outside air is cooler, the quantity of fresh air is increased and the quantity of re-circulated air is reduced to provide the required supply air temperature. In this way cooling by means of refrigeration equipment



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is avoided altogether at certain times of year and often at night times.

When the outside air temperature is higher than the room temperature in summer, the air mixing system will modulate to the minimum outside air position to keep the load on the refrigeration equipment to a minimum whilst ensuring sufficient fresh air is still introduced into the building to meet the occupancy demands.

#### Direct Benefits

- Reduction in compressor running hours
- Reduction in energy usage and so running costs
- Improved air quality for a large part of the year by the introduction of greater quantities of fresh air. In many cases simply increasing the volumes of clean fresh air can make occupiers “feel” cooler without a reduction in temperature

#### Indirect Benefits

- Reduced life cycle costs by reducing compressor run hours
- Increased life cycle of compressor

#### Install Costs/Power Savings

Having looked at the systems installed on existing customers sites; we have found that on average customers save £0.45 per square foot of commercial space per annum. We can calculate expected energy savings (allowing for forthcoming energy increases), and also for the installation and commissioning of retrofitted free cooling as follows:

**Square footage (X) x £0.45 = Annual Energy Saving**

#### Free Cooling in practice

Considerer a public area of 2500m<sup>2</sup>, this would require a cooling system of 225,000W or 225kW. The power input required to generate the above cooling output is approximately 66kW and assuming a cost/kW of 0.11p/kWh then to cool the area for 1 hour will cost £7.26, and release 32kg of CO<sub>2</sub>\*.

If we can reduce compressor operation by an average of 4 hours per day, 360 days per year then the total annual saving would be £10,454.00 and 46,080kg of CO<sub>2</sub>. Other factors can be considered such as reduced compressor running which in turn will increase the compressors lifespan and so reduce replacement costs.

#### About ID HVAC & Energy

As a specialist installation and maintenance provider of environment managed solutions, ID HVAC & Energy ID Scotia designs, installs and maintains HVAC and climate control energy efficient systems, helping save clients energy through technically advanced heating and cooling services.

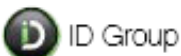
The company's portfolio covers the entire spectrum of designing, installing and maintaining HVAC, building managements systems and energy efficient lighting systems, while providing energy assessments to meet all legislative requirements.

For more information on how ID HVAC can help move your business forward please contact us on:

**0800 1970 123**  
or email:  
**info@idhvac.co.uk**

**ID HVAC & Energy Ltd**  
Unit 4, West Moor Park  
Durham Lane, Doncaster DN3 3FE

T 01302 832700 F 01302 836060  
W [www.idhvac.co.uk](http://www.idhvac.co.uk)



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