

energy measures

fact file

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ADDITIONAL INFORMATION: HVAC

Minimum Ventilation Requirements for Buildings

As at 31.07.00, building regulations governing ventilation and air throughflow are the subject of a general consultation exercise on building regulations. It is likely that requirements will be updated to more stringent standards over the coming months. We would, therefore recommend that you contact your local planning authority or the Building Regulations Division of the Department for the Environment Transport and the regions to gain a copy of the latest standards.

As a general guide, however, a sedentary person in an office has the following fresh air requirements:

Ventilation – litres per second of fresh air per person							
0	5	10	15	20	25	30	35
0.3 - to provide oxygen for breathing	5 - to reduce build up of carbon dioxide.	8 - to control body odour	16 - to minimise the effects of some smoking			32 – to minimise the effects of heavy smoking	

Source: BRE Digest 399.

HVAC - Glossary of technical terms

Adjustable Speed Drive: Electric motors are often required to supply a lower amount of power than their design output. There are a number of mechanical and hydraulic methods for controlling the output, most of which are analagous to driving your car by flooring the gas pedal and simultaneously applying the brake to go slower as necessary. An adjustable speed drive (also called a variable frequency drive, or VFD) precisely controls the speed of AC motors, avoiding the waste associated with other types of controls.

Cooling tower: Piece of equipment, frequently used by centralised air conditioning units, to chill matter (usually water, but occasionally gel or ice) during times of low energy cost. Air is then passed over this mass during times of high energy costs to cool it and provide air conditioning. This system often does not improve the energy efficiency of air conditioning systems (unless heat recovery is also installed), but because of its use of off-peak power, it can significantly lower costs.

Degree Day: When forecasting energy use or savings related to HVAC equipment, it is helpful to have a sense for how many days out of the year buildings in a given area typically have to be heated (heating degree days) and how many they have to be cooled (cooling degree days). Heating and cooling degree days will help an engineer to both calculate the required size of air conditioning/heating plant and will also help to assess the approximate costs of operating such units. BRE calculates these numbers based on historical weather data and uses them in forecasting.

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Demand: Electrical demand is the amount of electricity being drawn by customers at a specific time, measured in kilowatts. Electricity demand is different from electricity consumption (measured in kilowatthours) which reflects total electricity usage over time.

Economizer: In some cases, buildings will require air conditioning even when the outside air is colder than the desired room temperature. This is due in large part to heat generated by things like lights and office equipment. In situations like this, air conditioning units often use a device called an economizer which uses some of the cool outside air instead of trying to cool down the warm air from inside the building.

Energy Management System (EMS): Building owners sometimes find that their building is using a lot of energy even though they have invested money in efficient equipment. One reason for this is that the efficient technologies are not being controlled properly. An EMS can be used to automate building equipment so that equipment is turned off or ramped down at appropriate times, and any malfunctioning equipment is brought to the attention of the building engineer.

Heat Exchangers: HVAC systems control temperature by moving heat into or out of a building through a heat exchanger. There are many different heat exchange technologies, but the idea is simply what the name implies: heat is moved from one mass of air to another. In the case of an air conditioner, the heat is expelled to the outside. In the case of a heater, the heat is blown indoors.

Heat Pump: In climates where heating and cooling are required at different times of year, heat pumps are often a good option for heating and air conditioning. Heat pumps are air conditioning systems that are able to run in reverse.

HVAC: Heating, ventilation, and air conditioning systems are sometimes referred to by their initials, as HVAC. This blanket term is sometimes used just in reference to heating or cooling.

Inlet Guide Vanes: Outside air entering an HVAC system can be controlled using inlet guide vanes, which are essentially rotating fan blades over the system inlet. HVAC system designers will sometimes use different strategies to try and improve system efficiency by adjusting the design of the inlet guide vanes.

Motor Efficiency: Motor efficiency varies depending on how close to its design operating load it is operating. Typically, peak efficiency occurs at somewhere around 75% of full load, although this varies between motors.

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Variable Air Volume (VAV): VAV systems meet changing air conditioning load requirements by adjusting the amount rather than the temperature of chilled air that flows to a given zone in a building. Energy is saved in a VAV system by allowing the motor which drives the fan to operate at a lower level when less cooling is required.

Source: Pacific Gas and Electricity Company, Business Edge Pages
http://www.pge.com/customer_services/business/energy/bizedge/em.html.

Recommended Temperatures for Different Parts of the Building

Building/ room type	Winter dry resultant temperature for stated activity and clothing levels			Summer dry resultant temperature range for stated activity and clothing			Suggested air Supply rates (litres per person-except where otherwise stated)
	Temp (C)	Activity	Clothing	Temp (c)	Activity	Clothing	
Hotels • Bathrooms • Bedrooms	26-27 19-21	1.2 1.0	0.25 1.0	25-27 21-23	1.2 1.0	0.25 1.2	12' 8
Offices • Executive • General • Open plan	21-23 21-23 21-23	1.2 1.2 1.2	0.85 0.85 0.85	22-24 22-24 22-24	1.2 1.2 1.2	0.7 0.7 0.7	8° 8° 8°
Restuarants/ dining rooms	22-24	1.1	0.9	24-25	1.1	0.65	8°
Sports Halls • Changing rooms • Pool Halls	22-24 13-16	1.4 3.0	0.55 0.4	24-25 14-16	1.4 3.0	0.35 0.35	6-10ACH 8°
Squash Courts	10-12	4.0	0.25	-	-	-	4ACH
Swimming pools Changing rooms Pool Halls	23-24 23-26	1.4 1.6	0.5 <0.1	24-25 23-26	1.4 1.6	0.35 <0.1	10ACH 0-15Ls m ²