

Daikin's heat reclaim ventilation system is bringing massive energy savings without any loss of air conditioning efficiency

Significant savings are in the air

The need to improve indoor air quality is fixed firmly in the spotlight and the tighter Workplace (Health, Safety & Welfare) Regulations now in place could soon make life difficult for those building owners and occupiers choosing to cast a blind eye to problems such as inadequate ventilation.

The fact is, the air we breathe indoors, already an unpleasant cocktail of organic and inorganic pollutants such as carbon monoxide, carbon dioxide, formaldehyde, nicotine, airborne dust and microbes, is deteriorating and taken in combination with inadequate ventilation looks to be a likely cause of sick building syndrome (SBS) - an ephemeral and difficult to isolate condition - yet one which in America, is automatically investigated as a possible culprit whenever 5

per cent or more of a workforce is off sick at any one time.

SBS has in the past been associated with air conditioning: a claim at some variance with recent authoritative and independent studies which have found that air conditioned buildings can provide a healthier working environment than those that are merely naturally ventilated. Fresh air, of course, is a key component of a balanced and equable indoor environment but its provision, often via complex mechanical ventilation systems, can have dramatically adverse effects on the efficiency levels of an air conditioning system which needs to allocate cooling load to temper it.

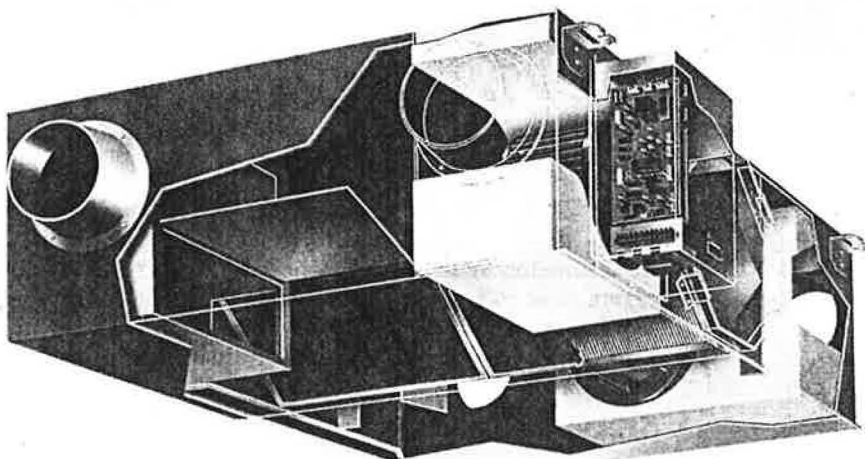
Fresh air ventilation can be handled in several ways: at source for example, or by adding it to the cool-

ing/heating load of an air conditioning system, if there is one. The former method is preferable however, since it enables overall control of the building, particularly in rooms with intermittent occupancy levels.

Air contains two types of energy — latent heat in the form of water vapour and sensible heat in the form of dry air - and a normally occupied sedentary adult requires at least 0.47 lit/sec of fresh air to cope with his oxygen requirements and compensate for his carbon dioxide output. The energy consumption needed to supply one lit/sec of fresh air to a building (at an ambient of 10°C) and temper it to 21°C without heat recovery is 32kWh/annum (say 270 days at eight hours/day) at a cost of some £1.60/lit/annum air supplied. Current design parameters often allow ten or more lit/sec per person of fresh air.

Some years ago, Daikin addressed this problem with the introduction of HRV (heat reclaim ventilation) which can bring about reductions in ventilation energy consumption of a massive 60 per cent and reductions in the overall energy consumption of a building of around 23 per cent. Some 17 per cent of this reduction stems from the lower energy losses associated with heat recovery, the remainder being achieved by integrating and operating ventilation in combination with the air conditioning. The heart of the system is the VAM heat exchanger in which sensible and latent heat is removed from the return air prior to its exhaust to atmosphere and excess humidity removed from the incoming fresh air. The heat exchange that passes between treated incoming air and the return air within the VAM unit enables a balance to be achieved between indoor and outdoor ambients, allowing the cooling (or heating) required to condition the incoming air to be reduced.

The supply of Daikin HRV heat recovery ventilation, either stand alone or integrated with VRV and/or SkyAir air conditioning, is a speciality of Space Airconditioning plc and has been marketed in UK with in-



◀At the heart of the HRV system is the VAM heat exchanger which removes heat from the return air

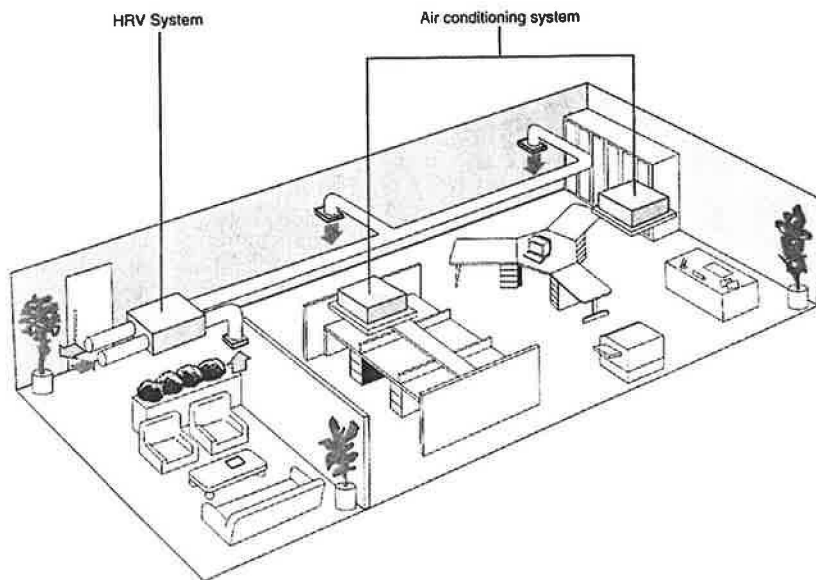
◀ With Daikin's HRV unit temperature and humidity are exchanged between supply and exhaust air

Windows 95, enables designers to calculate the number and size of Daikin VAM heat reclaim units required on a new or retrofit basis as a stand alone ventilation system or integrated with HI-VRV, VRV or SkyAir systems for combined air conditioning and ventilation. VAM models are available with airflow rates from 320 to 2100m³/h, each with the facility to operate ventilation independently during the intermediate season when neither cooling nor heating is necessary. The selection programme which comes complete with a dedicated selection guide, enables users to calculate fresh air requirements based on both occupancy levels and air changes per hour, ducting needs, comfort levels, capacities, energy savings, pay back period and other design parameters connected with equipment selection.

The VAM heat exchanger has been an important component within the Daikin HI-VRV complete indoor environment system since its introduction some four years ago. The computerised selection programme however, will not only simplify its retrofit integration with the 13,000 Daikin inverter driven and heat recovery VRV systems in operation throughout the UK but also its specification as a stand-alone ventilation system, enabling savings in energy beyond the scope of contemporary fresh air ventilation systems to be enjoyed by users without loss in air conditioning efficiency.

• All editorial and photographs have been supplied and paid for by Daikin Europe NV.

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installations in properties owned or occupied by Homebase, NEC, Daewoo, BT, Lufthansa, BBC, ICI, Barclays Bank and British Gas.

Payback periods for HRV systems vary from around three years, if used for stand alone fresh air ventilation or less (say two years) if retrofitted to an existing air conditioning system, resulting in reductions in ongoing cooling load. Its integration with VRV air conditioning at the design stage however, enables the VRV to be downsized by around 10 per cent with significant savings in capital costs and fresh air ventilation costs of just £0.56/lit/annum (11.23kWh/ annum).

The system is available in compact units with capacities between 500 and 2000m³/h, that can be mounted horizontally within a false ceiling, vertically or (weatherproofed) outside. The modular concept of the sys-

tem simplifies design layout, reduces ducting requirements and enables the electronically controlled VAM units to operate where and when needed. The system has recently been extensively upgraded and improvements include the facility to supply ventilation independently during the intermediate season when neither cooling nor heating is necessary. Also, the airflow rate, previously governed by the HRV remote controller, can now be modulated via the indoor fan coil unit remote controller whilst new pre-cool and pre-heat facilities which delay ventilation start up during air conditioning have been introduced in order to maximise energy savings.

A new, user friendly computerised heat reclaim ventilation selection programme for architects and specifiers is available from all Daikin distributors. The programme, suitable for use with Windows 3.11 and

An automatic changeover in the HRV system selects either heat exchange or bypass mode, depending on indoor or outdoor temperatures

