

How chilled beams help improve the energy efficiency of buildings

John Staunton discusses the role of chilled beams in delivering comfort cooling efficiently and how they contribute to a building's BREEAM rating.

From October 2008, all commercial buildings will be required to have an Energy Performance Certificate (EPC) when they are built, rented or sold. Additionally, all buildings occupied by a public authority or institutions providing public services, which are visited by large numbers of people, that are over 1000 m² will need a Display Energy Certificate (DEC) that shows the actual energy usage of the building.*

This new legislation, coupled with the amendments to Part L of the Building Regulations (the requirement for a 28% reduction in carbon dioxide emissions for mechanically-cooled, non-domestic structures) and clients striving for high BREEAM (Building Research Establishment Environmental Assessment Method) rating, is leading to many changes in the market.

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The application of direct water-based cooling systems, such as chilled beams or integrated service modules, is helping to meet the challenge of balancing the requirements of such regulations while ensuring performance is guaranteed for occupant comfort.

Chilled beams and ISMs, also known as multi-service chilled beams, can provide a quiet, energy-efficient and comfortable cooling solution. The fact that they can be pre-fabricated off-site and save up to 75% in labour, compared to a traditional fan-coil installation, is another contributor to their growing popularity.

BSRIA (Building Services Research & Information Association) has recently reported that the market for chilled ceilings and beams grew by a third in 2006, with an increase of 40% expected in 2007. Further growth is predicted in the market for both this year and 2009, particularly in the commercial office sector.

Chilled beams and ISMs use water as the heat-transfer medium and convection to deliver the cooling. They can be either ‘passive’, which work using natural convection, or ‘active’, which

incorporate additional fresh-air ventilation. Passive chilled beams/ ISMs produce outputs in the region of 300 W per metre of length. Active chilled beams/ ISMs have outputs of up to 500 W per metre of length. For further details see article in *Modern Building Services* in August 2007, or go to our web site www.modbs.co.uk and put Staunton in the search field.

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The ability to set up separate cooling zones, ensuring only occupied areas are cooled, will further reduce the energy required to provide cooling. Additionally ISMs that leave the concrete soffit exposed also allow the thermal mass of a building to be exploited.

All these energy saving opportunities will reduce both energy bills and carbon emissions — and, potentially, the size of the central plant too.



To help achieve the highest possible BREEAM rating for the recently opened Jobcentre Plus in Bournemouth, cooling and fresh air are provided by SAS active chilled beams.



As part of a sustainable solution for the refurbishment of the Strand Building of King's College London, nearly a kilometre of active chilled beams with integrated lighting have been installed.

BREEAM considerations

In buildings where the design brief requires a high BREEAM rating, chilled beams and ISMs are emerging as a leading source of comfort cooling. Companies and organisations that currently utilise chilled beams and ISMs include M&S, Vodafone, the

Department for Work & Pensions, Hilton Hotels, Kings College London and Scottish Gas.

Based on BREEAM: Offices[†], for example, one point (credit reference P01) is awarded when using ‘refrigerants with a global warming potential (GWP) of less than five or where there are no refrigerants specified for use in building services’.

An additional point (credit reference P02) is awarded ‘where evidence provided demonstrates that refrigerant leaks can be detected or where there are no refrigerants specified for use in the building or development’.

A further 1.154 BREEAM points (credit reference HW11) can be achieved if fresh air is provided at 12 l/s/person. Active chilled beams provide this volume, and this figure is achievable by passive chilled beams used with a separate fresh-air supply system.

Together, the points achieved through the use of such systems can provide a project with either 5% of the required total to achieve an ‘Excellent’ rating or 6% of the requirement for a ‘Very good’ rating.

There are a further 11.35 points (credit reference E01) available ‘where the building demonstrates a percentage improvement above the requirement for carbon-dioxide emissions as set out in the Building Regulations’.

Because of their inherent energy efficiencies and associated reduction in carbon-dioxide emissions, chilled beams and ISMs can help achieve these BREEAM points. They will also assist in achieving higher EPC and DEC (Display Energy Certificate) ratings.

As companies’ Corporate Social Responsibility (CSR) and green policies continue to be discussed around the boardroom table, particularly as the price of energy continues to increase, the popularity of chilled beams and ISMs will rise even further.

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[†]Design and procurement pre-assessment estimator. www.breem.org

* www.communities.gov.uk