

Residential corridor overheating – a burning issue

Dr Chris Iddon, Design Manager with SE Controls, explains the impact of the rapidly growing issue of corridor overheating, why it's a concern for the construction industry and how innovative solutions are already being applied to address the problem.



In most circumstances, retaining heat within a building is a positive goal, as it reduces the energy demand and costs associated with providing a comfortable environment for a building's occupants. Indeed, the principles of improving insulation together with minimising air leakage and 'infiltration' are fundamental aspects of Part L of the Building Regulations, which deals with the conservation of heat and power.

Even though Building Regulations Part F deals with the need for adequate ventilation to remove stale odours and pathogens, while contributing to the cooling process during warmer weather, it relates only to ventilation within main dwellings and consequently a building's circulation spaces fall outside of these guidelines.

When these factors are combined with innovative building design, particularly in multi-story residential blocks, where the layout seeks to legitimately maximise the rentable space and reduce circulation spaces, it can have the effect of creating 'landlocked' spaces, such as corridors, which have no ventilation and are usually sealed by fire doors. Also, while the practice of routing communal heating pipework through corridor ceiling voids is ideal for maintenance regimes, it has the effect of further contributing to heat build up.

The result, or more accurately, the 'unintended consequence' of these measures is corridor overheating with temperatures typically exceeding 35 degrees Celsius, even in winter months. This situation has become a growing concern not only for residents and maintenance engineers who have to use and work in these hot corridors, but also the construction industry that now has to address the issue.

Less hot air, better environment

SE Controls has worked with numerous consultants, developers and contractors to build a clear

understanding of the overheating issues within circulation spaces, measuring the temperatures present and modelling the anticipated thermal impact over a 12 month cycle.

While a key driver in this process was to build an expert knowledge base of the conditions within numerous individual buildings, it also allowed us to develop a highly effective and cost efficient solution to the problem of overheating using a building's existing smoke ventilation system.

As smoke control systems are a legal requirement in buildings over three storeys high, it made sense, both practically and financially, to adapt the existing smoke vent system to undertake the supplementary role of day to day environmental ventilation and cooling of circulation spaces.

The value to those involved in the design, construction and management of the building, is that the ventilation and cooling infrastructure is already in place. So, for retro-fitted solutions where corridor overheating has emerged as a problem, there is no need to consider supplementary evaporative or air-conditioned cooling systems, which are costly to 'retro-install' and consume additional energy.

A further benefit is that the environmental cooling mode can be designed in to the smoke control system from the start, based on detailed building modelling and analysis, addressing the problem before it becomes an issue. This versatility allows designers the continued freedom to optimise rentable space and maintain high levels of energy efficiency without compromising the construction costs by incorporating more complex cooling methods.

A cool solution

Using research project data and building modelling information amassed to date, a detailed thermal modelling analysis is undertaken on the building, either at the design stage or after construction, depending on whether the project is 'preventative' or 'corrective' in nature.

Using a diverse array of measurement standards and regulations, including CIBSE Guide A and TM52 among others, thermal colour maps of a whole design year as modelled is created, which shows the

cooling effect of different ventilation and temperature scenarios.

With this information, smoke control system can be adapted to include additional automatic stairwell air inlet louvres and supplementary smoke shaft dampers or vents, which enables cool air to enter building's stairwell, flow along each corridor and escape through the smoke shaft louvres on each floor to be vented to atmosphere. Solutions have also been created for buildings with dual smoke shafts using bi-directional flow to aid cooling.

By creating this ventilation path, temperatures can be reduced from highs of 35 degrees down to the typical levels expected of a free running building, as described in CIBSE TM52. As the environmental mode is a function of the smoke ventilation system, it is controlled automatically by the system's temperature sensors, which minimise unnecessary heat losses, while also maintaining the integrity and effectiveness of the life critical smoke ventilation system.

By limiting other sources of corridor heat gain, such as stairwell glazing or the addition of solar shading, these measures can help increase the efficacy of environmental temperature control using smoke ventilation systems while maintaining design freedom and control over building running costs.

