

The Importance of SHEV

For years, European Building Regulations have stipulated the inclusion of Smoke & Heat Exhaust Ventilation (SHEV) systems, as a standard fire safety measure in new buildings. As the UK becomes increasingly inclined to follow suit, General Manager of Jet Cox, Chris Lister, looks at how the Building Industry needs to prepare for the already-growing number of SHEV specifications.

On the basis that Europe is well versed in the manufacture, installation and commissioning of SHEV systems, there seems little point in reinventing the wheel, when the UK can benefit from tried and trusted techniques. Since September 2006, Europe has required all SHEVs to be certified in accordance with DIN EN 12101-2 and whilst a number of UK manufacturers already work to these standards, Jet Cox has its history firmly rooted in Germany, where the inclusion of SHEV units is compulsory in all cases where Building Regulations require a natural smoke vent. As such they boast a long and successful track record of SHEV installations both across Europe and the UK, in accordance with these standards.

Why the need for SHEV systems?

The greatest immediate danger to the occupants of a large building in the event of a fire comes from the smoke rather than the heat of the fire. Only 20% of fire deaths in the UK are caused by burns. Worryingly, 61% of UK fire deaths are caused by smoke inhalation or injuries involving smoke inhalation*. Even a small fire can rapidly fill a large building with smoke to an extent where people escaping the building cannot see to find the escape routes and can be overcome by smoke inhalation.

It is the responsibility of the Building owners, designers, developers and all of its stakeholders to ensure steps are taken to reduce the risk of fire and if fire does occur, that its occupants are suitably protected.

Often smoke incapacitates so quickly, that people are overcome and can't make it to an otherwise accessible exit. The synthetic materials commonplace in today's buildings, produce especially dangerous substances. As a fire grows inside a building, it will often consume most of the available oxygen, slowing the burning process. This "incomplete combustion" results in toxic gases.

Smoke is made of components that can each be lethal in its own way:

- **Particles:** Unburned, partially burned, and completely burned substances can be so small they penetrate the respiratory system's protective filters, and lodge in the lungs. Some are actively toxic; others are irritating to the eyes and digestive system.

- **Vapours:** Fog-like droplets of liquid can poison if inhaled or absorbed through the skin.
- **Toxic Gases:** The most common, carbon monoxide (CO), can be deadly, even in small quantities, as it replaced oxygen in the bloodstream. Hydrogen cyanide results from the burning of plastics, such as PVC pipe, and interferes with cellular respiration. Phosgene is formed when household products, such as vinyl materials, are burned. At low levels, phosgene can cause itchy eyes and a sore throat; at higher levels it can cause pulmonary edema and death.

In addition to producing smoke, fire can incapacitate or kill by reducing oxygen levels, either by consuming the oxygen, or by displacing it with other gases. Heat is also a respiratory hazard, as superheated gases burn the respiratory tract. When the air is hot enough, one breath can kill.

The principal aim of SHEV systems is to lead smoke, gases and heat out of burning buildings, whilst also keeping escape routes free of smoke and toxic fumes. They also help in keeping passages clear allowing emergency services to enter safely and to tackle the fire in its early stages.

Depending on factors such as use, size and location etc, every building is unique in its requirement for smoke, heat and ventilation solutions, which is why it's imperative that every party involved in the specification and installation of the system, has the relevant experience and technical knowledge to ensure its success.

It is also the case that the industry is becoming ever more aware of the importance of healthy working and living conditions, making the use of SHEV systems even more relevant.

On a day-to-day basis, these systems provide controllable natural daylight and ventilation, helping to combat the causes of numerous human health problems. Furthermore, natural ventilation, or other systems that improve airflow, can positively impact on the long-term running costs and energy efficiency of a building, in comparison to alternative mechanical means such as cooling or air-conditioning units.

Building Owners Need to Act Now

Whether UK Building Regulations are ever permanently changed to include the specification of SHEV units for all new build commercial and industrial premises, remains to be seen, but in the meantime, one of the factors already affecting SHEV specification, is the increasing demand from commercial insurers for proof that all possible steps are being taken by building owners, to ensure their buildings are as safe as possible in the event of fire. As this trend takes hold, Building Designers are having to rethink their approach in order to accommodate the relevant solutions and additionally, there is an increasing onus on building

owners to install precautionary and preventative measures such as SHEVS, purely in the interests of public service and safety.

Within the very near future, we envisage a greater requirement for building owners and insurers to work more closely together in reaching suitable solutions. With that in mind, building owners would be well advised to instigate this process wherever possible, as a safeguard to ensure their obligations are met.

As a matter of course, this could also extend to the use of SHEV units in the refurbishment of commercial and industrial buildings, which often results in the use of a building being completely changed from its original purpose. When making these alterations, it's important to consider the effect that any such changes may have on the ability of the existing ventilation system (if any) to perform as it should, or indeed to consider the addition of a SHEV system where there may have been no previous requirement.

It's About More Than Just the Product

In order to attain this ideal European model and to address insurers' requirements for the foreseeable future, it is recommended that your specified SHEV system should meet European Technical Specification. Modular systems, meeting these standards, are available, offering the added benefit of off-site construction, keeping site personnel to a minimum and offering no negative impact on project completion times:

- CE EN12101-2 Certified
- Certificate 1368-CPD-C-002/2009 (I.F.I Institute, Germany)
- Aerodynamic Free Area up to $Aa2.74m^2$ in accordance with DIN EN12102-2
- Snow Loads up to $2400N/m^2$
- Wind Loads up to $1500N/m^2$
- Low Ambient Temperature T(-15°)
- Heat Exposure B300
- Reaction to Fire Class E
- Opening Speed of less than 60 seconds

Whilst many systems are available from non-manufacturing resellers, the UK's contractors may find themselves faced with unfamiliar systems, of which they have no previous installation experience. It is therefore advised that specifiers should be mindful of choosing a supplier that not only provides a proven track record of successful installations, but one that also demonstrates a full technical support,

commissioning and on-going maintenance package to ensure longevity and the continual efficiency of the system.

SHEVs are a significant component of a building's safety strategy, therefore correct commissioning and maintenance of the system is absolutely crucial to ensure that it operates correctly in the case of emergency. By drawing on the success of Europe's experience and renowned build-quality, UK building planners, designers and SHEV manufacturers can now work together to produce some of our safest, healthiest buildings.

Ends 1250 words

*Department for Communities and Local Government: Fire Statistics Great Britain April 2013 - March 2014 (ISBN: 978-1-4098-4669-7)