fire design solutions

FREE PDF GUIDE

Smoke Ventilation Systems Application Guide

By keeping escape routes such as corridors and staircases clear, smoke ventilation systems allow the safe & compliant evacuation of residential buildings, while also maintaining the access routes into the building for the Fire & Rescue Services. Here, we look at the range of systems available to architects, developers and contractors and the benefits that they can bring to a project.

Smoke Ventilation Systems

Due to the complexity and importance of smoke control systems it can be difficult to know which option is most suitable.

Smoke ventilation systems are vital for the safety of building occupants during a fire. They are designed to minimise smoke and fumes in the event of a building fire, keeping smoke away from escape routes for residents leaving the building and enabling easier access for Fire & Rescue Services.

Maintaining a smoke ventilation system is a legal requirement for every building where installed, under the Regulatory Reform (FireSafety) Order 2005. These systems may consist of smoke detection, dedicated ventilation, smoke chimneys, smoke curtains, smoke dampers, and smoke shafts/fans. It is important that all components are working correctly as the whole system is only effective if each part functions.

"In 2016/17 the majority (around 37,000 or 68%) of fire safety audits were satisfactory and the remainder (17,000, 32%) were unsatisfactory. These proportions were similar to the previous year."

Home Office

In this guide, we compare and discuss mechanical and natural smoke ventilation systems. We give case study examples from real Fire Design Solutions clients to demonstrate how our smoke control systems are used in practice The type of system chosen will depend on the characteristics of the building and here we will discuss the differences.

Let's look at the numbers

30,296 total fires in 16/17
3, 007 deliberate fires
27,289 accidental fires

Mechanical Smoke Ventilation Systems

In most multi-story buildings, the main escape route is via common corridors and lobbies opening into the stairs. The aim of smoke ventilation systems is to keep these area's clear of smoke in the eventt of a fire, providing a safe escape route for all those inside.

Take a look at our MSVS infographic

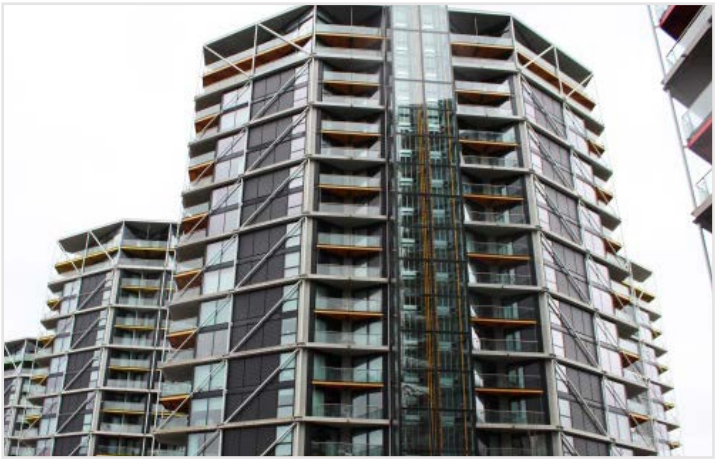
How It Works

Smoke ventilation systems are provided for each stairway, lobby or protected corridor opening into the stairways. When smoke is detected within a protected area, the fire damper to the smoke shaft on the respective level opens along with the vent at the head of the stairs. The fan at the top of the mechanical smoke shaft will be activated and extract the smoke from the fire affected floor Make-up air is drawn into the building through the vent at the head of the stairs creating a continuous airflow through the escape route, extracting via the mechanical smoke shaft exhaust vents. This also prevents smoke from migrating into adjacent compartments.

Practical Applications

Riverlight

Depending on the size of the building, many systems will be needed. One of our recent large-scale projects was on London's Southbank Riverfront with the construction of Riverlight, a 20-story building consisting of apartments, shops, bars, and restaurants.

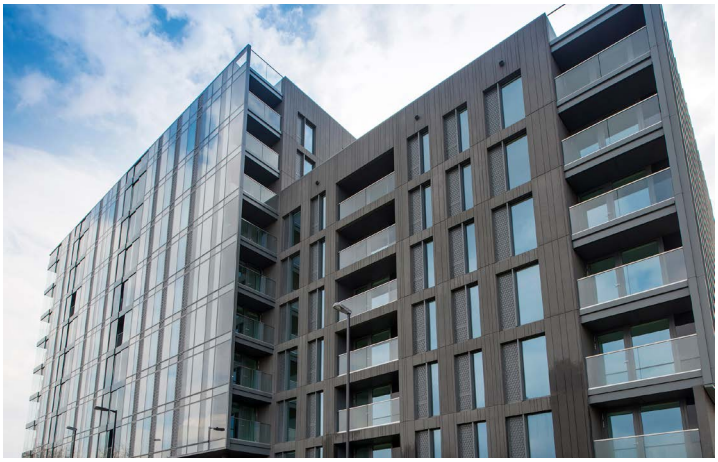


Due to the buildings height and design, a Mechanical Smoke Ventilation System was more practical than a natural control system. This particular project saw six systems installed.

Mechanical Smoke Ventilation Systems can be used in instances other than solely smoke ventilation.

Langham Square

For instance, we were contracted by St. James on their Langham Square project after the previous contractor had departed. Working with the existing Mechanical Smoke Ventilation System to provide day-to-day ventilation, we provided a solution to potential overheating in the development's common corridor, utilising the system for environmental ventilation while reducing costs by removing the need to specify a separate dedicated ventilation system.



Residential buildings are susceptible to accidental fires, which means having an efficient system in place could 'determine a life or death outcome'. For that reason we have installed many MSVS on residential buildings.

Chambers Wharf

Most recently, our Chambers Wharf project saw a ventilation system and corridor environmental system go in to reduce overheating in both 9 story towers, as well as creating a safe escape route for residents.

Natural Smoke Ventilation Systems

Natural Smoke Ventilation Systems make use of the 'passive' forces of wind and thermal buoyancy - the process of hot air rising to draw in colder, denser air – to provide a safe escape route for a building's occupants, and the attending fire services.

These low energy systems are easily integrated into the design, offering maximum cost efficiency. They require minimal on-going servicing and can act as a stand-alone system or as part of an integrated fire safety approach.

Take a look at our NSVS infographic

How It Works

The operation of the system is simple: in the event of a fire, natural smoke ventilation systems open airways, using natural air flow dynamics to remove smoke. This can be automatic opening windows or vents (AOV), or vertical smoke shafts.

Mechanical and Natural Systems Combined

While each system can be used on their own, in some buildings it can be highly beneficial to have a main mechanical system supported by a natural system, such as fire doors and automatic opening windows.

	Mechanical	Natural
Cost	High	Low
Maintenance	Frequent	Low
Efficiency	High	Moderate
Shaft Size	0.25m2 to 0.6m2	1.5m2
Regulatory Reform	Engineered Solution	Compliant

"Taking this bespoke approach allowed FDS Group to deliver significant cost savings, while focusing on the end-client's commercial objectives."

Barratt Homes

Practical Applications

Barratt Homes

In December 2013, we worked on a residential project with Barratt Homes. The buildings were created at varying heights, meaning a normal system would not fit. In addition to saving the project £1 million by specifying smoke ventilation systems, we installed a bespoke smoke ventilation system combined with mechanical and natural systems.

Mechanical smoke ventilation systems utilising 0.5m² shafts with fans fitted at roof level were used in the larger parts of the building, and a natural venting system was also utilised where shorter travel distances to the building's escape routes permitted this.

Summary

The smoke ventilation system that is most suitable for a project will depend on a range of factors including the type of building (residential, commercial), size, architectural features and internal layout.

It is always best practice to seek the advice of fire safety and smoke ventilation specialists who can assist you in find the best solution.

To find out more about mechanical or natural smoke ventilation systems, contact our expert team today.

Call 01322 387411 or email info@firedesignsolutions.com.