Mechanical smoke ventilation systems
Our products and systems ensure healthy, comfortable and safe working and living conditions in buildings.

Outstanding expertise, unsurpassed support

For more than 25 years we have been supplying high-performance, fully certified and approved smoke control products. Smoke ventilation systems today require sophisticated control mechanisms and integration with highly complex building management infrastructure. We provide authoritative, comprehensive guidance on smoke control practice and approaches for any building, in any sector.

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Compliance without compromise

We design, manufacture and install comprehensive smoke control systems throughout the UK.

From supply-only to a full service consultancy, design and support, we can meet any requirement. We provide certification advice, design consultation and roof surveys, bespoke CAD drawing and custom design. You’re also guaranteed an exemplary level of post-installation support.

In addition, we offer commissioning, servicing and emergency call-outs for existing SHEVs installations.

This brochure gives you a brief overview of our mechanical smoke ventilation products. You’ll find the full range and performance details at www.whitesales.co.uk.

Our expert teams are always happy to answer your questions, give technical advice and, of course, ensure your next project receives the attention to detail it deserves. Please feel free to get in touch at any time.

Call 01483 271371  Email sales@whitesales.co.uk  Visit www.whitesales.co.uk

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Smoke control in the built environment

Statistics show that 53% of fire-related fatalities result from people being overcome by smoke or gas, rather than dying from the fire itself. Smoke control systems are life-saving devices - greatly increasing an occupants’ chances of survival in the event of fire by keeping escape routes smoke-free. They help firefighters tackle blazes more safely and effectively, so they can save more lives and reduce structural and material damage to buildings.

Essentially, Smoke Heat Exhaust Vent systems (SHEVs) delay or prevent flashover – to slow or stop fire developing to catastrophic levels. Mechanical ventilation systems, in particular, provide exceptionally effective smoke control, as well as greater building design flexibility.

The purpose of our smoke and heat exhaust ventilation systems (SHEVs) is to save lives by reducing the potentially fatal build-up of smoke and heat, leaving an area of breathable air above the floor.

Key features for smoke control systems
- There are several key features a smoke control system must have to provide effective smoke ventilation for a building and be an integral part of the building fire strategy.
- Continued operation, even in the event of a mains power failure, is one of the most important functions of an integrated smoke control system.
- A comprehensive system will monitor not only the communications around the system network but also the devices themselves, ensuring full network integrity.
- Smoke ventilation systems are rarely designed to manage more than one fire incident at any one time. The initial incident detected should be the only one to be acted on, with all subsequent events being locked out.
- Lastly, all systems must provide a mechanism for the Fire Service to override the operation – through setting it into action, stopping it, or re-setting it into a different mode of operation.

Smoke ventilation system types
- Mechanical smoke ventilation systems are comprised of an extract shaft serving common corridors and lobby areas of a building. When smoke is detected within an area covered by the system, the vent to the smoke shaft on the floor where the fire is located will open (all other vents must remain shut). At the same time, the head of stair vent will open to provide make-up air for the smoke extraction system. The fan at the top of the mechanical smoke shaft extracts the smoke and prevents migration of smoke into the adjacent compartments.
- The alternative to mechanical ventilation is a natural smoke ventilation system, which opens air ways, and uses natural air flow dynamics to remove smoke, when a fire occurs.

Compliance without compromise
- At Whitesales, we offer the most advanced and cost-effective solutions to suit any project requirements, whether mechanical or natural.
- Our extensive range of smoke control products are designed and manufactured to ISO 9001, CE marked and fully certified, and meet the requirements of Building Regulations AD B and AD L.
- Whatever the building, whatever the sector, our design experience and product range ensure we provide outstanding solutions.
Case Study

Project  Grafton Quarter
Scope  Supply and install of smoke and environmental ventilation systems to three apartment blocks over eight floors.
The system included roof-mounted mechanical and environmental pods, smoke shaft vents and control systems.
Products  3 no. Es-SHEV Mechanical and Environmental Pods, 3 no. Sertus Control Panels, 18 no. Smoke Vent Louvres, 3 no. head of stair Em-Vents.

Es-SHEV Mechanical Pod

The Es-SHEV Mechanical Pod is a modular smoke ventilation system. The Es-SHEV gives a guaranteed flow rate and pressure performance and is available in a choice of sizes with short lead times for smoke ventilation solutions in high-rise buildings. It is certified to BS EN12101-3 (Fans), BS EN12101-7 (Ducts), BS EN12101-10 (Power Supplies) and is supplied pre-commissioned in a prefabricated, prewired pod, ready for a single lift to rooftop for easy installation.

Benefits
- Available in standard range of guaranteed performances
- Pre-commissioned unit for fast installation with no risk of missing parts
- Standard and bespoke smoke ventilation system for high-rise buildings
- Certified lifting eyes for single crane lift to roof for easy installation

Type
- Es-SHEV Mechanical Pod: 560mm diameter
- Es-SHEV Mechanical Pod: 630mm diameter
- Es-SHEV Mechanical Pod: 710mm diameter

Exceeding minimum standards
- Extract fans CE marked and fully certified to BS EN12101-3:2015 Specification for Powered Smoke & Heat Control Ventilators (Fans)
- Adaptor certified to BS EN12101-7:2011 Smoke Duct Sections
- Control panel certified to BS EN12101-10:2015 Power Supplies
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Noise attenuator to reduce sound pollution for adjoining properties or internal noise for tenants or both internal and external.

The Sertus Mechanical Control Panel contains an automatic transfer switch for three phase primary & secondary supply, invertors and a duty & standby fan changeover switch.

Certified lifting eyes to allow easy craning to roof area – can be removed after installation, if required.

Powder coated aluminium cladding, colour-coded panels.

Fireproof foam seal.

Backdraft damper and bird mesh to protect system when in standby mode.

Duty and standby extract fans designed to perform to required extraction specification.

Anti-vibration mounts to ensure smooth running of fan with no stress to frame structure.

Adjustable height large flat mounting feet to provide stable support with no damage to roof finish.

Fire resistant square to round adaptor to ensure smooth air flow – can be connected to roof adaptor.

Powder coated steel box section, fully welded and load weight tested for structural integrity.

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Increased lobby & corridor overheating has become a feature of modern living in city centre multi-residential buildings. This is mainly due to centralised heat generation systems which significantly increase heat build-up in common areas. Improved energy efficiency, air tightness, and urban density are also contributory factors.

The secondary use of a mechanical smoke ventilation system is becoming more common, and is an effective means of reducing temperature areas deep within a building through the use of the smoke shaft as a cooling chamber. It assists by providing negative pressure within the communal areas to draw air up through the building and works most effectively when combined with low-level inlet air.

The Es-SHEV Environmental Pod is an additional pod which is integrated into the Mechanical Pod by means of a fire proof damper, and includes an energy efficient extract fan controlled by thermostats and smoke shaft vents at each level. The system automatically modulates the internal temperature and shuts down immediately if a fire signal is given. In addition, primary and secondary attenuation may be installed to reduce noise pollution for adjoining properties or building occupants.

**Type**
- Es-SHEV Environmental: 350mm diameter
- Es-SHEV Environmental: 400mm diameter
- Es-SHEV Environmental: 450mm diameter

**Exceeding minimum standards**
- Extract fans meeting the requirements of IEC 60364-8-1 Low Voltage electrical installations Part 8-1 Energy Efficiency
- Smoke vent dampers certified to BS EN 12101-8: 2011 Smoke Control Dampers

**Benefits**
- Effective secondary ventilation through the smoke shaft with the simple addition of the Es-SHEV Environmental Pod
- Es-SHEV Environmental pod utilises highly efficient extract fans in line with IEC 60364-8-1 Energy Efficiency guidelines
- Attenuation, either primary or secondary, prevents noise pollution to adjoining properties or building occupants
- The Sertus Mechanical Control panel immediately shuts down the environmental system on receipt of a fire signal
- Ranges of fan sizes combined with invertor control provide variable flow rates to enable correct extraction rates for every heat load and size of building
Enclosed car park areas require ventilation for environmental and smoke control.

Natural ventilation may be suitable for both environmental and smoke control if a minimum of 5% of floor area is achievable as a free vent area. In addition, vents must be located on either side of the zone to enable sufficient cross flow ventilation. Alternatively, a natural vent area of 2.5% may be provided if this is for smoke only and a supplementary mechanical Carbon Monoxide ventilation system is provided.

Often this level of natural ventilation is impossible to provide particularly if the car park is partly or entirely underground. Mechanical ventilation is the only solution in this situation and extract fans are sized to provide 10 air changes per hour for smoke control and exposure to no more than 30 parts/million of Carbon Monoxide over an 8hr period for environmental control.

Mechanical systems include ducted extract, although impulse or induction jet fans are becoming more popular due to their lower cost, and space saving design.

Smoke control in car parks has the main aim of creating smoke free zones for escape and firefighting, limiting smoke temperature and structural damage and preventing spread of the fire to other floors. Guidance on the design of car park ventilation is found within Building Regulations Approved Document B & F and BS 7346 part 7:2013.
Sertus Mechanical Control Panel

This fire resistant control panel is modulated to maintain a consistent temperature and contains as standard: automatic transformer switch, invertor drives and duty & standby fan changeover switches.

Es-SHEV Accessories

A full range of accessories are available to support the functionality of the Es-SHEV Mechanical and Environmental Pods. These include:

- Uninterrupted power supplies (UPS) to enable a mechanical system to be installed without the requirement for two dedicated three phase power supplies.
- Additional ducting items including access panels for ease of maintenance, primary and secondary attenuators to reduce external sound pollution to adjoining properties and internal noise for tenants.
- Smoke exhaust fire dampers are available for use when combining both fire and comfort ventilation systems. They are available in a variety of configurations to either open or close on fire.

Benefits

- A full range of accessories available to enhance and support the Es-SHEV systems
- Designed and manufactured to achieve maximum performance
- Supplied with the full Es-SHEV guarantee package

Type

Es-SHEV: Uninterrupted Power Supplies
Es-SHEV: Ductwork and Attenuation
Es-SHEV: Dampers
Because some things are too important to leave to chance...

We provide support at every step, from design and planning, through to system servicing and maintenance.

1. **CONCEPT**
   With a Technical Design team boasting over 50 years’ of industry experience, we ensure that all of our projects are designed to comply to the requirements in Approved Document B through the use of our BS EN 12101 certified products. We provide further advice for system specifiers and consultants to ensure best practice in design is achieved.

2. **DESIGN**
   At the project design stage we provide support to understand, and even modify, fire strategy documents. We can assist with product selection and ensuring cost-effective, compliant solutions. Our CPD programme offers Consultants, Architects and System Designers invaluable insight on the implication of Smoke Control in building design and safety.

3. **INNOVATION**
   Our R&D team apply the latest technologies in the development of our products. 3D design software in R&D and manufacturing helps us shorten the time to market for our innovative products, whilst maintaining rigorous testing and quality standards.
   
   Some of our latest product developments include:
   - Es-SHEV Mechanical Pod, offering simplified commissioning
   - BS EN 12101-2 certified smoke shaft door
   - Adaptive smoke control system
   - Mechanical Car Park smoke ventilation and comfort venting systems
   - Automatic smoke curtain systems

4. **PLANNING STAGE**
   Our experienced system surveyors will perform in-depth site surveys and/or condition reports to assess current installations. We can provide varying levels of support as required during planning phases.

5. **SPECIFICATION**
   Our written specification, with fully-costed solutions, will clearly outline product recommendations to meet, or exceed, agreed requirements. Our in-depth proposals and quotes include: CAD drawings, schematics, case studies and bespoke factors, from custom project designs, to flexible project implementation strategies.

6. **SUPPORT**
   Our outstanding project support includes production of: project specific drawings, featuring wiring schematics; BIM objects; 3D modelling; product technical data sheets and product samples, if required.

7. **PRODUCT RANGE**
   We offer the UK’s largest range of stocked smoke ventilation products. In addition, we manufacture and supply a broad range of smoke control components: special sized vents; made-to-measure glazed louvres, certified single-component, craneable mechanical SHEV, unique to the UK market.

8. **INSTALLATION**
   Our project management teams deliver a bespoke service from concept to final handover. Our in-depth programming of work ensures that all aspects of a project are planned and managed optimally. We closely manage onsite progress with regular monitoring and reporting.

9. **HANDOVER**
   We provide commissioning and system certification to BS 7346 – 8, including product documentation handovers ( O&M manuals, DOP certification, data sheets and schematic drawings, and warranty documents). Our customer service team also provides support from order placement to final handover and any follow-up through the warranty period.

10. **AFTER-CARE**
    Our team provide on-going support, from engineer callouts to parts replacement. We provide annual servicing packages to maintain smoke control systems, as detailed in BS 7346 – 8, ensuring continued operational efficiency throughout its lifecycle.
Design considerations

Certification

BS EN 12101: Smoke and Heat Control Systems
From July 2013 compliance with this CE Harmonised Norm became compulsory in the UK in terms of CPR Regulation No. 305/2011.

BS EN 12101-1: 2006 Specification for Smoke Barriers
This standard describes the function, types and applications of smoke barriers, including their performance and classifications. Tests include reliability, durability, response times, permeability, fire resistance and deflection under load.

BS EN 12101-2: 2017 Natural Smoke and Heat Exhaust Ventilators
This standard describes natural smoke and heat exhaust ventilators (SHEVs) as a system of safety equipment intended to perform a positive role under load.

BS EN 12101-3: 2015 Specification for Powered Smoke & Heat Control Systems (Fans)
This standard details testing and assessment of smoke and heat extraction by powered systems. Tests include reliability, response times, resistance to fire, and effectiveness of smoke and hot gas extraction.

BS EN 12101-4: Installed SHEVs systems for smoke and heat ventilation
Specifies the design of Smoke and Heat Exhaust Ventilation systems (SHEVs) to create a smoke-free layer above the floor of a building to improve escape routes.

BS EN 12101-5: Guidelines on functional recommendations and calculation methods for smoke and heat ventilation systems
Gives recommendations and guidance on functional and calculation methods for smoke and heat ventilation systems.

BS EN 12101-7: 2011 Smoke Duct Sections
This standard describes construction of components used in single and multi-compartment smoke control ducts and tests include fire resistance, integrity, insulation and leakage.

BS EN 12101-8: 2011 Smoke Control Dampers
This standard describes the construction and operation of smoke control dampers. Tests include fire resistance, integrity, insulations, leakage, durability and response times.

BS EN 12101-9: 2004 Control Panels
This European Standard specifies the product performance requirements, classifications and test methods for control panels, designed for use in smoke and heat control systems in buildings.

BS EN 12101-10: 2005 Power Supplies
This standard details power supply for a primary and secondary electrical system, and pneumatic equipment. Products include mains electrical, batteries, generators and compressed gases. Tests include operation in damp, and cold conditions. Evaluation also includes factory production control.

Approved Document B only requires the smoke vent to finish 150mm above finished roof level, but EN 12101-2 states that it must be a minimum of 300mm.

Guidance

This British Standard gives recommendations for the planning, design, installation, commissioning and maintenance of smoke control systems, including smoke clearance, in and around buildings. The recommendations are applicable to systems intended for the protection of life and/or protection of property, including: a) natural smoke ventilation; b) mechanical smoke ventilation; c) smoke barriers; d) smoke and heat exhaust ducts; e) smoke dampers, and their controls, power supplies and interconnections.

BS 9991 – 2015 – Fire Safety in the Design, Management and Use of Residential Building
This British Standard gives recommendations and guidance on the design, management and use of residential buildings. It covers dwellings, residential accommodation blocks and residential housing. It applies to the design of new buildings and material alterations and extensions to existing buildings. Its intentions are to safeguard the lives of building occupants and fire-fighters.

BS 7456-9: 2007 Fire Safety in the Design, Management and Use of Building
This British Standard gives recommendations and guidance on the design, management and use of buildings to achieve reasonable standards of fire safety for all persons in and around the building. It is a comprehensive document covering design of buildings, fire protection, means of escape, access and facilities for fire-fighting personnel and management of risk assessment of occupied buildings.

It is not applicable to individual dwelling-houses, and might have only limited applicability to certain specialist buildings and areas of buildings (e.g. areas of lawful detention).

Legislation

Approved Document B 2006 Fire Safety
For smoke ventilators, Approved Document B states that the free area of a smoke ventilator may be measured by either the aerodynamic area in accordance with the EN 12101-2 or the total unobstructed cross sectional area measured in the plane with areas at a minimum and at right angles to the direction of air flow. There is nothing in Approved Document B to specify a specific opening angle for smoke ventilators; however if they open to anything less than 90°, this would affect the air flow calculation.

The Regulatory Reform (Fire Safety) Order 2005
The aim of this reform is to simplify, rationalise and consolidate existing legislation. This provides a risk based approach to fire safety, allowing a more efficient and effective approach by the fire and rescue services and other enforcing authorities. Among many other things it details the ‘responsible person’ and their duties imposed on them including general fire precautions, risks assessments, fire-fighting and emergency routes and exits.

Smoke Control Association (SCA) Guidance on Smoke Control to Common Escape Routes in Apartment (Flats and Maisonettes) Revision 2: October 2015
This guide has been developed by the SCA in conjunction with other experts from the fire industry and covers information and requirements on the design, calculation, methods, installation and testing of systems intended for smoke control within the common escape routes within apartment blocks and maisonettes. The smoke control described within this guide include Natural, Mechanical and Pressure systems. Guidance in the guide is based around compliance with Building Regulations and references guidance within BS 9991 and BS 7346-6. Designers are also advised to take note of EFM regulations, Workplace Health, Safety and Welfare) Regulations, and Regulatory Reform (Fire Safety) Order. The guide assists designers, architects, and fire engineers to ensure the smoke control system complements the overall fire safety strategy and provide a suitable level of compliance. Practical guidance contained in the guide include design criteria, giving advice on tolerability, travel distance calculations, and documentation, and selection of appropriate methods of smoke control and their installation and commissioning and maintenance.

Regulation compliance is paramount, as life-saving devices, systems must meet, or exceed standards, and achieve strict performance criteria.

Please see the full document for detailed information.