

Light + Air
UK & Republic of Ireland



Smoke and Fire Dampers in HVAC Systems

Maintenance and management



SMOKE AND FIRE DAMPERS IN HVAC SYSTEMS MAINTENANCE AND MANAGEMENT



HVAC ductwork is a cornerstone of modern building design – a way of passing air through infrastructure and keeping the building and its occupants healthy and comfortable.

When a fire breaks out, however, ductwork can provide a channel for smoke, hot toxic gases and flames to pass from one fire compartment to another. The ducting system may become a distribution system, spreading hazardous smoke throughout a building and potentially allowing the fire to spread uncontrollably past walls that are provided to contain it.

HVAC dampers are used to regulate airflow in the system design, fire dampers are put into HVAC ductwork to maintain compartmentation in the event of a fire and smoke control dampers are used to regulate the flow of smoke and hot gases within a smoke control system during a fire.

Dampers are louvred vents or shutters situated at key points within the ducting system. The fire resistance requirements of fire dampers and fire walls are described in Approved Document B.

In everyday use, fire dampers remain open and inert, allowing the flow of air through ductwork. When fire or smoke is detected, however, they will close, blocking the duct and preventing any passage. Fire dampers will remain effective in prohibiting the movement of fire and smoke for several hours, depending on their classification, allowing for occupant escape and providing time for the emergency services to work.

It is crucial that records are kept detailing the location of dampers throughout a building's ductwork, whether from the initial construction or subsequent alterations. These records will allow for effective maintenance.



THE DIFFERENCE BETWEEN SMOKE AND FIRE DAMPERS

Smoke and fire dampers fill complementary roles. Both are installed in similar locations, and both are designed to stop ducting becoming a weak point in a building's fire safety arrangements.

There are, however, a few key differences when it comes to effective placement:

Fire Dampers

The fire damper allows air to pass when the system is operating normally. When fire is detected, the damper closes to maintain the integrity of the barrier, preventing fire spread across the barrier up to the point the barrier fire performance is exceeded.

The primary functions of a fire damper are:

- permit airflow in normal use
- maintain compartmentation in fire

They should be CE marked (or UKCA Marked after Jan 2023) to BS EN 15650, Tested to BS EN 1366-2 and classified in accordance with BS EN 13501-3.

When a fire damper is referred to as a 'smoke and fire damper', it means that it has the additional 'S' classification, i.e., it has met the lower leakage rate of the test standard and will permit less air and smoke to pass through when closed. This could be particularly important in escape routes or refuges, for example.

Fire Dampers should always fail to the closed position.

Technically, a fire damper can be spring closed and either manual (with a fusible link) or motorised reset. The motorised damper offers much more flexibility to the building user as opening the dampers after use can be controlled centrally - the fusible link operated damper offers no flexibility - once closed it has to be physically accessed to be reset.

Smoke Control Dampers

Smoke Control Dampers are designed to control the flow of heat and/or smoke into and out of a smoke control system and so have more complex operation capabilities.

Single compartment smoke control dampers can either open to allow the passage of smoke and heat into a smoke control system or close in the event of a fire to only prevent smoke (and not fire) spreading from the smoke control system to other areas. These have a temperature rating but not a fire rating.

Multi-compartment fire dampers operate in the same way, but when closed, they offer a fire rated barrier between the smoke control system and the adjacent areas.

They should be CE marked (or UKCA Marked after Jan 2023) to BS EN 12101-8, Tested to BS EN 1366-10 and classified in accordance with BS EN 13501-4.

Smoke Control Dampers may need more sophisticated control systems as deciding which damper is open and which is closed needs to be preprogrammed as part of a detailed cause and effect, whereas fire dampers will simply all close.

Other classifications which affect the selection of smoke control dampers include:

- Temperature rating (single compartment)
- Period of fire resistance (multi-compartment)
- Insulation
- Smoke sealing
- Manual or automatic operation
- number of test cycles
- Operating Pressure

Safety Records Require Attention

Smoke control and fire dampers are invaluable – and prerequisite – when it comes to maintaining the integrity of any building's fire strategy. It is equally important that records are kept of their location, allowing for regular testing and maintenance.

If building owners do not maintain a clear idea of how many dampers are installed and their locations, it becomes difficult to keep track of whether they are working. As such, it is vital to maintain safety records which detail the location, and keep a record of all maintenance testing for each damper.

Unlike smoke curtains and fire alarms, dampers are not immediately accessible – but their maintenance is no less importance.

Kingspan Light + Air is experienced in conducting full-site surveys to identify the location and efficacy of each damper, standing the client in good stead for future management.

In terms of HVAC management, best practice guidelines entail that:

- The building owner or facilities manager knows that they have a HVAC and/or smoke control system that the Regulatory Reform (Fire Safety) Order 2005 and BS9999 require them to undertake maintenance work.
- They know how many dampers they have on site.
- They know where each damper is located and it's function.
- They know the service specifications of each damper, and whether they are motorised or fusible link dampers.
- They have a clear record of when their dampers were last tested, serviced or replaced.
- Where structural changes have been made to the building, pre-existing dampers are still accessible for maintenance, and new dampers have been installed as required.



HVAC systems require regular, routine maintenance. It is never too late to take stock of damper location and status.

Damper Regulations

The success of HVAC systems is underpinned by extensive legislation:

- Building Safety Act 2022
- The Fire Safety Act 2021
- The Regulatory Reform (Fire Safety) Order 2005
- The Fire (Scotland) Act
- Fire Safety and Safety of places of Sport Act 1987
- Construction Products Regulation
- BS EN 12101-8
- BS EN 15650
- Fire Precautions (Workplace) Regulations 1997
- Fire Precautions (Health & Safety) Regulations 1999

Other related Guidance and standards:

- IBS 9999 : 2017; Code of practice for fire safety in the design, management and use of buildings
- IRATA - Access Works
- H & S Regulation 6 - Maintenance and Testing
- H & S and IEE Regulations - servicing and high-level access works

The best approach to HVAC maintenance

Proper, preventative, pre-emptive service work undertaken by qualified specialists will not only ensure the highest levels of safety and security – it will also mean savings in time and money.

That said, maintenance and service is just part of the answer. At the heart of HVAC competence is a truly effective management system.

HVAC management involves committed record keeping and proper data management. Kingspan Light + Air recommends identifying a damper maintenance provider that is knowledgeable of Building Regulations, including the design, application and specification of ventilation systems, particularly fire related and smoke control systems.

Kingspan Light + Air will conduct the following procedure to ensure successful HVAC management for a client:

Review and Advise

Kingspan Light + Air will look over existing damper maintenance provisions, review maintenance processes and offer advice on how best to proceed.

Survey and Plan

Kingspan Light + Air will survey the site, verifying damper locations and locating dampers, developing a clear picture of the scale of the operation and an idea of the existing maintenance schedule.

Service and Report

Kingspan Light + Air will check each damper individually, ascertaining the operational status of the system. The client should also review the effectiveness of any and all HVAC controls in place on-site.

Repair and Replace

Kingspan Light + Air will consider, where necessary, which dampers can be repaired and which should be replaced, creating a cost-effective and considerate strategy for moving forwards.

Assist with Asset Register

Upon completion of the damper review process, Kingspan Light + Air will provide assistance to our client in the completion of asset registers, including providing all necessary location, specification and maintenance history for all dampers covered by the service contract.

Conclusions

Smoke and fire dampers facilitate the escape of building occupants and allow for easier fire fighter access. A crucial part of any HVAC system, dampers serve to save lives and protect property. As such, damper maintenance is of the utmost importance.

The BRE report, 'Examination of the Fire Resistance Requirements for Ducts and Dampers', produced on behalf of the Office of the Deputy Prime Minister, now known as the Department for Leveling Up, Housing and Communities (DLUHC), details numerous case studies from the UK and the USA of fires within ducted HVAC systems. The report concludes that regular, specialist preventative maintenance and testing is the best and simplest strategy that can be put in place to minimise the impact of fire in ductwork systems.

Kingspan Light + Air has unrivalled and unique expertise in providing service and technical support for active smoke control and ventilation equipment. We have a dedicated team of damper specialists on-hand to help with any enquiries – call us on 02920 776160.

When it comes to HVAC, we've got it covered

Kingspan Light + Air's regional engineering, sales and operations centres provide local customer support from the UKI's largest team of technical service and refurbishment engineers.

Dedicated health and safety, design and project teams ensure that our clients comply with the latest legislation and standards. Kingspan Light + Air is committed to carrying out work of the highest standard while meeting budget and time constraints specific to each client.

Working with a UKI-wide network of approved partners and the full resources of the Kingspan Group, the company is proud to offer the UKI's leading range of smoke control and air quality solutions.



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