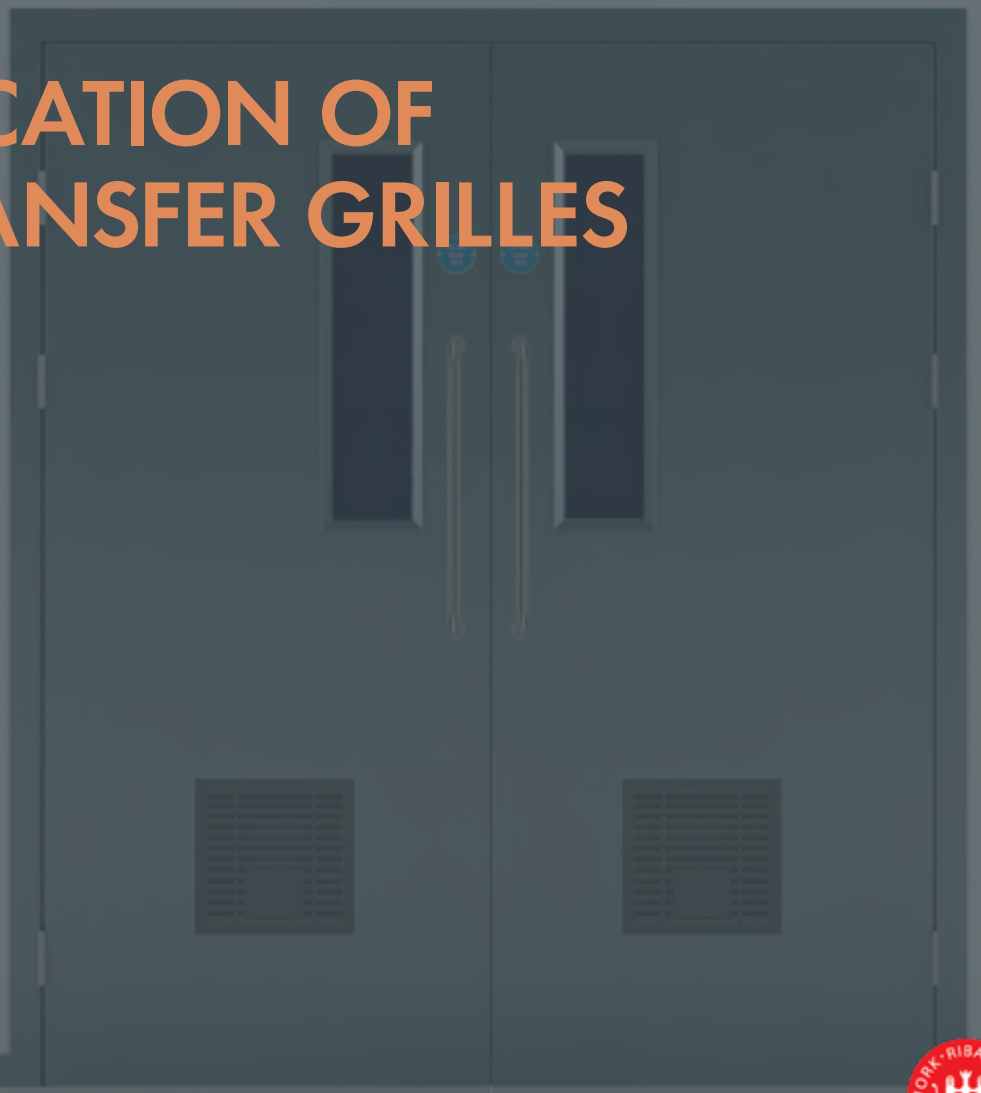
# THE DESIGN & SPECIFICATION OF INTUMESCENT AIR TRANSFER GRILLES

## GAI SPECIFIER'S GUIDE

*The specifier's guide to understanding intumescent air transfer grilles, the role they play and the critical considerations you should take into account when it comes to their specification.*



Guild of Architectural Ironmongers

RIBA · CPD PROVIDERS NETWORK · RIBA · CPD PROVIDERS NETWORK

Guild of Architectural Ironmongers

MARCH 2025

# THE DESIGN & SPECIFICATION OF INTUMESCENT AIR TRANSFER GRILLES

## GAI SPECIFIER'S GUIDE

*The specifier's guide to understanding intumescent air transfer grilles, the role they play and the critical considerations you should take into account when it comes to their specification.*

*To ensure that your project meets the latest standards, regulations, legislation and best practice, it is strongly recommended that the ironmongery should be specified by a GAI Registered Professional such as a Registered Architectural Ironmonger (RegAI). All RegAI's have successfully completed the GAI Diploma in Scheduling qualification, and continue to maintain and update their knowledge through the GAI continuing professional development (CPD) programme. RegAI status is a clear demonstration of professional competence in matters which are critical to building safety, accessibility and security. Visit www.gai.org.uk/RegAI.*

## CONTENTS



SPONSORED BY

LORIENT
ASSA ABLOY



RIBA · CPD PROVIDERS · NETWORK

Guild of Architectural Ironmongers

# 1. BACKGROUND

## FIRE STATISTICS

Government statistics show that the fire figures in England are now beginning to fall, with 220 deaths* from dwellings and other buildings. However, 5,515 people† were seriously injured, many with either horrific burns or permanent lung damage caused by the inhalation of toxic smoke.

The property losses gathered by the Association of British insurers have increased and is now at a staggering 1.3 billion pounds per year. But we can't be complacent about any of these figures because further detailed analysis shows us that 51% of the fatalities and injuries are caused by smoke rather than fire.

## APPROVED DOCUMENTS

Approved Documents B & F are part of a series of documents which give us practical guidance about how to meet the technical requirements of the 2010 building regulations, this is for common building situations in England, Wales, Scotland and Northern Ireland all have their own technical guidance. Ventilation systems are obviously an integral part of our building and whilst this is covered in Doc F, the guidance on fire precautions entirely resides within Doc B. It can be found in Section 9 of AD B1 'Protection of openings and fire-stopping' and section 10 of AD B2 'Protection of openings and fire-stopping'.

Doc F Section 4.37 states **"Where ducting passes through a fire resisting wall/floor or fire compartment, the required measures to ensure compliance with Part B of the Building Regulations must be taken."**

Within Doc B, several scenarios are outlined for the use of 'fire dampers' to maintain fire compartmentation. As we will come onto later the use of the term fire damper in this situation also includes intumescent air transfer grilles as well as fire and smoke intumescent air transfer grilles.

The detail within Doc B barely scratches the surface in terms of the variability of applications into which fire dampers or intumescent air transfer grilles may be situated. It does offer some general guidance, but also references BS EN 15650 which provides the performance requirements for fire dampers and also covers intumescent systems, but does not reference the relevant product standards for these systems, which do allow classification to EN 13501-3 & EN 13501-4.

## FIRE SAFETY IN PURPOSE-BUILT BLOCKS OF FLATS

With regards to the remediation of existing buildings, there was a study conducted on behalf of local government which looked at the issues surrounding high rise flats. One of the issues faced with these buildings is the common use of shared ventilation risers, which often connect kitchens and bathrooms of multiple flats with little to no fire or smoke protection.

The document provides a clear assessment of the potential hazards associated with these buildings and outlines a simple medium-term solution, using air transfer grilles. These have the potential to relatively cheaply avoid either fire spread and/or cold smoke spread between compartments, although access issues will always present a problem.

* England 2024
† Home Office 2025

Guild of Architectural Ironmongers

# 2. UNDERSTANDING INTUMESCENT AIR TRANSFER GRILLES

## THE ROLE OF AN INTUMESCENT AIR TRANSFER GRILLE

The role of intumescent air transfer grilles is essential in maintaining both ventilation and fire safety within a building.

- **Air Movement and Fire Risk:** Air movement is necessary for ventilation, but it can also create pathways for fire and smoke to spread. This is particularly relevant in fire-resisting doors, walls, or ductwork.
- **Fire Compartmentation:** To prevent fire from moving between building compartments, intumescent air transfer grilles can be installed. In the event of a fire, these grilles expand to form a solid barrier, effectively sealing off the opening and blocking fire from spreading further.
- **Smoke Containment:** In addition to fire control, smoke containment is critical. Combined fire and smoke-resistant air transfer grilles are designed to block not only fire but also cold smoke, which can spread rapidly in low-temperature conditions. This feature is particularly important along escape routes, where preventing smoke movement can buy valuable time for building occupants to evacuate safely.

By allowing necessary airflow while providing robust protection against fire and smoke, intumescent air transfer grilles serve as a crucial component in a building's passive fire protection strategy.

## DEFINITIONS

When it comes to intumescent air transfer grilles, it's essential to understand that the terminology differs across fire test standards, even though the product function is fundamentally the same.

Here's how the following standards describe it:

- **EN 1364-5 - Referred to as an air transfer grille.** Here, it's defined as a device that has an active or reactive element—sometimes with a decorative cover grille—that allows air movement under normal conditions. However, in the event of a fire, it's designed to expand and seal off the opening, maintaining fire resistance.
- **EN 1366-12 - Referred to as a non-mechanical fire damper.** This term highlights that the device is entirely passive, with no moving parts, used in HVAC systems where fire compartmentation is required. When exposed to high temperatures, it closes off airflow to contain the fire, but under normal conditions, it remains open. EN 1366-2 relates to mechanical fire dampers, rather than reactive intumescent.
- **Approved Document B - Referred to as a fire damper.** Here, it's described as a mechanical or intumescent device that automatically activates to resist the spread of fire, which could imply mechanical operation. In this case, however, the product functions through intumescent expansion alone, not mechanical movement.
- **VH001 - Referred to as an Intumescent Block Fire Damper.** This document published by the Building Engineering Services Association regarding the maintenance requirements for Fire & Smoke Dampers, describes it as an Intumescent Block Fire Damper.

Understanding these subtle differences in definitions is crucial. They illustrate that while the terminology varies—air transfer grille, non-mechanical fire damper, or fire damper—the product's role remains consistent: it's a passive fire-protection solution in ventilation systems that prevents fire spread by sealing off openings when temperatures rise

Guild of Architectural Ironmongers

# 2. UNDERSTANDING INTUMESCENT AIR TRANSFER GRILLES CONT'D

## THE DIFFERENCE BETWEEN AN INTUMESCENT AIR TRANSFER GRILLE AND FIRE DAMPER

### An air transfer grille

These are 'reactive' products which act in a passive manner to allow the transfer of air between compartments, until subjected to heat from a fire, wherein they intumesce to seal the aperture and maintain compartmentation.

### A fire damper

These are mechanical or electro-mechanical devices which in an open position allow the movement of air between compartments. Closure of the device maybe triggered by localised heat from a fire or by triggering from a fire panel.

It's important to note that both air transfer grilles and fire dampers are generally tested to different product standards.

If we look at functional types of ATG, there are many variations in both design and performance. Everything from decorative cover grilles, which offer nothing beyond security and privacy, to Fire & Smoke containment.

Cover grilles can be important when it comes to achieving insulation in test. This is primarily down to the intricacies of the test standard and means of surface measurement on reactive materials. So if specifying an Intumescent Air Transfer Grille with an EI rating, it's worth nothing that a cover grille may form part of that system.

The basis of a Fire Containment ATG is a reactive material which we'll come onto shortly. The application for these can be varied, from doors to walls, to ducts. But in all cases it is there to maintain the fire barrier in the event of a fire. So it goes without saying that it should be tested to the same rating as the structure in which it is mounted.

A more advance form of reactive fire barrier, combines an intumescent ATG with smoke shutters. But as mentioned before, these are not designed to control smoke, but act as a containment barrier. Their origin was in providing a solution for air transfer through fire & smoke doors, but has expanded to walls and ducts. Obviously these need to work in conjunction with a buildings fire strategy so ideally should be installed with connection to the Building Management System (BMS).

Guild of Architectural Ironmongers

# 2. UNDERSTANDING INTUMESCENT AIR TRANSFER GRILLES CONT'D

## ROLE & PERFORMANCE

**Purpose -** Intumescent air transfer grilles are essential for allowing air movement while also ensuring fire protection. They're designed to maintain compartmentation within a building, helping to prevent or slow down the spread of fire by sealing off openings when exposed to high temperatures.

**Function -** In a fire, the air transfer grille components - specifically the slats and framing - expand significantly, swelling to many times their original size. This intumescence causes the materials to fuse together, forming a solid barrier that effectively blocks the passage of fire and hot smoke. This reaction transforms the air transfer grille from an open structure into a secure fire-blocking shield.

**Location -** Intumescent air transfer grilles are versatile and can be installed in various parts of a building, including doors, walls, ducts, floors, and ceilings, provided that suitable evidence exists for their fire performance in each application. Their role in each location is to reinforce the fire barrier, contributing to the containment strategy within the building.

**Operation -** Intumescent air transfer grilles are considered reactive products. They passively allow air to transfer between compartments under normal conditions, but during a fire event, they intumesce - meaning they expand quickly to seal the opening. This automatic response reinforces compartmentation, maintaining the integrity of the building's fire safety strategy.

## THE PRINCIPLE & IMPORTANCE OF COMPARTMENTATION

Approved Document B, Volume 2 (2019) defines fire compartments as:

> "A building or part of a building comprising one or more rooms, spaces or storeys constructed to prevent the spread of fire to or from another part of the same building or an adjoining building."

The image below clearly illustrates how a lack of sealing, or openings in compartmentation boundaries can lead to the passage of a significant amount of smoke. Here we can see how smoke can move through a door, but it will also affect pipes, ventilation ducts as outlined in Approved Document B Vol 1, Section 7.20:

Openings in other compartment walls, or in compartment floors should be limited to those for any of the following.

a) Fire doorsets of the appropriate fire resistance, fitted in accordance with the provisions in Appendix C.

b) Pipes, ventilation ducts, service cables, chimneys, appliance ventilation ducts or ducts encasing one or more flue pipes, complying with the provisions in Section 9.

c) Refuse chutes of class A1 construction.

d) Atria designed in accordance with Annexes B and C of BS 9999.

e) Protected shafts that conform to the provisions in the following paragraphs.

Guild of Architectural Ironmongers

# 2. UNDERSTANDING INTUMESCENT AIR TRANSFER GRILLES CONT'D

## TYPES OF INTUMESCENT

In general, there are two main types of intumescent materials used:

- Sodium Silicate Base
- Graphite Base

## ACTIVATION TEMPERATURES

**Sodium Silicate:** These activate at around 100°C, expanding early with a high degree of pressure to form a solid barrier. This lower activation temperature is beneficial for faster response to initial fire conditions.

**Graphite-Based Grilles:** Graphite activates later, between 150°C and 190°C. Despite the higher activation threshold, once the temperature is reached, graphite expands rapidly to block fire effectively.

This distinction makes sodium silicate ideal for scenarios needing quicker fire response, while graphite's later activation suits applications where rapid intumescence at higher temperatures is advantageous.

## STRUCTURAL SUPPORTS

**Sodium Silicate:** Typically encased in a PVC carrier, sodium silicate grilles have added protection and stability during their regular, non-fire operation. This casing helps preserve their structure until they're needed in a fire event.

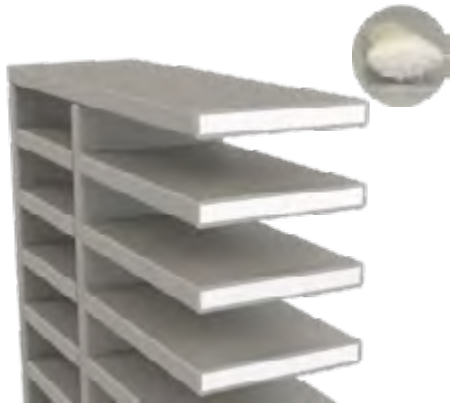
**Graphite-Based:** Graphite is often integrated into a honeycomb structure in simpler grilles. However, higher-performance options use an aluminium or steel foil as part of the barrier system for added strength and reliability.

## HUMIDITY

**Sodium Silicate:** Sodium silicate is hygroscopic, meaning it absorbs moisture from the air. This characteristic makes it less suited for exterior applications or high-humidity areas, where moisture could impact its stability over time.

**Graphite-Based:** Graphite, on the other hand, is non-hygroscopic, so it does not absorb moisture. This hydrophobic nature makes graphite ideal for exterior or high-humidity settings, where it remains stable and unaffected by moisture.

Understanding this difference helps ensure the correct material is chosen based on the specific humidity conditions of the installation environment.



*Sodium Silicate Base*

*Graphite Base*

Guild of Architectural Ironmongers

# 3. COMBINED FIRE & SMOKE

## WHAT IS A COMBINED FIRE AND SMOKE RESISTANT AIR TRANSFER GRILLE?

This image opposite shows the typical set up of a combined intumescent fire and smoke air transfer grille. Here we can see two intumescent fire only ATG's, which in turn sandwich the smoke shutter plates which are operated by the actuator. This provides containment of cold smoke via interface with smoke sensors in addition to the normal function of an air transfer grille.

## ROLE & PERFORMANCE

**Purpose -** Combined intumescent fire & smoke resistant air transfer grilles are designed to integrate air movement with fire & cold smoke protection.

**Function -** Connected to a standard fire alarm system through a control panel, the shutters close automatically in the event of a fire or power failure, blocking the passage of cold smoke.

**Location -** Combined intumescent fire & smoke resistant air transfer grilles can be used in all applications where cold smoke containment is required.

**Operation -** The smoke shutters contained within the intumescent air transfer grille can be actively controlled. This allows their status to be actively monitored and fed back to the Building Management System.

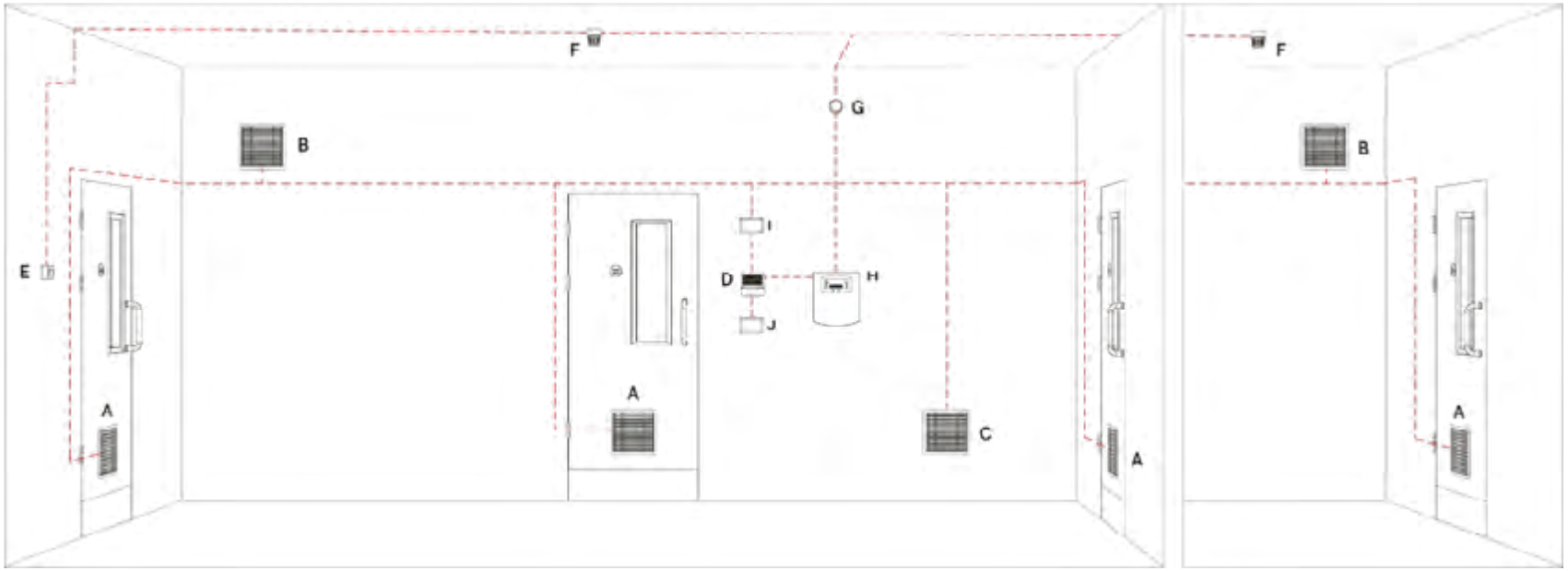
Guild of Architectural Ironmongers

# 3. COMBINED FIRE & SMOKE CONT'D

## TYPICAL INSTALLATION

Fire & Smoke air transfer grilles (ATG's) are fitted into buildings with sometimes complex compartmentation strategies, with requirements in terms of air handling, pressure control as well as smoke and fire containment. Communications between Fire & Smoke ATG's and the Building Management System or BMS, are commonplace and so systems can either be stand alone, triggered from the fire panel and/or provide communication back to the BMS.

The example below illustrates what can be achieved with a monitored system, whereby doors, wall mounts and end of duct installations can all be controlled and monitored to enable implementation of the compartmentation strategy. With an increasing emphasis on smoke containment strategies, the installation of Fire & Smoke ATG's within doors has become increasingly relevant.




KEY

- A Door mounted fire & smoke ATGs
- B End of duct fire & smoke ATGs
- C Wall mounted fire & smoke ATGs
- D Power & monitor unit
- E Fire point
- F Smoke sensors
- G Fire alarm indicator
- H Fire alarm panel
- I Audio alarm
- J Battery back-up

Guild of Architectural Ironmongers

# 3. COMBINED FIRE & SMOKE CONT'D

## CONTROL SYSTEMS FOR FIRE & SMOKE RESISTANT AIR TRANSFER GRILLES

Control systems which allow the control and monitoring of fire and smoke containment systems have been on the market for many years. These systems can vary from simply cutting the power to the damper and relying on a spring to close the device, to systems which add a high degree of functionality, such as self-test, continuous monitoring of status, and communication with the Building Management System (BMS).

Given the number of dampers which may be fitted into large buildings, such as hospitals, the additional functionality can help reduce maintenance and man hours spent resetting systems after false alarms.

These are the key features to look for in a control system:

- **Is it compatible with fire-resistant and smoke-resistant air transfer grilles & mechanical fire dampers?**
- **Does it have self-testing functionality?** For example, automatically opening and closing smoke shutters to verify they are working and to clear debris.
- **Can it continuously monitor each air transfer grille?** Look for systems that display status updates on the Damper Control Monitor (DCM) visually or with audible alerts.
- **Is it fail-safe?** Will it close in the event of power loss or loss of communication with the control panel?
- **Is it CE marked under the Low Voltage Directive (LVD) and the Electromagnetic Compatibility (EMC) Directive to meet essential safety and electromagnetic compatibility standards?**
- **Does it use safe, low-voltage power?** This feature can enhance both safety and reliability in critical situations.

Guild of Architectural Ironmongers

# 4. HOW TO SPECIFY

*Here are some of the critical considerations when it comes to specification:*

### LOCATION & SUBSTRATE

The substrate into which an air transfer grille is installed will have an impact on its validity.

Within walls for example, testing in rigid (masonry) walls does not transfer to flexible (metal/timber) stud walls. Equally, fire stopping methods involving ablative batt systems will perform differently and installation methods will differ.

Environmental considerations may come in to play for internal or external placements.

Performance in relation to moisture – Particularly important in exterior application or areas of high humidity.

### FIRE RATING

The air transfer grilles should match or exceed the fire performance of the wall (door, duct) within which it is mounted. But also consider whether insulation is a requirement. ADB quote: "The damper assembly shall have a fire integrity classification equal to the fire barrier it penetrates".

### SMOKE CONTAINMENT

Is there a need to maintain smoke compartmentation, perhaps in protection of an escape route.

Distinction between hot & cold smoke – Cold smoke may be a consideration on an escape route or corridor at low level, whereas hot smoke maybe requirement at higher level or within a particular compartmentation strategy.

Compartmentation – In using smoke containment technology will there be a requirement to simply contain/segregate smoke risk areas or will there be a need to allow smoke evacuation through control of smoke shutters.

### SUITABILITY

Does the product match the installation requirements on site, such as:

- Support structures
- Size Requirements
- Performance in relation to moisture
- Activation Temperature & Rate
- Is there evidence or third party certification for insulation, fire and smoke performance for the specific solution
- Will it last given the location, reliability & durability

### RISK ANALYSIS

What are the implications to the fire safety model if the air transfer grille should fail – Risk to life / property, extent.

### COMMERCIAL

To arrive at a specific solution, it's important to consider the previous points on suitability before considering price and availability.

When specifying air transfer grilles, it is important that the specifier understands their responsibilities and legal requirements under the CDM 2015 regulations. This includes both their duties as a designer and, where applicable, as the principal designer. Manufacturers involved in the specification process also have responsibilities under these regulations and must ensure their products contribute to a compliant and safe design.

# 4. HOW TO SPECIFY CONT'D

## SUPPORTING STRUCTURES

**Standard Supporting Constructions**

A Standard Supporting construction as defined in EN1363-1:2020 as:

> "Forms of construction which have a quantifiable influence on the heat transfer between the construction and the test specimen and which provide known resistance to thermally induced distortion".

There are various types of Standard Supporting Constructions included:

Rigid supporting constructions

- High-density rigid constructions have an overall density greater than or equal to 850kg/$m^3$ at an appropriate thickness. Examples of this could include a masonry or homogeneous concrete wall.
- Low-density rigid construction is an aerated concrete block wall with an overall density of 650+/- 200 kg/$m^3$, at an appropriate thickness.

Flexible Supporting Constructions

- This is a lightweight plasterboard faced steel partition constructed in accordance with EN1363-1:2020.

## APERTURES

When specifying air transfer grilles, several key factors must be considered relating to their intended apertures:

- **Maximum Tested Size:** Begin by confirming the air transfer grille's maximum tested dimensions
- **Modular Construction:** Check if the air transfer grille's can be assembled in sections. This can allow for more flexible sizing while maintaining performance.
- **Plane of Installation:** It's essential to verify where the air transfer grille can be installed:

  - Can it be installed horizontally, i.e. in a floor/ceiling.

  - Can it be installed vertically, i.e. in a door/wall.
- **Positioning – Height:** The height placement of the air transfer grille within the structure matters, particularly for smoke containment and compartmentation.
- **Supporting Structure Thickness:** The thickness of the structure (such as a wall or door) must be sufficient to support the air transfer grille and maintain its tested fire performance.
- **Installation Method:** Installation techniques, such as surface mounting or rebating, can impact the effectiveness of the seal and its compliance with fire safety standards.
- **Effect on Insulation:** Finally, consider how the air transfer grille impacts the insulation properties of the overall structure, as this can influence both fire safety and thermal performance.

## FREE AREA CHARACTERISTICS

Looking at some key performance characteristics which are important when it comes to correctly specifying ATG's, one of the principal restrictions on its passive ventilation performance is free area.

'Free Area' is the area within an aperture unobstructed by the components of an air transfer grille product when in the normal or open position through which air is free to flow.

Important physical characteristics relating to free area are:

- **Air Velocity -** Is the speed of passage of air and is usually measured in metres per second or in imperial terms in feet per second.
- **Volumetric flow -** Is the volume of air movement in a specific time and is usually given in cubic metres per hour or litres per second
- **Pressure differential -** In order to create air movement through any ventilation system it is necessary to create a pressure differential from one end of the system to the other. Though this can be achieved by natural phenomena in the building such as "stack effect" it is more usual to incorporate motor driven fans.
- **Sound / noise generation -** From movement of air through the device.

# 4. HOW TO SPECIFY CONT'D

## DOORSET SMOKE LEAKAGE

When specifying ATGs in walls and ducts, they are often considered in isolation. However, when integrated into doors, they become part of a larger system that collectively achieves the required fire resistance rating and smoke containment performance level.

This point is further emphasized when considering variations in ATG size alongside the choice of perimeter seals. Selecting a higher-performing perimeter seal can provide greater flexibility when specifying the ATG size for the doorset. At a minimum, the specifier should obtain the leakage rate from the manufacturer if the doorset cannot be tested as a complete system for primary evidence purposes.

Hardware used on fire doors can significantly impact their performance in a fire. In addition to the guidance within this Approved Document, further recommendations are available in Hardware for Fire and Escape Doors, published by the Door and Hardware Federation (DHF) and the Guild of Architectural Ironmongers (GAI).

It is important to reference Appendix C of Approved Document B (Volumes 1 & 2), which provides detailed requirements for fire doorsets. In particular, C15 highlights Hardware for Fire and Escape Doors as a key source of guidance, jointly authored by GAI and DHF. This reinforces the critical role of appropriately specified hardware in maintaining the fire integrity and smoke control performance of fire-resisting doorsets.

## AIRFLOW AND PRESSURE LOSS

In many instances Air Transfer Grilles are placed in walls and doors to manage air flow and pressure disparity between rooms. That might be in a situation where one room is more pressured than a connected room and results in difficulty in opening or closing doors. In this situation an Air Transfer Grille will allow movement of air and a balancing of pressures, whilst at the same time maintaining the fire compartmentation.

However, any obstruction to the flow of air through an aperture will result in a difference in pressure from the air supply side to receiving side. An air transfer grille might take up 30 to 70% of the area of an open aperture, so will create a pressure differential. The pressure differential will be affected by the design of the product, it's free area or size characteristics and the flow rate of air across it. To correctly specify these products, tests are carried out to EN ISO 7235:2009 - Acoustics, which creates a chart or nomogram to allow performance characteristics to be determined across the size and flow range.

The same is true for noise generated by movement of air through the air transfer grille. In this case the product is tested to EN ISO 5135:2020 - Sound Power Level and allows the mapping of noise generation against size and flow rate.

## TEST STANDARDS FOR INTUMESCENT AIR TRANSFER GRILLES

Differing methods of fire & smoke containment have different product standards, but all are tested against the same basic fire & smoke standards:

**Fire**
- BS 476-20:1987 or
- EN 1363-1:2020

**Smoke**
- BS 476-31.1:1983 or
- EN 1634-3:2004

**Product test standard**
- EN 1364-5:2017 (Walls)
- EN 1366-12:2014 +A1 2019 (Duct)
- ISO 21925-2:2021 (Air Distribution Systems)
- EN 1634-1 (Doors)
- EN 1751:2024 (Aerodynamic testing)

**References**
- EOTA TR 024
- BESA DW145

Guild of Architectural Ironmongers

# 4. HOW TO SPECIFY CONT'D

## CLASSIFICATIONS

Depending upon the application of the air transfer grille, the test standard, such as EN 1634-1 for doors or EN 1364-5 for walls, will dictate the performance criteria which may be evaluated in the test. These will be parameters such as:

- **Integrity (E) -** Leakage during the fire test of less than 360 $m^3/hr/m^2$, no failure of the installation
- **Insulation (I) -** Average temperature rise on the unexposed face of 140°C with a maximum value of 180°C
- **Leakage (S) -** Leakage during the fire test of less than 200 $m^3/hr/m^2$ and the same requirement for a second unit of the smallest section to be manufactured and measured at ambient conditions

These parameters provide the direct field of application. However, EN 15725 extended field of application rules maybe be applied. The values achieved either in direct or extended field of application will then dictate the classification of the product in accordance with EN 13501-2, Fire classification of construction products and building elements.

## CERTIFICATION

Certification within the UK is largely in relation to BS 476 test standards, however what it does provide is a 3rd party means of assessment and validation for a product group which currently cannot be CE marked. Certification schemes, such as Warringtonfire's Certifire, require manufacturers to have in place a Factory Production Control system which enables them to maintain consistency and make improvements both in products and processes.

Currently CE marking is not quite there for Intumescent ATG's. The publication of BS EN1364-5 and BS EN 1366-12, along with classification within EN 13501-2 are steps in the right direction.

- A UKCA or CE Mark is required in accordance the Construction Product Regulations. (Note that Government has extended the use of the CE Mark indefinitely)
- The current editions of AD B 1&2 use the European classification system for reaction to fire and also for fire resistance, see B10 and B25 of Appendix B of both documents.

## HEALTH & SAFETY

When specifying intumescent air transfer grilles, it's crucial to conduct a fire risk assessment as per HSE guidelines. This assessment helps identify potential fire hazards, ensuring that the air transfer grilles meet necessary safety standards for fire resistance, smoke containment, and emergency escape. It should consider the specific risks in the building and how air transfer grilles can mitigate them effectively. The process must also evaluate escape routes, ensure compliance with relevant regulations, and be revisited periodically for ongoing safety.

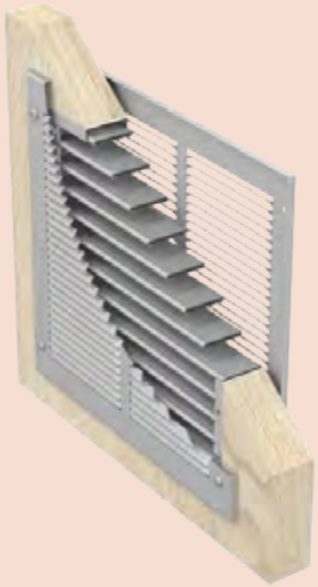
For more details, visit the HSE fire safety page.

## SUITABILITY CONSIDERATIONS

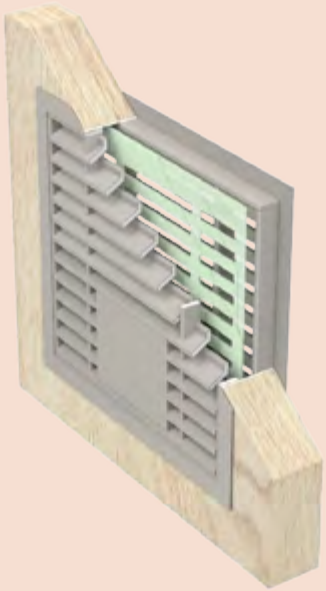
Considering the full life-cycle of air transfer grilles, from manufacturing to disposal, is essential for assessing their environmental impact. Factors such as recyclability, energy efficiency, and carbon footprint play a key role in making informed decisions regarding sustainability.

1. **Product Life-cycle -** Air transfer grilles are engineered for long-lasting durability. Proper installation, routine inspections, and regular maintenance can significantly extend their lifespan, helping to minimise waste.
2. **Environmental & Energy Implications -** Air Transfer Grilles can enhance building energy performance allowing the management of air movement within the building, contributing to overall energy efficiency.
3. **Carbon Footprint -** Air Transfer Grilles can help reduce a building's carbon footprint by improving air circulation and energy efficiency, though their own carbon impact can depend on factors such as material sourcing, manufacturing processes, transportation, and the operational life of the product.
4. **Recyclability & Material Reclamation -** Certain components may be recyclable or reclaimed for reuse. Many manufacturers utilise recyclable materials whenever possible, along with recyclable packaging. However, intumescent air transfer grilles are typically not recyclable due to their chemical composition.
5. **Safe Disposal -** Safety data sheets should be referred to for the safe disposal of air transfer grilles.

Where made available by the manufactures, Environmental Product Declarations (EPDs) must comply with BS EN 15804:2012 + A2 :2019 "Sustainability of Construction Works: Environmental Product Declarations". Note that in respect of new registrations, from November 2022 the A2: 2019 amendment standard is mandatory.



FIRE RESISTANT



FIRE & SMOKE RESISTANT

Guild of Architectural Ironmongers

# 5. PRODUCT SOLUTIONS

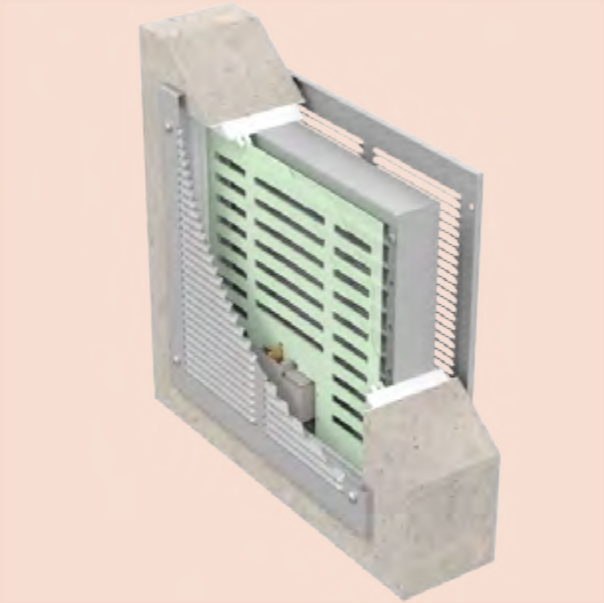
## DOOR APPLICATIONS

Here we have examples of air transfer grilles suitable for door applications. On the top, we can see a graphite based intumescent air transfer grille in a timber door. On the bottom, we can see a sodium silicate cased air transfer grille, with the addition of smoke shutters, therefore is suitable for cold smoke containment.

In circumstances where air movement is required between compartments, which may be for pressure balancing effects, in order to aid operability, or to ease access through the door. The specification of a door mounted air transfer grille could be considered in conjunction with the fire and smoke sealing system to enable ease of access whilst maintaining fire and smoke compartmentation.

If used purely for ventilation, utilising the door as part of that solution can be a cost-effective solution. There is no need to open apertures in the wall for instance. An intumescent system due to its compact nature is ideally suited to door applications, where mechanical devices tend to be too bulky or impart too much heat into the timber door core during a fire.

FIRE RESISTANT



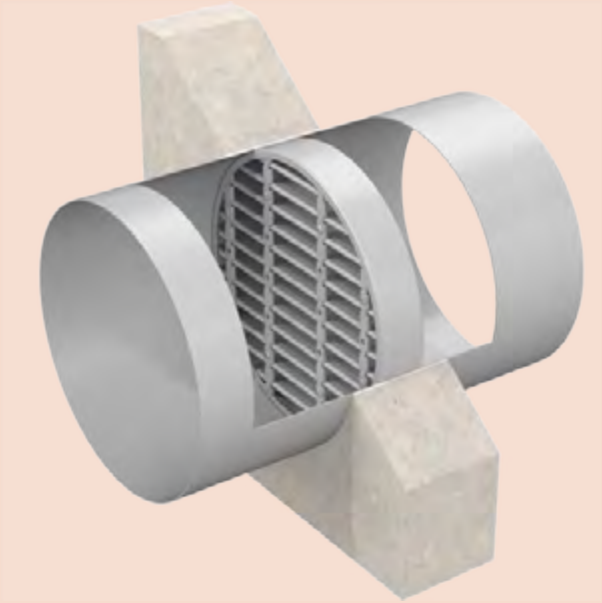
FIRE & SMOKE RESISTANT

Guild of Architectural Ironmongers

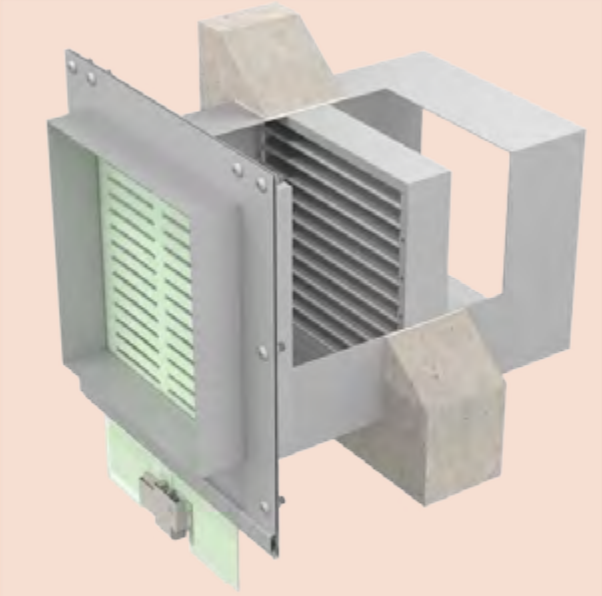
# 5. PRODUCT SOLUTIONS
## WALL APPLICATIONS

The simplicity of the intumescent systems, along with their lower weight characteristics make them suitable for many wall applications where ventilation is required but fire compartmentation needs to be maintained.

Below left is an example of a graphite based intumescent air transfer grille in a wall and below right is a sodium silicate cased air transfer grille, with the addition of smoke shutters, therefore is suitable for cold smoke containment.



FIRE RESISTANT



FIRE & SMOKE RESISTANT

Guild of Architectural Ironmongers

# 5. PRODUCT SOLUTIONS

## DUCT APPLICATIONS

Duct applications tend to be application rather than performance led. The variability around Heating, Ventilation, and Air Conditioning (HVAC) installation requirements leads to many applications whereby an intumescent air transfer grilles may be better deployed over mechanical devices.

This might be due to access issues, whereby regular access for maintenance is hard to achieve and a simpler approach with minimal intervention is a better approach.

It might be due the location or the size requirements, however it's important to understand as was previously discussed, that there are very different applications and test methods for mechanical fire and hot smoke control devices versus intumescent fire and smoke containment devices.

Guild of Architectural Ironmongers

# 6. INSTALLATION & MAINTENANCE

## DOORS & PANELS

Paramount to any application within doorsets is the relevant evidence. If not held by the ATG manufacturer, this may be available from the door manufacturer or, in some cases, the door core supplier. In all cases, the door should have evidence supporting the inclusion of an aperture of equal or greater size.

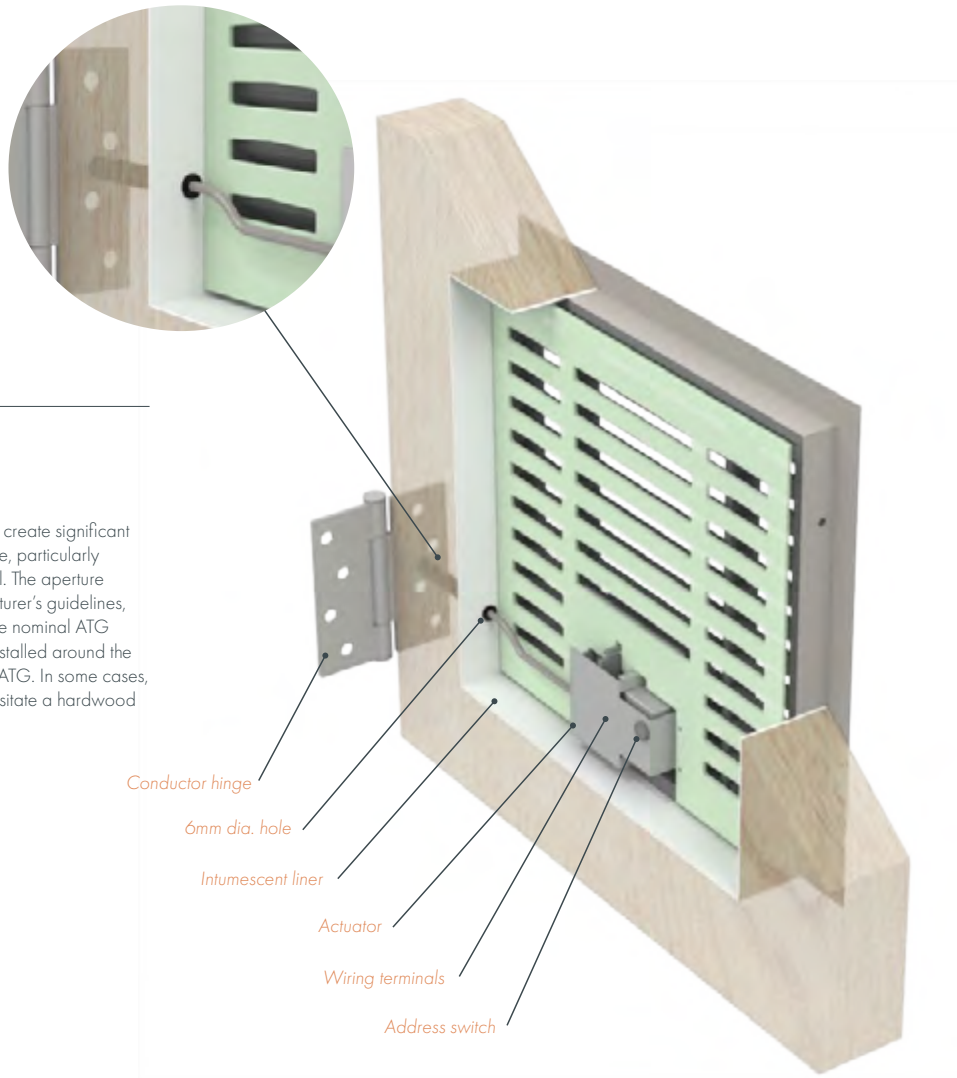
Door mounted smoke shutters are installed within an aperture at the centre of the door leaf. These may be protected with pressed steel cover grilles fitted to both faces of the door.

Where fire resistance is required, a pair of louvred intumescent grilles is fitted within the aperture, one to each face of the shutter. In both cases there must be a means of delivering power to the centre of the door. In the example shown, this is achieved via a raceway or cable-way through the core. An intumescent liner running through the core provides protection, with the most effective format being a low-pressure intumescing graphite tube, which also acts as a conduit for the cable.

Power and communication transfer can be facilitated via a conductor hinge with integral cabling running through the knuckle, or alternatively, a door loop may be used for transference.

## RETROFITTING

Retrofitting these systems to doors can create significant challenges regarding fire performance, particularly if carried out by unqualified personnel. The aperture tolerance must align with the manufacturer's guidelines, typically allowing for +3mm above the nominal ATG size. An intumescent liner should be installed around the aperture to ensure a secure fit for the ATG. In some cases, the door core construction may necessitate a hardwood liner to provide additional support.



Guild of Architectural Ironmongers

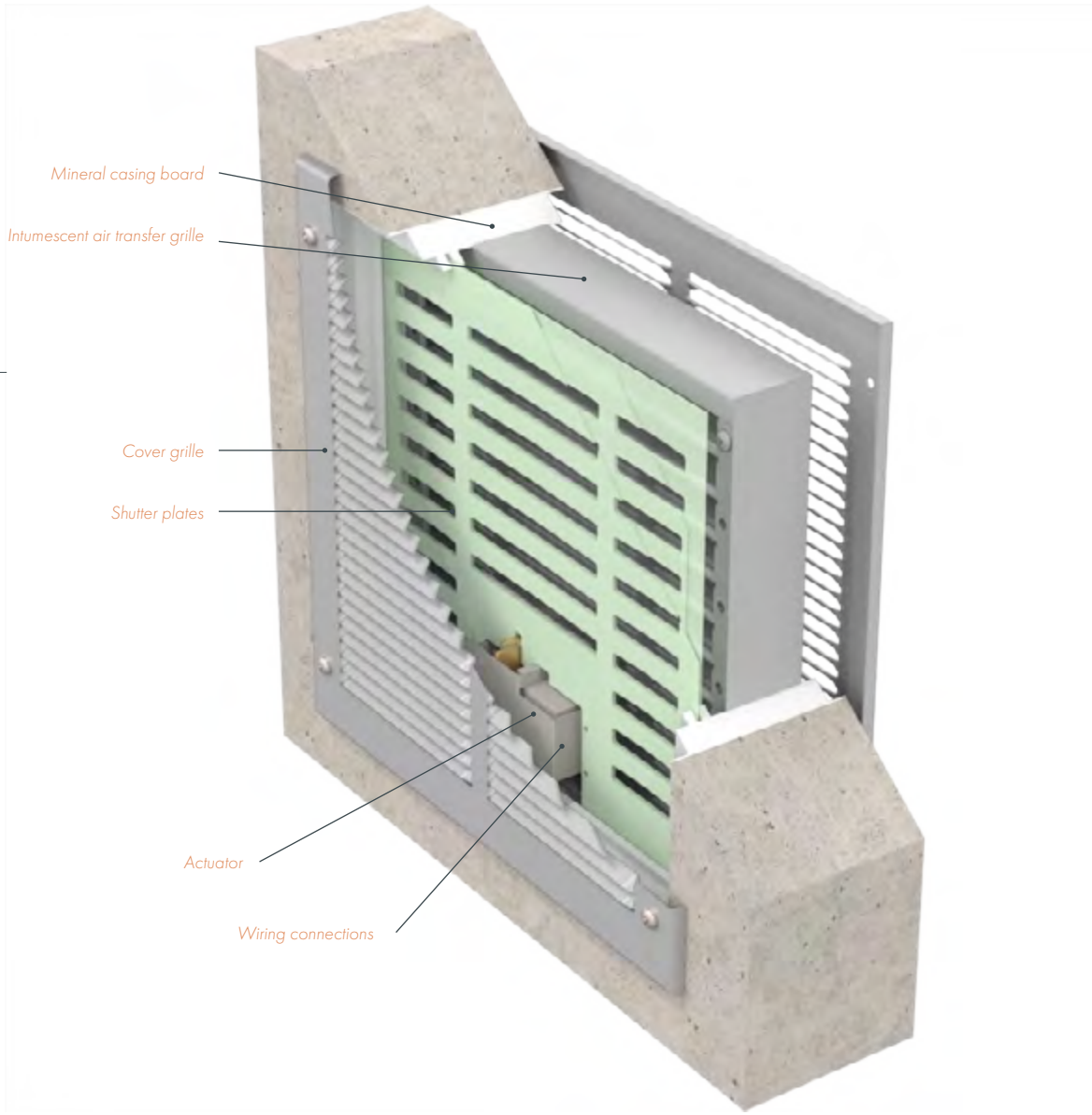
# 6. INSTALLATION & MAINTENANCE CONT'D

## WALLS

Wall mounted air transfer grilles with fire and cold smoke containment should be installed with the air transfer grille as close to the centre of the wall thickness as possible. It is usual to protect the internal components. Pressed steel cover grilles fixed to each face as shown.

The period of fire integrity may be varied by using different types of fire grilles e.g. 60 minutes, 120 minutes etc. Where only smoke containment is required the fire grille can be omitted.

Tolerance of fitting these products into the wall is greater than that of doors, +10mm is permissible. So fitting is generally simple so long as the aperture is well prepared. For flexible walls, steel and timber, the aperture should be supported with noggins top and bottom and stud either side. The aperture can then be lined with plasterboard, which must be taken into consideration when sizing the aperture.



Guild of Architectural Ironmongers

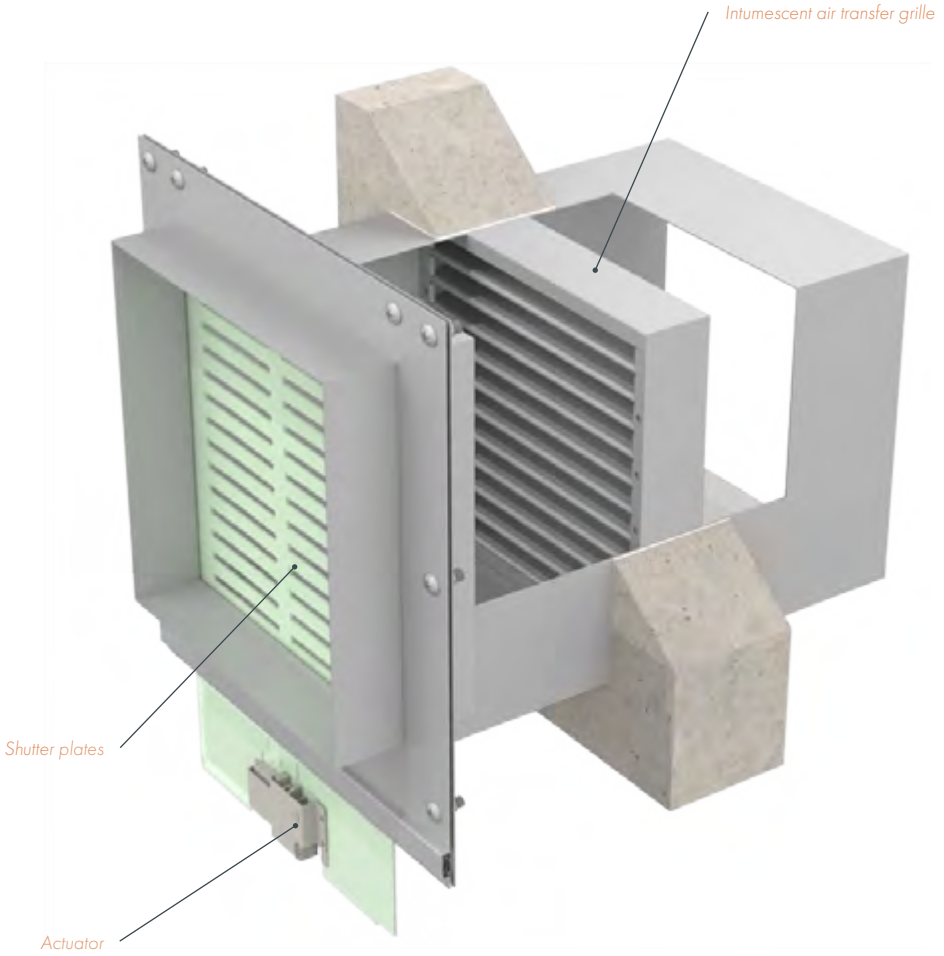
# 6. INSTALLATION & MAINTENANCE CONT'D

## DUCTS

For duct applications the key to any application is the test evidence and how that relates to the functionality of the device within the designed application.

Electrically driven shutter plates provide cold smoke containment at ambient temperature, with the fire resistance and elevated temperature leakage containment provided by an integrated intumescent air transfer grille.

The period of fire integrity may be varied by using different types of intumescent air transfer grilles e.g. 60 minutes, 120 minutes etc. Or even for periods up to 4hrs for fire only applications.



Guild of Architectural Ironmongers

# 6. INSTALLATION & MAINTENANCE CONT'D

## APPROVED INSTALLERS

In the world of air transfer grilles, the best person to install the product revolves less around the product itself and more around the application. The skill sets, training and certifications required are very different, when considering a timber door versus a wall application. When installing into walls and ducts, third party certification schemes cover the elements of fire stopping relating to air transfer grilles well, however, when it comes to timber fire doors in particular the competency debate can be a grey area and can potentially lead to incorrect and dangerous installation practices.

## WHAT IS A LICENSED FIRE DOOR PROCESSORS?

A licensed processor is a joinery company which takes a certificated fire door and makes adjustments to it according to the scope of the manufacturer's fire test data sheet. They are licensed by the prime door / door blank manufacturer and are 3rd party accredited.

The principal role of a licensed processors is to fit vision panels, although they are also authorised to manufacture frames, fit other requirements such as air transfer grilles, letter plates and spy holes and make up doorsets, while maintaining the certification of the fire door.

## INSTALLATION MISHAPS

The quality of the installation is dependant on a variety of factors. Here are some examples of installation mistakes:

1. Sodium silicate air transfer grille specified for a high humidity application –a graphite / stainless steel system should have been used.
2. Missing fire and smoke resistant air transfer grille. Also, no intumescent liner, and aperture has been prepared incorrectly – drilled twice.
3. Aperture size was cut too big. Gaps need to be firestopped correctly in accordance with the products installation and test evidence.
4. Poorly maintained products can fail, this is true of not just air transfer grilles but all passive fire protection elements.





*GAI Specifier Resource Book*


*Code of Practice: Hardware for Fire and Escape Doors*

Guild of Architectural Ironmongers

# 7. SOURCES OF FURTHER INFORMATION

**GAI website - Specifier Resources**
(www.gai.org.uk/specifier)

- GAI Specifier Resource Book
- GAI Specifiers Guides
- Consult the services of a RegAI - Registered Architectural Ironmonger

**Further Resources**

- Code of Practice: Hardware for Fire and Escape Doors (www.firecode.org.uk)
- Architectural Ironmongery Journal
- Fire Door Inspection Scheme (www.fdis.co.uk)
- RIBA Product Selector:
(www.ribaproductselector.com)
- Lorient ATG Product Selector:
(https://www.lorientuk.com/grilles)

# Guild of Architectural Ironmongers

The Guild of Architectural Ironmongers (GAI) is the only trade body in the UK that represents the interests of the whole architectural ironmongery industry - architectural ironmongers, wholesalers and manufacturers.

Formed in 1961, the GAI is internationally recognised and respected as the authority on architectural hardware, building its reputation on three key pillars; education, technical support and community.

Its technical information service is the only specialist service of its kind, providing comprehensive advice on issues relating to the legislation, regulations and standards governing the use of architectural ironmongery and related hardware.

, Ironmongers' Hall, Shaftesbury Place, Aldersgate Street, London, EC2Y 8AA **T:** +44 (0)20 7033 2480 **E:** technical@gai.org.uk **www.gai.org.uk**