

## INTRODUCTION

There have been a lot of attempts to provide generic information with regard to damper installations. With the publication of BS EN 1366-2:1999, the European standard for the fire testing of dampers (where no specific standard existed before), and revisions to the guidance from the UK regulators (Approved Document B (ADB)), it has been increasingly difficult for manufacturers to provide such generic information.

This is because the method of installation, in terms of the interface between the damper and the supporting construction and the supporting construction itself, has a clear effect on the final result of the test and thus the “classification” of the damper.

This classification states the performance of the fire damper, for the installation method, as a time. This time is associated with some letters, E (for Integrity) and, if available for the specific product, S, which makes the damper a leakage rated fire damper. The SmokeShield range has both E and ES classifications, but the times vary with method of installation. For an overview please see the summary page.

Therefore the information that a manufacturer provides must be specific as it represents what we have tested or have been able to have assessed. In the following pages you will find installations fully described, along with drawings, all specific to our SmokeShield and HotShield products. Also referenced are our test reports, which are available from the Actionair sales office.

Assessments are not easy to come by with regard to the BS EN 1366-2:1999 test methods for the reasons described above. It is advisable to check that your proposed installation method meets one of those described. If not, we suggest that you make a fully dimensioned drawing, and using the test report obtained from us that is closest, approach the Building Control Authorities (BCA) for their approval. This is best done before installations commence, because if they do not accept it and work has already started, the repercussions could be costly.

Generally it is safest to install the dampers as close to the tested method as possible.

Actionair are not able to approve specific installations that vary from those tested and described herein. You may seek assessment from bodies such as BRE/LPC or WFR. They will require fully dimensioned drawings with material details for your proposed installation, together with any copies of Actionair’s relevant test reports.

Over and above product testing, Actionair have their products third party certificated. This means that in addition to full BS EN ISO 9000 quality assurance, the notified body also checks the products to ensure that they are still being manufactured as tested or assessed, such that the components are traceable back to the fire tests, assessments and product design files. Both QA and product audits are performed by the Loss Prevention Certification Board (LPCB).

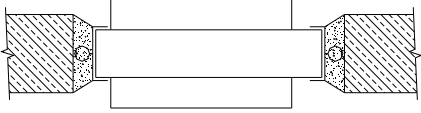
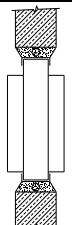
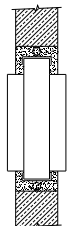

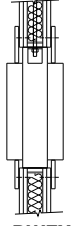
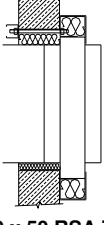
Although Actionair’s test program has been extensive, it is not complete and we will continue to undertake tests that supplement those published here. These will be added in further versions as and when the details become available.

Please take time to read the background section, as this contains all the relevant regulatory requirements, details of the test standards and some information on fire damper certification. A small section on fire rated ductwork standards has been included for reference.

The regulatory requirements should be understood by all designers and installers – remember fire dampers are life safety products.

Paul White  
Technical Director  
March 2007

**SMOKESHIELD CLASSIFICATION AND TEST REPORT SUMMARY**

SmokeShield/HotShield		
<p>E = Fire Integrity            ES = Fire Integrity with restricted leakage(200 m<sup>3</sup>/hr/m<sup>2</sup> @ 300Pa at ambient temperature            (smallest and largest single sections) and during the fire test (largest single section) 200 x 200 1000 x 1000)</p>		
DIAGRAM	BS EN 13501 Classification	BS EN13662 Test/Assessment
 <p>SmokeShield + IF 1000 x 1000</p>	<p><b>E240</b> <b>ES120 (E120S)</b></p>	<p><b>BRE 231740</b></p>
 <p>SmokeShield + IF 1000 x 1000</p>	<p><b>E120</b> <b>ES60 (E60S)</b></p>	<p><b>TE 94134</b> <b>(CC225285)</b></p>
 <p>SmokeShield + IF 1000 x 1000</p>	<p><b>E180</b> <b>ES90 (E90S)</b></p>	<p><b>BRE 206672</b> <b>(CC225285)</b></p>
 <p>SmokeShield + DWFX-F 1000 x 1000</p>	<p><b>E90</b> <b>ES60 (E60S)</b></p>	<p><b>BRE 220895</b> <b>(CC225285)</b></p>
 <p>SmokeShield + DWFX-C 1000 x 1000</p>	<p><b>E120</b> <b>ES120 (E120S)</b></p>	<p><b>BRE 231741</b></p>
 <p>SmokeShield + 50 x 50 RSA T &amp; R 1000 x 1000</p>	<p><b>E90</b> <b>ES90 (E90S)</b></p>	<p><b>Stadt Wien</b> <b>MA39VFA2003185101</b></p>

## BACKGROUND

### Requirements

**The Building Regulations** - this is the law.

**Approved Documents** - These are published guides described as “practical guidance” to meeting the requirements of the building regulations.

**British and European Standards** - These are published standards on product definition, testing and classification, system requirements, recommendations and maintenance.

**Certification Standards** - These are standards published by certification bodies to ensure products have undergone the necessary third party testing. They are then used by a notified body as the basis to ensure that products remain as tested, and that changes are re-tested or assessed by qualified personnel.

There are further documents available, which are referenced in ADB that give details to designers to allow the consideration of business risk issues from smoke and fire – i.e. financial loss, and is sponsored by insurers, to help assess premiums.

### Building Regulations

By following the instructions in the approved documents you will fulfil the requirements of the regulations.

If you can prove (with evidence or calculation) that another method is satisfactory you may use this - this is called fire engineering, but must be approved by a Building Control Authority (BCA) before use.

#### England & Wales

The document that gives an interpretation of the rules for Fire Safety is Approved Document B (ADB). This is available as a free download from the Planning Portal website.

It has been republished dated 2006 and will be applicable to all projects submitted for planning approval from April 2007.

It recommends the use of products meeting independent certification schemes, such schemes certifying compliance with the requirements of a recognised document, which is appropriate to the purpose for which the material is to be used. In addition to life safety it mentions the protection of property, including the building itself, stating that this may require additional measures, and insurers may seek their own higher standards, before accepting the insurance risk.

There have been a considerable number of changes with regard to fire dampers. They now have their own section giving very specific guidance.

Paragraphs 5.46 to 5.48 "Mechanical ventilation and air conditioning systems" state that fire dampers protecting escape routes should respond to a smoke detector or suitable fire detection system, noting that a fusible link alone is not acceptable and this implies that some type of actuator be used. The purpose of this is to ensure early closure to prevent passage of smoke. It also states that a damper with an ES classification may be used. The reader is then directed to paragraph 10.15.

Paragraphs 10.11 to 10.15 "Fire dampers" are more specific and also require actuation for fire dampers in buildings where there are levels of sleeping risk. The note that “fusible link only dampers being unsuitable to protect escape routes” is repeated together with the suitability of an ES rated product. 10.15 then explains the requirements for E and ES classifications. To achieve any classification fire dampers must be tested to BS1366-2:1999. A Fire Damper has an E (Integrity) classification. A Leakage Rated Fire Damper has an E (Integrity) and an S (Reduced leakage) classification.

SmokeShield dampers fulfil the ES requirements for escape routes and areas with sleeping risk. FireShield fulfil the E requirements and can be used in all other areas for run out ducting etc.

ADB states that dampers should be mounted within the structure that they are seeking to protect and should be installed as tested.

Finally there is a statement saying that fire dampers tested only to BS476 may only be appropriate for fan off situations.

For the purposes of application, what are presently known as “combination fire and smoke dampers”, providing that they have an ES classification to BS EN 13501-3:2005, now termed “leakage rated fire dampers”, actuated via a smoke detection system will fulfil the requirements for the protection of escape routes and the protection of areas with sleeping risk. Curtain fire dampers and other dampers having an E classification to BS EN 13501-3:2005 will fulfil the general requirements for all other applications/areas.

## Scotland

These exist as technical standards (AMD's). They give very similar guidance to ADB. They already include direct references to the application of European standards. They are available as a free download from the Scottish Executive website.

## Standards

### Fire damper Standards

**BS EN 1366-2:1999 (Test standard)** gives requirements for testing dampers to the standard time/temperature curve with a requirement to close within two minutes of the start of the test. After closure a 300Pa pressure differential is applied to the damper and the damper leakage (corrected to 20°C) is recorded throughout the rest of the test. The largest size of damper to be offered for sale must be fire tested. Pass and fail criteria is included in the standard.

**Integrity – E** – the damper must leak no more than 360 m<sup>3</sup>/hr/m<sup>2</sup> at any point during the test.

**Optional Integrity and Leakage – ES** – the damper must leak no more than 200 m<sup>3</sup>/hr/m<sup>2</sup> at any point during the fire test. This also applies to the largest and smallest size of damper to be offered for sale at ambient temperatures for the ES criteria to be applicable.

**Optional Insulation – I** – insulation rating - not required by legislation for dampers in the UK.

**BS EN 13501-3:2005 (Classification Standard)** – states times and performance to enable the classification of fire dampers (E, ES and I requirements)

**prEN 15650 (Product standard)** under development, this describes the products available and how they should be tested and classified. It will provide the rules for CE marking.

### Related and system design and related standards

**BS5588 part 9: Code of practice for ventilation and air conditioning ductwork** – gives further details on the application of dampers in ventilation systems. It recommends that damper operation should be at 74°C. It refers to the older standards in some instances and in some areas is both supported by, or superseded by, the information in the ADB. It (ADB) should be considered as the higher authority as BS5588-9 needs updating in the light of changes made in the ADB. The references to BS ISO 10294 may be replaced by BS1366-2, as this is very similar and is the now applicable British and European standard.

**BS5588 part 4: Code of practice for smoke control using pressure differentials** - This gives requirements for smoke control systems to have performances to 300°C for 1 and 2 hours and 600°C for 1 and 2 hours. It requires that fire compartments are maintained in accordance with BS5588 part 9. There are no clear requirements for dampers. There is a new general requirement for Fire engineering input.

**BS5588 part 12 – Managing fire safety** – The question is often asked where does it state how often dampers and systems are to be tested. This is the reference. It gives clear guidance on how often dampers, smoke control systems, etc. should be tested. For dampers this is at least once per year for units with spring operation. Systems have to be checked, as often as once per week or month to ensure ongoing confidence in the life safety system. This may require checking the associated damper equipment as well. This may be seen as analogous to fire alarm systems.

## Certification Standards

LPS 1162 is a typical product certification standard. It contains all the tests that the Loss Prevention Certification Board (LPCB) requires the product to undergo, before certification may be offered. It also states that to meet it, a company must have full BS EN ISO 9001 accreditation. The LPCB visit the factory at least once a year to confirm by measurement that the certificated products maintain all the tested dimensions, and confirm that the products still comply with any assessments that may have been made. Using certificated products mean less time needs to be taken checking up that products meet the required standards, as a third party is making sure that this is the case.

## Extended fields of application (Assessments)

Under BS EN 1366-2 etc. specific documents are being drafted for the extended field of application for all products. It is becoming clear that assessments for small component changes and the use of units smaller than those tested are allowable. However the use of methods of installation other than that tested will lead to problems, with assessments being difficult to acquire. The reason for this is the fact that the test is passed or failed based on the leakage of the unit during the test, as well as any failure at the boundary between the damper and the supporting construction. The damper closing is just the start of the test.

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The laboratories are unwilling to state that a change in building in method will not affect the leakage performance.

Previously, under the BS 476 ad-hoc testing, assessments were forthcoming with respect to installation, this was because the test pass or fail criteria were purely mechanical with gap gauges etc, not leakage measurement.

## Ductwork (Fire classified and smoke control systems classified)

Ductwork is following a similar path to dampers with a fire rated duct standard already being published. There will also be further standards for smoke control systems ducts. ADB is not too specific on the regulatory requirements.

### Fire rated duct

**BS EN 1366-1:1999** – test standard

**BS EN 13501-3:2005** – classification standard

**Product Standard** – In draft

## Smoke Control

This is an emerging application, normally dealt with by fire engineering design. It is not yet apparently recognised in UK legislation. The EN12101 series of standards are under development and give design requirements for systems and products to be used in those systems.

### Smoke Control Dampers

Smoke control dampers may be seen to be different to fire dampers in various ways. Fire dampers are designed to “failsafe” shut in the case of fire (fusible links, springs and spring return actuators). In a smoke control/exhaust system this could be seen to be disastrous.

Smoke control dampers have no pre-determined “failsafe” position. It is unknown where in a system the smoke “event” may occur and any smoke control damper may be required to open or close and remain in that position.

SmokeShield and HotShield dampers are available with two position (2P) drive open and drive closed mode/actuators and these could be used with an associated fire engineered smoke extract system, if this was acceptable to the BCA.

Smoke control dampers are not generally required at compartment boundaries, because with reference to the EN 12101 series, they will normally be associated with fire and/or smoke control classified ducts.

### Current smoke control draft standards

#### Smoke control dampers

**prEN 1366-10 (2007?)** – test standard

**EN 13501-4 (2007?)** – classification standard

**prEN12101- 8 (2007?)** – product standard

#### Smoke control systems duct

**BS EN 1366-8:2004** - multi compartment test standard

**prEN 1366-9 (2007?)** - single compartment test standard

**prEN 13501-4 (2007?)** – classification standard

**prEN 12101-7 (2008?)** – product standard