

# Requirements & Future Developments for Fire Dampers

## 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 just been republished dated 2006 and will be applicable to all projects without 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 will in general 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 timely 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 an E or ES 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.

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.

So, for the purposes of application, what are colloquially known, at present, as combination fire and smoke dampers (providing that they have an ES classification to BS EN 13501-3:2005 and as such are 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 will fulfil the general E 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 at the start of the test and then have a 300Pa pressure differential applied throughout the rest of the test after closure. The largest size of damper to be offered for sale must be 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 test. This also applies to the largest and smallest size of damper to be offered for sale at ambient temperatures as well for the ES criteria to be applicable.

**Insulation (I)** – optional 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 give the rules for CE marking.

**BS ISO 101294-1:1996 (Test Standard)** – gives requirements almost exactly the same as stated for BS EN 1366-2 above.

**BS ISO 10294-2:1999 (Classification Standard)** – gives classification details almost exactly the same as BS EN 13501-3 above.

### Related & System Design & Related Standards

**BS5588 part 9: Code of practice for ventilation & 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.

**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 generally at least once per year for units with spring operation. Units associated with systems may be required to be checked, as part of the system, as often as once per week or month to ensure ongoing confidence in the life safety system. 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) require 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 no assessments being forthcoming. 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 (NOTE: The damper closing is just the start of the test).

The laboratories are unwilling to state that a difference 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.

Dampers should always be installed by the method tested.

## 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 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.

The unplanned closure of a damper in such a system could close off the area from which the smoke and heat is to be evacuated. Correspondingly, a damper designed to failsafe open could allow smoke into another area or open up pathways, causing the fan to be unable to extract fully from an area as expected.

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. Therefore smoke control dampers are tested to see if they can maintain their ability to stay open as well as closed. They must have only drive open/drive close capabilities (no fusible links or springs) and must be under the control of a system to do this: i.e. the ones where the smoke is (and along the path of extract) open and all the others close.

Existing “combination fire and smoke dampers” with fusible links and spring return actuators are not suitable for this purpose and may not be classified for it.

The smoke control dampers are tested as pairs mounted on a duct, one inside the furnace and one outside. The furnace is started and the unit inside the furnace is driven from closed to open and the one outside from open to closed. This may happen at 30 seconds from the start (for automatic applications) or at 25 minutes (for override-able or brigade initiated systems). This is done following a 600°C or a full fire test curve.

The damper outside is tested for leakage when closed to ensure its closure integrity. The damper inside the furnace is recorded for its ability to remain open.

PrEN 1366-10 (2009?) – test standard

EN 13501-4:2007 – classification standard

PrEN12101-8 (2009?) – product standard

## Ductwork (fire classified & 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 systems duct

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

prEN 1366-9 (2008?) – single compartment test standard

prEN 13501-4:2007 – classification standard

prEN 12101-7 (2008?) – product standard