BRITISH STANDARD

BS EN 15650:2010

Ventilation for buildings — Fire dampers

ICS 91.140.30

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British Standards

National foreword

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Foreword

This document (EN 15650:2010) has been prepared by Technical Committee CEN/TC 156 “Ventilation for buildings”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2010, and conflicting national standards shall be withdrawn at the latest by October 2010.

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Introduction

This standard contains the basic performance and requirements for fire dampers.

A fire damper is used to prevent fire and reduce smoke spreading from one fire compartment to another through the air ductwork system which may penetrate fire separating walls and floors. Annex A gives descriptions of typical fire dampers.

Where the words separating element are used in this standard, they should be taken to mean e.g. a wall, a floor, a ceiling or any other barrier that is designed to maintain compartmentation. This covers any type of construction (e.g. block and mortar, concrete, board or mineral wool).

In the case of fire or elevated temperatures, the dampers should close automatically by means contained within their own construction (a thermal activation element). As an addition, fire dampers may be closed by an external input.

Particular reference should be made to EN 1366-2, which defines the furnace testing associated with these products and EN 13501-3, which provides details on their fire resistance classification. Consideration of any caution notices within any fire testing standards (e.g. health and safety) should be considered before undertaking any fire testing.

In addition, the aerodynamic performance of fire dampers should be tested to EN 1751, if such information is to be presented by a manufacturer.

The areas for which products supplied to this standard are considered applicable include, but are not limited to:

a) commercial premises;

b) shopping and retail centres;

c) hospitals;

d) multi-residential buildings.

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1 Scope

This European Standard applies to fire dampers that are to be used in conjunction with fire separating elements to maintain fire compartments. This standard specifies requirements and gives reference to the test methods defined for fire dampers, which are intended to be installed in Heating, Ventilating and Air Conditioning (HVAC) installations in buildings. All fire dampers close automatically in response to raised temperatures indicating fire. Details are given for the provision of evaluation of conformity and marking of fire dampers.

To avoid duplication reference is made to a variety of other standards. To this end it is advised to read this standard in conjunction with EN 1366-2 and EN 1363-1 for details of the fire resistance testing and EN 13501-3 for classification.

Fire dampers meeting requirements of this standard may be considered suitable for both ducted and unducted applications.

This standard has not considered in detail the detrimental and/or corrosive effects that may be caused by chemical processes present in the atmosphere, which are drawn through the system intentionally or inadvertently and therefore does not apply to fire dampers used in such applications. An indication of salt spray corrosion may be determined using the method described in Annex B.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1366-2:1999, *Fire resistance tests for service installations — Part 2: Fire dampers*

EN 1751, *Ventilation for buildings — Air terminal devices — Aerodynamic testing of dampers and valves*

EN 13501-3:2005, *Fire classification of construction products and building elements — Part 3: Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers*

EN 60068-2-52:1996, *Environmental testing — Part 2: Tests — Test Kb: Salt mist, cyclic (sodium chloride solution) (IEC 60068-2-52:1996)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN ISO 5135, *Acoustics — Determination of sound power levels of noise from air-terminal devices, air-terminal units, dampers and valves by measurement in a reverberation room (ISO 5135:1997)*

EN ISO 13943:2000, *Fire safety — Vocabulary (ISO 13943:2000)*

ISO 10294-4:2001, *Fire resistance tests — Fire dampers for air distribution systems — Part 4: Test of thermal release mechanism*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in EN ISO 13943:2000 and the following apply.

3.1
fire damper
device for use in heating, ventilation and air conditioning (HVAC) systems at fire boundaries to maintain compartmentation and protect means of escape in case of fire

3.2
insulated fire damper
fire damper of any type that shows classifiable insulation characteristics when tested

3.3
leakage rated fire damper
fire damper of any type that shows classifiable reduced leakage characteristics when tested

3.4
multi-section fire dampers
fire damper of any type constructed from smaller units

3.5
fire compartment
enclosed space, comprising one or more separate spaces, bounded by elements of construction having a specified fire resistance and intended to prevent the spread of fire (in either direction) for a given period of time

NOTE Fire compartment often has regulatory definitions and requirements. The term should not be confused with "room of origin" or "fire cell".

3.6
triggering device
device such as a fire detector system, smoke detector or pushbutton, which sends an activating signal to the initiation device

3.7
horizontal mounting
position of the damper mounted horizontally when installed in a floor or a ceiling

3.8
vertical mounting
position of the damper mounted vertically when installed in a wall

3.9
actuating mechanism
mechanism, integral or directly associated with the fire damper which, when initiated by the fire damper release device, which causes the movable component of the damper to change from the "open" to the "closed" position

3.10
thermal release mechanism
mechanism, containing/linked to the sensing element, that causes the open damper to release and close in response to elevated temperature

3.11
sensing element
device that senses temperature, that causes the thermal release mechanism to activate at a defined elevated temperature

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4 Fire damper requirements

4.1 General

4.1.1 Fire resistance

The fire damper shall be fire resisting and demonstrate the following and shall be classified in accordance with EN 13501-3:

a) integrity: this shall be tested in accordance with test method in 5.2.2 and the integrity classification (E) declared;

b) insulation: this shall be tested in accordance with test method in 5.2.2 and the insulation classification (I) declared;

c) leakage: this shall be tested in accordance with test method in 5.2.3 and the leakage classification (S) declared.

4.1.2 General application

Where the manufacturer intends to provide information regarding aerodynamic characteristics, this shall be done according to EN 1751.

4.2 Construction and components: characteristics

4.2.1 Construction and operation

4.2.1.1 General

Fire dampers shall have one safety position, fully closed. This is required to maintain compartmentation.

4.2.1.2 Nominal activation conditions / Sensitivity

4.2.1.2.1 General

The units may be open as part of a heating and ventilating system and shall close only on the receipt of:

— an elevated temperature; or

— an external input.

Consequently, fire dampers shall:

a) move to and maintain their closed position;

b) have known leakage characteristics;

c) include a thermal release mechanism that causes the damper to close (this may be function of their design), where the thermal release mechanism uses a sensing element which shall be tested in accordance with 5.2.5;

d) be fire resisting to maintain compartmentation in closed position.

NOTE A facility for manual override to open and close the damper for inspection purposes may be useful and may be included in the product design. This would be of use during commissioning should no power be available.

4.2.1.2.2 Sensing element response temperature

The thermal release mechanism shall be equipped with a sensing element with response temperature to an increase of temperature in accordance with test method in 5.2.5.

4.2.1.2.3 Sensing element load bearing capacity

The thermal release mechanism shall be equipped with a sensing element which load bearing capacity is in accordance with test method in 5.2.5.

4.2.1.3 Response delay: closure time

Any temperature may be used, provided that the fire dampers' response delay (closure time) is within the time period of 2 min in accordance with test method in 5.2.4.

4.2.1.4 Position indication

When fire dampers incorporate blade positioning signalling devices, such devices shall be demonstrated to provide information (at ambient temperature) which is indicative of the actual blade position (open and closed) in accordance with Annex C (C.1).

4.2.2 Protection against corrosion

Where a manufacturer intends to demonstrate an enhanced salt spray corrosion resistant performance of a fire damper to give a guide on its durability, the test detailed in Annex B shall be performed and the result of these tests declared (i.e. pass/fail). Alternatively, this performance may be made by using of known-corrosion-resistance products, components and treatments and this shall be declared.

NOTE Except for products used in a corrosive/contaminated environment, there are no corrosion resistance requirements on products for other uses.

4.2.3 Actuators

Actuators shall be constructed and assembled to have the strength and rigidity necessary to perform the design operations to which it may be subjected, without the loosening or displacement of parts, or other serious defects when subjected to the tests referred to in Annex C. Actuators shall be assessed by an IP42 test as a minimum according to EN 60529:1991.

Actuator construction shall be such that it does not cause a fire damper to fail the test by flaming outside of the furnace and outside the duct.

Where modulating actuators allowing fire dampers to give variable volume control are to be supplied, these shall be subjected to more extensive cycle testing according to Annex C.

As smoke is seen as being as, if not more, dangerous than fire, closing actuators may be used that close the unit early as the result of, for instance, a fire alarm. These shall form a part of the tested construction if the actuator is seen as being the prime mover of the unit. If an actuator is associated with a fire damper for everyday use, it should be tested at the same time as the fire damper to ensure that it does not cause the fire damper to fail in any way that may have not been foreseen.

4.3 Fire resistance performance criteria

4.3.1 Fire dampers: integrity, insulation, leakage, operational reliability

The assessment of integrity (E) of fire dampers, as one of the fire resistance performance characteristics, shall be made on the basis of:

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a) Largest size − 50 cycles prior to the fire test (unless it is impossible to re-open the damper in any way once it has been closed). Except for fire dampers which have "single use" (no mechanical closing element), but giving closure by change of state, such as a fully intumescent style product, may be exempted from the 50 cycle test and the cold leakage test and consequently cannot be considered for extra restriction on leakage.

   The operational reliability shall be satisfied by the 0 or 50 cycle test at ambient temperature;

b) Largest size − leakage (measured continuously) through the damper when closed after 5 min from the start of the fire test;

c) Cracks or openings in excess of given dimensions and ignition of a cotton pad and sustained flaming on the non-exposed side at the perimeter of the damper junction with the wall or floor or duct (the penetration).

   When insulation characteristics (I) are proven for fire dampers, this shall be classified and declared, together with integrity.

   A smoke leakage performance requirement is described in EN 1366-2 to allow the (S) classification, and this shall be applied, if the damper is intended for the end uses where this performance is required (largest and smallest sizes at ambient and largest size (measured continuously) after 5 min from the start of the fire test).

4.3.2 Fire resistance classification and designation

Having achieved the performance criteria in 4.3.1, the fire damper shall be classified and designated in accordance with EN 13501-3.

The following shall be declared for each fire damper:

a) integrity class "E", integrity and insulation class "EI" (in accordance with EN 13501-3:2005);

b) indication(s) of suitability for vertical and/or horizontal use, together with mounting in, or on to, a wall or in a duct passing through a wall or in, or on to, a floor, or in a duct passing through a floor, or both, respectively: as $\underline{v_e}$ and/or $\underline{h_o}$. The classification is completed by "(i → o)", "(o → i)", or (i ←→ o)" to indicate whether the element has been tested and fulfils the requirements from the inside of outside only or both. In addition, the symbols "v_e" and/or "h_o" indicate the suitability for vertical and/or horizontal use. The addition of the symbol "S" indicates the satisfaction of an extra restriction on leakage.

NOTE $\underline{v_e}$ or $\underline{h_o}$ should not be taken to imply the direction of operation, nor the orientation of the axis of the damper blade.

EXAMPLE EI 60 ($\underline{v_e}$) S.

4.3.3 Durability

4.3.3.1 Durability of response delay

Following the test described in 5.2.5 demonstrates the durability of response delay by testing the sensing element for response temperature and load bearing capacity.

4.3.3.2 Durability of operational reliability

To ensure requirements on this durability aspect, the following proxy characteristics shall be taken in account:

The ability of the fire damper to demonstrate its operational reliability over the life of the system shall be determined by the open and closing cycle tests shown in Annex C.

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The intended application of the product within the system determines the number of complete cycles to be achieved during this test.

A cycle is defined as the damper moving from the open position to the closed and back to the open position or between the upper position to the lower position and back to the upper position for modulating dampers.

The fire damper passes the open and closing cycle test when:

— the cycles required are fully completed with the average time of each travel less than 120 s;

— the average time of the last travel is less than 120 s.

4.3.4 Other performance criteria

Where the manufacturer intends to provide information regarding aerodynamic performance, it shall do so in accordance with EN 1751.

5 Test methods

5.1 Ambient Leakage Tests

The test method shall be in accordance with EN 1366-2 and/or EN 1751.

5.2 Fire resistance test

5.2.1 General

In addition to other requirements in this standard, the fire damper shall be subjected to a furnace mounted fire resistance test. The purpose of the test is to evaluate the ability of a fire damper to prevent fire and smoke spreading from one fire compartment to another through the air ductwork system which may penetrate fire separating walls and floors.

The fire damper is attached (directly or remotely via a section of ducting), in/to a supporting construction using a method described in the test standard (EN 1366-2) in a manner generally representative of practice. Fire dampers may be situated within the construction of the wall/floor, attached to the face of the wall/floor, or mounted remotely from it via a section of fire resistant ducting.

NOTE Test results are only valid for the tested method of mounting, together with any direct or extended field of application that may be applicable.

Tests shall be performed starting with the fire damper in the open position to expose the thermal release mechanism of the fire damper to furnace conditions.

Temperature and integrity measurements shall be carried out in various parts of the test construction during the test. The impermeability of the fire damper system shall be measured by direct flow measurements whilst maintaining a constant pressure differential across the closed fire damper of 300 Pa. The leakage rate of dampers requiring an S classification shall be measured at ambient temperature.

It may be necessary to test fire dampers not mounted directly within the centre of the supporting construction, both inside and outside the supporting construction for it to be universally acceptable for that method of installation.

5.2.2 Fire damper: integrity and insulation

Equipment and method as fully described in EN 1366-2, the largest size to be manufactured shall be subjected to the closure test, followed by the fire resistance test (EN 1366-2). Units shall be fire tested in the

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plane of proposed installation (i.e. for classification the damper shall be tested horizontally mounted or vertically mounted, depending on the proposed installation).

NOTE For information purposes only, the unit may be ambient leakage tested prior to the fire test.

5.2.3 Leakage rated fire damper

Equipment and method as fully described in EN 1366-2, the largest size to be manufactured shall be subjected to the closure test, followed by the ambient leakage test, followed by the fire resistance test (see EN 1366-2). Units need to be fire tested in the plane of proposed installation (i.e. vertically and horizontally).

In addition the smallest size to be manufactured shall be subjected to an ambient leakage test (see EN 1751) to provide the information necessary to gain this classification.

5.2.4 Response delay of a fire damper

Any temperature may be used, provided that the units close within the time period of two minutes defined in EN 1366-2:1999, 10.4.6.

5.2.5 Sensing element: response temperature and load bearing capacity

The thermal release mechanism uses a sensing element which response temperature to an increase of temperature is in accordance with ISO 10294-4:2001, 4.2.

The thermal release mechanism uses a sensing element which load bearing capacity is in accordance with ISO 10294-4:2001, 4.2.

5.3 Salt Spray Exposure Test

The equipment and test method referenced in Annex B and EN 60068-2-52 shall be used.

5.4 Cycling Tests

5.4.1 Pre-fire test cycling

Pre-fire test cycling shall be in accordance with EN 1366-2.

5.4.2 Damper durability cycling

The equipment and test method referenced in Annex C shall be used.

For dampers with sensing elements only, damper durability shall be demonstrated by the pre-fire test cycling defined in 5.4.1.

5.5 Damper Aerodynamic Performance

The following performance and rating test methods for dampers and valves specified in EN 1751 and EN ISO 5135 shall be used:

a) Damper blade leakage

Leakage past a closed damper or valve may be classified using the data published in EN 1751. Classes then increase 1 to 4 with class 4 being the most leak tight;

b) Damper casing leakage

Duct damper casings shall be constructed to meet the minimum leakage limits specified for the ductwork system to which they are installed. Dampers shall have casing leakage classes to meet EN 1751. Ductwork leakage classifications C and D will be met by dampers having casing leakage classification C according to EN 1751.

NOTE There is no class D classification for damper casings in EN 1751, but due to the small surface area of a damper as part of the whole ductwork system Class C is adequate.

In order to apply the calculation sometimes required to confirm ductwork leakage, the reference casing area shall be taken as the perimeter size of the damper multiplied by the equivalent length of one metre (e.g. an 800 mm × 400 mm duct damper shall have a surface area for casing leakage performance calculated as ((2 × 0,8) m + (2 × 0,4) m) × 1 m = 2,4 m^2);

c) Damper flow rate/pressure resistance characteristics

Damper flow rate/pressure resistance characteristics shall be measured according to the method prescribed, and presented in the manner described, in EN 1751;

d) Operational torque testing

Operational torque shall be measured according to the method prescribed, and presented in the manner described, in EN 1751;

e) Thermal transfer testing

Thermal transfer shall be measured according to the method prescribed, and presented in the manner described, in EN 1751;

f) Regenerated sound power levels

Regenerated sound power levels shall be measured according to the method prescribed, and presented in the manner described, in EN ISO 5135.

6 Evaluation of conformity

6.1 General

The compliance of a fire damper with the requirements of this standard shall be demonstrated by:

a) initial type testing;

b) factory production control by the manufacturer, including product assessment.

For fire dampers produced as one-offs, pre-production fire dampers (e.g. prototypes) and fire dampers produced in very low quantities, 6.4 shall apply.

6.2 Initial type testing

6.2.1 General

Initial type testing (ITT) shall be performed to demonstrate compliance of fire dampers with this European Standard.

All essential characteristics for which the manufacturer declares performances are subject to initial type testing. Tests shall be carried out in accordance with Clause 5. No fire damper needs to be re-tested for the

sake of proving repeatability, but more than one fire damper shall be required to be tested to cover different applications.

Because the objective of the general testing procedures is to establish the ability of the fire damper to achieve the product design and performance requirements and classification in its operational position (i.e. end use conditions), and to continue to act as a barrier for a designated period of time, the complete product (i.e. including motors and fixings) to be installed shall be tested.

6.2.2 Modifications

In the case of modification of the fire damper or of the method of production (where these may affect the stated performance characteristics), the initial type testing shall also be performed. All characteristics given in Clause 4, which may be changed by the modification, shall be subject to this initial type testing, except those tests described in 6.2.3.

6.2.3 Previous tests and product families

Tests previously performed in accordance with the provisions of this standard may be taken into account for the ITT purpose providing that the tests:

— were equivalent or more rigorous;

— were carried out by a third party in the frame of a national/voluntary certification scheme;

— were carried out on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

Products may be grouped into families where the results for one or more characteristics from any one product in the family are representative for all other products within that family.

NOTE 1 Products may be in different families for different characteristics.

NOTE 2 Reference to the test standards should be made to allow the selection of a suitable representative sample.

In addition, Type Tests or Initial Type Testing shall be performed for all characteristics included in the standard for which the manufacturer declares performances:

— at the beginning of the production of a new or modified fire damper design, the raw material or supplier of the components;

— at the beginning of a new or modified method of production (where this may affect the stated properties); or

— they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the fire damper design, in the raw material or in the supplier of the components, or in the production process (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where kit components are used whose characteristics have already been determined, by the component manufacturer, on the basis of compliance with other technical specifications, these characteristics need not be reassessed. The specifications of these components shall be documented, as shall the inspection scheme for ensuring their compliance.

Products CE marked in accordance with appropriate harmonised European specifications may be presumed to have the performances stated with the CE marking, although this does not replace the responsibility of the fire damper designer to ensure that the fire damper as a whole is correctly designed and its components have the necessary performance values to meet the design.

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6.2.4 Test samples

Test samples of fire dampers shall be representative of the current production.

If the technical documentation (see 8.1) of the test samples does not give a sufficient basis for later compliance checks, a reference test sample (identified and marked) shall remain available for this purpose.

6.2.5 Test report

All initial type testing and its results shall be documented in a test report.

6.3 Factory Product Control (FPC)

6.3.1 General

The manufacturer shall establish, document and maintain an FPC system in a form of permanent internal control of production to ensure that the fire damper placed on the market continuously conforms with the ITT sample, for which compliance with this European Standard has been verified and expressed by the fire damper's stated performance characteristics.

If the manufacturer has the product designed, manufactured, assembled, packed, processed and labelled by subcontracting, FPC of the original manufacturer may be taken into account. However, where subcontracting takes place, the manufacturer shall retain the overall control of the products and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard. The manufacturer, who subcontracts all of his activities, may in no circumstances pass his responsibilities on to a subcontractor.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. This production control system documentation shall ensure a common understanding of conformity evaluation and enable the achievement of the required fire damper characteristics and the effective operation of the production control system to be checked.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

a) identify procedures to demonstrate conformity of the product at appropriate stages;

b) identify and record any instance of non-conformity;

c) identify procedures to correct instances of non conformity.

Factory production control, therefore, brings together operational techniques and all measures allowing maintenance and control of the conformity of the product with this European Standard. Its implementation may be achieved by controls and tests on measuring equipment, raw materials and constituents, processes, machines and manufacturing equipment and finished products, including material properties in products, and by making use of the results thus obtained.

6.3.2 General requirements

Manufacturers having an FPC system which complies with EN ISO 9001:2008 and/or EN ISO 9002:1994 and which addresses the requirements of this harmonised standard are recognised as satisfying the FPC requirements of the Council Directive 89/106/EEC.

Where a manufacturer operates different production lines or units in the same factory, or production lines or units in different factories, and these are covered by a single, overall FPC system, the manufacturer still has to keep control records for each separate production line or unit (and this shall be made a requirement of the technical specification). However, when performing FPC inspections, although the product specific aspects

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always need to be evaluated, the Notified Body does not have to repeat systematically the assessment of "general" FPC provisions which apply to all lines/units.

6.3.3 FPC specific requirements

6.3.3.1 General

The FPC system shall:

— address this European Standard; and

— ensure that the products placed on the market comply with the stated performance characteristics.

This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations;

b) the effective implementation of these procedures and instructions;

c) the recording of these operations and their results;

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-conformity.

Production control operations include some or all of the following operations:

e) the specification and verification of raw materials and constituents;

f) the controls and tests to be carried out during manufacture according to a frequency laid down in the prescribed test plan;

g) the verifications and tests to be carried out on finished products according to a frequency in accordance with Annex E and adapted to the product and its conditions of manufacture.

NOTE Depending on the specific case, it may be necessary to carry out:

1) the operations referred to under b) and c);

2) only the operations under b); or

3) only those under c).

The operations under b) centre as much on the intermediate states of the product as on manufacturing machines and their adjustment, and equipment, etc. These controls and tests and their frequency are chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters, etc.

With regard to operations under c), where there is no control of finished products at the time that they are placed on the market, the manufacturer shall ensure that packaging, and reasonable conditions of handling and storage, do not damage products and that the product remains in conformity with the technical specification.

The appropriate calibrations shall be carried out on defined measuring and test instruments.

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6.3.3.2 Verification and tests

6.3.3.2.1 General

The manufacturer shall have or have available the installations, equipment and personnel which enable him to carry out the necessary verifications and tests. He may, as may his agent, meet this requirement by concluding a sub-contracting agreement with one or more organisations or persons having the necessary skills and equipment.

The manufacturer shall calibrate or verify and maintain the control, measuring or test equipment in good operating condition, whether or not it belongs to him, with a view to demonstrating conformity of the product with its technical specification.

The equipment shall be used in conformity with the specification or the test reference system to which the specification refers.

6.3.3.2.2 Monitoring of conformity

If necessary, monitoring shall be carried out of the conformity of intermediate states of the product and at the main stages of its production.

NOTE This monitoring of conformity focuses where necessary on the product throughout the process of manufacture, so that only products having passed the scheduled intermediate controls and tests are dispatched.

6.3.3.2.3 Prescribed test plan

Tests shall be in accordance with the test plan in Annex E.

6.3.3.2.4 Test Records

The manufacturer should establish and maintain records which provide evidence that the product has been tested. These records should show clearly whether the product has satisfied the defined acceptance criteria. Where the product fails to satisfy the acceptance measures, the provisions for non-conforming products should apply.

6.3.3.2.5 Treatment of products which do not conform

If control or test results show that the product does not meet the requirements, for example if the statistical variation of test results exceeds the limits allowed by the technical specification (see Annex E), the necessary corrective action shall immediately be taken.

Products or batches not conforming shall be isolated and properly identified. Once the fault has been corrected, the test or verification in question shall be repeated.

If products have been delivered before the results are available, a procedure and record should be maintained for notifying customers.

6.3.3.2.6 Recording of verifications and tests (manufacturer's register)

The results of factory production controls shall be properly recorded in the manufacturer's register. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the register under the signature of the person responsible for control who carried out the verification.

With regard to any control result not meeting the requirements of the technical specification, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the register.

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6.3.3.2.7 Traceability

It is the manufacturer's, or his agent's, responsibility to keep full records of individual products or product batches, including their related manufacturing details and characteristics, and to keep records of to whom these products or batches were first sold. Individual products or batches of products and the related manufacturing details shall be completely identifiable and retraceable. In certain cases, for example for bulk products, a rigorous traceability is not possible. The expression of the requirement in the relevant technical specifications should be realistically adapted keeping in view a traceability as complete as possible.

6.3.4 Initial inspection of factory and FPC

6.3.4.1 Initial inspection of factory and FPC shall be carried out when the production is already running and the FPC is already in practice.

6.3.4.2 The following shall be assessed:

— the FPC-documentation; and

— the factory.

In the initial assessment of the factory and FPC, the following shall be verified:

a) that all resources necessary for the achievement of the product characteristics required by this European Standard are (see 6.3.4.1) available; and

b) that the FPC-procedures in accordance with the FPC-documentation are (see 6.3.4.1) implemented and followed in practice; and

c) that the product complies (see 6.3.4.1) with the initial type testing samples, for which compliance with this European Standard has been verified.

6.3.4.3 All assessments and their results shall be documented in a report.

6.3.5 Continuous surveillance of FPC

6.3.5.1 The factory, which has been assessed according to 6.3.4, shall be re-assessed annually.

6.3.5.2 All assessments and their results shall be documented in a report.

6.3.6 Procedure for modifications

In the case of modification of the fire damper, the method of production or the FPC system (where these may affect the fire damper's declared performance characteristics), a re-assessment of the factory and of the FPC system shall be performed for those aspects (including the relevant ITT), which may be affected by the modification.

All assessments and their results shall be documented in a report.

6.4 One-off fire dampers, pre-production fire dampers (e.g. prototypes) and fire dampers produced in very low quantities

Fire dampers produced as a one-off, prototypes assessed before full production is established, and fire dampers produced in very low quantities (less than 30 per year) shall be assessed as follows.

For initial type assessment, the provisions of 6.2 shall apply, with the following exceptions:

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— all fire dampers presented for test shall be supported by full design documentation;

— a sampling process is not required as no "production batch" will be available.

The FPC system of one-off fire dampers and those produced in very low quantities shall ensure that raw materials and/or components are sufficient for their production. The provisions of 6.3 shall apply, only where appropriate. The records allowing traceability of the fire dampers shall be maintained.

For prototypes, where the intention is to move to series production, the initial inspection of the factory and FPC shall be carried out before the production is already running and/or before the FPC is already in practice. The following shall be assessed:

— the FPC-documentation; and

— the factory.

In the initial assessment of the factory and FPC the following shall be verified:

a) all resources necessary for the achievement of fire dampers characteristics required by this European Standard shall be available; and

b) the FPC-procedures in accordance with the FPC-documentation will be implemented and followed in practice; and

c) procedures are in place to demonstrate that the factory production processes can produce a fire damper complying with the requirements of this European Standard and that fire dampers will be the same as the initial type testing samples, for which compliance with this European Standard has been verified.

Once series production is fully established, the provisions of FPC in 6.3 shall apply.

7 Marking and documentation

The fire damper shall be marked at least with the following information:

— the name or identifying mark of the manufacturer;

— the model/type;

— the number of this standard and the year of its publication (i.e. EN 15650:2010), followed by the generic name of the product "Fire Damper";

— if the fire damper has an S classification (EN 13501-3), the words "Leakage rated" shall be added;

— the classification for resistance to fire and other related information according to EN 13501-3;

— power requirements, e.g. for electric actuators the power, current, voltage, for pneumatic actuators the operating air pressure (if this cannot be seen on the actuator itself);

— actuator model (if this cannot be seen on the actuator itself);

— the text "This damper shall be installed as per the manufacturer's instructions";

— the manufacturer's installation instructions or a reference to a document held by the manufacturer giving these instructions;

— the date of manufacture (month and year).

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NOTE Where ZA.3 covers the same information as this clause, the requirements of this clause are met.

8 Product, installation and maintenance information (documentation)

8.1 Product specification

The manufacturer shall provide, and retain a detailed description of the product including all the relevant components. This shall include a description of the materials used (e.g. densities, thickness) in the construction of the fire damper. It shall also include details of the supporting construction, the method of installation, including the sealing and fixing details, the actuator details and any penetration or linear gap seals used to seal the gap between the duct and the supporting construction.

Blade axis shall also be noted (i.e. whether the blades are supported vertically or horizontally).

8.2 Installation information

The manufacturer shall provide appropriate installation details that shall include at least information for:

a) fixing and installation;

b) connection to external services (e.g. electric or pneumatic installation);

c) health and safety information to allow safe installation.

8.3 Maintenance information

The manufacturer shall provide appropriate maintenance information for the damper that shall include at least:

a) inspection and maintenance procedures;

b) the recommended frequency of operational checks;

c) recommended checks to establish the effects of corrosion.

NOTE Regular testing/inspection should be undertaken to meet regulatory requirements, or at intervals not exceeding six months. A comprehensive example of the above procedure is given in Annex D. Some automatic systems may allow more frequent testing (48 h or less) and this may be required by national regulation.

Annex A
(informative)

Typical fire damper descriptions

A.1 General

This clause gives details of available units, but this may not be exhaustive and other products may be available that fulfil the requirements of this standard.

Test results or assessments are required for plane of installation (e.g. horizontal and vertical) and the method of installation.

A.2 Folding Curtain Fire Dampers

Folding curtain fire dampers are constructed of a series of interlocking blades, which fold to the top of the assembly permitting the maximum free area in the airway. The blades are held open by means of a thermal release mechanism. The blades fall/are sprung to fill the airway to prevent the passage of the fire.

A.3 Single Blade Fire Dampers

Single blade fire dampers are constructed with a single pivoting blade within a frame. The blade is released from its open position by means of a thermal release mechanism. The blade pivots/moves to close the airway to prevent the passage of fire.

A.4 Multi-blade Fire Dampers

Multi-blade dampers are constructed with a number of linked pivoting blades contained within a frame. The blades are released from their open position by means of a thermal release mechanism. The blades pivot/move to close the airway to prevent the passage of fire.

A.5 Cone valve fire damper

A damper consisting of a cone which closes into a profiled ring to prevent the passage of fire. This is usually achieved by a spring arrangement and held open by a thermal element.

A.6 Intumescent Fire Dampers

Intumescent fire dampers incorporate components, which swell by intumescent activity under the action of heat, to close the airway to prevent the passage of fire. The intumescent materials form the main component for fire integrity. In some instances this may be supported with a mechanical device to prevent cold smoke leakage. Activation temperatures will be influenced by the type of intumescent material selected.

Annex B
(normative)

Salt spray exposure test

B.1 General

Use the methods and equipment described in EN 60068-2-52. The values referenced below shall be used and, where they differ, they shall replace any other parameters stated in the standard.

B.2 Revised parameters

a) EN 60068-2-52:1996, Clause 5 Salt Solution

The salt solution concentration shall be (20 ± 1) % by weight;

b) EN 60068-2-52:1996, Clause 6 Severities

Severity 2 shall be used;

c) EN 60068-2-52:1996, Clause 7 Initial Measurements

The damper shall be fully operational before the test;

d) EN 60068-2-52:1996, Clause 8 Pre-conditioning

No pre-conditioning of the specimen shall be undertaken by either the test house or the manufacturer. The specimen shall be representative of that installed in practice;

e) EN 60068-2-52:1996, Clause 10 Recovery

The specimen shall be washed in running tap water for 5 min and allowed to dry. The temperature of the water used for washing shall not be less than 5 °C or exceed 35 °C;

f) EN 60068-2-52:1996, Clause 11 Final Measurement

The damper shall be fully operational after test.

NOTE Extended criteria above those listed may be set to allow testing to suit more difficult applications.

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Annex C
(normative)

Cycling Tests

C.1 General

This test shall be undertaken where fire dampers incorporate the following:

— a closure device that can be triggered remotely, but which is unable to re-open the damper without intentional intervention; or

— a general purpose actuator (fully open/fully closed); or

— a modulating actuator (fully open/fully closed with a variable control position in the middle of the travel).

Actuators for fire dampers would usually include a spring return system, but it is possible that closure may be achieved in a different way.

The largest size shall be tested.

Generally it may be seen that for fire dampers, which have the closed position as safety position, any torque supplied by air movement tends to support the closing process. Therefore a test under load can be omitted. Thus using purely cycling is a satisfactory method to determine durability.

The results of any tests shall record that the cycles were fully completed and the average time of each travel.

A cycle is defined as the damper moving from the open position to the closed position and back to the open position or for modulating dampers, from the upper position to the lower position and back to the upper position.

Position indication:

When fire dampers incorporate blade positioning signalling devices, for each cycle, confirm open and closed position by using for example a light connected to the switches.

C.2 Equipment

Equipment shall be required to control a supply to allow the fire damper actuator to be cycled. This equipment shall be able to provide the nominal operating power/supply less 10 %, plus 15 %, and be variable between these values to confirm that the fire damper shall operate at the extremes. If the unit to be tested requires a control signal of any type this shall be provided in addition and shall be able to give the device a signal at each extreme and any in between these.

NOTE A device that allows the fire damper to be cycled automatically, together with a method of recording completed cycles, would be useful, so that a test could be set to run without attendance, noting that each cycle could potentially take in excess of 120 s.

C.3 Cycles required

C.3.1 Fire Dampers incorporating a closure device that can be triggered remotely, but which is unable to re-open the damper without intentional intervention

100 cycles at nominal operating power, followed by

100 cycles at nominal operating power less 10%, followed by

100 cycles at nominal operating power plus 15%.

The results shall record that the cycles were fully completed.

C.3.2 Fire Dampers incorporating a general purpose actuator

10 000 cycles at nominal operating power, followed by

100 cycles at nominal operating power less 10%, followed by

100 cycles at nominal operating power plus 15%.

The results shall record that the cycles were fully completed.

C.3.3 Fire Dampers incorporating a modulating actuator

10 000 cycles at nominal operating power (0° to 90°), followed by

10 000 cycles at nominal operating power (45° to 60°).

The results shall record that the full cycles were fully completed.

Annex D
(informative)

Example of inspection and maintenance procedure

This annex is included here for guidance on how to handle inspection and maintenance of installed products without prejudice of national provisions.

After installation, when the system is running it is recommended that suitably qualified site personnel carry out, and record, the following inspections shown in Table D.1. These inspections should be undertaken at the time intervals stated in the manufacturer's maintenance information (see Clause 8).

Table D.1 — Recommended inspections for Fire Dampers

Operation/task	Result
Damper Reference	
Date of inspection	
Check actuator wiring for damage (where applicable)	
Check end-switch wiring for damage (where applicable)	
Check damper cleanliness and clean where necessary	
Check the condition of blades and seals, rectify and report where necessary	
Confirm the safety closure operation of the fire damper according to the manufacturer's instructions	
Confirm operation of damper to OPEN and CLOSE by use of the control system and physical observation of the damper, rectify and report where necessary	
Confirm operation of OPEN and CLOSED end-switches, rectify and report (where necessary)	
Confirm that the damper fulfils its function as part of the control system (where necessary)	
Confirm that the damper is left in its normal working position	

NOTE A fire damper is usually part of a system. As this is the case the whole system should be checked as governed by the operation and maintenance requirements for the system.

Annex E
(normative)

Factory Production Control – TEST PLAN

One fire damper per product family shall be submitted to the checks indicated in Table E.1, according to the foreseen frequency. The results of the checks shall be registered.

Table E.1 — Checks frequency

Annually	Twice per year	Daily
Carry out a third party certification product audit by notified body	Make a complete cycling test to suit series application	Take 1 % of production or at least one unit per day (whichever is the greater) and check and test by: a) confirming that the damper complies with all the test report and assessment requirements (e.g. dimensions); b) opening the damper manually or with supply power, where actuated, and confirming open end-switches (where applicable); c) closing the damper and confirming closed end-switches; d) confirming that the time of actuation from the closed position to open position is as specified; e) confirming that the time of actuation from the open position to closed position is as specified; f) performing a leakage test at ambient temperature (standard requirements + 10 % to give tolerance on diverse sizes).

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Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive (Construction products Directive 89/106/EEC)

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/109, Fire alarm/detection, fixed firefighting, fire and smoke control and explosion suppression products, given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the fire dampers covered by this annex for the intended uses indicated herein; reference shall be made to the information given with the CE marking.

WARNING — Other requirements and other EU Directives, not affecting the fitness for intended use may be applicable to the fire dampers falling within the scope of this standard.

NOTE 1 In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through http://ec.europa.eu/enterprise/construction/internal/dangsub/dangmain.htm.)

This annex has the same scope as Clause 1 of this standard and is defined by Table ZA.1. It establishes the conditions for the CE marking of the fire dampers intended for the uses indicated below and shows the relevant clauses applicable (see Table ZA.1).

Table ZA.1 — Relevant clauses for fire dampers

Construction products: Fire dampers. **Intended use:** To be used in conjunction with partitions to maintain fire compartments in heating, ventilating and air conditioning installations.			
Essential characteristics	**Requirement clauses in this and other European Standard(s)**	**Levels and/or classes**	**Notes**
Nominal activation conditions/sensitivity: - sensing element load bearing capacity - sensing element response temperature	4.2.1.2 4.2.1.2.2 4.2.1.2.3	–	
Response delay (response time): - closure time	4.2.2.2	–	
Operational reliability: - cycling	4.3.1, a)	–	Cycling 0 or 50
Fire resistance:			
- integrity	4.1.1, a)	E	
- insulation	4.1.1, b)	EI	
- smoke leakage	4.1.1, c)	ES EIS	
- mechanical stability (under E)	4.1.1, a)	-	
- maintenance of the cross section (under E)	4.1.1, a)	-	
Durability of response delay: - sensing element response to temperature and load bearing capacity	4.2.1.2.2 and 4.2.1.2.3	-	
Durability of operational reliability: - open and closing cycle tests	4.3.3.2	–	Cycling 300 or 10 000 or 20 000

The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see ZA.3) may be used. The NPD option may not be used, however, for durability and where the characteristic is subject to a threshold level.

ZA.2 Procedure for the attestation of conformity of fire dampers

ZA.2.1 System of attestation of conformity

The system of attestation of conformity of fire dampers indicated in Table ZA.1 in accordance with the EC Decision 1996/577/EC (*OJEU L254 of 1996-10-08*), as amended by EC Decision 2002/592/EC (*OJEU L192, 2002-07-20*), as given in Annex III of the Mandate for Fire alarm/detection, fixed firefighting, fire and smoke control and explosion suppression products, is shown in Table ZA.2 for the indicated intended use and relevant level or class.

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Table ZA.2 — Attestation of conformity system

Product	Intended use	Level(s) or class(es)	Attestation of conformity system
Dampers	Fire safety		1
System 1: See Directive 89/106/EEC CPD Annex III.2 (i), without audit testing of samples.			

The attestation of conformity of the fire dampers in Table ZA.1 shall be according to the evaluation of conformity procedures indicated in Table ZA.3 resulting from application of the clauses of this or other European Standard indicated therein.

Table ZA.3 — Assignment of evaluation of conformity tasks for fire dampers under system 1

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	Parameters related to characteristics of Table ZA.1 relevant for the intended use which are declared	6.3.3
	Further testing of samples taken at factory according to the prescribed test plan	Characteristics of Table ZA.1 relevant for the intended use which are declared	6.3.3
Tasks under the responsibility of the product certification body	Initial type testing (ITT)	Characteristics of Table ZA.1 relevant for the intended use which are declared	6.2
	Initial inspection of factory and of FPC	Parameters related to characteristics of Table ZA.1, relevant for the intended use which are declared. Documentation of the FPC and the factory.	6.3.4
	Continuous surveillance, assessment and approval of FPC	Parameters related to characteristics of Table ZA.1, relevant for the intended use which are declared	6.3.5

ZA.2.2 EC certificate of conformity

When compliance with the conditions of this annex is achieved, the notified product certification body shall draw up an EC certificate of conformity, which entitles the manufacturer to affix the CE marking. This certificate shall include:

— name, address and identification number of the notified product certification body;

— name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;

NOTE The manufacturer may also be the person responsible for placing the product on to the EEA market, if he takes responsibility for the CE marking.

— description of the product (type, identification, use, etc.);

— provisions to which the product comply (i.e. Annex ZA of this European Standard);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

— the number of the EC certificate of conformity;

— name of, and position held by, the person empowered to sign the certificate.

ZA.3 CE marking and labelling

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown on a label on each fire damper and on the accompanying commercial documents (e.g. a delivery note). The following information shall accompany the CE marking symbol:

a) identification number of the certification body;

b) name or identifying mark and registered address of the manufacturer (see Note 1 in ZA.2.2);

c) the last two digits of the year in which the marking is affixed;

d) number of the EC certificate of conformity or factory production control certificate;

e) reference to this European Standard;

f) description of the product: generic name, model/type, material, dimensions, etc., and intended use;

g) information on those relevant essential characteristics listed in Table ZA.1 which are to be declared presented as:

   1) declared values and, where relevant, level or class (including "pass" for "pass/fail" requirements, where necessary) to declare for each essential characteristic as indicated in the column "Notes" in Table ZA.1;

   2) "No performance determined" for essential characteristics which the manufacturer does not intend to declare.

Figure ZA.1 gives an example of the information to be given on the fire damper, label and commercial documents.

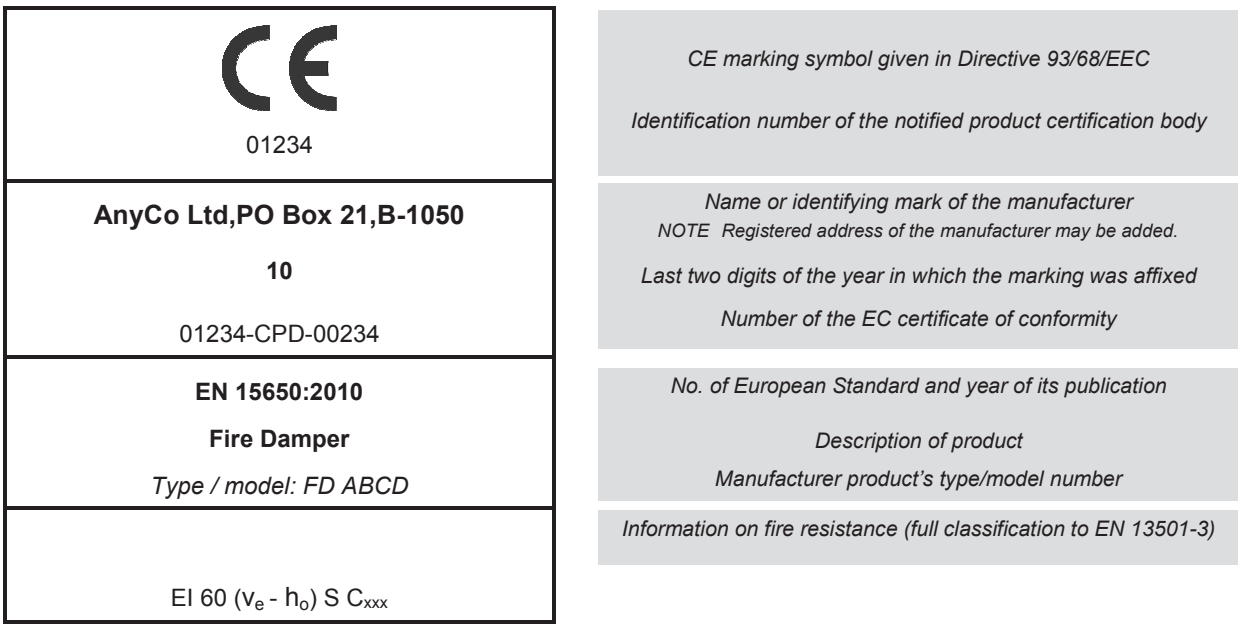

Figure ZA.1 — Example of the CE marking to be shown on the fire damper

In addition, the CE marking symbol shall be shown on a specific document, accompanying the product(s). This CE symbol shall be accompanied, in addition to the information a) to g) already given on the fire damper, by the following additional information:

h) nominal activation conditions/sensitivity:

   1) sensing element load bearing capacity;

   2) sensing element response temperature;

i) response delay (response time):

   1) closure time;

j) operational reliability:

   1) cycling;

k) resistance to fire:

   1) maintenance of the cross section (under E);

l) durability of response delay:

   1) sensing element response temperature and load bearing capacity;

m) durability of operational reliability:

   1) open and closing cycle.

Figure ZA.2 gives an example of the CE marking to appear on a document, accompanying fire dampers.

CE 01234		*CE marking symbol given in Directive 93/68/EEC* *Identification number of the notified product certification body*
AnyCo Ltd **10** 01234-CPD-00234		*Name or identifying mark of the manufacturer* *NOTE Registered address of the manufacturer may be added.* *Last two digits of the year in which the marking was affixed* *Number of the EC certificate of conformity*
EN 15650:2010 **Fire Damper** *Type / model: FD ABCD*		*No. of European Standard and year of its publication* *Description of product* *Manufacturer product's type/model number*
Nominal activation conditions/sensitivity: **- sensing element load bearing capacity** **- sensing element response temperature**	Pass	*Information on all regulated characteristics*
Response delay (response time): **- closure time**	Pass	
Operational reliability: **- cycling**	10 000 cycles – passed	
Fire resistance: **- maintenance of the cross section (under E)**		
- Integrity E - Insulation I - Smoke leakage S - Mechanical stability (under E) - cross section (under E)	EI 60S (v_e-h_o) ...	
Durability of response delay: **- sensing element response temperature and load bearing capacity** **Durability of operational reliability:** **- open and closing cycle**	Pass Pass	

Figure ZA.2 — Example of the CE marking to be shown on a document, accompanying fire dampers

In addition to any specific information relating to dangerous substances shown above, the product shall also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE 1 European legislation without national derogations need not be mentioned.

NOTE 2 Affixing the CE marking symbol means, if a product is subject to more than one directive, that it complies with all applicable directives.

Bibliography

[1] EN 12101-2, *Smoke and heat control systems — Part 2: Specification for natural smoke and heat exhaust ventilators*

[2] EN 12101-3, *Smoke and heat control systems — Part 3: Specification for powered smoke and heat exhaust ventilators*

[3] EN 13501-4, *Fire classification of construction products and building elements — Part 4 : Classification using data from fire resistance tests on components of smoke control systems*

[4] EN 1363-1, *Fire resistance tests — Part 1: General requirements*

[5] EN ISO 9001:2008, *Quality management systems — Requirements (ISO 9001:2008)*

[6] EN ISO 9002:1994, *Quality systems — Model for quality assurance in production, installation and servicing (ISO 9002:1994)*

[7] Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products

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