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This European Standard was approved by CEN on 17 March 2011.

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Foreword

This document (EN 12101-8:2011) has been prepared by Technical Committee CEN/TC 191 "Fixed firefighting systems", 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of an identical text or by endorsement, at the latest by November 2011, and conflicting national standards shall be withdrawn at the latest by November 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This European Standard has the general title "*Smoke and heat control systems*" and consists of the following separate parts:

— Part 1: Specification for smoke barriers,

— Part 2: Specification for natural smoke and heat exhaust ventilators,

— Part 3: Specification for powered smoke and heat exhaust ventilators,

— Part 4: Installed SHEVS systems for smoke and heat ventilation (Technical Report (TR)),

— Part 5: Guidelines on functional recommendations and calculation methods for smoke and heat exhaust ventilation systems (TR),

— Part 6: Specification for pressure differential systems – Kits,

— Part 7: Smoke duct sections,

— Part 8: Smoke control dampers (this standard),

— Part 9: Control panels,

— Part 10: Power supplies.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard contains the basic performance and requirements for smoke control dampers that are to be used in conjunction with pressure differential systems and smoke and heat control systems. They can also be used to pressurise when gas extinguishing systems are used.

Particular reference is required to EN 1366-10, which defines the furnace testing associated with these products and EN 13501-4, which provides details on their fire resistance classification.

In addition to the prevention of transmission of smoke and combustion products from a fire zone, smoke control dampers are utilised to contain the spillage of otherwise harmful and toxic extinguishing gases from the affected area, and for the control of pressurising and excess air relief within pressurisation systems.

Smoke control systems are designed to fulfil the following basic functions. These are:

a) the extraction of smoke from a single fire compartment to the outside of the building,

b) the extraction of smoke from fire compartments of a building, using a SHEVS connected to one or more fire compartments. The smoke control system duct may or may not pass through other compartments of the building to reach the outside of the building,

c) the use of pressurisation to maintain smoke free clear areas.

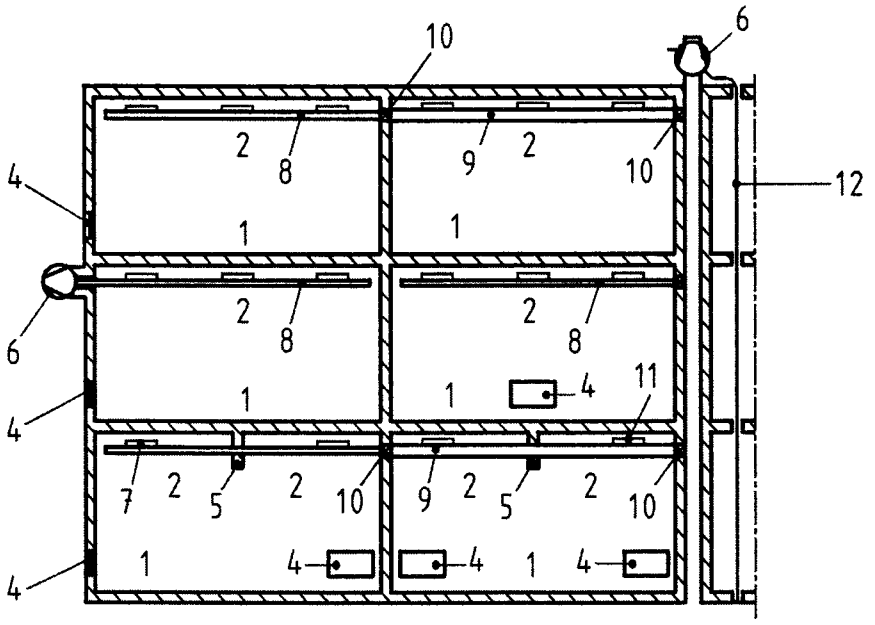
Smoke control dampers are commonly used in smoke and heat control systems as a means of limiting the number of ducts and high temperature fan units. The ducts into which such smoke control dampers are fitted generally serve a number of different fire compartments. The systems may be dedicated smoke extraction or possibly a combined environmental ventilation/smoke extraction.

The smoke and heat control system may remove smoke using either high temperature fans (in accordance with EN 12101-3) or natural ventilators (in accordance with EN 12101-2).

It may be necessary for a number of reasons (fire growth, smoke release, etc.) that the open smoke control damper(s) is (are) required to close and that the damper(s) previously closed is(are) required to open.

The tests defined in this standard are based on the assumption that when smoke is detected within a building, all smoke control dampers other than those serving the fire compartment/smoke reservoir (where the fire has initiated) remain closed or move to the closed position. All smoke control dampers serving the smoke affected fire compartment/smoke reservoir remain open or move to the open position, and the fan(s) started/natural vents opened.

NOTE Figure 1 gives examples of installation positions, but these are not the only positions where dampers may be fitted.



Key

1 Fire compartment

2 Smoke reservoir

4 Air inlet

5 Smoke barrier

6 Powered smoke and heat exhaust ventilator (fan)

7 Smoke control dampers for single compartments (FprEN 12101-8 and EN 1366-10)

8 Smoke control ducts for single compartments (FprEN 12101-7 and EN 1366-9)

9 Smoke control ducts for multi compartments (FprEN 12101-7 and EN 1366-8)

10 Smoke control dampers for multi compartments (FprEN 12101-8 and EN 1366-10) mounted inside or outside of wall or floor

11 Smoke control dampers for multi compartments (FprEN 12101-8 and EN 1366-10) mounted on the surface of the duct

12 Electrical equipment

Figure 1 – Example of powered smoke and heat exhaust ventilation

Further guidance on the application of smoke control dampers may be found within the rest of the EN 12101 series of harmonised standards and technical reports.

The areas for which products supplied to this standard are considered applicable include for example:

a) commercial premises,

b) shopping and retail centres,

c) hospitals,

d) multi-residential buildings.

Smoke control dampers are intended for use in the following types of systems, including:

1) pressurisation,

2) pressure relief,

3) extraction systems,

4) ductwork systems,

5) inerting fire suppression systems.

It is realised that all the above systems do not address smoke directly, but similar properties are required of such smoke control dampers to limit leakage in a fire and smoke control situation.

1 Scope

This European Standard applies to smoke control dampers, placed on the market and intended to operate as part of a pressure differential system or smoke and heat control system. This standard specifies requirements and gives reference to the test methods defined for smoke control dampers and their associated components, such as actuators which are intended to be installed in such systems in buildings. It also provides for the evaluation of conformity of these products to the requirements of this standard. Furthermore, provision on marking and information on installation and maintenance of these products are also given.

This European Standard distinguish between two categories of smoke control dampers, i.e. single compartment smoke control dampers and multi-compartment fire resisting smoke control dampers.

Smoke control dampers covered by this European Standard can be installed into smoke control system ducts or onto the ducts´ surface. They can be installed also into a wall, floor or ceiling/roof elements or onto the surface of these elements.

To avoid duplication, reference is made to a variety of other standards. To this end, this standard is to be read in conjunction with EN 13501-4, EN 1366-10 and EN 1366-2, for details of the furnace testing.

This standard does not consider in detail the detrimental and/or corrosive effects that may be caused by process chemicals present in the atmosphere, which are drawn through the system intentionally or inadvertently.

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, *Fire resistance tests for service installations – Part 2: Fire dampers*

EN 1366-10, *Fire resistance tests for service installations – Part 10: Smoke control dampers*

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

prEN 12101-9, *Smoke and heat control systems - Part 9: Control panels*

EN 12101-10, *Smoke and heat control systems - Part 10: Power supplies*

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*

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

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, *Fire safety – Vocabulary (ISO 13943:2008)*

3 Terms and definitions

For the purposes of this document, the definitions given in EN ISO 13943, together with the following, apply.

3.1
air inlet
device connected to outside air to allow the inlet of air from outside the building

3.2
attended control room
room with people, who have the duty to control the smoke exhaust system permanently (24 hours per day, seven days per week), monitor the incoming signals from the smoke control systems and put the smoke control system into operation in case of smoke alarm

NOTE This ensures that the smoke control system is running and items such as dampers are in position within the system response time.

3.3
elevated temperature
temperatures in excess of normal ambient air, below those necessary for fire resistance testing, to which smoke and heat exhaust ducts for single compartments are tested, to gain classification

3.4
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

3.5
interface control unit
device which controls the operation of the actuator located at the damper or within the same fire zone as the damper

3.6
multi compartment smoke control dampers
smoke control dampers, which are fire resisting, for use in multi compartment areas, which may be associated with multi or single compartment smoke control ductwork and/or may be installed in a fire compartment structure

3.7
multi compartment fire resisting smoke control ducts
fire resisting smoke control ducts, built from more than one smoke control duct section, for use in multi compartment applications designed to transport smoke and/or hot gases away from the source of a fire [EN 12101-7]

NOTE May also have a dual function as a normal air conditioning duct.

3.8
natural smoke and heat control system
smoke and heat ventilation system which uses natural ventilation

NOTE Natural ventilation is caused by buoyancy forces due to differences in density of the gases because of temperature differences.

3.9
penetration seal
product tested for use between the smoke control duct/damper and the fire compartment structure to maintain the fire resistance, at the position where a smoke control system duct passes through the element, or a damper is mounted in the element

3.10
powered smoke and heat exhaust system
smoke and heat ventilation system, which utilises a number of hot gas fans that are suitable for handling hot gases for a limited period of time, which causes the positive displacement of gases

3.11
pressure differential system
system of fans, ducts, vents and other features provided for the purposes of creating a lower pressure in the fire zone than in the protected space

3.12
remote signalling
device located away from the damper which will indicate the damper position, open or closed

3.13
safety position
position (open or closed) into which specific projects may require certain dampers to move, depending upon the fire location within the building

3.14
single compartment smoke control dampers
smoke control dampers for use in single compartment areas, which may be associated with single compartment smoke control ductwork and/or may be installed in an external wall or roof

3.15
single compartment smoke control ducts
smoke control ducts, built from more than one smoke control duct section, for use within single fire compartment application designed to transport smoke and/or hot gases away from the source of a fire [EN 12101-7]

NOTE May also have a dual function as a normal air conditioning duct.

3.16
smoke and heat exhaust ventilation system (SHEVS)
system consisting of products and/or components jointly selected to exhaust smoke and heat

NOTE The products and/or components form a system in order to establish a buoyant layer of warm gases above cooler cleaner air.

3.17
smoke and heat exhaust ventilator (SHEV)
device specially designed to move smoke and hot gases out of a construction works under conditions of fire

3.18
smoke barrier
barrier to restrict the spread of smoke and hot gases from a fire, forming part of the boundary of a smoke reservoir or used as a channelling screen, or used as a void edge boundary

3.19
smoke control damper for systems with automatic activation
smoke control damper that is applicable to the systems defined in 3.26

3.20
smoke control damper for systems with manual intervention
smoke control damper that is applicable to the systems defined in 3.27 and 3.28

3.21
smoke control damper
device automatically or manually activated, which may be open or closed in its operational position, to control the flow of smoke and hot gases into, from or within a duct

3.22
smoke control damper – horizontal installation
smoke control damper fitted in-line across a vertical duct, or on the top and bottom surface of a horizontal duct

3.23
smoke control damper – vertical installation
smoke control damper fitted in-line across a horizontal duct, or on the sides of a horizontal duct, or on any surface of a vertical duct

3.24
smoke control duct - section
element of smoke control duct constructed to form part of a smoke control system [EN 12101-7]

3.25
smoke control system with automatic activation
smoke control system (smoke and heat exhaust ventilation type or pressure differential type), that operates automatically on receipt of a smoke or fire alarm without any manual action/intervention

NOTE A system with an attended control room can also be accepted as an automatic system. Once initiated, the system will not cause the damper position to be changed.

3.26
smoke control system with automatic activation and with manual override
smoke control system (smoke and heat exhaust ventilation type or pressure differential type), that can be put into operation as 3.26 on receipt of a smoke or fire alarm, but once initiated the system will allow the damper position to be changed by external input or fireman's override

3.27
smoke control system with manual initiation
smoke control system (smoke and heat exhaust ventilation type or pressurization type), that has to be put into operation, on detection of smoke or fire, by human intervention (e.g. by pressing a button, or pulling a handle), leading to a sequence of automatic actions in the operation of the smoke control system

NOTE Once initiated, the system may allow the damper position to be changed by external input or fireman's override.

3.28
smoke free clear area
volume of air which is unpolluted by smoke

3.29
smoke layer
layer of smoke that stabilises underneath the roof due to the affect of temperature gradient

3.30
smoke reservoir
region within a building limited or bordered by smoke barriers or structural elements and which will, in the event of a fire, retain a thermally buoyant smoke layer

3.31
system response time
time from the initiation of the smoke control system to it being fully operational

3.32
triggering device
device such as a fire detector system, smoke detector or pushbutton, which sends an activating signal to the initiation device(s)

4 Smoke control damper requirements

4.1 General

4.1.1 Fire resistance

The smoke control damper shall demonstrate the following and shall be classified in accordance with EN 13501-4:

a) integrity: this shall be tested in accordance with test method in 5.2 and the integrity classification (E) declared;

b) insulation: this shall be tested in accordance with test method in 5.2 and the insulation classification (I) declared;

c) leakage: this shall be tested in accordance with test method in 5.2 and the leakage classification (S) declared;

d) mechanical stability: this shall be tested in accordance with test method in 5.2 and forms part of the integrity classification (E) declared;

e) maintenance of cross section: this shall be tested in accordance with test method in 5.2 and forms part of the integrity classification (E) declared;

f) high operational temperature: this shall be tested in accordance with test method in 5.2 and the classification (HOT400/30) declared.

4.1.2 General application

Where the manufacturer intends to provide information regarding aerodynamic characteristics, this shall be done according to EN 1751 – see 5.5.

4.2 Construction and components: characteristics

4.2.1 Construction and operation

Smoke control dampers shall be required to have two safety positions, i.e. fully open and fully closed. In the case of a single fire compartment, this safety position shall generally be open, unless separate smoke reservoirs are designated along a duct run. For multi compartment fire resisting smoke control dampers, the safety position shall be either open or closed, depending on the source and path of the smoke and heat to be extracted.

The purpose of this is to maintain a fixed extraction path through the ductwork (open dampers), whilst also maintaining the fire compartmentation to the compartment and the duct (closed dampers). Depending on the position of the fire source, any smoke control damper shall be required to perform both functions.

Where a smoke control damper is required to maintain fire compartmentation, it shall be fire resisting (i.e. a multi compartment fire resisting smoke control damper).

Smoke control dampers that are designed to function automatically on smoke detection shall travel to, or remain in, the correct position to exhaust smoke from the fire compartment.

Smoke control dampers that are initiated manually by switches, or actuated automatically at higher temperatures, shall be capable of operating at the appropriate higher temperatures.

Smoke control damper construction shall contain no device that is able to change the position of the damper once the safety position has been reached, i.e. it shall not change position unless required by direct instruction from a triggering device.

NOTE It is assumed that, as specified, power should be maintained throughout a building where a smoke control damper referred to in this standard is installed.

Consequently, smoke control damper assemblies shall have no thermal devices to cause uncontrolled operation and no automatic return mechanisms that can, for instance, operate on loss of power.

The smoke control damper construction shall contain a method for the remote signalling of both, open and closed positions.

The smoke control damper shall move from one end position to the other within 60 s of the receipt of a signal.

4.2.1.1 Actuators

Actuators shall be constructed and assembled to have the strength and rigidity necessary to perform the design operations to which they may be subjected, without loosening or displacement of parts, or other serious defects, when subjected to the test in EN 1366-10.

Actuator construction shall contain no device that is able to change the position of the damper once the safety position has been reached, i.e. it shall not change position unless required by direct instruction from a triggering device.

NOTE It is assumed that, as specified, power shall be maintained throughout a building where a smoke control damper referred to in this standard is installed.

Consequently actuators shall have no thermal devices to cause uncontrolled operation and no automatic return mechanisms that can, for instance, operate on loss of power.

The actuator shall be designed to operate the damper within the time period described in 4.2.1.4.

4.2.1.2 Interface control units

Any interface control unit that governs the movement of the actuator shall be tested and operate to the same time/temperature criteria as the actuator it controls. The interfacing unit shall be designed to be suitable for connection to control panels in accordance with prEN 12101-9 and power supplies in accordance with EN 12101-10.

4.2.1.3 Nominal activation conditions / sensitivity

The units may be open or closed as part of a heating and ventilating system or a smoke and heat ventilation system and shall only open or close only on the receipt of an external input.

Consequently, smoke control dampers shall:

a) move to and maintain either their closed position, or open position, in the specified time of receiving an alarm;

b) have known leakage characteristics;

c) if multi compartment, be fire resisting to maintain compartmentation in closed position;

d) maintain their free area when fully open, at elevated or standard fire temperatures.

4.2.1.4 Response delay/closure time

The smoke control dampers' response delay is such that closure/opening starts within the time period of 30 s or 25 min in accordance with the test method in 5.2. The unit shall then open/close within 60 s in accordance with the test method in 5.2.

4.2.2 Protection against corrosion

Where a manufacturer intends to demonstrate an enhanced salt spray corrosion resistant performance of a smoke control 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.

4.3 Fire resistance performance criteria: Single compartment smoke control dampers

4.3.1 Integrity, leakage, HOT400/30

The assessment of integrity (E) of a single compartment smoke control damper, as one of the fire resistance performance characteristics, shall be made on the basis of:

a) leakage through the damper at ambient and when closed after 5 min (automatic operation) or 30 min (systems with manual intervention) from the start of the elevated temperature test,

b) the ability of the damper to maintain its opening when subjected to the elevated temperature test (i.e. to 600 °C),

c) the suitability for use of the damper at an under pressure, measured at ambient.

A smoke leakage performance requirement is described in EN 1366-10 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 (automatic operation) or 30 min (systems with manual intervention) from the start of the fire test.

The HOT 400/30 (High Operating Temperature) performance requirement (operating at 400 °C for 30 min) is described in EN 1366-10 and this shall be applied, if the damper is intended for the end uses where this performance is required.

4.3.2 Durability

4.3.2.1 Durability of response delay

Following the test described in 5.2.4 demonstrates the durability of response delay by proving that the single compartment smoke control damper closes at the prescribed time and in the required time period.

4.3.2.2 Durability of operational reliability

The ability of the single compartment smoke control damper to demonstrate its operational reliability over the life of the system shall be determined by the open and closing cycle tests shown in 5.4.

The number of cycles to be performed reflects the proposed use of the single compartment smoke control damper in smoke control only systems, combined smoke control and environmental systems, or modulating use in combined smoke control and environmental systems.

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 single compartment smoke control damper passes the open and closing cycle test when:

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

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

NOTE In the case of smoke exhaust, the control system should ensure modulating actuators to move the smoke control damper only into fully open or fully closed position, i.e. the modulating signal should be overridden.

4.3.3 Fire resistance classification and designation

Having achieved the performance criteria in 4.3.1, the single compartment smoke control damper shall be classified and designated in accordance with EN 13501-4.

The following shall be declared for each single compartment smoke control damper:

a) integrity class "E_{600}", (in accordance to EN 13501-4);

b) the addition of HOT 400/30 indicates the satisfaction of the high operational temperature requirements;

c) the additions of the indication(s) of suitability for vertical and/or horizontal installation, together with mounting in a duct or in a wall or both, respectively: as v_{ed}, v_{ew} or v_{edw} and/or h_{od}, h_{ow} or h_{odw} ;

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

d) the addition of the symbol "S" indicates the satisfaction of an extra restriction on leakage;

e) the addition of "500", "1000" or "1500" indicates the suitability of use up to these underpressures;

f) the addition of "AA" or "MA" indicates automatic activation or manual intervention;

g) the addition of the symbols "(i → o)", "(o → i)", or (i ↔ o)" to indicate whether the element has been tested and fulfils the requirements from the inside or outside only or both;

h) the addition of "C_{300}", "C_{10000}", "C_{mod}" indicates the suitability for use in smoke control only systems, combined smoke control and environmental systems, or modulating use in combined smoke control and environmental systems;

i) the addition of the suffix "single" to indicate suitability.

EXAMPLE E_{600} 60 (v_e-i↔o) S 1500 C_{10000} MA single.

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 – see 5.5.

4.4 Fire resistance performance criteria: Multi compartment fire resisting smoke control dampers

4.4.1 Integrity, insulation, leakage, HOT 400/30

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

a) leakage through the damper at ambient and when closed after 5 min (automatic operation) or 30 min (systems with manual intervention) from the start of the fire test,

b) the ability of the damper to maintain its opening when subjected to 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),

d) the suitability for use of the damper at an under pressure, measured at ambient.

When insulation characteristics are proven for multi compartment fire resisting control dampers, this shall be classified and declared, together with integrity.

A smoke leakage performance requirement is described in EN 1366-10 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 (automatic operation) or 30 min (systems with manual intervention) from the start of the fire test.

The HOT 400/30 (High Operating Temperature) performance requirement (operating at 400 °C for 30 min) is described in EN 1366-10 and this shall be applied, if the damper is intended for the end uses where this performance is required.

4.4.2 Durability

4.4.2.1 Durability of response delay

Following the test described in 5.2.4 demonstrates the durability of response delay by proving that the multi compartment smoke control damper closes at the prescribed time and in the required time period.

4.4.2.2 Durability of operational reliability

The ability of the multi compartment smoke control damper to demonstrate its operational reliability over the life of the system shall be determined by the open and closing cycle tests shown in 5.4.

The number of cycles to be performed reflects the proposed use of the multi compartment smoke control damper in smoke control only systems, combined smoke control and environmental systems, or modulating use in combined smoke control and environmental systems.

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 multi compartment smoke control damper passes the open and closing cycle test when:

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

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

NOTE In the case of smoke exhaust, the control system should ensure modulating actuators to move the smoke control damper only into fully open or fully closed position, i.e. the modulating signal should be overridden.

4.4.3 Fire resistance classification and designation

Having achieved the performance criteria in 4.4.1, the multi compartment smoke control damper shall be classified and designated in accordance with EN 13501-4.

The following shall be declared for each multi compartment smoke control damper:

a) integrity class "E", integrity and insulation class "EI" (in accordance to EN 13501-4);

b) the addition of HOT 400/30 indicates the satisfaction of the high operational temperature requirements;

c) the additions of the indication(s) of suitability for vertical and/or horizontal installation, together with mounting in a duct or in a wall or both, respectively: as v_{ed}, v_{ew} or v_{edw} and/or h_{od}, h_{ow} or h_{odw} ;

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

d) the addition of the symbol "S" indicates the satisfaction of an extra restriction on leakage;

e) the addition of "500", "1000" or "1500" indicates the suitability of use up to these underpressures;

f) the addition of "AA" or "MA" indicates automatic activation or manual intervention;

g) the addition of the symbols "(i → o)", "(o → i)", or (i ↔ o)" to indicate whether the element has been tested and fulfils the requirements from the inside or outside only or both;

h) the addition of "C_{300}", "C_{10000}", "C_{mod}" indicates the suitability for use in smoke control only systems, combined smoke control and environmental systems, or modulating use in combined smoke control and environmental systems;

i) the addition of the suffix "multi" to indicate suitability.

EXAMPLE EI 60 (v_{edw}-i→o) S 500 C_{10000} AA multi.

If the multi compartment smoke control damper requirements defined in this clause are satisfied, this shall be deemed to satisfy also the corresponding single compartment smoke control damper requirements in 4.3.1.

4.4.4 Other performance criteria

Where the manufacturer intends to provide information regarding aerodynamic performance, it shall do so in accordance with EN 1751 – see 5.5.

5 Test methods

5.1 Ambient Leakage Tests

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

5.2 Fire resistance tests

5.2.1 General

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

The smoke control damper in the furnace (e.g. fire compartment) is tested on its ability to open, and stay open, to allow smoke to be extracted. The smoke control damper on the non-exposed position (neighbouring compartment) is tested upon its ability to stay closed and have known maximum leakage to allow sensible fan selection and give a guide to smoke not leaking back through.

Single compartment smoke control dampers will be subjected to an elevated temperature test matching the standard time temperature heating curve but levelling out to a flat maximum of 600 °C. Multi-compartment smoke control dampers will be subjected to a fire test to the standard time temperature test curve.

Two smoke control dampers are attached to a single compartment smoke control duct (methods are described in EN 1366-10 for both horizontal and vertical ductwork) in a manner generally representative of practice. One smoke control damper will be mounted on the duct inside the furnace and one outside the furnace as described in EN 1366-10.

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 smoke control damper inside the furnace in the closed position and the smoke control damper outside the furnace in the open position (unless in its application it will never be open at the commencement of a smoke situation, in which case it will remain closed). This is to demonstrate the abilities of the smoke control damper both inside and outside the fire compartment. The damper inside the furnace will be required to open during the test and the smoke control damper outside the furnace will be required to close. The time at which these changeovers occur is determined by the requirement for automatic activation or for manual intervention

Temperature and integrity measurements shall be carried out in various parts of the test construction during the test.

When the dampers have changed position, hot gases from inside the furnace are drawn through the now open smoke control damper inside the furnace, past the now closed smoke control damper outside the furnace. The provision of a perforated plate (described in EN 1366-10) allows the smoke control damper outside the furnace to be subjected to pressure differential of 500Pa. The leakage of the smoke control damper outside the furnace is recorded when it is closed. The leakage rate of dampers requiring an S classification shall be measured both at ambient temperature as well as during the fire test.

Similar information is given in EN 1366-10 for the testing of dampers in compartment barriers to demonstrate maintenance of fire resistance when closed and maintenance of opening to allow smoke and hot gases to be moved through them.

5.2.1.1 HOT 400/30

If the smoke control damper is intended for the end uses where this performance is required, a sample of the smoke control damper and the associated actuator shall be first subjected to a furnace based fire test to prove maintenance of closure.

The smoke control 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, referenced by EN 1366-10) in a manner generally representative of practice. Smoke control 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 smoke control damper in the open position. It will be driven closed at the start of the test to meet the two minute requirement.

Temperature and integrity measurements shall be carried out in various parts of the test construction during the test. The impermeability of the smoke control damper system shall be measured by direct flow measurements whilst maintaining a constant pressure differential across the closed smoke control 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 smoke control 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.

A further smoke control damper sample shall be subjected to a furnace based fire test to prove operation and maintenance of opening. The smoke control 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 1366-10) in a manner generally representative of practice. Smoke control 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.

Tests shall be performed starting with the smoke control damper in the open position. It will be cycled and observed (EN 1366-10).

5.2.2 Smoke control damper: integrity and insulation

Equipment and method as fully described in EN 1366-10, the largest size to be manufactured shall be subjected to the selected cycling test, followed by the fire resistance test (EN 1366-10). Units shall be fire tested in the plane of proposed installation, noting the direct field of application of fire test results.

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

5.2.3 Leakage rated smoke control damper

Equipment and method as fully described in EN 1366-10, the largest size to be manufactured shall be subjected to the selected cycling test, followed by the ambient leakage test, followed by the fire resistance test (see EN 1366-10). Units need to be fire tested in the plane of proposed installation, noting the direct field of application of fire test results.

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 smoke control damper

The response delay is proven, provided that the smoke control dampers achieve the opening and closing requirements defined in EN 1366-10:2010, 6.2.

5.2.4.1 HOT400/30

A second smoke control damper sample shall be subjected to a standby temperature test to prove the longevity of any electrical items. This shall be as described in EN 1366-10.

5.3 Salt Spray Exposure Test

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

5.4 Cycling Tests

5.4.1 Damper durability cycling

The equipment and test method referenced in EN 1366-10.

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 $((2 \times 0{,}8)\ m + (2 \times 0{,}4)\ m) \times 1\ m = 2{,}4 m^2$).

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 transmittance 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 smoke control damper with the requirements of this European Standard shall be demonstrated by:

— initial type testing,

— factory production control by the manufacturer, including product assessment.

For smoke control dampers produced as one-offs, pre-production smoke control dampers (e.g. prototypes) and smoke control 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 smoke control 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 smoke control damper needs to be re-tested for the sake of proving repeatability, but more than one smoke control 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 smoke control 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/opening 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 smoke control 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 methods 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 smoke control 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 smoke control 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 smoke control damper designer to ensure that the smoke control damper as a whole is correctly designed and its components have the necessary performance values to meet the design.

6.2.4 Test samples

Test samples of smoke control 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 smoke control damper placed on the market continuously complies with the ITT sample, for which compliance with this European Standard has been verified and expressed by the smoke control 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 smoke control damper characteristics and the effective operation of the production control system to be checked.

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 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 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 conform 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:

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

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

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

Depending on the specific case, it may be necessary to carry out i) the operations referred to under b) and c), ii) only the operations under b) or iii) 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.

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 C.

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 C), 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.

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 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 smoke control damper, the method of production or the FPC system (where these may affect the smoke control 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 smoke control dampers, pre-production smoke control dampers (e.g. prototypes) and smoke control dampers produced in very low quantities

Smoke control dampers produced as a one-off, prototypes assessed before full production is established, and smoke control 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:

— all smoke control 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 smoke control 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 smoke control 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 it shall be verified:

a) that all resources necessary for the achievement of smoke control dampers characteristics required by this European Standard will be available, and

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

c) that procedures are in place to demonstrate that the factory production processes can produce a smoke control damper complying with the requirements of this European Standard and that smoke control 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 smoke control 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 12101-8:2011), followed by the generic name of the product "Smoke Control Damper",

— the classification for resistance to fire and other related information according to EN 13501-4,

— if the smoke control damper has an S classification (EN 13501-4), the words "leakage rated" shall be added,

— "suitable for automatic activation" or "suitable for manual intervention", as relevant,

— "suitable for single compartment applications" or "suitable for multi-compartment applications", as relevant,

— 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).

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 smoke control damper and details of the actuator used. Blade axis shall also be noted (i.e. whether the blades are supported vertically or horizontally).

If mounted in, or adjacent to a wall or floor construction, it shall include details of the supporting construction and the method of installation, including any penetration seal and fixing details.

If mounted on a smoke control duct, it shall include details of the supporting ductwork and the method of installation, including the sealing and fixing details.

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 6 months. A comprehensive example of the above procedure is given in Annex B. Some automatic systems may allow more frequent testing (48 hours or less) and this may be required by National regulation.

Annex A
(normative)

Salt spray exposure test

A.1 General

The methods and equipment described in EN 60068-2-52:1996 shall be used with the following revised parameters (see A.2).

A.2 Revised parameters

The values referenced below shall be used and, where they differ, they shall replace any other parameters stated in the referred standard:

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. 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.

If the requirement under f) is achieved the damper shall be declared as "Pass", otherwise as "Fail".

Annex B
(informative)

Example of inspection and maintenance procedure

After installation, when the system is running, it is recommended that regular inspections are carried out and recorded as shown in Table B.1. It is further recommended that these inspections should be undertaken at the time intervals stated in the manufacturer's maintenance information, or at least every 3 months, whichever is the shorter.

Table B.1 – Recommended inspections

Damper reference	
Date of inspection	
Check actuator wiring for damage	
Check end-switch wiring for damage	
Check damper cleanliness and clean where necessary	
Check the condition of blades and seals, rectify and report where necessary	
Confirm operation of damper to OPEN (within 60 s) and CLOSE (within 60 s) 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 smoke control system	
Confirm that the damper is left in its standby position	
NOTE A smoke control damper is inherently part of a smoke control system. As this is the case the whole system should be checked as governed by the operation and maintenance requirements for the system.	

Annex C
(normative)

Factory production control – test plan

One smoke control damper per product family, shall be submitted to the checks indicated in Table C.1, according to the foreseen frequency. The results of the checks shall be recorded.

Table C.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).

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

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 smoke control 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 smoke control 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/cpd-ds.

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

Construction products: Smoke control dampers.

Intended use: Smoke control dampers that are to be used in smoke control systems, either at 600 °C or under fire conditions

Table ZA.1a – Relevant clauses for single compartment smoke control dampers

Construction products: Smoke control dampers. **Intended use:** Smoke control dampers that are to be used in smoke control systems in single compartment applications at temperatures up to 600 °C			
Essential characteristics	**Requirement clauses in this European Standard**	**Mandated levels and/or classes**	**Notes**
Nominal activation conditions/sensitivity	4.2.1.3	–	
Response delay (response time)	4.2.1.4	–	
Operational reliability	4.3.2.2	–	Cycles: 300, 10,000 or 20,000
Fire resistance			
– integrity	4.1.1 a), 4.3.1	E_{600}	Insulation not required for single compartment smoke control dampers
– insulation	-	-	
– smoke leakage	4.1.1 c), 4.3.1	$E_{600}S$	
– mechanical stability (under E)	4.1.1 d)	-	
– maintenance of cross-section (under E)	4.1.1 e)	-	
– high operational temperature	4.1.1 f), 4.3.1		
Durability - of response delay - of operational reliability	4.3.2.1 4.3.2.2	–	

Table ZA.1b – Relevant clauses for multi compartment smoke control dampers

Construction products: Smoke control dampers. **Intended use:** Smoke control dampers that are to be used in smoke control systems, in multi-compartment applications, either up to 600 °C or at fire temperatures			
Essential characteristics	**Requirement clauses in this European Standard**	**Mandated levels and/or classes**	**Notes**
Nominal activation conditions/sensitivity	4.2.1.3	–	
Response delay (response time)	4.2.1.4	–	
Operational reliability	4.3.2.2	–	Cycles: 300, 10,000 or 20,000
Fire resistance			
– integrity	4.1.1 a), 4.4.1	E	
– insulation	4.1.1 b), 4.4.1	EI	
– smoke leakage	4.1.1 c), 4.4.1	ES EIS	
– mechanical stability (under E)	4.1.1 d)	-	
– maintenance of cross-section (under E)	4.1.1 e)	-	
– high operational temperature,	4.1.1 f), 4.4.1		
Durability - of response delay - of operational reliability	4.4.2.1 4.4.2.2	–	

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, where the characteristic is subject to a threshold level.

ZA.2 Procedure for the attestation of conformity of smoke control dampers

ZA.2.1 System of attestation of conformity

The system of attestation of conformity of smoke control 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.

Table ZA.2 – Attestation of conformity system

Product	Intended use	Level(s) or class(es)	Attestation of conformity system
Smoke control dampers	Smoke control and 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 smoke control 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 smoke control 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 all characteristics of Tables ZA.1a and ZA.1b relevant for the intended use which are declared	6.3.3
	Further testing of samples taken at factory according to the prescribed test plan	All characteristics of Tables ZA.1a and ZA.1b relevant for the intended use which are declared	6.3.3
Tasks under the responsibility of the notified product certification body	Initial type testing (ITT)	All characteristics of Tables ZA.1 a and ZA.1b relevant for the intended use which are declared	6.2
	Initial inspection of factory and of FPC	Parameters related to all characteristics of Tables ZA.1 a and ZA.1b relevant for the intended use which are declared	6.3.4
	Continuous surveillance, assessment and approval of FPC	Parameters related to all characteristics of Tables ZA.1 a and ZA.1b relevant for the intended use which are declared	6.3.5

ZA.2.2 EC certificate of conformity and EC declaration 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,...),

— 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 smoke control 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 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,... 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 smoke control damper, label and commercial documents

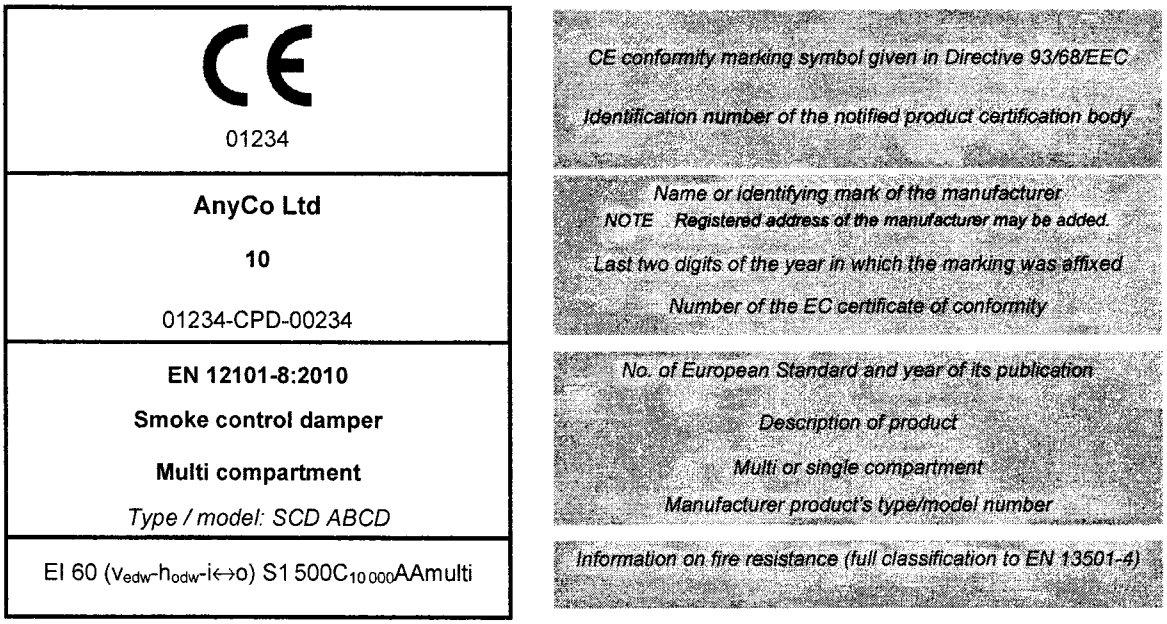


Figure ZA.1 – Example of the CE marking to be shown on the smoke control damper

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 smoke control damper, by the following additional information:

a) nominal activation conditions/sensitivity

   1) suitability for automatic activation or for manual intervention;

b) response delay (response time)

   1) closure time;

c) operational reliability

   1) cycling;

d) resistance to fire:

   1) mechanical stability (under E),

   2) maintenance of cross section (under E);

e) durability

   1) cycling,

   2) closing at correct time and in correct time period;

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

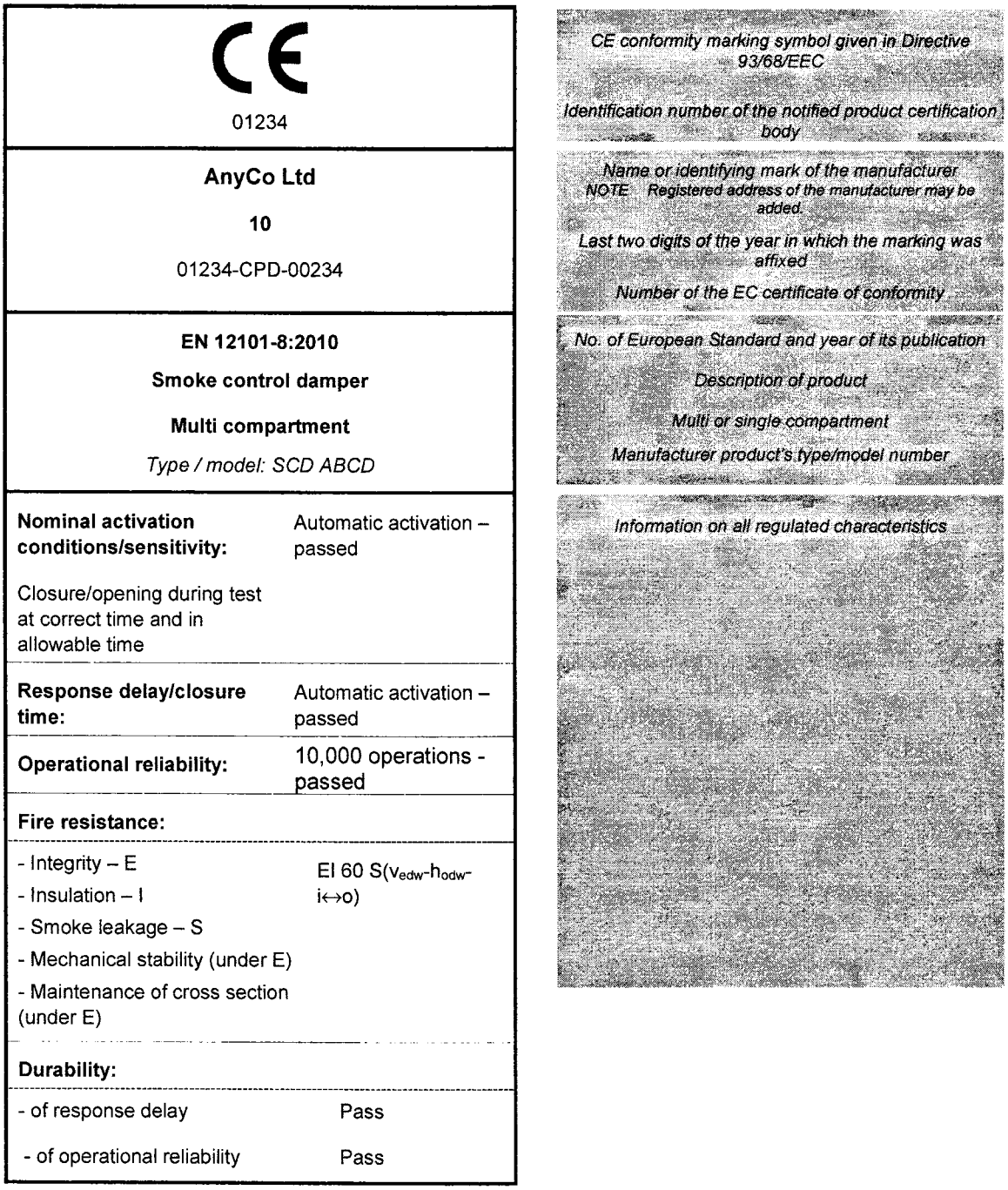


Figure ZA.2 – Example of the CE marking to be shown on a document, accompanying smoke control dampers

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] prEN 15882-2, *Extended application of results from fire resistance tests for service installations — Part 2: Dampers*

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

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

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

[7] EN 1366-8, *Fire resistance tests for service installations — Part 8: Smoke extraction ducts*

[8] EN 1366-9, *Fire resistance tests for service installations — Part 9: Single compartment smoke extraction ducts*

[9] EN 12101-6, *Smoke and heat control systems — Part 6: Specification for pressure differential systems — Kits*

[10] FprEN 12101-7, *Smoke and heat control systems — Part 7: Smoke duct sections*

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