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Preskusi požarne odpornosti servisnih inštalacij - 10. del: Dimne lopute

Fire resistance tests for service installations - Part 10: Smoke control dampers

Feuerwiderstandsprüfungen für Installationen - Teil 10: Entrauchungsklappen

Essais de résistance au feu des installations techniques - Partie 10 : Volets de désenfumage

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ICS:

13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements
91.060.40	Dimniki, jaški, kanali	Chimneys, shafts, ducts

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English Version

Fire resistance tests for service installations - Part 10: Smoke control dampers

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 1366-10:2022) has been prepared by Technical Committee CEN/TC 127 “Fire safety in 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of an identical text or by endorsement, at the latest by March 2023, and conflicting national standards shall be withdrawn at the latest by March 2023.

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

This document supersedes EN 1366-10:2011+A1:2017.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

EN 1366, Fire resistance tests for service installations consists of the following:

— Part 1: Ventilation ducts

— Part 2: Fire dampers

— Part 3: Penetration seals

— Part 4: Linear joint seals

— Part 5: Service ducts and shafts

— Part 6: Raised access and hollow core floors

— Part 7: Conveyor systems and their closures

— Part 8: Smoke extraction ducts

— Part 9: Single compartment smoke extraction ducts

— Part 10: Smoke control dampers

— Part 11: Fire protective systems for cable systems and associated components

— Part 12: Non-mechanical fire barrier for ventilation ductwork

— Part 13: Chimneys

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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Introduction

When smoke and heat exhaust ventilation is being considered, it becomes apparent that a clear path between the area where heat and smoke is being generated (source of the fire) and the outside of the building is needed.

To create this path ducts and an uninterrupted smoke extract path are needed. This means that smoke control dampers at the fire and along the path are open and will remain open. Smoke control dampers at branches, or on the surface of the duct, along the path are closed and will remain closed. In fact, if the duct crosses a compartment boundary it becomes part of the fire compartment in which the fire started.

The purpose of this document is to define test methods to evaluate the abilities of smoke control dampers to:

a) be applicable to single compartment and/or multi compartment fire resisting applications;

b) be applicable to automatic systems or systems with manual activation;

c) change state from closed to open at elevated temperatures, (and vice versa);

d) once opened maintain a defined cross-sectional area at elevated temperature or under fire conditions following the standard time/temperature curve; and

e) maintain a satisfactory leakage performance when subjected to negative pressure at elevated temperatures or under fire conditions following the standard time/temperature curve.

The units are mounted for the tests in a manner representative of practice.

Temperature and integrity measurements are carried out on various parts of the test construction during the test. The required leakage measurements are measured by direct flow measurement at the prescribed pressure differentials. Ambient leakage of the units is also recorded.

The satisfactory passing of some, or all, of these tests will allow products to be assessed in accordance with EN 12101-8 and be classified to EN 13501-4. The required temperatures, pressure differentials etc. are stated in EN 12101-8. EN 13501-4 requires a classification report.

CAUTION:

The attention of all persons concerned with managing and carrying out this furnace testing is drawn to the fact that fire testing can be hazardous and that there is a possibility that toxic and/or harmful smoke and gases can be evolved during the test. Mechanical and operational hazards can also arise during the construction of the test elements or structures, their testing and disposal of test residues.

An assessment of all potential hazards and risks to health should be made and safety precautions should be identified and provided. Written safety instructions should be issued. Appropriate training should be given to relevant personnel. Laboratory personnel should ensure that they follow written safety instructions at all times.

1 Scope

This document specifies test methods for smoke control dampers to assess their performance under elevated temperature or fire conditions, as well as at ambient temperatures.

Smoke control damper tests are used to confirm that the furnace testing requirements of EN 12101-8 are met and EN 12101-8 is for consideration before carrying out these tests.

Smoke control dampers tested to this document are expected to be classified using EN 13501-4 and this document is expected to be considered before carrying out these tests.

NOTE Some smoke control dampers to be tested might require testing following the information given in EN 1366-2 and this needs consideration before carrying out testing.

This document is expected to be read in conjunction with EN 12101-8, EN 13501-4, EN 1366-2 and EN 1363-1, the latter giving further details for fire resistance testing.

For installation details, the requirements for smoke extraction ducts are for consideration and these are defined in EN 1366-8 and EN 1366-9.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1363-1, *Fire resistance tests — Part 1: General requirements*

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

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

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

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

EN 10095, *Heat resisting steels and nickel alloys*

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 ISO 5167-1, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 1: General principles and requirements (ISO 5167-1)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
elevated temperature
temperature in excess of normal ambient air, below those necessary for fire resistance testing (i.e. the standard fire curve in accordance with EN 1363-1), to which smoke and heat exhaust ducts for single compartments are tested

3.2
HOT 400/30
additional test and classification for a smoke control damper that requires proof of opening and closing operations for 30 minutes at 400 °C

3.3
HVAC
heating, ventilating and air conditioning

Note 1 to entry: Usually used with the addition of the word “system”.

3.4
interface control unit
device which controls the operation of the actuator located at the smoke control damper or within the same fire zone as the smoke control damper and usually associated with a smoke control/fire alarm system

3.5
largest size
greatest size of smoke control damper individual unit including the maximum width and height (as opposed to an assembly/battery of units) proposed for sale/manufacture

3.6
modulating actuator
smoke control damper control mechanism which can control the smoke control damper to be in a position or number of positions between fully open and fully closed in normal day to day operation (not fire conditions)

3.7
penetration seal
fire stopping method
product(s) used between the smoke control system duct/damper and the fire compartment structure to maintain the fire resistance, and tested in accordance with EN 1366-8 (ducts) or EN 1366-10 (dampers)

3.8
safety position
position (open or closed) into which specific projects could require certain dampers to move to, or remain in, depending upon the fire location within the building

Note 1 to entry: Specific projects can require certain smoke control dampers to move to an open or closed position, depending upon the fire location within the building.

3.9
smallest size
least size of smoke control damper individual unit including the minimum width and height proposed for sale/manufacture

3.10
multi-compartment smoke control damper
multi-compartment SCD
device which can be open or closed to control the flow of smoke and hot gases into, from or within a duct for use in multi-compartment applications which is required to maintain compartmentation when closed

3.11
single compartment smoke control damper
single compartment SCD
device which can be open or closed to control the flow of smoke and hot gases into, from or within a duct for use in single compartment applications at elevated temperatures (600 °C)

3.12
builders work
any construction formed from concrete, blockwork, light wall or other materials as part of general construction, such as used to construct shafts, walls and floors

3.13
duct mounted smoke control damper
duct mounted SCD
smoke control damper mounted on the surface of, or in line with a smoke control duct and not associated with a compartment boundary formed from builders' work – e.g. a shaft, wall, floor

3.14
compartment mounted smoke control damper
compartment mounted SCD

smoke control damper mounted at a compartment boundary formed from builders' work – e.g. a shaft, wall, floor

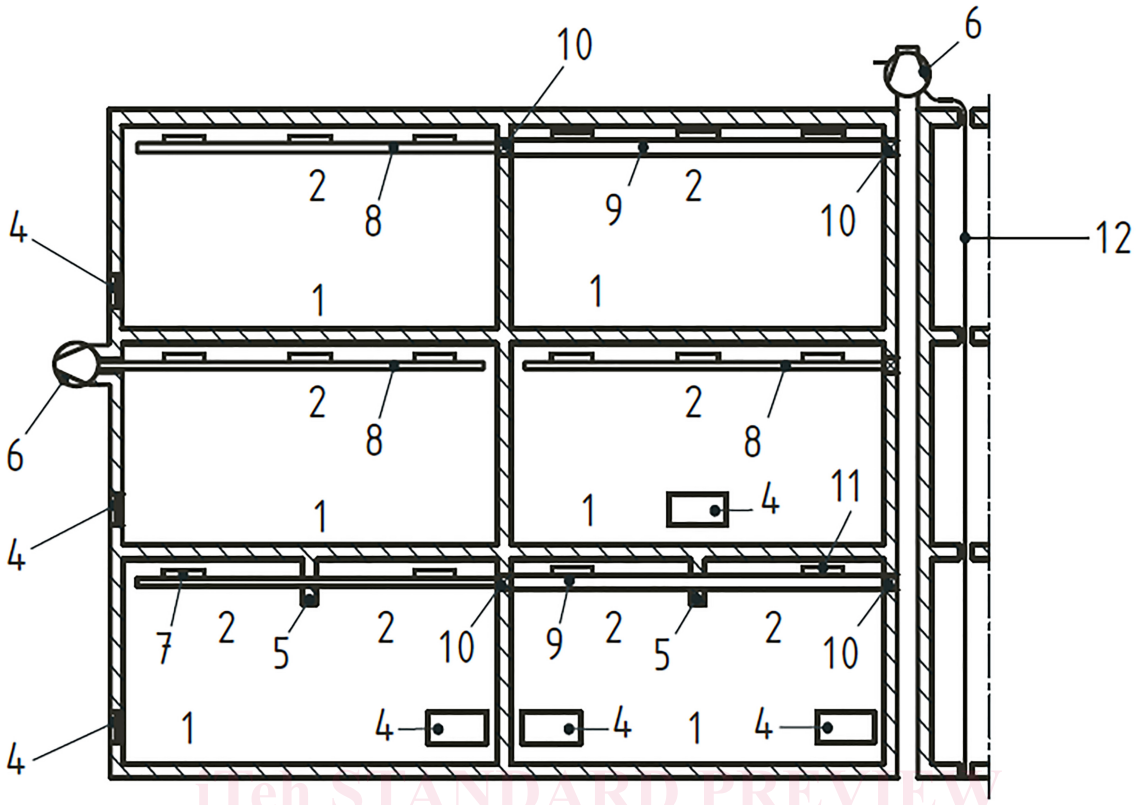
3.15
smoke control damper for systems with automatic activation
smoke control damper that is applicable to the smoke control systems that operate automatically on receipt of a smoke or fire alarm without any manual action/intervention and allow no firefighter overrides

Note 1 to entry: A smoke control system with an attended control room can also be accepted as an automatic system, provided that once initiated, the system does not cause the smoke control damper position to be changed.

3.16
smoke control damper for systems with manual activation
smoke control damper that is applicable to the smoke control systems (smoke and heat exhaust ventilation type or pressurization type), that will be put into operation, on detection 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 or a system that allows firefighter overrides

3.17
thermal operating device
temperature sensitive device such as a fusible element which responds to temperature to initiate a subsequent action such as causes the damper to change position

Note 1 to entry: Further information is given in Figure 1.



Key

1	fire compartments
2	smoke reservoirs
4	air inlets
5	smoke barriers
6	powered smoke and heat exhaust ventilator (fan)
7	smoke control dampers for single compartments (EN 12101-8 and EN 1366-10)
8	smoke control ducts for single compartments (EN 12101-7 and EN 1366-9)
9	smoke control ducts for multi compartments (EN 12101-7 and EN 1366-8)
10	smoke control dampers for multi compartments (EN 12101-8 and EN 1366-10) mounted inside or outside of wall or floor (compartmentation tests)
11	smoke control dampers for multi compartments (EN 12101-8 and EN 1366-10) mounted on the surface of the duct (surface of duct tests)
12	electrical equipment

Figure 1 — Example of powered smoke and heat exhaust ventilation system in cross-section

4 Test equipment

4.1 General

In addition to the test equipment specified in EN 1363-1, the equipment in the following clauses is required (examples of test arrangements are given in Figure 4, Figure 5, Figure 8 and Figure 9).

4.2 Test duct for surface mounted SCDs

See 5.2.2.2 and 5.2.2.3.

4.3 Connecting duct for compartment boundary mounted SCDs

4.3.1 Compartmentation test

See EN 1366-2.

4.3.2 Maintenance of opening test

The duct connector (Figure 9, item 9) shall be classified in accordance with EN 13501-4 and match the damper cross section.

A normal steel fabricated duct may be used for the mounting of the perforated plate (Figure 9, item 5). The perforated plate mounting duct shall have a cross section 1 000 mm × 250 mm and have a minimum length of 2 m. The perforated plate mounting duct may be provided with a gas tight observation window.

4.4 Cycling equipment

Full information on the equipment needed to perform the cycling tests is shown in Annex A. In addition, the following shall be considered:

Equipment shall be required to control a supply to allow the smoke control damper actuator to be cycled. This equipment shall be able to provide the nominal operating motive force less 10 %, plus 15 %, and be variable between these values to confirm that the smoke control 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.

Methods of adding a load to the smoke control damper are required (see Annex A).

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

4.5 Condensing unit

When performing the compartmentation test, there could be a requirement for a condensing unit, because the smoke control damper could generate some steam; refer to EN 1366-2.

4.6 Gas temperature measuring devices

These shall be positioned adjacent to the flow measuring device. A suitable device is a 1,5 mm diameter sheathed thermocouple (Type K) orientated vertically with its measuring junction located at the centre line of the measuring duct and at a distance equal to twice the diameter of the measuring duct downstream from the flow measuring device. A similar thermocouple shall be located at the exit from the connecting duct plenum (see Figure 8, Figure 19, Figure 20).

4.7 Exhaust fan system

This shall be capable of controlling the flow rates and maintaining the specified pressure differential between the connecting duct and the furnace when the smoke control damper is closed.

The pressure differential shall be regulated by means of a dilution damper installed just before the fan inlet. The pressure shall be controlled to within ± 5 % of the specified value. A balancing damper shall be fitted at the outlet of the fan to adjust the pressure range of the systems to suit the smoke control damper under test. A variable speed fan may be used instead of the dilution damper.