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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

Ta slovenski standard je istoveten z: **prEN 1366-10**

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

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

Feuerwiderstandsprüfungen für Installationen - Teil 10: Entrauchungsklappen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 127.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 1366-10:2020) has been prepared by Technical Committee CEN/TC 127 “Fire safety in buildings”, the secretariat of which is held by BSI.

This document is submitted to the CEN Enquiry.

This document will supersede 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

Introduction

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

To create this path there 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; and

e) maintain a satisfactory leakage performance when subjected to negative pressure at elevated temperatures.

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.

Performance of these tests will allow products to comply with EN 12101-8 and be classified to EN 13501-4. The required temperatures, pressure differentials etc. are stated in EN 12101-8.

Completing the tests within this document does not ensure full compliance with EN 12101-8, as other, additional, requirements are defined in EN 12101-8. Some of these could be required to meet the classification requirements of EN 13501-4 as well.

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.

It is of note that the smoke control damper to be tested could require testing to EN 1366-2 and that this is for consideration before carrying out these tests.

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.

To this end, 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 5167-1:2003)*

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 http://www.electropedia.org/

3.1
elevated temperature
temperature 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

3.2
fire compartment
enclosed space, comprising one or more separate spaces, bounded by elements of construction having a specified fire resistance and intended to prevent the spread of fire (in either direction) for a given period of time

Note 1 to entry: Fire compartment often has regulatory connotations. The term should not be confused with "room of origin" or "fire cell".

3.3
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

3.4
HVAC
heating, ventilating and air conditioning (usually used in association with the word system)

3.5
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

3.6
largest size
greatest size of damper individual unit (as opposed to an assembly of units) proposed for sale/manufacture

3.7
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

3.8
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, when tested and having met the requirements of EN 1366-8, at the position where a smoke control system duct passes through the element, or a smoke control damper is mounted in the element

3.9
safety position
position (open or closed) into which specific projects couldrequire certain dampers to move, 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.

3.10
smallest size
least size of damper individual unit including the minimum width and height proposed for sale/manufacture

3.11
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

3.12
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

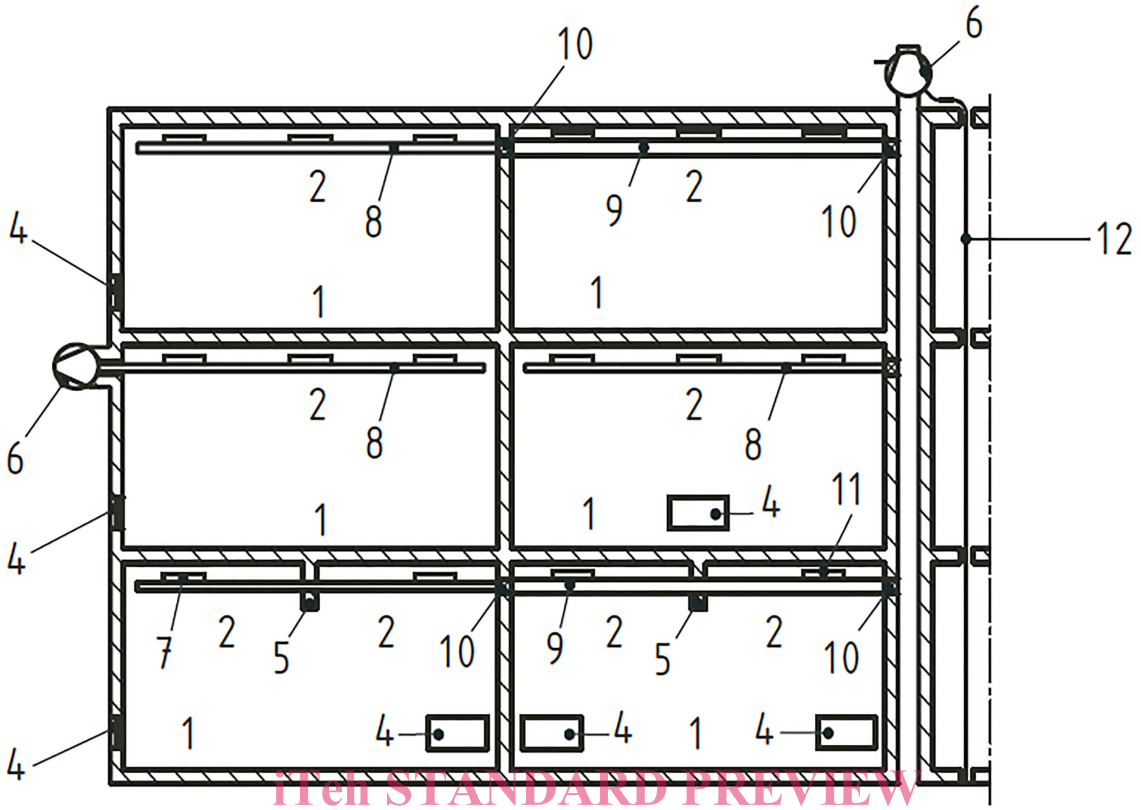
3.13
smoke control damper for systems with automatic activation
smoke control damper that is applicable to the smoke control systems that operate automatically on receipt of a smoke or fire alarm without any manual action/intervention

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.

3.14
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

Note 1 to entry: Once initiated, the system allows the smoke control damper position to be changed by external input/firemen's override.

3.15
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



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

4 Test equipment

4.1 General

In addition to the test equipment specified in EN 1363-1, the following 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 connecting duct shall be classified according to EN 13501-4 with a section 1 000 × 250 mm. The duct shall have a minimum length of 2 m. A duct connector shall be provided between the SCD and the duct (see Figure 9). A perforated plate shall be installed in the duct (see Figure 9). The connecting 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.

4.8 Perforated plate

The perforated plate controls the flow through the duct so that the required differential pressure, see Table 1, can be achieved. Depending on the end-use conditions, a pressure level from Table 1 shall be selected: These levels correspond to typical values used in smoke extraction design.