SLOVENSKI STANDARD
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Fire resistance tests for service installations - Part 12: Non-mechanical fire barrier for ventilation ductwork

Feuerwiderstandsprüfungen für Installationen - Teil 12: Nichtmechanische Brandschutzverschlüsse für Lüftungsleitungen

Essais de résistance au feu des installations techniques - Partie 12 : Barrière résistante au feu non mécanique pour les conduits de ventilation

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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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EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 1366-12:2014+A1:2019) 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of an identical text or by endorsement, at the latest by May 2020 and conflicting national standards shall be withdrawn at the latest by May 2020.

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.

[A1] This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association. [A1]

This document includes Amendment 1 approved by CEN on 2 September 2019.

This document supersedes [A1] EN 1366-12:2014 [A1].

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] [A1].

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

— *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* [A1] *text deleted* [A1];

— *Part 12: Non-mechanical fire barrier for ventilation ductwork (this document)*;

— *Part 13:* [A1] *Chimneys* [A1].

[A1] *text deleted* [A1]

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The purpose of the test is to evaluate the ability of a non-mechanical (no moving parts) fire barrier (see Annex A) to prevent fire and smoke spreading from one fire compartment to another through the air ductwork system which may penetrate fire separating walls and floors.

Non-mechanical fire barriers are unable to achieve an “S” classification, which requires a known limited ambient leakage, as they are unable to be closed except under fire conditions.

The non-mechanical fire barrier is attached (directly or remotely via a section of ducting), to a fire separating element in a manner representative of practice.

Tests are performed starting with the non-mechanical fire barrier in its cold standard state to expose it to furnace conditions.

Temperature and integrity measurements are carried out in various parts of the test construction during the test. The leakage of the non-mechanical fire barrier system is measured (continuously during the test) by direct flow measurements while maintaining a constant pressure differential across the closed non-mechanical fire barrier of 300 Pa.

Caution:

The attention of all persons concerned with managing and carrying out this fire resistance test is drawn to the fact that fire testing may be hazardous and that there is a possibility that toxic and/or harmful smoke and gases may be evolved during the test. Mechanical and operational hazards may 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 part of EN 1366 specifies a method for determining the fire resistance of non-mechanical fire barriers installed in fire separating elements designed to withstand heat and the passage of smoke and gases at high temperature. This European Standard is used in conjunction with EN 1363-1 and EN 1366-2.

This European Standard is not suitable for testing non-mechanical fire barriers in suspended ceilings without modification.

This European Standard is not suitable for testing fire dampers, see EN 1366-2.

This European Standard is not suitable for testing such products as air transfer grilles, as the pressures and flows involved are different and may cause differing behaviour.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 1363-2, *Fire resistance tests - Part 2: Alternative and additional procedures*

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

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)*

EN ISO 5167-2, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 2: Orifice plates (ISO 5167-2)*

EN ISO 5167-3, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 3: Nozzles and Venturi nozzles (ISO 5167-3)*

EN ISO 13943, *Fire safety - Vocabulary (ISO 13943)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1363-1, EN 1366-2 and EN ISO 13943, together with the following, apply.

3.1
non-mechanical fire barrier
open device with no moving parts for use in HVAC ventilation systems at fire boundaries that only closes to maintain compartmentation in the event of a fire

3.2
test specimen
non-mechanical fire barrier, connecting frame and (if applicable) the perimeter penetration sealing system

3.3
connecting duct
duct section between the non-mechanical fire barrier or supporting construction and the measuring station

3.4
test construction
complete assembly of the test specimen, the connecting duct and the supporting construction

3.5
measuring station
equipment installed between the connecting duct and the exhaust equipment to determine the volume flow rate of gases passing through the fire barrier under test

3.6
exhaust equipment
equipment consisting of a fan and balancing or dilution barriers (if any), to apply and maintain the underpressure in the connecting duct

4 Test equipment

4.1 General

In addition to the test equipment specified in EN 1363-1, and if applicable, EN 1363-2, the following is required. Examples of test configurations are shown in Figures 1 and 2.

4.2 Connecting duct

The connecting duct shall be of all welded construction fabricated from (1,5 ± 0,1) mm thick steel of the same size (width x height or diameter) as the non-mechanical fire barrier being tested. The duct shall have a length of two times the diagonal dimension of the non-mechanical fire barrier up to a maximum of 2 m. Where a non-mechanical fire barrier that has a short spigot such that connection to the connecting duct is difficult, this spigot shall be extended by 500 mm using material of the same type and thickness of the spigot in order to provide a secure air-tight connection without unduly stiffening the non-mechanical fire barrier. This extended spigot shall be all welded the same as the connecting duct. The length of the connecting duct shall then be reduced by 500 mm.

The connecting duct may be provided with a gas tight observation window.

Care should be taken in the event of testing to Figure 4, to select a method of connecting the non-mechanical fire barrier to the ductwork to ensure that accurate leakage is recorded.

4.3 Volume flow measuring station

This shall consist of a venturi, orifice plate, or other suitable device and (where necessary) an air flow straightener, installed in straight lengths of pipe, all sized to EN ISO 5167-1, EN ISO 5167-2 and EN ISO 5167-3. It shall be installed between the connecting duct and the exhaust fan to determine the volume flow rate of gases passing through the non-mechanical fire barrier under test. The measuring device shall be capable of measuring to an accuracy of ± 5 %. Regardless of whether vertical or horizontal non-mechanical fire barriers are being tested, the volume flow measuring station shall always be used in a horizontal orientation.

4.4 Condensing unit

Where materials used in the construction of a non-mechanical fire barrier may generate quantities of steam during the fire test, a condensing unit having provision for drainage shall be installed between the non-mechanical fire barrier and the flow measuring device. When using the condensing device, the temperature recorded by the thermocouple positioned downstream of the flow measuring device described in 4.3 shall not exceed 40 °C.

4.5 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 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 may be located at the exit from the connecting duct plenum for information purposes only (see Figure 1).

4.6 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 non-mechanical fire barrier is closed under fire conditions.

The 300 Pa (or higher if applicable) pressure differential shall be regulated by a suitable control system. The pressure shall be controlled to within ± 5 % of the specified value.

5 Test conditions

The heating conditions and the furnace atmosphere shall conform to those given in EN 1363-1, or if applicable, EN 1363-2.

The furnace pressure shall be controlled to EN 1363-1, except in the case of testing non-mechanical fire barriers installed in a vertical separating element when the pressure shall be controlled to (15 ± 3) Pa at mid height of the non-mechanical fire barrier. If two or more such non-mechanical fire barriers are being tested simultaneously, this pressure shall be established at mid height of the lower non-mechanical fire barrier.

For non-mechanical fire barriers installed in a horizontal separating element the pressure shall be controlled to (20 ± 3) Pa at 100 mm below the underside of the separating element to which it is fixed.

Details of pressure conditions within the connecting duct are given in 9.2.

6 Test specimen

6.1 Size

For the fire test, see 10.2, the maximum size of non-mechanical fire barrier shall be tested. If this is made from sections, the maximum number of sections with all their framework (transoms and mullions) shall be tested.

6.2 Number of tests

6.2.1 General

The number of tests depends on various factors.

- Supporting construction;

- method of installation in the supporting construction;
- method of installation on to the supporting construction;
- method of installation away from the supporting construction.

It may be seen that there are considerable combinations of supporting constructions, installation methods etc. and this leads to a large number of tests.

Reference should be made to the extended field of application standard before starting a test program as careful consideration of this may reduce the number of tests that need to be completed. It is advisable that this is done in conjunction with a notified body or test authority.

6.2.2 Supporting construction

Typical supporting constructions would be masonry walls, blockwork walls, dry walls, concrete floors etc. Other supporting constructions may be available and these should be used if it is proposed that the non-mechanical fire barrier be tested in conjunction with them.

6.2.3 Method of installation in the supporting construction

Each method proposed for installation in each supporting construction shall be tested. The non-mechanical fire barrier shall be tested both ways round.

NOTE There were many discussions on symmetry in the revision and development of this standard. It proved impossible to define symmetry in an objective way to allow all test or authorizing bodies to apply rules in a similar way, particularly in the case of installation in the supporting construction. Also to be considered was where the non-mechanical fire barrier was installed in the depth of the wall and so on. The concept of symmetry has been removed from the standard.

6.2.4 Method of installation on to the supporting construction

Each method proposed for installation on to each supporting construction shall be tested. One test shall be undertaken with the non-mechanical fire barrier inside the furnace and one test undertaken with the non-mechanical fire barrier outside the furnace. The face of the non-mechanical fire barrier to be presented to the supporting construction shall be clearly identified so that in cannot be installed the wrong way round on site. If it is to be allowed to be installed either way round it shall be tested both ways round inside the furnace and both ways round outside the furnace.

In the case of an uninsulated non-mechanical fire barrier fixed in this manner, only a barrier on the inside of the furnace needs to be tested, as this is considered to be to the most onerous condition.

6.2.5 Method of installation away from the supporting construction

Each method proposed for installation away from each supporting construction shall be tested. One test shall be undertaken with the non-mechanical fire barrier inside the furnace and one test undertaken with the non-mechanical fire barrier outside the furnace. The face of the non-mechanical fire barrier on the side of the supporting construction shall be clearly identified so that in cannot be installed the wrong way round on site. If it is to be allowed to be installed either way round it shall be tested both ways round inside the furnace and both ways round outside the furnace.

In addition to the largest size, when testing on the outside of the furnace only, a non-mechanical fire barrier of the smallest size shall be tested. This is to prove closure when restricted exposure is given to the radiant heat of the furnace.

The method of support of the ductwork through the supporting construction shall be clearly defined as this will form part of the installation method