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Fire resistance tests for service installations - Part 5: Service ducts and shafts

Feuerwiderstandsprüfungen für Installationen - Teil 5: Installationskanäle und -schächte

Essais de résistance au feu des installations de service - Partie 5: Gaines pour installation technique

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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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Fire resistance tests for service installations - Part 5: Service ducts and shafts

Essais de résistance au feu des installations de service - Partie 5: Gaines pour installation technique

Feuerwiderstandsprüfungen für Installationen - Teil 5: Installationskanäle und -schächte

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Foreword

This document (EN 1366-5:2010) 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of an identical text or by endorsement, at the latest by September 2010, and conflicting national standards shall be withdrawn at the latest by September 2010.

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 supersedes EN 1366-5:2003.

This document includes a bibliography.

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Introduction

The purpose of this test is to measure the ability of a service duct or shaft to resist the spread of fire from one fire compartment to another with fire attack from inside or outside the duct or shaft. The test specimens incorporate joints and access openings as intended in practice and are suspended as they would be in practice. Test specimens of service ducts are not loaded as in practice but a standard load is included to represent a typical service load. Test specimens of service shafts are not loaded as in practice, but a standard load is included to represent a typical service load.

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 European Standard specifies a method for determining the fire resistance of horizontal service ducts and vertical service shafts, which pass through walls or floors and enclose pipes and cables. The test examines the behaviour of ducts and shafts exposed to fire from outside and from inside the duct. This European Standard is intended to be read in conjunction with EN 1363-1.

This European Standard does not examine the risk of fire spread as a result of thermal conduction along the piping installed in service ducts or shafts, or thermal conduction through the media these pipes carry. It does not cover the risk of damage produced by thermal elongation or shortening of tubes and cables as a result of fire, or damaged pipe suspensions. This European Standard does not give guidance on how to test one, two or three sided service ducts or shafts.

NOTE Guidance on testing service ducts and shafts of less than four sides will be covered in the extended field of application rules being developed by CEN/TC 127.

This test is unsuitable for evaluating service ducts with internal barriers at walls and floors.

Whilst the walls of service ducts or shafts tested to this method may provide specified levels of integrity or insulation, testing to this European Standard does not replace the testing of the functional endurance of small electrical cables which is covered in EN 50200.

Fire resistance testing of ducts for air distribution systems is covered in EN 1366-1.

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 1363-1:1999, *Fire resistance tests — Part 1: General requirements*

EN 1366-3, *Fire resistance tests for service installations — Part 3: Penetration seals*

EN ISO 898-1:2009, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes – Coarse thread and fine pitch thread (ISO 898-1:2009)*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1363-1:1999, EN ISO 13943:2000 and the following apply.

3.1
service duct
horizontal duct enclosing combustible or non-combustible services, such as pipes or cables

3.2
service shaft
vertical shaft enclosing combustible or non-combustible services, such as pipes or cables

3.3
shutter of access opening
openable door or panel allowing for access to the services within the duct or shaft

3.4
supporting construction
wall, partition or floor which the duct passes through in the test

4 Test equipment

4.1 General

In addition to the test equipment specified in EN 1363-1, the following are required.

4.2 Furnace

The furnace shall be capable of subjecting service ducts and shafts to the standard heating and pressure conditions specified in EN 1363-1 and be suitable for testing horizontal ducts (see Figures 1 and 2) or vertical shafts (see Figures 3 and 4).

4.3 Loading equipment

Stranded steel cables are used to apply load to the bottom internal face of the service duct to represent service loading, or any other equivalent equipment.

4.4 Gas extraction equipment (optional)

If for safety reasons a laboratory requires to extract gases away from the open end of the duct or shaft, this shall not influence the test conditions.

5 Test conditions

5.1 Furnace

The heating and pressure conditions and the furnace atmosphere shall conform to those given in EN 1363-1.

5.2 Loading

Horizontal service ducts shall be loaded when supporting service installations. In this case, the load shall be representative of that used in practice.

Vertical service shafts shall not be loaded except in the two following situations:

— when supporting service installations. In this case, the load shall be representative of that used in practice;

— when the service installation shaft is not fixed to each floor or when the height between two supports is greater than 5 m. In this case a weight load shall be added to the shaft length of the next floor.

6 Test specimen

6.1 Size

6.1.1 General

Any size of duct or shaft may be tested as required by the sponsor. However, sizes other than those in Tables 1 and 2 may have restricted direct field of application.

6.1.2 Length

The minimum lengths of the parts of the test specimen inside and outside the furnace shall be as given in Table 1.

Table 1 — Minimum length of test specimen

Orientation	Minimum length m			
	Inside furnace		Outside furnace	
	fire outside	fire inside	fire outside	fire inside
Horizontal duct	4,0	0,25	2,0	2,5
Vertical shaft [a]	2,0	0,25	2,0	2,0
[a] See also 5.2.				

6.1.3 Cross-section

The standard sizes of duct and shaft shall be as given in Table 2.

Table 2 — Cross-section of test specimen

Exposure conditions		Width mm	Height mm
Fire inside		1 000 ± 10	500 ± 10
Fire outside	size (1)	200 ± 10 [a]	200 ± 10 [a]
	size (2)	1 000 ± 10	500 ± 10
[a] Or the smallest size intended in practice.			

6.2 Number

One test specimen shall be tested for each type of orientation, exposure conditions and cross-section (see Table 2).

6.3 Design

6.3.1 General

The test shall be made on a test specimen, representative of the complete service duct assembly, on which information is required.

6.3.2 Duct and shaft arrangement

6.3.2.1 General

Ducts shall be arranged as shown in Figures 1 and 2 and shafts shall be arranged as shown in Figures 3 and 4. Service ducts or shafts with fire exposure from outside will have no openings in the furnace (except access panels). For service ducts or shafts exposed to an internal fire, the end of the duct facing into the furnace shall be left open. No ducts or shafts shall contain anything other than the standard cables for loading. The exposure condition (fire inside or fire outside) shall be as specified by the sponsor.

Where used in practice, each service duct or shaft shall incorporate one access opening as follows:

— fire outside: inside furnace at mid-span of exposed section of duct;

— fire inside: as shown in Figure 2 (the dimensions may be applied also to vertical shafts).

For the test, the access opening shall be at the bottom of the duct. The size of the access opening shall be representative of practice.

Vertical shafts shall be arranged as shown in Figures 3 and 4 and shall penetrate through the furnace roof slab/supporting construction. The shafts shall be fixed at the furnace roof level as they would be fixed in practice when penetrating a floor (as specified by the sponsor).

6.3.2.2 Joints in horizontal ducts

The test configuration shall include at least one joint inside the furnace and at least one joint outside it. There shall be at least one joint for every layer of fire protection material, both inside and outside the furnace and in any steel duct.

Outside the furnace, the joint in the outer layer of the fire protection material shall be no further than 700 mm from the supporting construction and no nearer than 100 mm to thermocouples T2 in accordance with 9.1. Inside the furnace, the joint in the outer layer of fire protection material shall be located at approximately mid-span. The location of joints in inner layers shall be as specified by the sponsor.

The distance between joints and suspension devices shall not be less than that used in practice. If the minimum distance has not been specified, suspension devices shall be arranged so that the joint at mid-span lies midway between them. Centres of the suspension devices shall be specified by the sponsor and shall be representative of practice.

6.3.2.3 Joints in vertical service shafts

For the vertical shaft exposed to fire from inside, the test configuration shall include at least one joint inside the furnace and one joint outside it. There shall be at least one joint for every layer of fire protection material, both inside and outside the furnace and in any steel duct.

Outside the furnace, the joint in the outer layer of the fire protection material shall be no further than 700 mm from the supporting construction and no nearer than 100 mm to thermocouples T2 in accordance with 9.1. Inside the furnace, the joint in the outer layer of fire protection material shall be located at approximately mid-span. The location of joints in inner layers shall be as specified by the sponsor.

For the vertical shaft exposed to fire from outside, the test arrangement shall include at least one joint inside and one joint outside the furnace. There shall be at least one joint both inside and outside the furnace in every layer of fire protection material.

Outside the furnace, for both the shaft exposed to fire from inside and that exposed to fire from outside, there shall be a joint in the outer layer of the fire protection material no further away than 700 mm from the supporting construction but it shall not be within 100 mm of thermocouples T2.