**Draft for Public Comment**

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Responsible committee: FSH/22/-/4 Fire resistance tests for dampers, seals and smoke extraction

Interested committees:

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|---|
| Title: Draft BS EN 1366-15 prEN 1366-15 'Fire resistance tests for service installations. Part 15: 1-, 2-, 3- sided ducts'. |
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**Introduction**

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

**UK Vote**

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

**Submission of Comments**

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at **https://standardsdevelopment.bsigroup.com/**. You will need to register in order to comment.

**Template for comments and secretariat observations**

| Date: xx/xx/20xx | Document: ISO/DIS xxxx |
|---|---|

| 1 | 2 | (3) | 4 | 5 | (6) | 7 |
|---|---|---|---|---|---|---|
| **MB** | Clause No./ Subclause No./Annex **(e.g. 3.1)** | Paragraph/ Figure/Table/Note | **Type of comment** | **Commend (justification for change) by the MB** | **Proposed change by the MB** | **Secretariat observations on each comment submitted** |
| | 3.1 | Definition 1 | ed | Definition is ambiguous and needs clarifying. | Amend to read '...so that the mains connector to which no connection...' | |
| | 6.4 | Paragraph 2 | te | The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK. | Delete reference to UV photometer. | |

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# DRAFT
# prEN 1366-15

November 2023

ICS

English Version

## prEN 1366-15 'Fire resistance tests for service installations - Part 15: 1-, 2-, 3- sided ducts'

Feuerwiderstandsprüfungen für Installationen - Teil 15: 1-, 2-, 3-seitige Leitungen

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.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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# European foreword

This document (prEN 1366-15:2023) has been prepared by Technical Committee CEN/TC 127 “Fire safety in buildings”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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 floors

— Part 7: Closures for conveyors and trackbound transportation systems

— 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

— Part 14: Partial penetration seals

— Part 15: 1-,2- or 3-sided ventilation ducts



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# Introduction

The purpose of this test is to measure the ability of a representative 1 – 2 and 3 sided ventilation duct assembly / system that is part of an air distribution system to resist the spread of fire from one fire compartment to another with fire attack from inside or outside the duct. It is applicable to vertical and horizontal ducts, with or without branches, taking into account joints and openings, as well as suspension devices and penetration points.

The test measures the length of time for which ducts, of specified dimensions, suspended as they would be in practice, satisfy defined criteria when exposed to fire from inside and outside the duct (separate tests).

The test takes into account the effect of fire exposure from the outside where a pressure differential is maintained in the duct as well as the effect of fire entering the ducts in conditions where forced air movement may or may not be present.

**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 shall be made and safety precautions shall be identified and provided. Written safety instructions shall be issued. Appropriate training shall be given to relevant personnel. Laboratory personnel shall ensure that they follow written safety instructions at all times.



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# 1 Scope

This part of EN 1366 specifies a method for determining the fire resistance of horizontal 1-, 2- or 3-sided ventilation ducts and ducts whose fire resistance depends on the fire resistance performance of a ceiling or wall (where ducts are located in cavities enclosed by fire-resistant shafts or ceilings). The test examines the behaviour of ducts exposed to fire from the outside (duct A) and fire inside the duct (duct B). This document is used in conjunction with EN 1363-1.

This test method does not take into consideration the effect of spalling or deflection of the adjoining floor/wall.

This test method is only applicable to ventilation ducts that have passed the test for the appropriate time period according to EN 1366-1 (Duct A and B) in vertical and horizontal orientations.

Access panels as part of the duct, if any, are part of the test in accordance with EN 1366-1.

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

EN 1507, *Ventilation for buildings - Sheet metal air ducts with rectangular section - Requirements for strength and leakage*

EN 12237, *Ventilation for buildings - Ductwork - Strength and leakage of circular sheet metal ducts*

EN 20898-1, *Mechanical Properties of fasteners – Part 1: Bolts, screws and studs (ISO 898)*

EN 60584-1, *Thermocouples - Part 1: EMF specifications and tolerances*

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

ISO 5221, *Air distribution and air diffusion - Rules to methods of measuring air flow rate in an air-handling duct*



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# 3 Terms and definitions

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

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

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

**3.1**
**fire-resistant ventilation duct**
duct used for the distribution or extraction of air and designed to provide a degree of fire resistance

[SOURCE: EN 1366-1:2014+A1 :2020, definition 3.1]

**3.2**
**combustible lining**
lining / coating on the inner surface of the duct ; reaction to fire classification of the lining material (tested in end use condition, treated as an external, non-substantial component) worse than class A2-s1,d0 according to EN 13501-1

[SOURCE: EN 1366-1:2014+A1 :2020, definition 3.2]

**3.3**
**self-supporting duct**
duct constructed e.g. from fire-protective boards without encasing a steel duct

[SOURCE: EN 1366-1:2014+A1 :2020, definition 3.3]

**3.4**
**encased duct**
4 sided or circular inner duct with 1-, 2- or 3-sided fire protective enclosure to provide fire resistance

**3.5**
**unencased duct**
1-, 2- or 3-sided duct where the fire protection itself is the air leading surface of the duct

**3.6**
**suspension devices**
components used for suspending and fixing a duct from a floor or supporting a duct from a wall

[SOURCE: EN 1366-1:2014+A1 :2020, definition 3.4]

**3.7**
**adjoining wall**
wall on the exposed side that the duct is build up against

**3.8**
**adjoining floor**
floor on the exposed side that the duct is build up against



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**3.9**
**compensator**
device used to prevent damage from the forces generated by expansion

[SOURCE: EN 1366-1:2014+A1 :2020, definition 3.6]

**3.10**
**access panel**
cover for an inspection opening within the duct

[SOURCE: EN 1366-1:2014+A1 :2020, definition 3.7]

Note 1 to entry: The test specimens used here shall not incorporate access panels, these are tested in accordance with EN1366-1.

**3.11**
**kitchen extract duct**
ductwork where combustible deposits, such as grease are likely to accumulate on its internal surfaces

[SOURCE: EN 1366-1:2014+A1 :2020, definition 3.9]

# 4 Test equipment

## 4.1 General

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

## 4.2 Furnace

This shall be capable of subjecting ventilation ducts to the standard heating and pressure conditions specified in EN 1363-1 and be suitable for testing ducts in the horizontal (see Figure 1 to 4) orientation.

## 4.3 Fan for duct A

The fan shall be able to produce at the start and throughout the test an under-pressure of (300 ± 15) Pa within duct A (see Figure 1-2) and shall be connected either directly, or by a suitable length of flexible ducting, to the measuring station described in 4.5.

If the duct is used in practice as a smoke extraction duct, the duct shall be tested in accordance with EN 1366-8. In this case, fan A shall be adjusted to (500 ± 15) Pa for testing duct according to this standard.

## 4.4 Fan for duct B

This shall be able to produce an air velocity when extracting gas from duct B (see Figure 3-4), of at least 3 m/s measured at ambient temperature in the duct before the test. It shall be connected either directly, or by a suitable length of flexible ducting, to the air velocity measuring station described in 4.8. The fan shall be provided with a by-pass vent that can be opened prior to the damper described in 4.7 being shut.

## 4.5 Volume flow rate measuring station

This shall consist of a venturi, orifice plate, or other suitable device and (where necessary) an airflow straightener, installed in straight lengths of pipe, all sized to EN ISO 5167-1 and ISO 5221. It shall be connected to the end of the condensing unit to determine the volume flow rate of gas passing through duct A during the test. The measuring device shall be capable of measuring to an accuracy of ± 5 %. Regardless of whether vertical or horizontal ducts are being tested, the volume flow measuring station shall always be used in a horizontal orientation.



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### 4.6 Condensing unit

This shall be installed between the end of duct A and the flow-measuring device and shall allow for sufficient drainage. The gas temperature adjacent to the flow-measuring device shall be measured by sheathed thermocouple, type K according EN 60584-1, max. 2 mm in diameter, with an insulated hot junction, arranged pointing upwards to allow for draining moisture. Its measuring junction shall be located at the centre line of the measuring tube and at a distance equal to twice the diameter of the measuring tube downstream from the flow-measuring device. The temperature measured by this thermocouple shall not exceed 40 °C.

### 4.7 Damper

This shall be installed between the fan and the air velocity measuring station to shut off the airflow in duct B during evaluation of integrity in the “fan-off” condition.

### 4.8 Air velocity measuring station

This shall determine air velocity in duct B and shall consist of one or two inlet nozzle(s), or other suitable device, installed in a straight length of pipe sized to EN ISO 5167-1 and ISO 5221, connected to the end of both the vertical and horizontal duct B outside the furnace. The temperature of the extracted hot gas shall be measured with a sheathed thermocouple type K according EN 60584-1, max. 2 mm in diameter, with an insulated hot junction, arranged pointing upwards to allow for draining moisture. Its measuring junction shall be located at the centre line of the pipe and at a maximum distance of 100 mm downstream from the flange. If larger distance is necessary, the pipe between flange and measuring point shall be insulated.

### 4.9 Equipment for measuring gas pressure

This shall be provided in the laboratory, in the furnace and inside duct A. The measuring equipment for measuring pressures differentials between duct A and the laboratory must be provided with an accuracy of ± 5 % relative to the intended pressure difference, i.e. $\Delta P$ = 300 or $\Delta P$ = 500 Pa.

## 5 Test conditions

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

The furnace pressure shall be controlled to $\Delta P$ = 15 Pa throughout the test at the mid-height position of the horizontal ducts.

Details of test conditions within the ducts during the test are given in Clause 10.

## 6 Test specimen

### 6.1 Size

#### 6.1.1 General

For duct specimens of sizes other than those given in Table 2, the field of direct application is restricted (see Clause 13).

#### 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 (see also Figures 1 to 4):



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**Table 1 – Minimum length of test specimen**

| Orientation | Minimum length (m) | |
|---|---|---|
| | Inside furnace | Outside furnace |
| Horizontal | 3,8 | 1,0 |

### 6.1.3 Cross section

The standard sizes of ducts given in Table 2 shall be tested unless only cross-sections smaller than the standard size are used:

**Table 2 – Internal cross-section of test specimen (dimension of the open cross-section)**

| Duct | Encased / Unencased Rectangular | | Encased Circular |
|---|---|---|---|
| | Width (mm) | Height (mm) | Diameter (mm) |
| A | 1 000 ± 10 | 500 ± 10 | 800 ± 10 |
| B | 1 000 ± 10 | 250 ± 10 | 630 ± 10 |

Larger cross-sections are not covered by this standard.

## 6.2 Number of tests

Only horizontal ducts shall be tested according to this standard. The scenarios with vertical ducts are covered by the vertical tests conducted according to EN1366-1.

Fire from outside scenario (duct A)

The fire from outside scenario (duct A) has to be tested as, shown on Figure no. 1 to 2

Fire from inside scenario (duct B)

The fire from inside scenario (duct B) has to be tested as, as shown on Figure no. 3 to 4

NOTE For the field of application regarding the penetration and standard supporting construction the same rules of EN 1366-1 apply.

One test specimen shall be tested for each type of installation to be evaluated.

## 6.3 Design

### 6.3.1 General

The test shall be made on a test specimen representative of the complete duct assembly on which information is required. The method of duct construction, support and penetration shall be representative of that used in practice.

Ducts shall be arranged as shown in Figures 1 to 4.

### 6.3.2 Minimum distance between the ducts and between ducts and furnace walls

There is no limit to the number of ducts that may be tested simultaneously in the same furnace, provided that there is sufficient space to do so, in accordance with the dimensions shown in Figures 1 to 4.



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