Fire behaviour of building materials and elements

'Brandschacht'

DIN 4102 Part 15

Brandverhalten von Baustoffen und Bauteilen; 'Brandschacht'

Supersedes parts of DIN 4102 Part 1, May 1981 edition.

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Dimensions in mm

Contents

Continued on pages 2 to 15.

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1 Scope and field of application

This standard describes a test construction termed 'Brandschacht'*) for the fire testing of building materials and elements. It provides information on the type, dimensions, number and installation of specimens and specifies test conditions and requirements for inspection testing.

*) Translator's note. Since there is no English equivalent for 'Brandschacht', this term is used to designate the apparatus used for fire testing as described here.

2 Principle

The 'Brandschacht' is a square housing, into which air at a constant flow rate is introduced from below, and from which flue gas escapes from above. It is equipped with a square gas burner by means of which the specimens, arranged in a mounting frame so as to form a flue, are exposed to flame.

3 Designation

A 'Brandschacht' designed and constructed in accordance with this standard shall be designated:

Brandschacht DIN 4102 - 15

4 'Brandschacht' design

4.1 General

The 'Brandschacht' shall incorporate the elements described in subclauses 4.2, 4.4, 6.1.1 and 6.4 and be assembled as shown in figure 1.

4.2 Housing

4.2.1 Walls

The 'Brandschacht' walls shall be composed of the following layers, the order reflecting their arrangement from inside to outside:

a) 1,5 mm thick sheet of R St 37-2 steel complying with DIN 17100[1]);

b) 6 mm thick ceramic felt, with a density not exceeding 600 kg/m³[2]);

c) two 40 mm thick layers of mineral fibre insulating material complying with DIN 18165 Part 1, of building material class A1 as defined in DIN 4102 Part 1, having a density of about 100 kg/m³ and a minimum melting point of 1000 °C, as specified in DIN 4102 Part 17, the layers being arranged with staggered joints;

d) fibre cement or sheet steel as outermost layer.

The sheet used for the lining shall be applied in sections so as to reduce the likelihood of overall deformation due to thermal effects.

The walls shall be supported by means of equal steel angles measuring 40 mm × 5 mm or 40 mm × 4 mm. Thermal bridges between the lining and the outermost layer shall be avoided.

4.2.2 Doors

One side of the 'Brandschacht' shall be provided with one door or, where necessary, two doors arranged vertically, that can be closed tightly, their size being selected as a function of the specimens to be put through them. The door(s) shall be constructed from the same elements as the 'Brandschacht' walls and be located so that the screen and perforated plate can be easily removed for cleaning or replacement.

Strips of non-combustible ceramic fibre material[2]) shall be used to seal the door(s).

4.2.3 Windows

Both the door and one 'Brandschacht' wall shall be provided with an observation opening, into which a window with an inner clear area of about 0,2 m² shall be fitted, installation of two smaller adjacent windows with a total clear area of about 0,2 m² also being permitted. The windows shall be constructed of two panes of heat-resistant glass[2]), each 4 mm thick, separated by an air space and installed so that the inner pane is flush with the inside surface of the 'Brandschacht'.

4.2.4 Wall temperature measuring points

The 'Brandschacht' wall temperature shall be measured at two points as described in subclause 6.1.2, each point being located on the two walls without observation opening. Each measuring point shall be positioned along the vertical axis of the wall, at a height of 460 mm above the top of the burner.

4.2.5 Screen

A screen made from DIN 4189 - 1,25 × 0,56 St vzk woven wire cloth, with a percentage apertures (ratio of total area of apertures to total area of screen) of 48 %, shall be installed horizontally in the 'Brandschacht', with tight joints along the 'Brandschacht' walls (see detail X in figure 2).

4.2.6 Perforated plate

Below the screen, a perforated plate made of 1,2 to 1,5 mm thick sheet steel, with uniformly distributed holes 4,5 to 5,5 mm in diameter and a percentage apertures of 7 % to 8 % shall be fitted.

4.3 Air supply

The 'Brandschacht' shall be supplied with air from below, at a constant flow rate and temperature (cf. subclause 7.1), so as to produce uniform air flow through the 'Brandschacht'. Such uniformity can be achieved in one of the following ways.

a) The air is introduced from below via a tube connected at right angles to the 'Brandschacht' (see figure 3a).

b) The air flow is controlled by means of a damping element (e.g. mineral fibre pad[2])) installed flush with the inside surface of the 'Brandschacht' (see figure 3b).

The measuring point for determining the temperature of the air supplied shall be located on the axis of the 'Brandschacht', in the zone where the air enters it.

4.4 Exhaust duct

The exhaust duct shall be provided with a control device designed to maintain a negative pressure in the 'Brandschacht' throughout the test. The pressure tapping shall be positioned at the same level as the light measuring system (see figure 1).

Note. It is advisable that the 'Brandschacht' be connected to a flue gas purification system.

Five thermocouples shall be used to measure the flue gas temperature, these being placed at a height of 1560 mm above the top of the burner, as shown in section B-B of figure 1.

To measure the optical density in the 'Brandschacht', a DIN 50055[2]) light measuring system shall be arranged at a level of 1660 mm above the upper face of the burner,

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[1]) Superseded by DIN EN 10 025.

[2]) Information on sources of supply is obtainable from *DIN-Bezugsquellen für normgerechte Erzeugnisse* of DIN, Burggrafenstraße 6, D-10787 Berlin.