

Fire tests on building materials and structures —

Part 3: External fire exposure roof test

UDC 614.841.322:620.1:699.81:69.024

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Co-operating organizations

The Petroleum Equipment Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government department and scientific and industrial organization:

- British Gas Corporation
- British Mechanical Engineering Confederation
- British Rubber Manufacturers' Association Ltd.
- British Steel industry*
- Council of British Manufacturers of Petroleum Equipment*
- Department of Energy
- Oil Companies Materials Association*

The Industrial organization marked with an asterisk in the above list, together with the following, were directly represented on the Committee entrusted with the preparation of this standard:

- Association of Hydraulic Equipment Manufacturers
- British Chemical Engineering Contractors Association
- British Industrial Measuring and Control Apparatus Manufacturers' Association
- British Plastics Federation
- British Ship Research Association
- British Valve Manufacturers' Association
- Engineering Equipment Users Association
- Steel Castings Association

This British Standard, having been approved by the Petroleum Equipment Industry Standards Committee, was published under the authority of the Executive Board on 28 November 1975

© BSI 01-1999

First published, June 1952
First revision, March 1960
Second revision, November 1975

The following BSI references relate to the work on this standard:
Committee reference PEE/1
Draft for comment 74/74150 DC

ISBN 0 580 08817 0

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Co-operating organizations	Inside front cover
General foreword	ii
Foreword	iii
1 Scope	1
2 References	1
3 Definitions	1
4 Test specimen	1
5 Test equipment	1
6 Test procedure	4
7 Expression of results	5
8 Test report	5
Appendix A Copper asbestos disc radiometer	6
Figure 1 — Diagram showing radiation intensities at nine positions on plan of specimen for calibration	2
Figure 2 — Typical roof test apparatus	3
Figure 3 — Path of travel of pilot flame	5
Publication referred to	Inside back cover

General foreword

BS 476 was published as a single volume in 1932. A later revision expanded the standard into three Parts:

- *Part 1:1953, Fire tests on building materials and structures;*
- *Part 2:1955, Flammability test for thin flexible materials;*
- *Part 3:1958, External fire exposure roof tests.*

In the present revision the three sections of — Part 1:1953 have been revised and published as new and separate Parts in the BS 476 series. Thus the three sections of Part 1 are replaced respectively by:

- *Part 4:1970, Non-combustibility test for materials;*
- *Part 7:1971, Surface spread of flame tests for materials;*
- *Part 8:1972, Test methods and criteria for the fire resistance of elements of building construction.*

In addition, during the present revision new Parts have been added to the series as follows:

- *Part 5:1968, Ignitability test for materials;*
- *Part 6:1968, Fire propagation test for materials.*

Part 2:1955 has been withdrawn and replaced by BS 2782 “Methods of testing plastics”, Part 5 “Miscellaneous methods”.

This British Standard replaces — Part 3:1958 which is withdrawn.

At present the BS 476 series comprises Parts 3 to 8 inclusive; other tests are, however, under consideration. DD 36 “Fire tests on building materials and structures: measurement of the optical density of smoke produced by small specimens of materials” has been published as a Draft for Development. This test was originally prepared with the intention of issuing it as BS 476-9, but since it was considered that insufficient tests have so far been carried out to establish reproducibility between laboratories, it has been decided that the method cannot yet be given the full status of a British Standard in the BS 476 series.

The need for a glossary covering terms used in BS 476 has been established and this has been published as BS 4422 “Glossary of terms associated with fire”, with the following Parts:

- *Part 1: The phenomenon of fire;*
- *Part 2: Building materials and structures;*
- *Part 3: Means of escape;*
- *Part 4: Fire protection equipment;*
- *Part 5: Miscellaneous terms (in course of preparation).*

Foreword

A fire may create a hazard to neighbouring property. The extent of the hazard depends on the distance separating a building from the fire, the size and severity of the fire and the amount of the heat received on a building. The chief danger arises from radiated heat combined with the burning embers (flying brands) thrown off from the fire.

The tests described in this Part of BS 476 are designed to give information on the ability of a roof covering and its supporting deck or supports to act as a protective barrier against a fire in a nearby building and on the extent of any surface ignition. Provision is also made for the testing of rooflights, domelights and similar components. Whilst the test has been designed to give information on the performance of a roof to external fire exposure in a building situation, the results obtained do not necessarily show how the roof will behave in any particular fire and therefore should not be considered as an overall indication of the potential fire hazard. No information is obtained from the test on the performance of the roof when subjected to conditions of an internal fire.

When subjected to the performance test the specimen is exposed to radiant heat which can be regarded as, for example, the intensity incident on a roof 7.5 m above ground level from a fire 13.5 m away in a building with a facade of 15 m $\times$ 15 m and 50 % window openings.

A gas flame is employed in the test to represent flying brands falling on the roof.

In this revision of the standard the following modifications have been made.

- a) The separate spread of flame test has been dropped and in its place a measurement of the extent of surface ignition is made at the same time as the penetration test using the same level of radiation intensity. This change also avoids confusion with the surface spread of flame test now covered in Part 7 which relates to the characteristics of wall and ceiling linings under internal fire conditions.
- b) The requirements for suction under the roof specimen for the purposes of simulating the effects of a wind on the upper surface of a roof has been omitted. The requirement was found to interfere with observation of the underside of the specimen due to the presence of smoke within the enclosed specimen holder.
- c) To extend the field of application of the test, provision has been made for increasing its duration if required.
- d) The penetration of fire and surface ignition measurements being combined in one test reduce the number of specimens to be tested. The specimen size has been increased to 1.5 m $\times$ 1.2 m to provide a sufficient area for measurement of surface ignition and at the same time permit a more representative construction to be tested.
- e) The previous method required the test flame to be applied only once during the early part of the exposure. This was considered to be unrealistic and in the revised method the test flame is applied at intervals during the test.
- f) The performance of the specimen was previously expressed in terms of definite designations. These designations are replaced by the actual performance data. The above mentioned designations were used for the purposes of building control by grouping certain performance classifications in relation to type of buildings and distance from the boundary.