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BSI Standards Publication

PUBLISHED DOCUMENT

Classification rules for the end-use application of test results arising from BS 476-3, "Classification and method of test for external fire exposure of roofs"

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 22, an inside back cover and a back cover.

Foreword

Publishing information

This Published Document is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 September 2012. It was prepared by Panel FSH/22/-/8, *Fire resistance tests for external fire exposure for roofs*, under the authority of Technical Committee FSH/22, *Fire resistance tests*. A list of organizations represented on this committee can be obtained on request to its secretary.

Relationship with other publications

This Published Document is intended to be used as the basis for fire performance classification arising from fire tests conducted according to BS 476-3.

Use of this document

As a guide, this Published Document takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice.

Presentational conventions

The provisions in this Published Document are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

The word "should" is used to express recommendations of this document. The word "may" is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the clause. The word "can" is used to express possibility, e.g. a consequence of an action or an event.

Notes give references and additional information that are important but do not form part of the recommendations.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a Published Document cannot confer immunity from legal obligations.

0 Introduction

0.1 Background

Until recently, the fire classification for external fire exposure to roofs was based solely on the fire test data arising from BS 476-3:2004 or BS 476-3:1958. However, as the variations and range of roof systems have broadened, industry has sought to minimize expensive retesting of every potential variation of a particular type of roof system and, where possible, develop end-use application rules to permit a wider range of roof classifications to be established without further testing.

As the data base increases, more classification rules might become viable. However, end-use application of the classification cannot be considered where no test data exist. New rules can only be developed according to the scope of test data available.

NOTE 1 The testing described in BS 476-3 is designed to give information about the hazard of fire spreading to the roof of a building from a nearby fire outside the building itself. The fire testing is not concerned with the behaviour of a roof when subjected to the effects of fire on its underside.

When subjected to the fire penetration test in BS 476-3, specimens are exposed to radiation of intensity 12 kW/m^2 measured on the surface of the specimen. This can be regarded as, for example, the intensity incident on a roof 7.6 m above ground level from a fire 13.7 m away in a building with a facade of (15.2 x 15.2) m and 50% window openings. Because wind tends to carry any surface flames through any fissures in the roof, provision is made in the test to simulate the effect of wind of 6.7 m/s (15 mph) by applying suction to the lower side of the roof specimen during the test.

However, in the spread of flame test, the intensity of variation varies over the exposed surface of the roof specimen. The distance to which the fire spreads downwards over the specimen thus gives a measure of the minimum intensity required to ignite the surface when a small ignition source such as a brand is present.

For these reasons, the BS 476-3 fire test is designed to provide information on fire penetration through the entire roofing system, as well as surface spread of flame over the specimen, to enable national regulators to set out informed requirements for fire safety in buildings.

Fire tests on roofing systems are carried out in accordance with BS 476-3:1958 or BS 476-3:2004. The results from these tests are then used for classifying the roofing systems in accordance with Clause **4** and BS 476-3:2004.

In order to derive end-use application classifications for similar roofing systems based on the data obtained from BS 476-3, end-use application rules are needed. Where end-use application rules are provided, they are based on current knowledge and experience.

NOTE 2 Normally, the fire classification report is issued as part of the fire test report.

Since the rules cannot anticipate every possible application, they are to be considered as general guidance, and might be subject to change as further test data become available.

Where such rules are not available, this Published Document provides a procedure for determining the classification for the end-use application of similar roofing systems so that the number of tests can be minimized to cover the maximum range of end-use applications. Additional end-use application rules can be developed for each fire condition as sufficient test data become available.

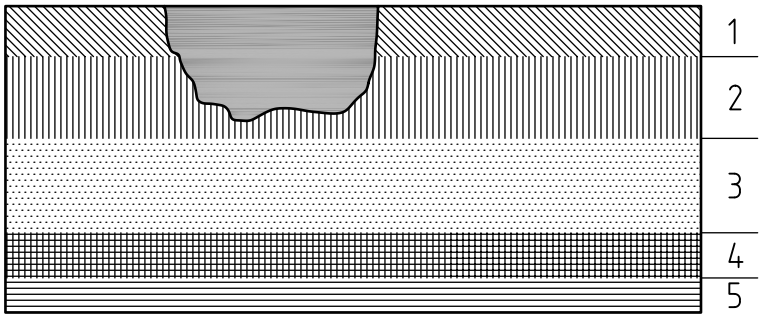
0.2 Variations in roofing systems

Roofing systems covered by this Published Document typically comprise a support deck, substrate, air and vapour control layer, insulation layer(s), membranes, and roof coverings. When other separating layers or intermediate layers are needed to satisfy other roof characteristics, these need to be included in the consideration of the roofing system to be classified.

This Published Document considers the possible effect(s) of single or multiple changes to the roofing system or end-use application parameters of the roof for external fire performance. Since varying several parameters at the same time can lead to unexpected results, the rules are only valid if they are applied to one parameter in the roofing system, and the others are kept unchanged, unless otherwise stated.

NOTE 1 The extent to which an individual component or layer is directly affected or damaged by the testing conditions is influenced by the layers and components used around the individual layer (see Figure 1).

Figure 1 **Layers affected in the fire test**



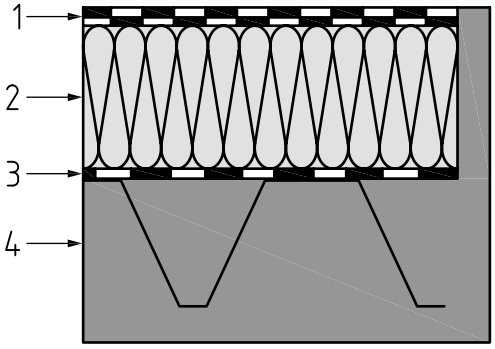
Key

1	Uppermost layer, can be over air gap	3	Uppermost layer not affected in fire test
2	Lowest affected layer	4/5	Any layer below layer 3

NOTE 2 The term "as tested" is used to indicate that specific end-use application rules do not yet exist, and additional fire testing is required to gain an appropriate classification.

NOTE 3 A number of variations are possible (see Figure 2). For example, insulation under a roof covering may be laid across profiled metal decking, as in Figure 2a) or the roofing system can include an insulation layer positioned between roof trusses, or it can be laid above the ceiling [as shown in Figure 2b)].

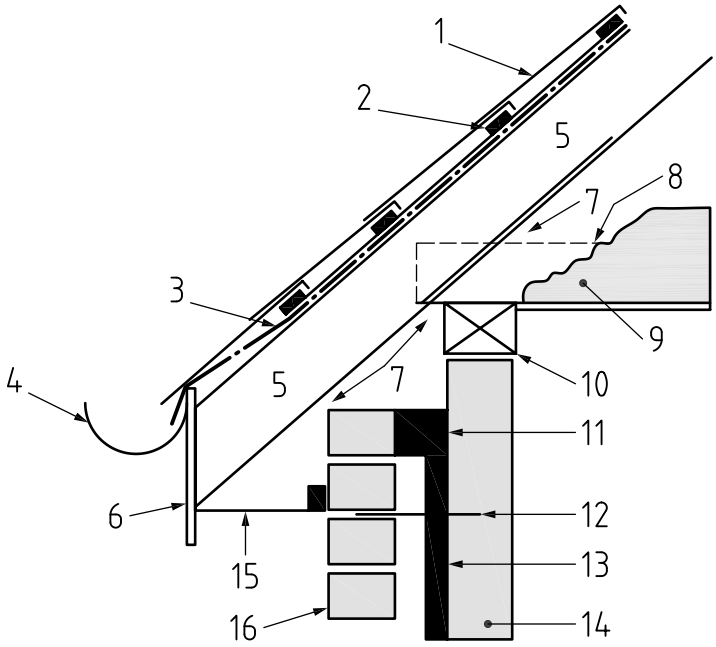
Figure 2 **Example roof variations**



Key

1 Bituminous roof covering (one or more layers)
2 Insulation (one or more layers)
3 Vapour barrier and/or one or more other layer, such as acoustic layer
4 Particular type of supporting deck

a) Typical roofing system without air gaps



Key

1 Tiles
2 Battens
3 Felt or membrane
4 Gutter
5 Roof trusses
6 Facia board
7 Air gap
8 Ceiling joist
9 Ceiling insulation
10 Wall plate
11 Cavity closer
12 Wall tie
13 Wall insulation
14 Blockwork
15 Soffit board with air vents
16 Brickwork

b) Alternative type of pitched roofing system with air gaps

1 Scope

This Published Document sets out a methodology for generating new classification rules for roof coverings tested in accordance with BS 476-3:1958 and BS 476-3:2004, which simplifies the specification of a roof covering in its end-use application as part of a roofing system. The document also considers the possible influences on the classification of single or multiple changes to the roof covering material and/or construction of the tested roofing system.

NOTE Applying the results of tests to an actual end-use application often requires specialist knowledge. This application is generally simplified if the tested roof covering/roofing system can be given a classification based upon the results of test(s) which is easily related to the end-use.

Where rules already exist, they are presented in Clause **4** and Clause **5**.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensible 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.

NOTE Product standards for roof coverings are listed in the Bibliography.

BS 476-3:1958, *Fire tests on building materials and structure – Part 3: Classification and method of test for external fire exposure to roofs* [1)]

BS 476-3:2004, *Fire tests on building materials and structure – Part 3: Classification and method of test for external fire exposure to roofs*

3 Terms and definitions

For the purposes of this Published Document, the following terms and definitions apply.

3.1 adhesive
organic or inorganic material (e.g. polyurethane-based, bitumen-based, dispersion adhesive) glue which is used to attach the surfaces of two or more products or components

*NOTE Adhesives or glues can be applied separately to form a separate layer within the roofing system, while factory pre-applied adhesives or glues (**3.7**) are part of the specific product/component forming a layer.*

3.2 binder content
amount of binder material (as percentage weight or percentage volume) within the product

NOTE 1 The binder can be inorganic or organic in nature. In the case of the latter, it adds a fire load to the product containing the binder, and is considered within the classification of products or product groups.

NOTE 2 This term does not apply to compound waterproofing sheets.

3.3 deemed-to-satisfy
solution established by an EC Decision (such as 2000/553/EC [1]) or by national regulation, which includes specific conditions for the materials (e.g. a minimum thickness) to be valid

1) Withdrawn.

3.4 classification without further testing
CWFT
products that have been proven to be stable in a given European class (on the basis of testing to the appropriate EN test methods), within the scope of their variability

NOTE See Table A.1.

3.5 end-use application parameter
aspect of the application of a product or a variation in product property (e.g. type of substrate, finish, colour, fixing or mounting method, type and position of joints), which might or might not affect the fire performance

3.6 end-use application rule
outcome of a process that predicts the classification result for a variation of a product property and/or its intended end-use application, based on the methodology in this document

3.7 factory (pre-)applied adhesive
layer of organic or inorganic material (e.g. polyurethane-based, bitumen-based) that is factory-applied to products such as to assist the installation (e.g. self-adhesion)

3.8 product parameter
aspect of a product (e.g. thickness, composition, density) which might vary, and which might or might not have an influence on the product's fire performance

3.9 roof covering
element(s) of a roofing system subject to classification

3.10 roof pitch
inclination of the roof surface to the horizontal

NOTE In the case of a roof comprising discontinuously laid overlapping elements, e.g. tiles or slates, the roof pitch is the rafter pitch, since the pitch of the roof might be a few degrees lower due to the overlaps.

3.11 roofing system
complete roofing assembly which includes the support, substrates, intermediate and external layers

3.12 separating layer
functional layer within a roof construction that is typically used to separate layers that do not match for reasons of chemical incompatibility, or is needed as underlay, where applicable

NOTE Separating layers can be products such as fire protective layers (e.g. glass fleece), underslating (e.g. polymeric sheet, polymeric sheet reinforced by polymeric fibres, bituminized reinforced sheets), and others such as bituminous kraft paper, aluminium sheet and covering (organic), and similar.

3.13 spread of flame
propagation of a flame front over the surface of a product under the influence of imposed irradiance

[BS 476-7:1997]

3.14 surfacing
surface finish applied either during construction or prefabricated as part of the surfacing layer

NOTE Surfacing can include materials such as:

- *lacquer, UV-protective coating;*
- *slate chips, ceramic-based granules;*
- *products for factory-made lamination with glass-fleece, bituminous roofing felt or similar.*

3.15 test result
outcome of a testing process and its associated procedures detailed within a specific test standard (which can include some processing of the results from the testing of a number of specimens), expressed in terms of one or more fire performance parameters

4 Classification procedures for end-use application rules from test results

4.1 General principles for end-use applications for roofing systems

Two options are available for establishing new classification rules for end-use application:

a) use of additional test results which, together with the initial test result, enables consideration of a larger range of one or several product parameters and end-use application parameters (**4.2**);

b) use of historical data and other relevant information, e.g. data from previous tests (**4.3**).

4.2 Extended end-use application by additional tests

4.2.1 Additional test results on one roofing system parameter

Where a classification exists for a particular fire-tested roofing system and it is proposed to change only one parameter, a revised classification needs to be established for the modified roofing system.

If the relationship between the fire performance and the roofing system parameter is unknown, the tests should be carried out on several variants of the parameter to assess the complete range of the product/end-use application parameter on which the end-use application is required to define the relationship.

From this relationship, it is possible to predict the different levels of fire performance as a function of the levels of the roofing system parameter, and therefore the classification.

If there is an established rule about the relationship between the roofing system parameter and the fire performance of a product or product group, it is possible to optimize the additional tests as a function of the classification result that is expected, as follows.

a) If the fire performance of the roof is known to be affected by the change of a roofing system parameter(s) in a known direction, the test can be carried out on the parameter, the variation of which is known to give the poorest performance in this instance, without changing the classification level.

b) If it is known that the fire performance changes with a change of the roofing system parameter but the relationship is not known, the number of additional tests should be sufficient to define the relationship adequately over the intended range of parameter variation. For most relationships this requires at least two additional test results.

4.2.2 Additional tests on several roofing system parameters

When more than one roofing system parameter or end-use application parameter is to change at the same time, and if the types of relationship are not known, it is necessary to assess the tests needed according to an experimental plan or an empirical approach. A more detailed series of tests should then be performed to determine the relationship between these parameters, the external fire exposure performance and the resultant classification.

The study of this relationship should be carried out from direct tests conducted in accordance with BS 476-3:2004.

If the types of relationship between the fire performance and the roofing system parameter are not known, a series of tests is necessary. The test series can be split into parts to obtain, firstly, a result on the type of the relationship (qualitative result) and, secondly, information on the quantitative relationship, if required.

In all cases, the field of end-use application should be observed. When a limited approach is used, the resulting relationships are only valid for the particular limits of the other parameters that were kept constant in the test.

4.3 The use of historical test data

When undertaking classification from end-use application, a good understanding of the product performance in fire based on the BS 476-3:1958 or BS 476-3:2004 fire test is required.

Primary data should be obtained from the BS 476-3:1958 or BS 476-3:2004 fire test method.

Additional historical test data can be found in the DD CEN/TS 1187 test 4 series.

4.4 Product and end-use application parameters

The following parameters should be considered.

Product parameters
Product composition and formulation
Reaction-to-fire classification (includes use of calorific value)
Colour (consider also pigments)
Binder content or fire retardant type and content
Thickness, mass per unit area and density
Geometry (structure, shape, dimensions and constitutive layers of multilayer product)
Air gaps (perpendicular to surface)
Joints
Surfacing on lower side of each layer (backing) and on upper side of each layer (facing)
Factory (pre-)applied adhesive
Reinforcement: mass per unit area, type of material, position within layer, etc.

End-use application parameters
Number of layers and order of layer in the roofing system
Orientation of each layer
Roof pitch
Substrate or underlying construction details
End-use application on existing roofs (“renovation”)
Spacing of frame elements (non-standard support)
Mounting method
Fixing method (e.g. adhesive)
Distribution, spacing and type of mechanical fixing (fasteners)
Joints
Air gaps

5 Influence on classification of changes to a product and/or to an end-use application parameter

5.1 Changes to individual parameters

The following is an analysis of how changing individual parameters can influence the test result, and the resulting classification for BS 476-3 fire test methods, assuming that all other parameters are kept unchanged. The BS 476-3:2004 fire test includes exposure to burning brands, wind and radiant heat, applied in two distinct stages.

5.2 Roof system classification

Roof systems should be designated by the letters EXT. F. or EXT. S. to indicate whether the test results apply to a flat (horizontal) or an inclined roof system, respectively.

5.3 Classification coding of roof system

Roof systems subject to conditions of external fire should be classified according to both the time of fire penetration through the roofing system and the distance of spread of flame along their external surface.

Each category designation should consist of two letters, e.g. AA, AC, BB, indicating penetration and spread of flame, respectively, in accordance with a) and b), with the suffix "X" added as necessary [see c)].

a) Fire penetration (first letter)

A Those specimens that have not been penetrated within one hour.

B Those specimens that are penetrated in not less than 30 min.

C Those specimens that are penetrated in less than 30 min.

D Those specimens that are penetrated in the preliminary flame test.

b) Spread of flame (second letter)

A Those specimens on which there is no spread of flame.

B Those specimens on which the spread of flame is less than or equal to 533 mm, with averaged results rounded up or down to a whole number as normally practised.

C Those specimens on which the spread of flame is greater than 533 mm, with averaged results rounded up or down to a whole number as normally practised.

D Those specimens that continue to burn for five minutes after the withdrawal of the test flame, or on which flame spreads more than 381 mm across the region of burning in the preliminary test.

c) Suffix "X"

Attention should be drawn to dripping from the underside of the specimen, any mechanical failure and the development of any holes by adding a suffix "X" to the designation to denote that one or more of these took place during the test.

Example 1

EXT. F. AA is a flat roofing system with one-hour fire penetration resistance on which there was no spread of flame.

Example 2

EXT. S. CCX is an inclined roofing system with less than 30 min fire penetration resistance, on which the spread of flame exceeded 533 mm and further deterioration took place.

5.4 Formulation of general rules

Unless **5.5** and **5.6** indicate that a roofing parameter has no effect on the performance, no general rules can be given.

However, for some test data it might be possible to interpolate between (or extrapolate from) data points from samples having a different value for a particular product and/or end-use parameter. It might also be possible to group roof coverings/roofing systems of a similar nature in order to derive an end-use application rule.

The influence of a combination of parameter changes on results from external fire exposure tests to roofs can be inter-related. The combination of parameters that give the poorest performance in the test should be identified. If the combination giving the poorest performance cannot be identified, tests should be conducted on a series of combinations of the relevant parameters of the roofing system.

5.5 General rules for product variations

5.5.1 Binder content/fire retardant type and content

The organic content and/or fire load of the roof can be critical to the outcome of the external fire exposure test, e.g. as relevant for flame spread and fire penetration.

In some cases, the organic content of layers within the roof can be protected from the effects of the external fire exposure. The effect of organic content is therefore dependent on the available route for fire penetration into and/or through the roof.

Since the fire retardant content is intended to limit any flame spread, any change in type or percentage of fire retardant could affect the classification.

5.5.2 Product composition and formulation/reaction-to-fire classification

The composition of the product can influence the fire performance.

Changing any layer of the roof system to another with a poorer reaction-to-fire classification can adversely affect the external fire performance of the roof.

Substitution is possible for a component or layer with the same or better reaction-to-fire classification when tested in the same end-use application, provided that the substitute component or layer is of the same generic product group. Note that this rule excludes the substitution of the external (top) layer.

5.5.3 Colour (consider also pigments)

Colour can affect the surface emissivity and absorptivity of the specimen under test. Dark colours might heat up more quickly than light colours or shiny surfaces.

Any increase in percentage or change to the calorific value (calorific potential, PCS) of organic pigments can adversely affect the external fire performance and classification of the roof system.

5.5.4 Factory pre-applied adhesive

Characteristics of adhesive, such as type, position and mass per unit area of the adhesive, can influence the fire performance, e.g. by adding extra combustible material to the product.

5.5.5 Geometry (structure, shape, dimensions, orientation and relative position of layers)

Geometry can influence the fire performance. The effect could vary according to the characteristics of parameters defining geometry (e.g. structure, profile, shape, dimensions and position of layers within a multi-layer product).

The extent to which individual layers are directly affected or damaged by the heat source is influenced by those layers used around them. Therefore, no general rules are available, unless listed for individual roof coverings in Annex A.

5.5.6 Mass per unit area/density/thickness

The following parameters can have an influence on the fire performance and should be considered.

a) Variable density products.

b) The thickness and density of each layer defined within the scope of the relevant product standard.

c) Tapered products such as those for self-draining end-use applications.

Following the initial classification of the roofing system to BS 476-3, using the maximum and minimum values of the given parameter for the component layer under investigation, where no change in class occurs, the resulting classification for the roofing system is valid within and including the limits of the component layer.

5.5.7 Reinforcement: mass per unit area, type of material, position within layer, etc.

Characteristics of reinforcements, such as type, position and mass per unit area, can influence the fire performance, e.g. a non-combustible intermediate layer might reduce the propensity for penetration.

NOTE Non-combustible materials are defined in Approved Document B to the Building Regulations [2].

5.5.8 Surfacing on lower side of each layer (backing) and on upper side of each layer (facing) in the roofing system

The surfacing on the lower side of each layer (backing) and/or on the upper side of each layer (facing) can influence the fire performance. Different types of coating or facing can behave very differently in fire.

The percentage of organic content or change to the calorific value (calorific potential, PCS) of the surfacing product (by mass) should not be increased. Note that this rule excludes the substitution of the external (top) layer.

The classification might change if a surfacing material is removed from any layer (backing or facing), unless that layer is below the uppermost layer not affected in the fire test (see Figure 1).

The extent to which an individual component or layer is directly affected or damaged by the testing conditions is influenced by the layers and components used around the individual layer.

5.6 General rules for end-use application variations

5.6.1 End-use application on existing roofs (“renovation”)

End-use application on existing roofs (“renovation”) can influence the fire performance.

It is not possible to give overall rules due to the wide variation in roof coverings and permutations of roofing systems that can occur. However, it is clear that renovation of existing roofs can follow one of several possibilities.

a) Extra layers

The existing roof can be improved for weather and thermal performance by the addition of extra layers.

In this instance, the impact on fire performance should also be considered using the methodology in Clause **4** and Clause **5**. Where uncertainties exist, the new roofing system should be tested and classified to **5.1** and BS 476-3:2004.

b) Partial replacement

The existing roof layers can be partially removed and replaced with the same layering product(s), to the same specification, in the same order, such that the roofing system is physically restored. In this instance, the original classification should remain unchanged.

Where different replacement layers are installed, or where different specifications or fixings are used, the new roofing system should be tested and classified according to Clause **4** and BS 476-3:2004.

c) Complete replacement

The existing roof layers can be wholly removed and completely replaced with new layers, to the original specification. In this instance, the original specification and classification should remain unchanged.

The new roofing system should be tested and classified according to BS 476-3:2004 where different replacement layers are installed or different specifications or fixings are used.

5.6.2 Air gaps

Air gaps (such as cavities) can influence the fire performance. Observations during fire tests have shown that:

a) one effect of air gaps, such as open joints or openings formed at joints (vertical or horizontal) by whatever means under the exposure to fire in the test, is that flames can attack both sides of the product and reach lower layers;

b) the heating of air in a partially enclosed space can lead to a chimney effect, substantially increasing the severity of the thermal attack.

5.6.3 Distribution, spacing and type of mechanical fixing (fasteners)

Distribution, spacing and type of mechanical fixing (fasteners) can influence the fire performance.

5.6.4 Joints

Joints in products and/or joints between layers can influence the fire performance.

Observations during fire tests have shown that:

a) flames can reach the unexposed side of the product and the interior layer(s) via the joints;

b) products can deform at the joints, leading to small air gaps behind the product;

c) the presence of joint filler can also influence the test result.

5.6.5 Mounting and fixing method

The method used to install products can influence the fire performance.

5.6.6 Number and order of layers (see details for each roofing system product)

The number of layers can influence the fire performance.

5.6.7 Orientation of each layer

The orientation of each layer can influence the fire performance. For example:

a) for non-symmetrical products, the effect on fire performance on the top and bottom surfaces of a layer can be different;

b) different fire performance can also be due to a directional effect of a profiled layer; the flame spread can be blocked or guided by the directional effect of this profile layer.

5.6.8 Pitch of roofing system

One of the most important end-use application parameters for the fire performance is the roof pitch.

In BS 476-3 testing, the roof specimen can be tested and classified in two standardized angles of the roof to the horizontal (roof pitch) and one special case, as follows.

a) Fire test at 0° for end-use application to all roof angles up to 10°.

b) Fire test at 45° for end-use application to all roof angles greater than 10°.

c) The roof can be fire-tested at one specific angle of end-use application. The fire test data and resulting classification are limited to that specific angle of end-use application and to no other angle of pitch.

5.6.9 Spacing of frame elements (non-standard-support)

Spacing of frame elements (non-standard support) can influence the fire performance.

6 End-use application classification report

An example of a typical classification report is shown in Annex B.

Annex A (informative)

Roofing covering product groups

This Annex provides an overview of most types of roof covering products.

As manufacturers make additional test data available for each product group, it is expected that new rules will be included in future editions of this Published Document to minimize the cost of fire testing and classification in the longer term.

Although European "classification without further testing" (CWFT) rules exist for specific product uses, they do not satisfy the external spread of flame requirements under BS 476-3. The inclusion of CWFT in Table A.1 merely serves to indicate compliance for fire penetration through a roofing system as defined in DD CEN/TS 1187.

Table A.1 **Typical roof coverings**

Product group for roof covering	Product standard	EC Decision for deemed-to-satisfy	EC CWFT Classification without further testing
Non-metallic slates and tiles	BS EN 12326-1 Slate and stone products for discontinuous roofing	EC Decisions 2000/553/EC [1] and 2005/403/EC [3] cover particular products	
	BS EN 1304 Clay roofing tiles and fittings	EC Decisions 2000/553/EC [1] and 2005/403/EC [3] cover particular products	
	BS EN 490 Concrete roofing tiles and fittings for roof covering and wall cladding	Products in this sector might be covered by "deemed-to-satisfy" EC Decision 2000/553/EC [1]	Products in this sector might be covered by CWFT Decision 2005/403/EC [3]
	BS EN 492 Fibre-cement slates and fittings	Products in this sector might be covered by "deemed-to-satisfy" EC Decision 2000/553/EC [1]	Products in this sector might be covered by CWFT Decision 2005/403/EC [3]
Shingles	BS EN 544 Bitumen shingles with mineral and/or synthetic reinforcements		
	Wooden shingles		
	Plastic polymeric shingles		
Metallic slates and tiles	BS EN 508 Roofing products from metal sheet: Specification for self-supporting products (Part 1 steel, Part 2 aluminium, Part 3 stainless steel)	EC Decisions 2000/553/EC [1] and 2005/403/EC [3] cover particular products/materials	
	BS EN 506 Roofing products of metal sheet: Specification for self-supporting products of copper or zinc sheet	EC Decisions 2000/553/EC [1] and 2005/403/EC [3] cover particular products/materials	

Table A.1 **Typical roof coverings**

Product group for roof covering	Product standard	EC Decision for deemed-to-satisfy	EC CWFT Classification without further testing
Metal sheets	BS EN 14782 Self-supporting metal sheet for roofing, external cladding and internal lining	Products in this sector might be covered by "deemed-to-satisfy" EC Decision 2000/553/EC [1]	Products in this sector might be covered by CWFT Decision 2005/403/EC [3]
	BS EN 14783 Fully supported metal sheet and strip for roofing, external cladding and internal linings	Products in this sector might be covered by "deemed-to-satisfy" EC Decision 2000/553/EC [1]	Products in this sector might be covered by CWFT Decision 2005/403/EC [3]
	BS EN 506 Roofing products of metal sheet: Specification for self-supporting products of copper or zinc sheet	Products in this sector might be covered by "deemed-to-satisfy" EC Decision 2000/553/EC [1]	Products in this sector might be covered by CWFT EC Decision 2005/403/EC [3]
Reinforced bitumen sheets	BS EN 13707 Flexible sheets for roof waterproofing: Reinforced bitumen sheets		
Profiled bitumen sheets	BS EN 534 Corrugated bitumen sheets: Product specification and test methods		
Plastic and rubber sheets	BS EN 13956 Flexible sheets for roof waterproofing: Plastic sheets and rubber sheets		
Fibre cement sheets	BS EN 494 Fibre-cement profiled sheets and fittings: Product specification and test methods	Products in this sector might be covered by "deemed-to-satisfy" EC Decision 2000/553/EC [1]	
Roof-lights	BS EN 14963 Roof coverings: Continuous roof-lights of plastics with or without up-stands: Classification, requirements and test methods		
	BS EN 1873 Prefabricated accessories for roofing: Individual roof lights of plastics		
Roof windows	BS EN 14351-1 Windows and doors: Windows and external pedestrian door-sets without resistance to fire and or smoke leakage characteristics		
Glazing systems	ETAG 002 Structural sealant glazing systems [4]		

Table A.1 **Typical roof coverings**

Product group for roof covering	Product standard	EC Decision for deemed-to-satisfy	EC CWFT Classification without further testing
Light transmitting plastic sheets	ETAG 010 Self-supporting translucent roof kits [5]		
	BS EN 1013 Light transmitting profiled plastic sheeting for single skin roofing		
Composite sandwich panels	BS EN 14509 Self-supporting double skin metal faced insulating panels: Factory made products	Products in this sector might be covered by "deemed-to-satisfy" EC Decision 2000/553/EC [1]	Products in this sector might be covered by CWFT Decision 2005/403/EC [3]
Composite lightweight panels	ETAG 016 [6]		
Liquid applied waterproofing	ETAG 005: Part 1 [7]		
Solar panels			
Photovoltaic cells			
Thatched roofs			
Green vegetative covered roofs			

Annex B (informative) Example of a typical classification report tested to BS 476-3:2004

B.1 Introduction

The following classification report defines the classification assigned to a roof covering system in accordance with the procedures given in BS 476-3:2004 and PD 476-3:2012.

External exposure to fire classification in accordance with PD 476-3:2004 and PD 476-3:2012

Product name:

Report no.:

Issue no.:

Prepared for:

Date:

B.2 Details of classified roof covering product

B.2.1 General

The product, (insert name and type), used in the specified end-use application is defined as being suitable for roof covering applications.

B.2.2 Roof covering product description

The product, (insert name and type), is fully described below and in the test reports provided in support of the classification listed in **B.4.2**.

General description		
Product reference of coating system		
Overall coating system thickness		
Overall thickness of composite		
Overall weight per unit area of composite		
Roof covering, top layer	Generic type	
	Product reference	
	Name of manufacturer	
	Colour	
	Application method	
	Weight per unit area	
	Flame retardant details	
Additional layers as identified in roof build up	Generic type	
	Product reference	
	Name of manufacturer	
	Colour	
	Application method	
	Weight per unit area	
	Flame retardant details	
Insulation	Generic type	
	Product reference	
	Name of manufacturer	
	Colour	
	Application method	
	Weight per unit area	
	Flame retardant details	

General description		
Substrate	Product reference	
	Generic type	
	Name of manufacturer	
	Thickness	
	Density/weight per unit area	
	Amount of flame retardant	
Brief description of construction of specimens		

B.3 Test reports and test results in support of classification

B.3.1 Test reports

Name of fire test laboratory	Name of sponsor	Test reports/extended application report Nos.	Test method/ extended application rules and date
Name and notified body number			BS 476-3:2004 PD 476-3:2012

B.3.2 Test results

Test pitch: 45°.

Substrate/Deck: For example, 9 mm thick calcium silicate-based board.

Supporting structure: N/A.

BS 476-3 preliminary test (stage 1):

Parameter	Criteria	Test results	Compliance
	Class limits	Specimen 1	Class
Burn time	<5 min	NIL	Yes
Flame spread distance	≤533 mm	NIL	Yes
Penetration	None in 60 mins	None	Yes

BS 476-3 test (stage 2):

Parameter	Criteria	Test results				Compliance
	Class	Specimen 1	Specimen 2	Specimen 3	Mean [A)]	Class
Penetration time	≥60 min	60 min	60 min	60 min	60 min	Y
[A)] If one or two of the specimens have not failed at one hour, a time of 60 min should be used in calculating the mean time of penetration.						

B.4 Classification and field of application

B.4.1 Reference of classification

This classification has been carried out in accordance with BS 476-3:2004 and PD 476-3:2012

B.4.2 Classification

The roof covering product, (insert name and type), when tested in the specified end-use application for external fire performance is hereby classified as, for example:

EXT S.AB

B.4.3 Field of application

This classification is valid for the following conditions.

Range of pitches	10° < pitch ≤70°
Substrate/deck	9 mm calcium silicate-based board as deck
Product configuration	No variation allowed
Product composition	No variation allowed
Product application method	No variation allowed
Product thickness	No variation allowed
Product colour	No variation allowed
Supporting structure	No variation allowed

B.5 Limitations

This classification report does not represent type approval or certification of the product.

SIGNED **APPROVED**

…….. ……..

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Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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BS EN 490, *Concrete roofing tiles and fittings for roof covering and wall cladding – Product specifications*

BS EN 492, *Fibre-cement slates and fittings – Product specification and test methods*

BS EN 494, *Fibre-cement profiled sheets and fittings – Product specification and test methods*

BS EN 506, *Roofing products of metal sheet – Specification for self-supporting products of copper or zinc sheet*

BS EN 508 (all parts), *Roofing products from metal sheet – Specification for self-supporting products of steel, aluminium or stainless steel sheet*

BS EN 534, *Corrugated bitumen sheets – Product specification and test methods*

BS EN 544, *Bitumen shingles with mineral and/or synthetic reinforcements – Product specification and test methods*

BS EN 1013 (all parts), *Light transmitting profiled plastic sheeting for single skin roofing*

BS EN 1304, *Clay roofing tiles and fittings – Product definitions and specifications*

BS EN 1873, *Prefabricated accessories for roofing – Individual roof lights of plastics – Product specification and test methods*

BS EN 12326-1, *Slate and stone products for discontinuous roofing and cladding – Part 1: Product specification*

BS EN 13707, *Flexible sheets for roof waterproofing – Reinforced bitumen sheets for roof waterproofing – Definitions and characteristics*

BS EN 13956, *Flexible sheet for roof waterproofing – Plastic and rubber sheets for roof waterproofing – Definitions and characteristics*

BS EN 14351-1, *Windows and doors – Product standard, performance characteristics – Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics*

BS EN 14509, *Self-supporting double skin metal faced insulating panels – Factory made products – Specification*

BS EN 14782, *Self-supporting metal sheet for roofing, external cladding and internal lining – Product specification and requirements*

BS EN 14783, *Fully supported metal sheet and strip for roofing, external cladding and internal lining – Product specification and requirements*

BS EN 14963, *Roof coverings – Continuous rooflights of plastics with or without upstands – Classification, requirements and test methods*

DD CEN/TS 1187, *Test methods for external fire exposure to roofs*

Other publications

[1] EUROPEAN COMMUNITIES. 2000/553/EC. COMMISSION DECISION 2000/553/EC of 6 September 2000 implementing Council Directive 89/106/EEC as regards the external fire performance of roof coverings. Luxembourg: Office for Official Publications of the European Communities, 2000.

[2] THE STATIONERY OFFICE. The Building Regulations 2000 Approved Document B – Fire Safety. London: The Stationery Office. 2007.

[3] EUROPEAN COMMUNITIES. 2005/403/EC. COMMISSION DECISION 2005/403/EC of 25 May 2005 establishing the classes of external fire performance of roofs and roof coverings for certain construction products as provided for by Council Directive 89/106/EEC.

[4] EUROPEAN ORGANISATION FOR TECHNICAL APPROVALS (ETAG). ETAG 002: *Guideline for European technical approval of structural sealant glazing systems (SSGS)*. Brussels: ETAG. (http://www.eota.be/).

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[6] EUROPEAN ORGANISATION FOR TECHNICAL APPROVALS (ETAG). ETAG 016: *Guideline for European technical approval of self-supporting composite lightweight panels* Brussels: ETAG. (http://www.eota.be/).

[7] EUROPEAN ORGANISATION FOR TECHNICAL APPROVALS (ETAG). ETAG 005: *Guideline for European technical approval of liquid applied roof waterproofing kits: Part 1: General.* Brussels: ETAG. March 2004. (http://www.eota.be/).

Further reading

BS EN 13162, *Thermal insulation products for buildings – Factory made mineral wool (MW) products – Specification*

BS EN 13163, *Thermal insulation products for buildings – Factory made products of expanded polystyrene (EPS) – Specification*

BS EN 13164, *Thermal insulation products for buildings – Factory made products of extruded polystyrene foam (XPS) – Specification*

BS EN 13165, *Thermal insulation products for buildings – Factory made rigid polyurethane foam (PUR) products – Specification*

BS EN 13166, *Thermal insulation products for buildings — Factory made products of phenolic foam (PF) — Specification*

BS EN 13167, *Thermal insulation products for buildings – Factory made cellular glass (CG) products – Specification*

BS EN 13169, *Thermal insulation products for buildings – Factory made products of expanded perlite board (EPB) – Specification*

BS EN ISO 13943, *Fire safety – Vocabulary (ISO 13943:2008)*

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