

ROOF COVERING FIRE PERFORMANCE

The current position

In the UK, the hazard that exists of fire spreading to the roof of a building from a nearby fire outside the building itself is covered under Building Regulations 'Fire Safety – Approved Document B' and uses BS 476: Part 3 2004 - 'External Fire Exposure Roof Test' to assess representative systems of the roof construction (not individual comprising components) in their response to fire from outside the building. The test is not concerned with the behaviour of roofs when subjected to the effects of fire from its underside, i.e. from within the building.

The test covers two primary elements; the penetration of flame would give an 'A – D' evaluation, and the spread of flame which would also be classified on an 'A – D' score to produce a two letter code to identify the final rating. This rating would then signify whether the system could be used anywhere on the roof if it achieved an 'AA', 'AB' or 'AC' classification and therefore deemed 'unrestricted' (low vulnerability). If, however, the system should achieve any other rating this would be regarded as 'restricted' (medium or high vulnerability) and not be utilised within at least 6, 12 or 20 metres (6-24 metres for Scotland) of the boundary (depending on the two letter classification) as they do not provide adequate protection against the spread of flame through or over them.

Each classification letter represents a different result :

First Letter - Fire Penetration Classification

- A : Those specimens which have not been penetrated within 1 hour.
- B : Those specimens which are penetrated in not less than 30 minutes.
- C : Those specimens which are penetrated in less than 30 minutes.
- D : Those specimens which are penetrated in the preliminary flame test.

Second Letter - Spread of Flame Classification

- A : Those specimens on which there is no spread of flame.
- B : Those specimens on which there is not more than 533mm, spread of flame.
- C : Those specimens on which there is more than 533mm, spread of flame.
- D : Those specimens which continue to burn for 5 minutes after the removal of the test flame or with spread of flame more than 381mm, in the preliminary test.

EUROPEAN FIRE STANDARDS

To advance and clarify the fire standards across Europe for External Fire Performance the industry has been going through a changeover from the test and classification of BS476-3:2004 to the tests of TS1187 and classification using BS EN 13501-5. The standardisation into one European test proved indefinable as many countries within the EU had differing regulations and so four test standards were required to cover the legislation in place within the various member states at the time. As such the TS1187 has four tests for roof covering systems: t1 for Germany, t2 for Scandinavia, t3 for France and t4 for the UK.

The results from testing under TS1187 with BS EN 13501-5 are given as European Class ratings Broof(t4), Croof(t4), Droof(t4), Eroof(t4) and Froof(t4) and can be related to the longstanding BS 476 two letter ratings as follows:

Separate Fire Standards apply to wall cladding

National Class	European Class	Minimum distance from any point on relevant boundary (England)	Minimum distance from any point on relevant boundary (Scotland)
AA, AB or AC	Broof(t4)	Unrestricted and can be used anywhere on	Low Vulnerability (<6m)
BA, BB or BC	Croof(t4)	At least 6m of the boundary	Medium Vulnerability (6-24m)
CA, CB or CC	Droof(t4)	At least 6,12 or 20m of the boundary depending on the building type and use	Medium Vulnerability (6-24m)
AD, BD or CD	Eroof(t4)	At least 6,12 or 20m of the boundary depending on the building type and use	High Vulnerability (>24m)
DA, DB, DC or DD	Froof(t4)	At least 20m of the boundary depending on the building type and use	High Vulnerability (>24m)

BAUDER WATERPROOFING SYSTEMS AND FIRE PERFORMANCE

Bauder waterproofing systems, with exposed membranes, achieve the highest classification for external fire penetration and surface spread of flame that denotes that they are classed as 'unrestricted' ('Low Vulnerability') within current Building Regulations due to the fire retardant in the cap sheets and the mineral chippings on the bitumen membrane's surface. Building regulations state a spread of flame allowance to the 'C' rating as the focus is towards saving human lives with the penetration of flame rating of 'A', rather than protecting the building itself as a result of the fire spreading.

In roofs that incorporate non-combustible surface finishes as set out in European Commission Directive 2000/553/EC such as stone chipping, pebbles, and paving that fully cover the roof, these are deemed to fully satisfy the regulation with no testing required.

ROOF INSULATION FIRE PERFORMANCE

Individual construction products are covered within EN 13501-1 for which insulation as a separate component will be encompassed and allocated a Euroclass according to their reaction to fire test results, again with letter classifications from 'A1' through to 'F'. On the whole, materials manufactured from plastics will achieve an 'E' rating, which will include the insulants Expanded Polystyrene (EPS), Extruded Polystyrene (XPS) and Polyisocyanurate (PIR).

Non-combustible insulants, such as mineral wool, are clearly desirable materials to include in a flat roof specification because of fire performance, and it is important to consider and balance the factors for inclusion within a roof system. In general, non-combustible insulants are not as thermally efficient as PIR insulation and therefore the extra thicknesses, increased weight per m³ and reduced compressive strength can be a limitation in some applications. PIR has the advantage of being highly efficient, which reduces the height and weight of a roof covering build-up offering greater versatility on a project.

Within a Bauder warm roof waterproofing system the insulation, be it mineral wool or PIR, is not exposed and is therefore protected through the fire performance of the cap sheet and its system classification; thus both insulants conform to Building Regulations in the same way - neither one achieving a higher rating than the other. Our BBA Certificate for BauderPIR states; *"the overall fire rating of any roof containing the*

products will depend on the type of deck and the nature of the roof waterproof covering."

Bauder PIR insulation has also been tested and approved by fire experts Factory Mutual (FM), whose principle global business is the insurance of buildings and loss prevention. FM currently offers PIR insulation within a flat roof just the same as they would mineral wool without an exclusion or premium adjustment to the building owner provided that they are installed as part of a FM Approved Assembly, i.e. a stated system configuration. Bauder PIR, as with all other products with FM Approval, are under regular surveillance by the insurer to confirm performance on buildings.

Inverted roof constructions also generally use plastic-based insulants such as EPS and XPS, though these are only used when they are fully covered with paving slabs etc and are therefore deemed to meet Building Regulations without testing.

GREEN ROOFS - GRO DESIGN GUIDANCE

-Growing medium should be certified for use on green roofs and where no permanent irrigation organic content should be <20% and peat free.

-Fire Breaks should be 50mm thick 20-40mm rounded pebble or paving slabs around all perimeters and glazing ideally 500mm wide, with a 1m wide break every 40m.

-Maintenance is important to prevent vegetation growing over Fire Breaks and to remove wildflower dry thatch in the Autumn.

IN SUMMARY

The Bauder waterproofing systems meet current Building Regulations for fire performance and our BBA certificates state, *"the systems, when used in a suitable specification, will enable a roof to be unrestricted (low vulnerability) under the Building Regulations"*, which confirms they are appropriate for use on any part of a roof.

Need more information?

Please contact our technical department on:

T: 0845 271 8800

E: technical@bauder.co.uk

Bauder Limited, 70 Landseer Road, Ipswich, IP3 0DH