Flame Retardant Standards for Building Membranes

INTRODUCTION

Building membranes are used in roof and wall installations to ensure long-term protection to the building envelope. Breather membranes offer water repellent properties combined with high water vapour permeability to control condensation within the building's interior. Air and vapour control layers improve the building's air tightness and prevent moisture within the building's warm air from reaching the insulation layer and forming interstitial condensation. Specialist membranes with additional characteristics, such as high UV resistance, ventilation control and energy efficiency, are also beneficial for the building's long-term protection.

British and international building standards specify flame retardant materials for specific installations and structures. Flame retardant additives are incorporated in the materials or added as a coating to make them flame retardant; it is the formulation, quality and amount of these additives that determine which flame retardant tests the material will pass and what standards to which they will comply.

A flame retardant material is one that self-extinguishes; it does not mean that it is flame proof. Flame retardant materials are resistant to catching fire, reduce flammability, and inhibit, suppress or delay the production of flames. Flame proof materials are ones that are not liable to catch fire or be damaged by fire and are not readily ignited or burned by flames.

In 2002, to harmonise the classification of the reaction to fire for building materials, the European Commission introduced the Euro Fire Class System, based on EN ISO 13501-1.

Euro Fire Class System and National Fire Class Systems*

Euro Class EN ISO 13501-1	UK BS 476 Parts 6 & 7	Germany DIN 4102
Class A1	NA	A1
Class A2	Class 0	A2
Class B	Class 0	B1
Class C	Class 1	B1
Class D	Class 1	B2
Class E	Class 2	B2
Class F	Class 3	B3

*Indicative purposes only; test methods and standards vary

STANDARDS

Internationally recognised British and European standards

EN 13501-1 Fire classification of construction products and building elements. Classification using test data from reaction to fire tests (EU).

BS 476 PART 6 Fire tests on building materials and structures. Method of test for fire propagation for products (UK)

BS 476 PART 7 Fire tests on building materials and structures. Method of test to determine the classification of the surface spread of flame of products (UK)

EN 13501-1 STANDARDS

FIRE BEHAVIOUR

Class A1 – non-combustible
Class A2 – very limited combustibility
Class B – combustible (limited)
Class C – normal flammable
Class D – normal flammable
Class E – normal flammable
Class F – not classified materials

SMOKE DEVELOPMENT

Class S1 – very limited smoke
Class S2 – limited smoke
Class S3 – no demands on smoke

BURNING DROPLETS

Class d0 – no droplets or particles
Class d1 – limited burning droplets
Class d2 – no demands on droplets

Non-combustible building materials
A1 or A2

Highest level for flame retardant materials
B-s1, d0

Stillington Road
Easingwold
York YO61 3FA
United Kingdom

Tel: +44 (0)1347 825200
Fax: +44 (0)1347 825222
Email: technical@powerlon.com
Website: www.powerlon.com

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FLAME RETARDANCY TESTS

To meet the requirements for EN ISO 13501-1, the Euro Fire Class System, two test standards must be passed.

EN 11925-2 *Single Flame Source Test "Reaction to fire tests for building products—Part 2: Ignitability when subjected to direct impingement of flame."* The method specifies a test for determining the ignitability of products by direct small-flame impingement under zero impressed irradiance using vertically oriented test specimens.

Although the method is designed to assess ignitability, this is addressed by measuring the spread of a small flame up the vertical surface of a specimen following application of a small (match-sized) flame to either the surface or edge of a specimen for either 15sec or 30sec. The determination of the production of flaming droplets depends on whether or not the filter paper placed beneath the specimen ignites.

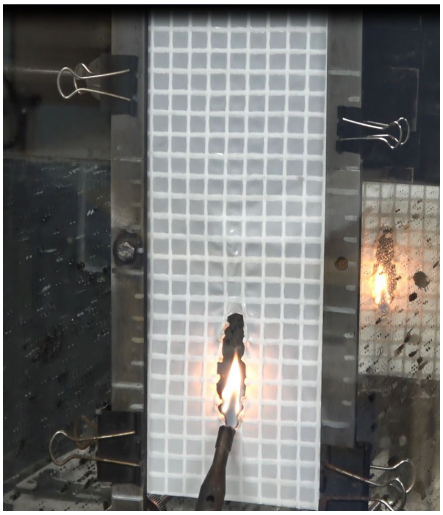
Pass standard:

- Flame spread (Fs) <150mm within 60sec (when exposure time is 30sec)

EN 13823 (SBI) *Single Burning Item (SBI) Test "Reaction to fire tests for building products—Building products excluding floorings exposed to the thermal attack by a single burning item."* A method of test for determining the reaction to fire behaviour of building products (excluding floorings) when exposed to the thermal attack by a single burning item (a sand-box burner supplied with propane). The specimen is mounted on a trolley that is positioned in a frame beneath an exhaust system. The reaction of the specimen to the burner is monitored instrumentally and visually. Heat and smoke release rates are measured instrumentally and physical characteristics are assessed by observation.

Pass standards:

- Fire Growth Rate Index (FIGRA) must remain below 120 W/s
- Total Heat Release (THR) in the first 600sec of exposure must be <7.5MJ
- Lateral Flame Spread (LFS) must not reach the edge of the specimen, the flame spread (Fs) must be <150mm within 60sec



Single Flame Source Test apparatus for EN 11925-2

Single Burning Item Test apparatus for EN 13823

UNITED KINGDOM BUILDING REGULATIONS

Building regulation in England covering fire safety matters within and around buildings are specified in **Approved Document B (Fire Safety)** Volume 1 (dwelling houses) and Volume 2 (buildings other than dwelling houses). The documents specify the minimum standards (BS 476 and EN ISO 13501-1) for all materials used in the construction, with specific installation requirements. The full document is available online: www.gov.uk.

UK Building Regulations Update

On 21 December 2018, changes to the Building Regulations 2010 specified that materials used in the external walls of buildings over 18m must now be Class A1 or A2, as determined by EN 13501-1. This relates to buildings containing dwellings, institutions or rooms used for residential purposes. Class 0 rated materials (as determined by BS476 Parts 6 & 7) no longer qualify.

Materials excepted include: door frames and doors, fire stopping materials, membranes, seals/gaskets/fixings/sealants and thermal break materials.