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Agrément Certificate No 92/2841
*Third issue**

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

LORIENT INTUMESCENT FIRE SEALS, SMOKE SEALS, ACOUSTIC SEALS AND RETROFIT SMOKE SEALS

Scellés de feu et de fumée
Feur- und Rauchverschlüsse

Product

- *THIS CERTIFICATE RELATES TO LORIENT INTUMESCENT FIRE SEALS, SMOKE SEALS, ACOUSTIC SEALS AND RETROFIT SMOKE SEALS.*
- *The products are available in a range of sizes with a variety of optional smoke seal designs.*
- *The products are for use in dry, internal conditions in domestic, commercial or industrial buildings to maintain the fire resistance of door assemblies, partitions and screens and / or to resist the passage of cold smoke and sound around the perimeters of the functional elements.*

Regulations

1 The Building Regulations 2000 (as amended) (England and Wales)

The Secretary of State has agreed with the British Board of Agrément the requirements of the Building Regulations to which fire and smoke protection systems can contribute in achieving compliance. In the opinion of the BBA, Lorient Intumescent Fire Seals, Smoke Seals, Acoustic Seals and Retrofit Smoke Seals, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement:	B1	Means of warning and escape
Comment:		The products can contribute towards satisfying this Requirement.
Requirement:	B3(3)	Internal fire spread (structure)
Comment:		Tests to BS 476-22 : 1987, BS 476-23 : 1987, BS 476-31.1 : 1983 and BS EN 1634-1 : 2000 show that the products can protect the gaps between the components of a door assembly, screens and partition allowing the structure to maintain its fire resistance. See sections 9.1 to 9.8 of this Certificate.
Requirement:	E1	Protection against sound from other parts of the building and adjoining buildings
Requirement:	E4	Acoustic conditions in schools
Comment:		The Acoustic Seals can contribute to a construction meeting these Requirements. See sections 8.1 and 8.2 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The products are acceptable. See sections 11.1 and 11.2 of this Certificate.

2 The Building (Scotland) Regulations 2004

In the opinion of the BBA, Lorient Intumescent Fire Seals, Smoke Seals, Acoustic Seals and Retrofit Smoke Seals, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Mandatory Standards as listed below.

Regulation:	8	Fitness and durability of materials and workmanship
Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The products can contribute to a construction satisfying this Regulation. See sections 11.1 and 11.2 and the *Installation* part of this Certificate.
Regulation:	8(2)	Fitness and durability of materials and workmanship
Comment:		The products can satisfy this Regulation. See section 10 of this Certificate.
Regulation:	9	Building standards — construction
Standard:	2.3	Structural protection
Comment:		Tests to BS 476-22 : 1987, BS 476-23 : 1987, BS 476-31.1 : 1983 and BS EN 1634-1 : 2000 show that the products can contribute towards satisfying this Standard with reference to clause 2.3.1(1)(2). See sections 9.1 to 9.8 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).

3 The Building Regulations (Northern Ireland) 2000

In the opinion of the BBA, Lorient Intumescent Fire Seals, Smoke Seals, Acoustic Seals and Retrofit Smoke Seals, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The products are acceptable when installed in accordance with sections 11.1 and 11.2 of this Certificate.
Regulation:	E4	Internal fire spread — Structure
Comment:		Tests to BS 476-22 : 1987, BS 476-23 : 1987, BS 476-31.1 : 1983 and BS EN 1634-1 : 2000 show that the products can contribute towards satisfying this Regulation. See sections 9.1 to 9.8 of this Certificate.

4 Construction (Design and Management) Regulations 1994 (as amended)
Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See section: 6 *Delivery to site and storage* (6.2).

Technical Specification

5 Description

5.1 The range of seals comprises intumescent fire seals with optional smoke control profiles, non-intumescent smoke seals, retrofit smoke seals and acoustic seals.

5.2 The fire, smoke and acoustic seals consist of a rigid PVC outer casing containing a core of intumescent material. The square and rounded edge designs available in the range are shown in Figure 1.

5.3 The intumescent material is supplied in large sheets coated on both faces with a protective epoxy resin layer. As part of the manufacturing process the sheets are cut into appropriately sized strips, leaving exposed edges. The edges are sealed with epoxy resin, hot melt resin or metal foil prior to insertion into the PVC outer casing. The range of seals are available in a variety of colours is listed in Table 1. Intermediate dimensions are also available.

Table 1 Range of intumescent fire seals(1)

Classification reference	Depth (mm)	Width (mm)
LP1003	3	10
LP1004	4	10
LP1504	4	15
LP2004	4	20
LP2504	4	25
LP2006	6	20
LP2007 / R(2)	7	20
LP3804	4	38
LP4804	4	48

(1) Intermediate dimensions are also available.

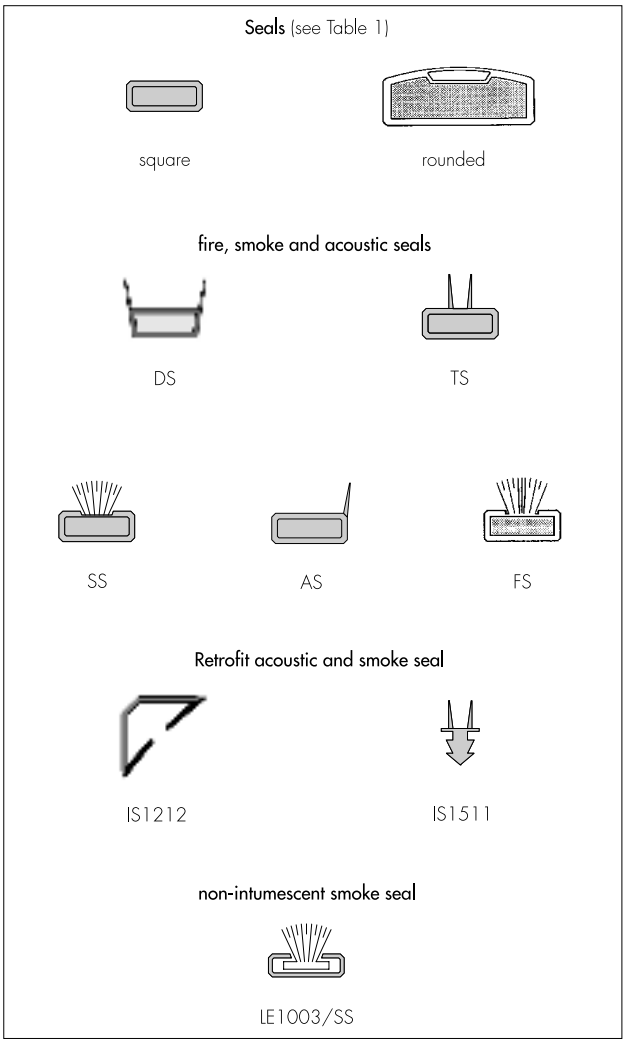
(2) Rounded profile for use in particular with meeting stiles and heels of double action pairs of doors.

5.4 The fire seals are supplied with a choice of optional smoke control profiles. The choice of profile design will depend on the required application as detailed in Table 2. The various designs of smoke control profiles are shown in Figure 1.

Table 2 Range of Lorient smoke control profiles

Classification reference	Description and application
SS	Plain brush pile used as an all-purpose smoke control seal for common single action doorset applications.
FS	Brush pile incorporating a central flexible fin, recommended for use with double action doorsets only.
DS	Comprises two ribbed, folding, fins positioned at the base of the profile. The flexible fins fold when fitted and are designed to form a low-friction seal.
TS	Consists of two centrally-positioned flexible fins. This profile is recommended for use where the service conditions demand a high standard of hygiene and the risk of bacterial or dust entrapment in a brush pile may be considered unacceptable, eg health buildings and food preparation plants.
AS	Consists of a singular flexible fin, offset to the very edge of the profile, thus enabling the smoke seal element to bypass the hinges of a door assembly without interruption. This profile is suitable for all applications and door configurations.

Figure 1 Lorient Intumescent Fire Seals, Smoke Seals, Acoustic Seals and Retrofit Smoke Seals



5.5 The non-intumescent smoke seal, consists of the PVC casing incorporating the selected smoke control profile. The retrofit smoke seals incorporate a rigid backing with elastomeric fins and are designed for upgrading existing fire resisting doors to accommodate current smoke control requirements but may also be introduced as part of an original design if required. These seals are used to prevent the passage of cold smoke only. Typical seal designs are shown in Figure 1.

5.6 Fire, smoke and acoustic seals are supplied with an approved, self-adhesive backing tape as standard, to secure the seals to the door or door frame. The retrofit smoke seal IS1511 does not require backing tape and is secured by inserting the product into a slot cut into the door or door frame.

5.7 The seals are secured in grooves cut into the head and vertical edges of the door or the door frame. The seals must run the full length of each edge. For sealing purposes the flexible element of the seal, ie fin / brush pile, should not be interrupted at the hinge positions. Also, if smoke and acoustic sealing is required an appropriate seal should additionally be fitted across the bottom of the door at the threshold position.

5.8 All components are subject to routine in-factory quality control.

6 Delivery to site and storage

6.1 The products are supplied in either cardboard boxes or tubes, marked with the manufacturer's name and trademark, the seal type reference and the batch number. The BBA identification mark, incorporating the number of this Certificate, is printed on the product or labelled on the packaging.

6.2 The seals should be stored in dry conditions until required for installation. Care must be taken not to expose the intumescent core by damaging the PVC outer casing.

Design Data

7 General

7.1 The intumescent fire seals are suitable for use in improving the fire resistance of fire door assemblies. The choice of width and depth of seal will depend on the period of protection required and must be considered as an aspect of the design appraisal for any fire-resistant door assembly.

7.2 The smoke seals are suitable for use in maintaining the resistance to smoke at ambient temperature conditions in the vicinity of a fire door assembly, as detailed in section 9.1.

7.3 The acoustic seals can contribute to reducing the transmission of sound, as detailed in section 8.

7.4 It is recommended that the fire, smoke and acoustic seals are installed in the door frame rather than the door leaf as this will avoid any difficulty associated with hanging and fitting the door, for example, where planing of the door edge is required. However, the specifier may wish to install an additional seal in the door as an alternative to selecting a wider / thicker strip in the door frame.

7.5 It is essential that all other elements such as locks, hinges and glazed panels, critical to the fire resistance of a doorset, are correctly installed to ensure that the required fire resistance period is provided.

7.6 When considering the position of a fire seal in a door assembly, allowances should be made for the distortion of any elements which can occur under fire conditions. Recommendations with regard to positioning of the seals are detailed in the *Installation* part of this Certificate.

8 Sound insulation

8.1 The acoustic seals, when used in conjunction with an appropriate door assembly, can provide a level of resistance to sound transmission.

8.2 Measures to be taken in design and during installation to avoid direct paths for airborne sound and minimise flanking sound transmission are given in the national Building Regulations and Standards as detailed:

England and Wales

Approved Document E, Section 2.25 to 2.27.

9 Behaviour in smoke and fire

Smoke performance

9.1 The intumescent smoke seals LP1004SS and LP2004AS were incorporated in a single-leaf door assembly and tested to measure air leakage using the principles of BS 476-31.1 : 1983. With each seal the door assembly satisfied the recommendations of BS 5588-1 : 1990, BS 5588-5 : 1991, BS 5588-6 : 1991, BS 5588-8 : 1999, BS 5588-10 : 1991 and BS 5588-11 : 1997 in that a leakage rate of 3 $m^3\ m^{-1}\ h^{-1}$ was not exceeded when the assembly was subjected to a pressure of 25 Pa.

9.2 Further tests were conducted individually on intumescent smoke seals LP1004SS, LP1004AS, LP1004FS and LP1004TS and Retrofit Smoke Seals IS1511 and IS1212. Again the seals were incorporated in a single-leaf door assembly and tested to measure air leakage using the principles of BS 476-31.1 : 1983. Tests were conducted before and after 100 000 opening and closing cycles. In each case the recommendations of BS 5588-1 : 1990, BS 5588-5 : 1991, BS 5588-6 : 1991, BS 5588-8 : 1999, BS 5588-10 : 1991 and BS 5588-11 : 1997 were satisfied.

9.3 The intumescent smoke seals LP1504DS and LP1504SS were incorporated into a single acting, single-leaf doorset and tested to measure air leakage using the principles of BS 476-31.1 : 1983. Generally the doorset satisfied the recommendations of BS 5588-2 : 1983, BS 5588-3 : 1983, BS 5588-6 : 1983 and BS 5588-10 : 1983 in that a leakage rate of 3 $m^3m^{-1}h^{-1}$ was not exceeded when subjected to a pressure of 25 Pa.

9.4 The test results detailed in sections 9.1 to 9.3 indicate that the smoke seals can be used to provide restriction to smoke leakage at ambient temperatures, and may therefore be used to contribute towards satisfying the provisions of Table B1, Appendix B, Approved Document B1 / 2 / 3 / 4 / 5 of the Building Regulations 2000 (as amended) (England and Wales).

Fire performance

9.5 Two intumescent fire seals LP1004 were incorporated in a fully insulated, single-swing, double-leaf doorset. One of the seals included the TS smoke seal. The assembly was tested to BS 476-22 : 1987, Section 6. An integrity rating of 77 minutes and an insulation rating of 59 minutes were achieved.

9.6 The intumescent fire seals LP1004, LP1004TS, LP2004 and LP2004TS were incorporated in a partially and fully insulated double-swing, single-leaf doorset and tested to BS 476-22 : 1987, Sections 6 and 7. An integrity and insulation rating of 40 minutes was achieved in both door types.

9.7 Two intumescent fire seals LP1003 were incorporated in a glazed double-action double doorset and tested to BS 476-22 : 1987, Section 7. An integrity rating of 59 minutes was achieved. The insulation rating was not claimed due to the presence of non-insulating glazed elements.

9.8 The intumescent fire seal LP2504 was incorporated in an unlatched, single-leaf, single-action doorset. The construction was tested to BS 476-22 : 1987, Section 7 and achieved an integrity rating of 66 minutes. The insulation rating was not claimed due to the presence of non-insulating glazed elements.

9.9 The intumescent fire seal LP1504DS was incorporated into two different specimens of single acting, single-leaf doorsets. Doorset A was glazed with non-insulating wired glass, and Doorset B was glazed with insulating glass. The doorsets were tested in accordance with BS 476-22 : 1987, Clauses 6 and 8. Doorset A achieved an integrity rating of 34 minutes, and Doorset B achieved an integrity rating of 24 minutes and an insulation rating of 24 minutes.

9.10 The intumescent fire seal LP1504DS was incorporated into two different specimens of single acting, single-leaf doorsets. Doorset A was glazed with non-insulating wired glass, and Doorset B was glazed with insulating glass. The doorsets were tested in accordance with BS EN 1634-1 : 2000. Table 3 shows the ratings achieved by each construction.

Table 3 Ratings achieved assessed in accordance with BS EN 1363-1 : 1999

	Rating	Construction	
		Doorset A	Doorset B
Integrity	Sustained flaming	31 minutes	20 minutes
	Gap gauge	38 minutes(1)	38 minutes(1)
	Cotton pad	21 minutes	20 minutes
Insulation	Area 1	31 minutes	20 minutes
	Areas 2 (vision panel)	3 minutes	20 minutes

(1) Test duration.

9.11 The intumescent fire seal reference LP1003 was tested in accordance with BS 476-23 : 1987. The tests were conducted as part of an ongoing durability programme in conjunction with other independent seal types. The results obtained are applicable for use on proven, single-acting, latched timber door assemblies of size up to that tested but not greater than 2100 mm by 926 mm at a thickness equal to the tested specimen. Under the test conditions, it was demonstrated that the sealing capacity of the intumescent material was sufficient to actively protect the gaps between door and frame for the required period of time. The results generated from these tests indicate that LP1003 can give an effective contribution to the fire resistance of the door assembly.

9.12 The results generated from the test work as detailed in sections 9.1 to 9.10 relate only to the behaviour of the specimen of the element of construction under the particular conditions of the tests. They are not intended to be the sole criteria for assessing the potential fire performance of the elements in use, nor do they reflect the actual behaviour in fires. Application of the results to specific assemblies should be the subject of design appraisal to ensure the required fire resistance can be obtained.

9.13 Tests in accordance with BS 476-22 : 1987, BS 476-23 : 1987 and BS EN 1634-1 : 2000 show that the intumescent seal expands under fire conditions. This action seals the gaps between the door and frame of the fire door construction restricting the passage of smoke and flames and contributing to the fire resistance of the construction. In the opinion of the BBA, it would seem reasonable to assume the product could also be used to resist the penetration of smoke and flames in other elements of construction such as glazed screens and partitions.

9.14 Intumescence of the seals takes place due to the heat-activated release of chemically bonded water. No other chemical reaction is involved.

9.15 It should not be assumed that installation of fire seals alone will guarantee fire resistance of any given period for a completed assembly. All aspects including seal size, door, doorframe, choices of lock and hinges should be considered as part of the design appraisal to ensure the completed assembly will satisfy the fire resistance period required.

10 Maintenance

The products, when installed in accordance with the recommendations and limitations laid down in this Certificate, will require minimum maintenance. Periodic inspection is recommended and cleaning when required. Brush seals particularly will respond to a damp cloth. Seals which have been mechanically damaged or contaminated with water should be replaced.

11 Durability

11.1 The intumescent material used in the seals is protected by an epoxy resin layer which will prevent the ingress of atmospheric moisture and carbon dioxide. In addition the material is encased in a PVC outer casing to protect the layer from abrasions. The product should remain effective for the lifetime of the assembly within which it is installed.

11.2 In a test monitored by the IFSA, the Certificate holder's fire seals were exposed to set temperature and humidity conditions for periods of 1, 2½, 5 and 10 years, and were tested to BS 476-23 : 1987, with no significant deterioration of the intumescent properties. Recent production has been tested to a draft European Technical Report, intended to become the criterion for CE marking for intumescent strips, and met its requirements.

Installation

12 General

The various types of Lorient Intumescent Fire Seals, Smoke Seals, Acoustic Seals and Retrofit Smoke Seals are recommended for fitting prior to installation of the door assembly, screen or partition.

13 Procedure

13.1 The intumescent fire seals, smoke seals and acoustic seals are fitted to the vertical and / or horizontal edges of the doors, partitions and screen. Alternatively the seals may be fitted to the edges of the component frame. In the case of a door assembly the seals are installed along the head and vertical edges, preferably in the frame. Seals are generally not fitted across the door threshold unless specified for smoke sealing or draught exclusion purposes.

13.2 Grooves suitable to accommodate the width and depth of the specified seal are machined into the edges of the component or component frame. The dimension of the groove must be sufficient to ensure that the installed seal is flush with the surrounding edge and will not impede any movement of the component.

13.3 The seals are supplied with a self-adhesive backing tape as standard to secure the seal in the groove.

13.4 The retrofit smoke seal IS1511 is installed by inserting the product into a machined groove, 3 mm wide and 4 mm deep.

13.5 Hinges, locks and plates, are applied after installation of the seal and accommodated by removing sections of the PVC casing using a sharp knife or suitable cutting device. Accessories are fitted through the remaining intumescent material.

13.6 The seals are supplied with square cut ends to allow butt jointing in length or at corners. The seals can be cut to the required length using a hacksaw or shears.

Positioning of the seals (see Figure 2)

13.7 Positioning of the seals must take into account distortion of the assembly that can occur under fire conditions. For installation in a door leaf the seal should be positioned centrally or towards the rebated edge. Using an increased seal width will minimise the effects of distortion.

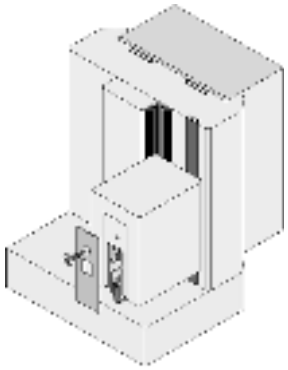
13.8 The seal specification can be adjusted to suit the fire-resistance period required, ie the longer the fire-resistance period required the greater the specification to be used. Increasing the width coverage in the door or frame edge will improve contact area of the expanded seal should the leaf distort away from the frame under fire conditions. Alternatively, two thinner seals may be used. This particular design will allow one seal to pass uninterrupted past the lock plate and hinges.

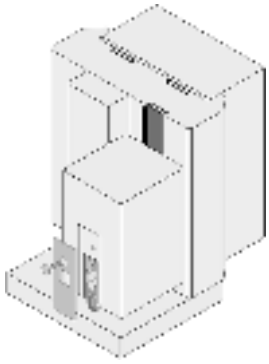
13.9 Double-leaf doors with rebated edges are generally unsuitable designs for fire resistance due to integrity losses which can be experienced with relatively small amounts of distortion on fire exposure.

13.10 Double-leaf doors incorporating unrebated meeting stiles require two seals. A smoke seal is used on one stile to compensate for the absence of a rebate. One seal only is required at heel position. Where longer periods of fire resistance are required, larger seals should be used as previously described.

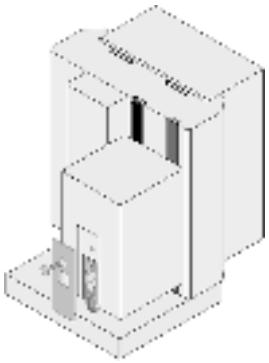
13.11 For sealing purposes, the flexible element of the smoke seal, ie the fin / brush pile, should not be interrupted at hinge positions, as shown in Figure 2. Also, where required for smoke sealing purposes, an appropriate smoke seal should additionally be fitted across the bottom of the door at the threshold position.

Figure 2 Position of seals

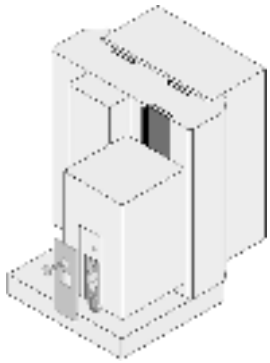




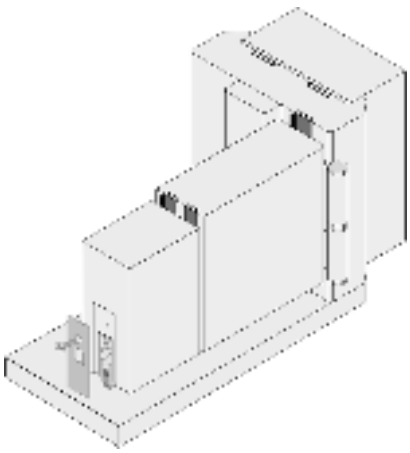
alternative solutions



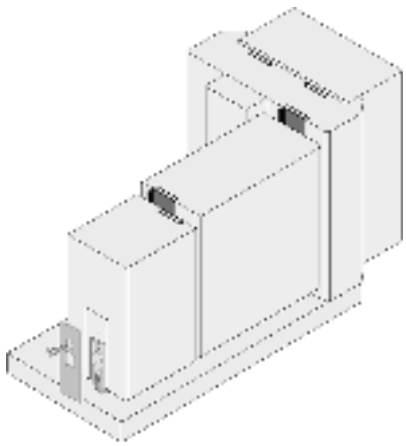
two thin seals for longer fire resistance period



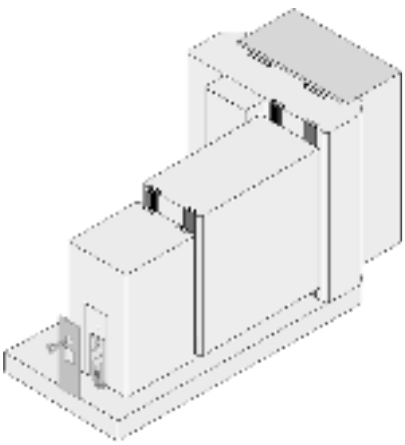
larger seal

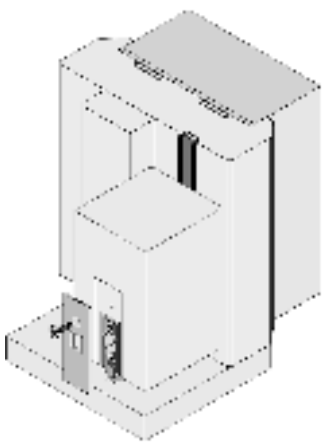


30 minute solution



double-leaf door seals





rebate styles are not recommended

Technical Investigations

The following is a summary of the technical investigations carried out on Lorient Intumescent Fire Seals, Smoke Seals, Acoustic Seals and Retrofit Smoke Seals.

14 Investigations

14.1 An assessment was made of the existing data relating to the long-term durability of the intumescent fire seals, including edge sealing properties and susceptibility to degradation by the atmosphere. In this respect, data generated from fire tests conducted on samples subjected to long-term exposure in a variety of atmospheric conditions were examined.

14.2 Test reports to BS 476-22 : 1987, BS 476-23 : 1987, BS EN 1634-1 : 2000 and the principles of BS 476-31.1 : 1983 were examined as part of this assessment.

14.3 Test data demonstrating the intumescent properties of the material were examined.

14.4 Test reports relating to the acoustic performance of acoustic seals were examined.

14.5 An assessment was made of the ease and practicability of installation.

14.6 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

14.7 A user survey of buildings where the seals have been installed was conducted. No failures or problems were reported to the BBA.

Additional Information

The Certificate holder has a range of intumescent seals in accordance with the procedure laid down in *Certifire Technical Schedule TS35* and *TS21*.

Bibliography

BS 476-22 : 1987 *Fire tests on building materials and structures — Methods for determination of the fire resistance of non-loadbearing elements of construction*
BS 476-23 : 1987 *Fire tests on building materials and structures — Methods for determination of the contribution of components to the fire resistance of a structure*
BS 476-31.1 : 1983 *Fire tests on building materials and structures — Methods for measuring smoke penetration through doorsets and shutter assemblies — Method of measurement under ambient temperature conditions*

BS 5588-1 : 1990 *Fire precautions in the design, construction and use of buildings — Code of practice for residential buildings*
BS 5588-5 : 1991 *Fire precautions in the design, construction and use of buildings — Code of practice for firefighting stairs and lifts*
BS 5588-6 : 1991 *Fire precautions in the design, construction and use of buildings — Code of practice for places of assembly*
BS 5588-8 : 1999 *Fire precautions in the design, construction and use of buildings — Code of practice for means of escape for disabled people*
BS 5588-10 : 1991 *Fire precautions in the design, construction and use of buildings — Code of practice for shopping complexes*
BS 5588-11 : 1997 *Fire precautions in the design, construction and use of buildings — Code of practice for shops, offices, industrial, storage and other similar buildings*

BS EN 1363-1 : 1999 *Fire resistance tests — General requirements*

BS EN 1634-1 : 2000 *Fire resistance tests for door and shutter assemblies — Fire doors and shutters*

Conditions of Certification

15 Conditions

15.1 This Certificate:

(a) relates only to the product that is named, described, installed, used and maintained as set out in this Certificate;

(b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;

(c) is valid only within the UK;

(d) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;

(e) is copyright of the BBA;

(f) is subject to English law.

15.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

15.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and / or fabrication including all related and relevant processes thereof:

(a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine; and

(c) are reviewed by the BBA as and when it considers appropriate.

15.4 In granting this Certificate, the BBA is not responsible for:

(a) the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product;

(b) the right of the Certificate holder to market, supply, install or maintain the product; and

(c) the actual works in which the product is installed, used and maintained, including the nature, design, methods and workmanship of such works.

15.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the installation and use of this product.

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

In the opinion of the British Board of Agrément, Lorient Intumescent Fire Seals, Smoke Seals, Acoustic Seals and Retrofit Smoke Seals are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 92/2841 is accordingly awarded to Lorient Polyproducts Ltd.

On behalf of the British Board of Agrément

Date of Third issue: 6th June 2005

Chief Executive

**Original Certificate issued on 9th March 1993. This amended version issued to include revised national Building Regulations, the inclusion of the Lorient Acoustic Seal and new* Conditions of Certification.

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