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Testing. Advising. Assuring.

Title:

Air Leakage Tests in Accordance with BS EN 1634-3 : 2004 on a Single-Acting, Single-Leaf timber Doorset

WF Report No:

384810/6

Prepared for:

Exitex Ltd
Mountpleasant,
Dundalk,
Co Louth.

Date: 20th February 2018

Notified Body No:

0833

UKAS TESTING

Summary

Objective

To evaluate the performance of a single-acting, single-leaf, timber doorset when fitted with a drop down threshold seal, and subjected to tests utilising the test method detailed within BS EN 1634 -3: 2004 Clause 3.1.2 at ambient temperature

Approved Document B (Fire Safety) of the Building Regulations requires doorsets shall "meet the additional classification requirement of S_a when tested to BS EN 1634-3: 2004 Fire resistance tests for door and shutter assemblies, Part 3 – Smoke control doors".

The classification requirement of S_a is specified within EN 13501-2:2016 as "when the maximum leakage rate measured at ambient temperature, and at a pressure of up to 25 Pa, does not exceed $3m^3/h$ per metre length of gap between the fixed and moveable components of the doorset (e.g. between the door leaf and door frame), excluding leakage at the threshold."

The threshold gap should be sealed by a seal either with a leakage rate not exceeding 3 $m^3/m/h$ at 25 Pa or just contacting the floor.'

In the absence of other criteria, this guidance has been adopted in reporting the results of this test. The leakage rates at other pressures are also included in this report.

Test Sponsor

Exitex Ltd, Mountpleasant, Dundalk, Co Louth.

Summary of Tested Specimen

The specimen doorset had overall nominal dimensions of 2080 mm high by 990 mm wide and incorporated a door leaf of overall dimensions 2040 mm high by 926 mm wide by 44 mm thick.

The doorset was fixed within a plywood faced, timber studded partition, to form the test construction. The doorset was tested latched, for the test.

The doorset was fitted with a dropdown seal which ran the full width of the threshold. It incorporated a TPE gasket within an aluminium carrier and screw fixed within a slot along the bottom edge of the door leaf. The drop down seal is referenced as Concealex A8100 Superior.

Full details of the exact manner of installation are included in the Schedule of Components.

Test Results

Leakage through the threshold only. All perimeter edges sealed.

Pressure (Pa)	Leakage Rate ($m^3/m/h$) (Positive)	Leakage Rate ($m^3/m/h$) (Negative)	Leakage Rate (m^3/h) (Positive)	Leakage Rate (m^3/h) (Negative)
10 Pa	1.39	1.05	1.39	1.05
25 Pa	**1.86**	**1.58**	**1.86**	**1.58**
50 Pa	1.90	2.34	1.90	2.34

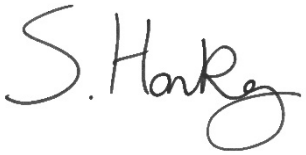
Date of Test

The test was conducted on the 13th June 2017.

Signatories

Responsible Officer
C.Hoyle*
Technical Officer

Approved
S. Gilfedder*
Test Report Co-Ordinator



Head of Department
S.Hankey
Business Unit Head

* For and on behalf of **Exova Warringtonfire**.

Report Issued

Date : 20th February 2018

Contents

Page No.

Test Procedure

Introduction

The specimen was required to provide a smoke leakage separating function and was therefore tested in accordance with BS EN 1634-3: 2004 'Fire resistance tests for doors and shutter assemblies - Part 3: Smoke control doors and shutters'. This test report should be read in conjunction with that Standard and with BS EN 1363-1: 1999, 'Fire resistance tests - Part 1: General requirements'

Certain aspects of some test specifications are open to different interpretations. The Fire Test Study Group has identified a number of such areas and has agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Group. Where such Resolutions are applicable to this test they have been followed.

Instruction to test

The test was conducted on the 13th June 2017 at the request of **Exitex Ltd**.

Test Specimen Construction

A comprehensive description of the test construction is given in the Schedule of Components. The description is based on a detailed survey of the specimen and information supplied by the sponsor of the test.

Installation

The specimen door was supplied by the test sponsor on the 10th May 2017. A representative of Exova Warringtonfire installed the doorset on the 13th June 2017.

Test Equipment

The test was conducted utilising a steel framed air leakage test chamber with one vertical open side. The specified differential pressures achieved via an inlet/outlet fan connected to an air flow measuring pipe with integral anemometer measuring head. Pressure within the test chamber was recorded by means of a digital manometer.

Preparation

The test was conducted in accordance with the requirements specified in the principles of BS EN 1634-3:2004.

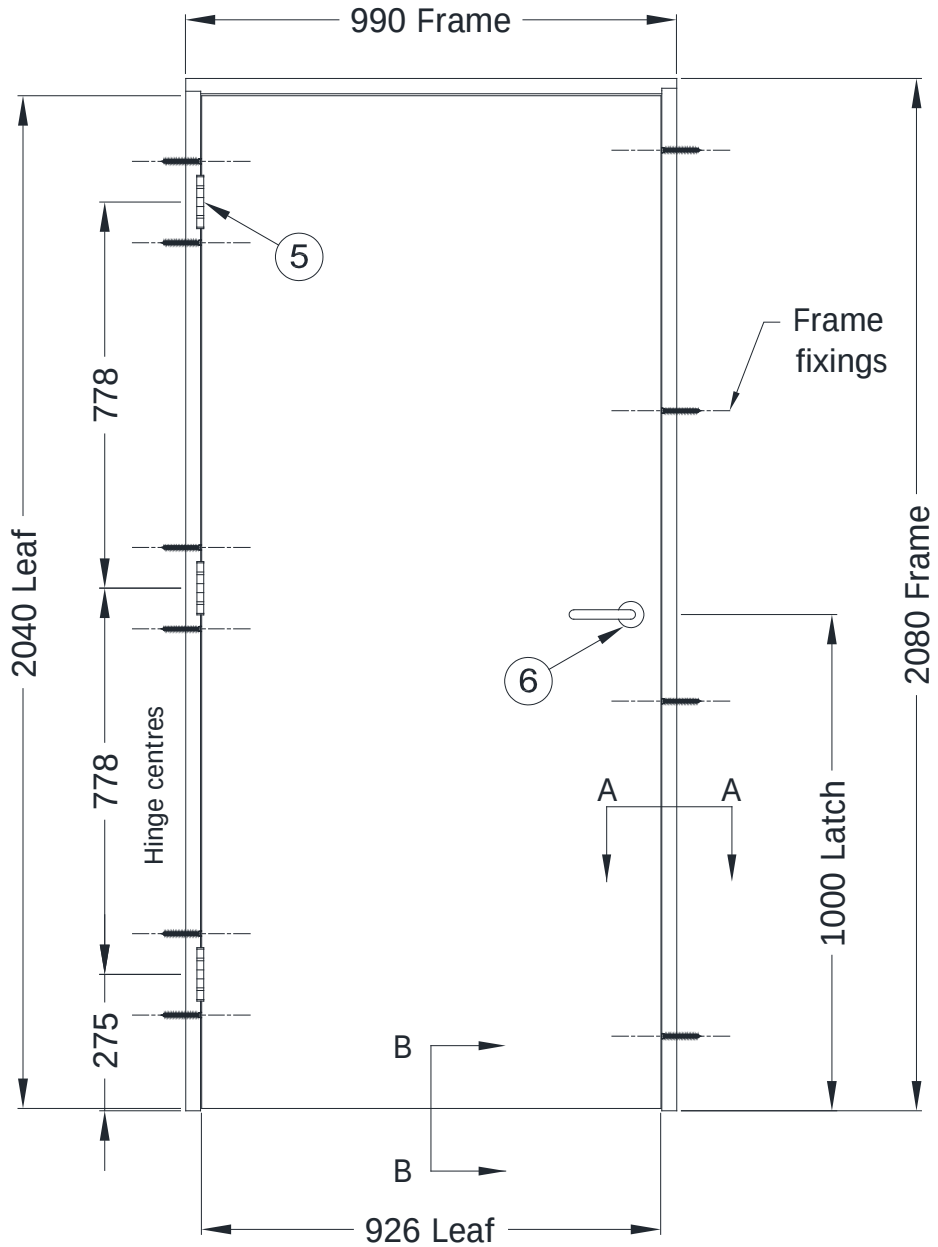
Prior to test the gaps between the leaf and the frame and between the face of the leaf and the doorstop were measured and the values recorded. The door gaps were then sealed and the differential pressures were applied. The leakage rates measured were recorded as the base rig leakage. The door gaps were then unsealed (except the threshold) and the leakage measured at the same differential pressures. The above procedure was then repeated with the airflow in the opposite direction.

Sampling

Exova was not involved in any selection or sampling procedures of the specimens or any of the components.

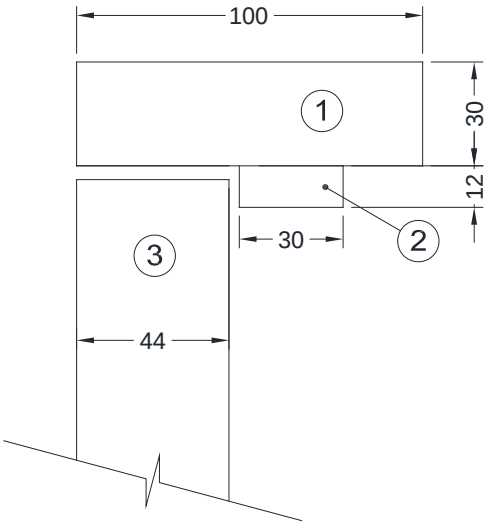
Test Construction

Figure 1- General Elevation of Doorset

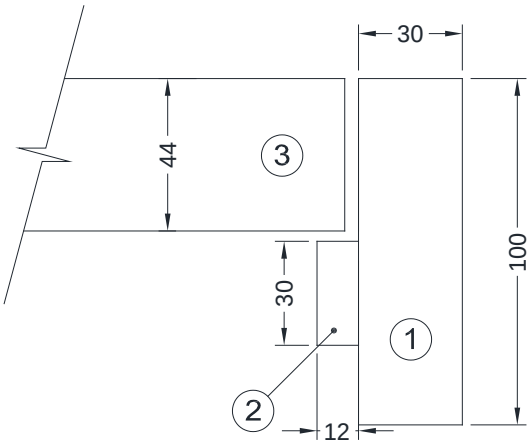


GENERAL ELEVATION OF TEST DOORSET

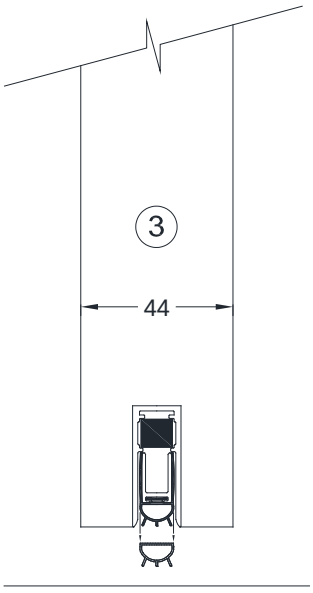
Figure 2 – Typical Section Through Test Construction



TYPICAL SECTION THROUGH
HEAD OF DOOR



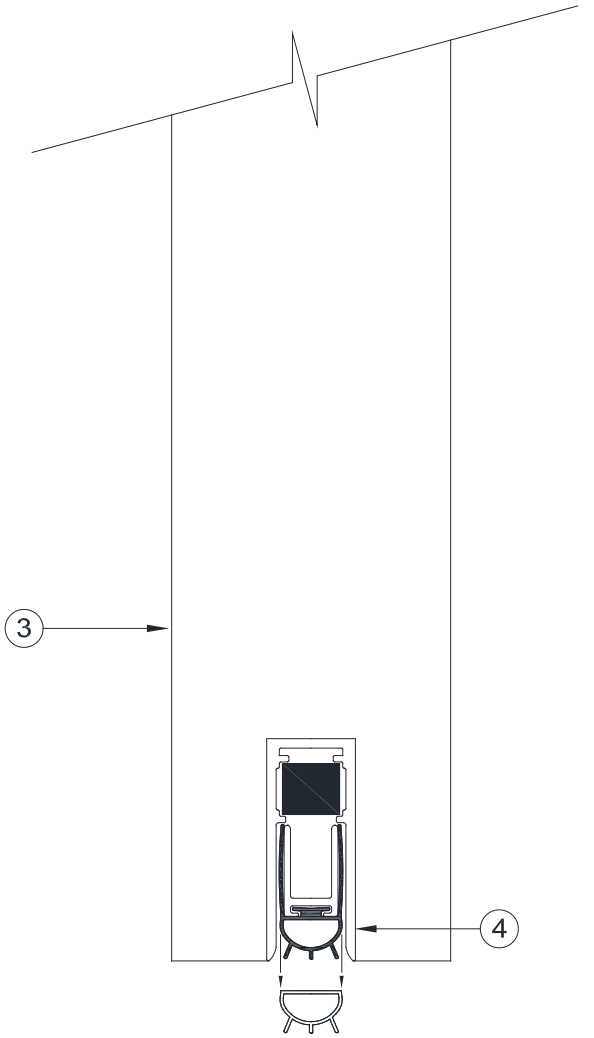
TYPICAL SECTION THROUGH
JAMB OF DOOR



TYPICAL SECTION THROUGH
DOOR BASE

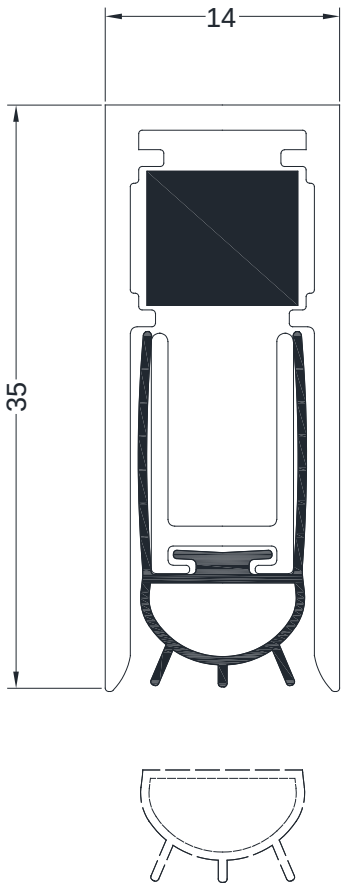
Do not scale. All dimensions are in mm

Figure 3 – Typical Section Through Bottom Edge of Door Leaf



TYPICAL SECTION B - B THROUGH
BOTTOM EDGE OF DOOR LEAF

Figure 4 – Details of Test Specimen



CONCEALEX A8100 SUPERIOR

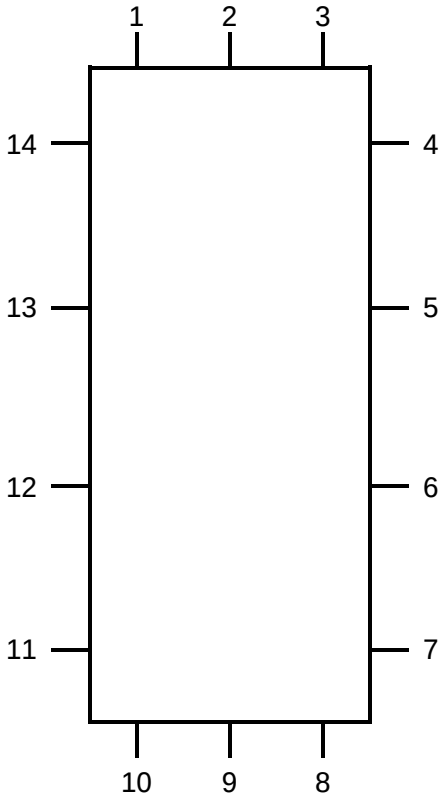
Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figure 1)
(All values are nominal unless stated otherwise)
(All other details are as stated by the sponsor)

Item		Description
1. Door Frame, Jamb & Head		
Material	:	Medium Density Fibreboard (MDF)
Fixing method	:	4 No. screws equally spaced along closing jamb 6 No. screws along hinged jambs (2 No. screws at 170 mm centres, about each hinge position)
2. Planted Stop		
Material	:	Medium Density Fibreboard (MDF)
Overall section size	:	12 mm deep x 30 mm wide
Fixing method	:	30 mm long steel screws at 300 mm centres along door frame, jambs and head
3.Door Leaf		
Manufacturer	:	Vicaima
Reference	:	Vicaima FD30 (Standard Duty Core) Timber Door
BWF Certifire No.	:	CF218 A4408074 FD30
Overall size	:	926 mm wide x 2040 mm high x 44 mm thick
Construction		
i. stiles and rails	:	Softwood
ii. faces	:	Plywood
iii. lippings	:	Hardwood, 5 mm thick to the vertical edges only
4. Drop Down Seal		
Manufacturer	:	Exitex Ltd
Reference	:	Concealex A8100 Superior
Materials		
i. carrier	:	Aluminium
ii. gasket	:	Co-extruded thermoplastic elastomer (TPE)
Overall section size	:	14 mm wide x 35 mm thick
Fixing Method	:	Screw fixed within a slot along the bottom edge of the door leaf
5. Hinges		
Manufacturer	:	D.P.Garg
Reference	:	CF714
Type	:	“Tuff” Butt hinge
Primary Material	:	Steel
Quantity	:	3 No. Hinges
Overall size	:	102 mm long x 30 mm wide x 3 mm thick blades
Fixing Method	:	4 No. countersunk head steel woodscrews
Intumescent Bedding Material	:	None
6. Latch / Lever handleset		
Reference	:	Eurospec
Primary Material	:	Steel
Overall size		
i. latch strikeplate	:	65 mm long x 25 mm wide
ii. forend plate	:	60 mm long x 25 mm wide

Doorset Clearance Gaps



Gap Dimension in mm at Positions													
1	2	3	4	5	6	7	8*	9*	10*	11	12	13	14
3.1	2.7	2.9	4.6	3.6	3.2	3.2	7.4	6.9	5.2	3.4	3.2	3.2	3.5
Mean		3.3		Maximum			4.6		Minimum			2.7	

* Dimension not included in calculations

Test Data and Information

General

The following data which was recorded during the tests is included in the report:

- Tables of the leakages through the specimen at specified pressure differentials.
- Graphs of the leakages through the specimen at specified pressure differentials.

The ambient air temperature in the vicinity of the test construction for the test was 20°C with a maximum variation of ±2°C, during the tests.

Leakage Calculation

The readings were corrected for each leakage measurement to a reference temperature of 20°C and standard atmospheric pressure (1 atmosphere equals 101325 Pa) utilising the following formula:

$$Q = Qa \times \frac{(Pa + p)}{101325} \times \frac{293.15}{(Ta + 273.15)} \times 1 - 0.3795 \times \frac{Mw}{100} \times \frac{Es}{Pa + p}$$

Where Q = Adjusted rate of air flow (m^3/h)

Qa = Measured rate of airflow (m^3/h)

p = Pressure increase (Pa)

Pa = Barometric Pressure (Pa)

Ta = Air temperature (°C)

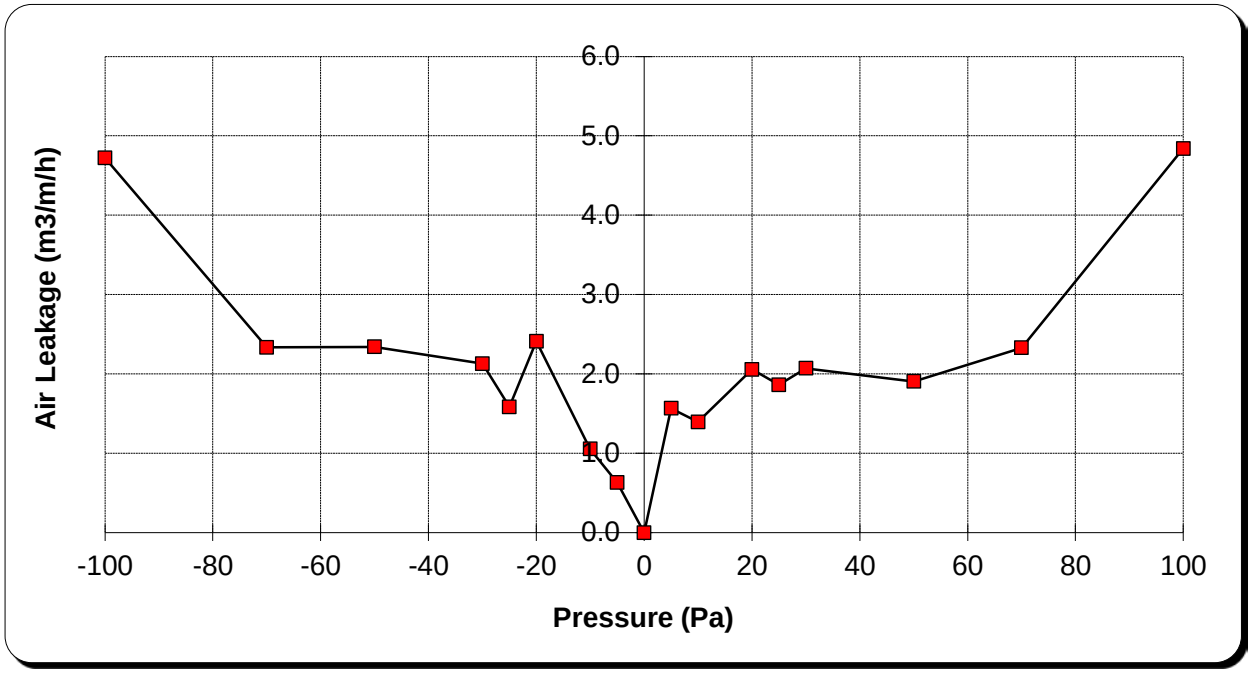
Mw = Relative Humidity (%)

Es = Saturated water vapour pressure (Pa)

Leakage Data

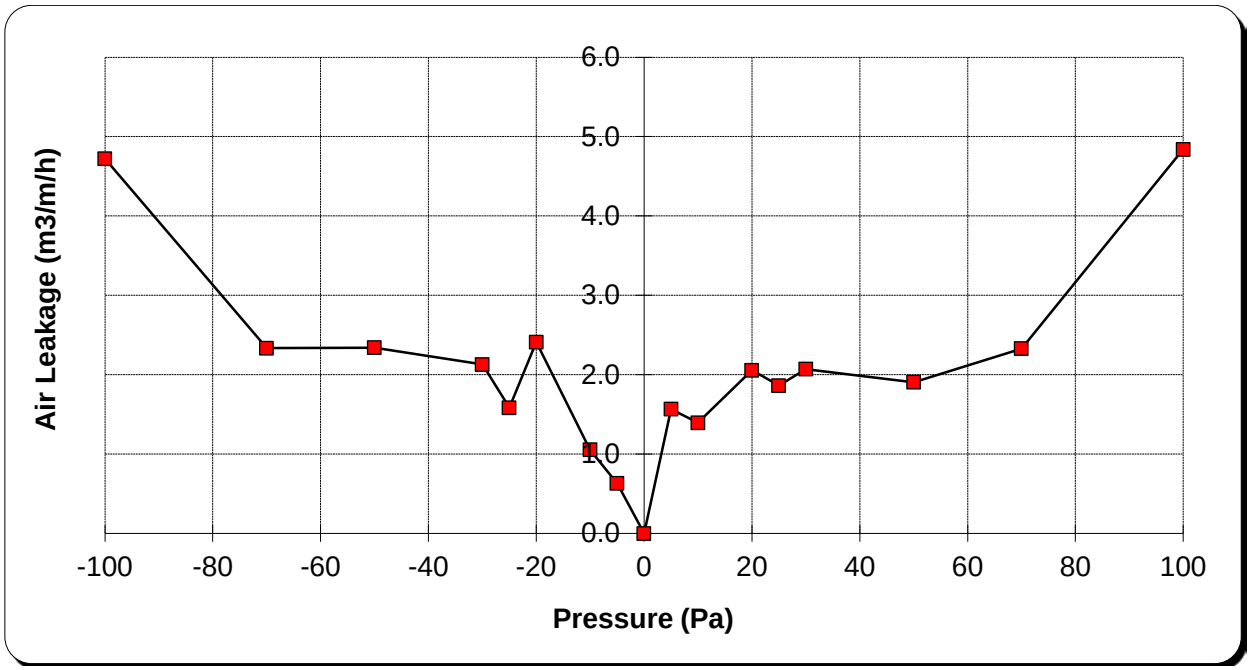
Net Leakages Per Metre of Perimeter Gap at Specified Pressure differentials with only the Threshold sealed.

Pa	$m^3/m/h$
-50	2.34
-25	**1.58**
-10	1.05
0	0.00
10	1.39
25	**1.86**
50	1.90



Corrected Air Leakage measured during the Test with only the Threshold sealed.

Pa	m^3/h
-50	2.34
-25	**1.58**
-10	1.05
0	0.00
10	1.39
25	**1.86**
50	1.90



Performance Criterion

General

Approved Document B (Fire Safety) of the Building Regulations requires doorsets shall "meet the additional classification requirement of Sa when tested to BS EN 1634-3: 2004 Fire resistance tests for door and shutter assemblies, Part 3 – Smoke control doors".

The classification requirement of Sa are specified within EN 13501-2:2016 as "when the maximum leakage rate measured at ambient temperature, and at a pressure of up to 25 Pa, does not exceed 3m3/h per metre length of gap between the fixed and moveable components of the doorset (e.g. between the door leaf and door frame), excluding leakage at the threshold."

The threshold gap should be sealed by a seal either with a leakage rate not exceeding 3 m^3/m/h at 25 Pa or just contacting the floor.'

In the absence of other criteria, this guidance has been adopted in reporting the results of this test. The leakage rates at other pressures are also included in this report.

Ongoing Implications

Limitations

The results relate only to the behaviour of the specimen under the particular conditions of test.

The test results relate only to the specimen tested incorporating the seal configurations used. Application of the results to specimens of different dimensions or incorporating different components should be the subject of a design appraisal.

The dimensions of the gaps between the leaf and frame were measured and are detailed earlier in this report. The results of these tests are, therefore, limited to doorsets where the gap dimensions are similar to, but do not exceed those detailed in this report for the relevant seal.

The classification requirement of S_a are specified within EN 13501-2:2007 as "when the maximum leakage rate measured at ambient temperature, and at a pressure of up to 25 Pa, does not exceed 3m^3/h per metre length of gap between the fixed and moveable components of the doorset (e.g. between the fabric curtain and the side guides and top box), excluding leakage at the threshold."

In the absence of other criteria, this guidance has been adopted in reporting the results of this test. The leakage rates at other pressures are also included in this report.

Conclusions

Evaluation against objective

A specimen of a single-acting, single-leaf doorset was fitted with a dropdown seal which ran the full width of the threshold. It incorporated a TPE gasket within an aluminium carrier and screw fixed within a slot along the bottom edge of the door leaf. The drop down seal is referenced as Concealex A8100 Superior. It has been subjected to tests in accordance with BS EN 1634-3: 2001.

The performance of the specimen was assessed against the criteria detailed within the Standard and the following results obtained:

Test Results

Threshold Sealed

Pressure (Pa)	Leakage Rate ($m^3/m/h$) (Positive)	Leakage Rate ($m^3/m/h$) (Negative)	Leakage Rate (m^3/h) (Positive)	Leakage Rate (m^3/h) (Negative)
10 Pa	1.39	1.05	1.39	1.05
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