

Ref: BMT/FEI/F14030

28 July 2014

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**Test reference: BMT/FEI/F14030**

**Re: Indicative Fire Resistance Test utilizing the temperature and pressure conditions of BS 476: Part 20: 1987 and the principles of BS 476: 22: 1987 (and current FTSG Resolutions where applicable)**

This letter is to confirm the results of an indicative fire resistance test undertaken on 6<sup>th</sup> May 2014. The specimen consisted of a door leaf section hung within a PVC frame.

**Details of the test specimen**

The leaf measured 1200mm high x 785mm wide x nominally 45mm thick

**Unexposed face prior to testing**



## Introduction

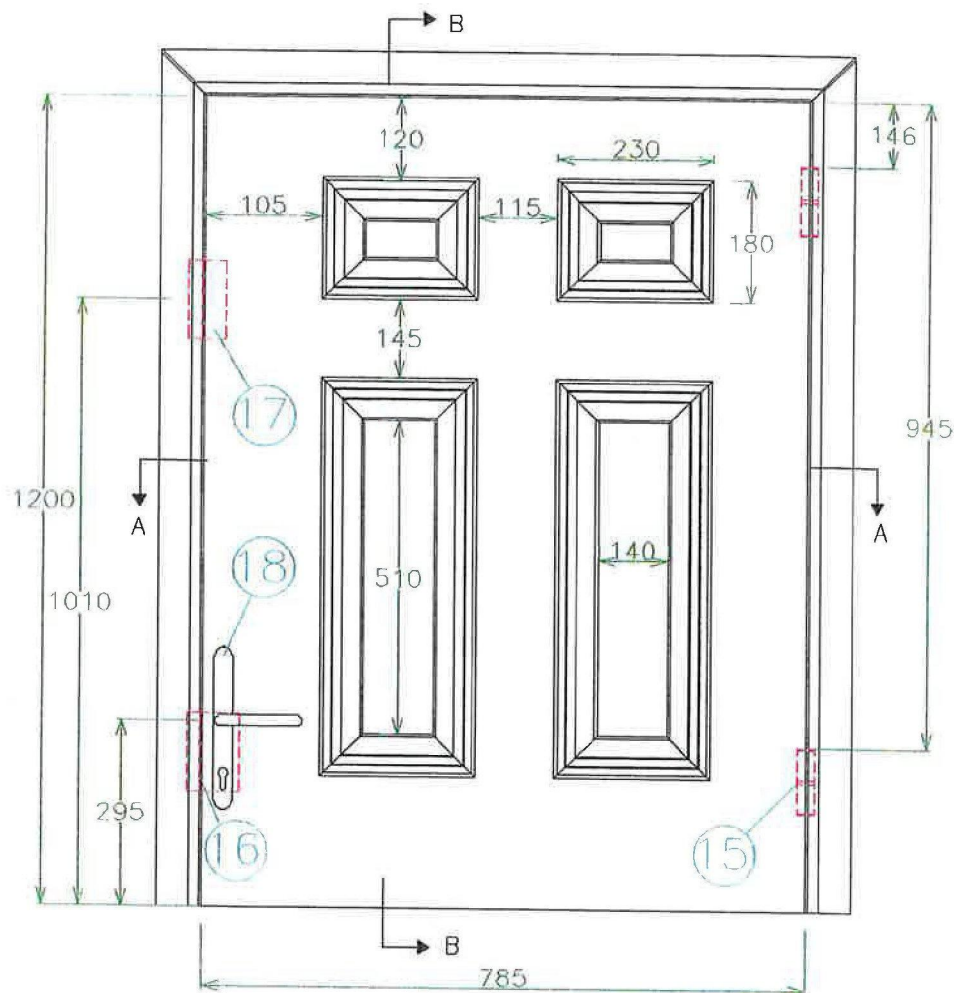
The specimen was supplied for test by the client and delivered during May 2014. BM TRADA installed the specimen into a timber stud plasterboard clad supporting construction within a refractory lined steel restraint frame mounted on the front of a 1.5m x 1.5m vertical furnace.

## Supporting construction

The supporting construction consisted of a C16 grade softwood timber stud frame, nominally 95mm deep x 45mm wide, clad on the furnace side only with 2No layers of nominally 15mm thick type F plasterboard. Drywall screws were used to fix the plasterboard at a maximum 300mm centres. The screw length was selected to achieve a minimum of 10mm penetration into the timber studs / track.

## Description of construction

### Front elevation showing hardware positions



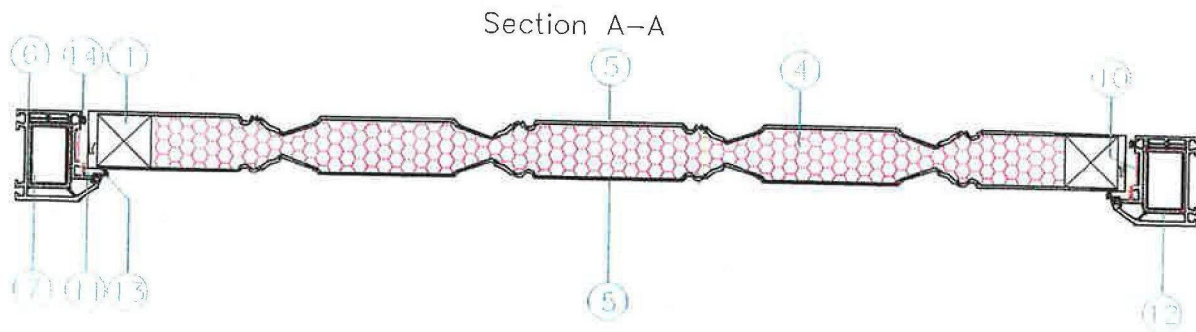
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Leaf – identified as a trimmed Nan Ya FD60 door blank

		Species/type	Dimensions (mm)	Density (kg/m³)	Key to figures
Stiles	Inner	#Mixed wood finger jointed lamels	30 wide x 40 thick	490 - 600*	1
	Outer – removed	-	-	-	-
Top rail (bottom rail removed)	Inner	#Mixed wood finger jointed lamels	30 wide x 40 thick	490- 600*	2
	Outer	#Mixed wood finger jointed lamels	70 wide x 40 thick	490- 600*	3
Core		Phenolic foam	41 thick reducing to 26 thick at fielded areas	90*	4
Facings		Interlocking GRP – 9mm wide interlocking detail	2 thick	-	5
Adhesive	Stiles and rails	PU	-	-	-
Lippings		None fitted – leaf edge trimmed back to the interlock of the facings	-	-	-

#Mixed wood consisting of Pine, Acasia and Styra \* Density stated by manufacturer, not verified by laboratory

Horizontal cross section

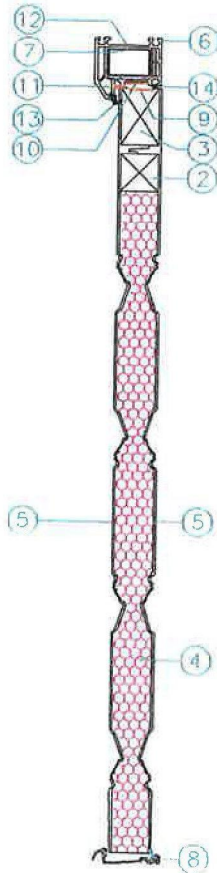


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## Door frame

	Species/type	Dimensions (mm)	Density (kg/m <sup>3</sup> )	Moisture (% w/w)	Key to figures
Head & jambs	PVCu LB Plastics 7000 range SR77950	70 wide x 70 deep including a 23 high x 21 wide integral stop	-	-	6
Frame reinforcement	Steel box section Product reference S119	30 x 35 x 1.5 thick	-	-	7
Stops – Integral	-	-	-	-	-
Frame corner jointing detail	Mitred – plastic welded	-	-	-	-
Frame to supporting construction fire stopping detail	Tightly packed rock mineral fibre capped with intumescent acrylic mastic	Nominally 5-10mm wide x 10-15 deep	-	-	-
Frame to supporting construction fixing detail	3 No steel wood screws per jamb	No 10 x 80 long at nominally 600-800 centres	-	-	-
Architrave	None fitted	-	-	-	-
Threshold	Stormguard Masterguard threshold	75 wide x 30 high	-	-	8

## Vertical cross section



Section B-B

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### Intumescent and sealing materials

	Make/type	Size (mm)	Location	Key to figures
Door edges – head only	Sealed Tight 25X2.5	25 x 2.5	Fitted centrally in the leaf head only	9
Frame reveal – head and vertical edges	Sealed Tight 25x2.5	25 x 2.5	Fitted in the rebate of the frame reveal profile	10
	Sealed Tight 10x2.0	10 x 2	Fitted up to the upstand of the stop in the frame reveal	11
Around frame reinforcement	Sealed Tight flexible graphite	1 thick	Fitted on outer faces of the frame reinforcement	12
Weather seal	Qlon Aquamac 21 weather seal	7 wide x 5 high	Fitted in the upstand of the stop	13
	2No. Brush Seal Ref SW73144	4.8 base plate x 7.5 high pile	Fitted in the profile of the frame reveal	14

### Intumescent interruptions and additional protection

	Make/type	Size (mm)	Location
Around hinges	Fully interrupted	-	Hinge blade fully interrupts 1 <sup>st</sup> seal in frame reveal leaving 2 <sup>nd</sup> seal continuous
Under hinge blade	Sealed Tight flexible graphite	1 thick	Fitted under the hinge blade on the frame
	Sealed Tight flexible graphite	3 thick	Fitted under the hinge blade on the leaf
Encasing lock/latch body	None fitted	-	-
Under latch forend and latch body cut outs	Sealed Tight flexible graphite	10 x 2	Fitted under the latch forend and latch body cut outs
Around latch and hook bolt keeps	Fully interrupted	-	Latch keeps fully interrupts seal in frame reveal
Under latch keep/lining hook bolt pocket	Sealed Tight flexible graphite	1 thick	Fitted under the latch keep and lining the hook bolt keep pocket

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## Hardware

	Make/type	Size (mm)	Location	Key to figures
Hinges	2 No. Masterdor bearing butt type stepped hinges	101 x 35 (blade size)	Fitted 146mm and 945mm from the head of the leaf	15
Closer	None fitted	-	-	-
Lock/latch – engaged	Winkhaus AV2 multi point lock/latch with Eurocylinder	1130 x 20 (forend size)	Latch fitted 295mm from the threshold of the leaf	16
		235 x 30 (latch keep size)	Fitted appropriate to the latch	
		230 x 25 (hook bolt keep size)	Fitted 1010mm from the threshold of the leaf	17
Furniture	Hoppe lever type handle	235 x 30 (footprint size)	Fitted appropriate to the lock/latch	18

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## Pre-test measurements

### Door perimeter gaps

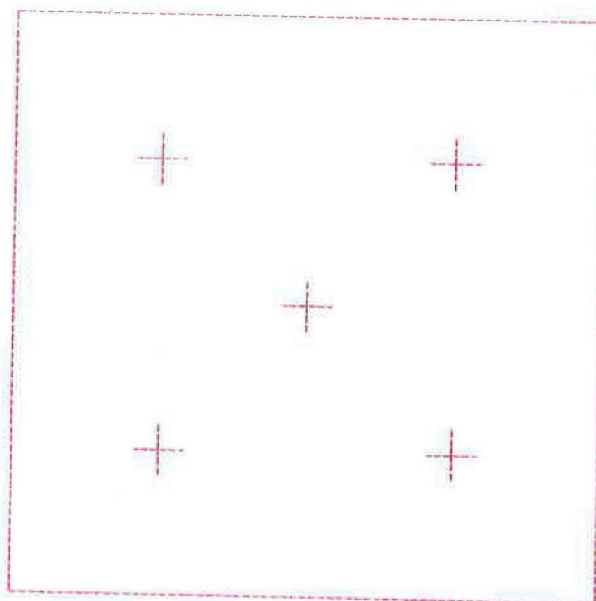
The manufacturer did not declare a working range so the door was installed to open and close freely, maintaining gaps, where possible, to a range of 2-4mm along all edges. The leaf to frame gaps were measured prior to test, the measurements are shown below.

### Test conditions

The furnace temperature was measured using the average of 5No furnace thermocouples. The temperature and pressure were controlled to the conditions outlined in BS 476: Part 22: 1987.

The furnace pressure was maintained at 5.75Pa, equating to 8.3Pa at the head of the specimen.

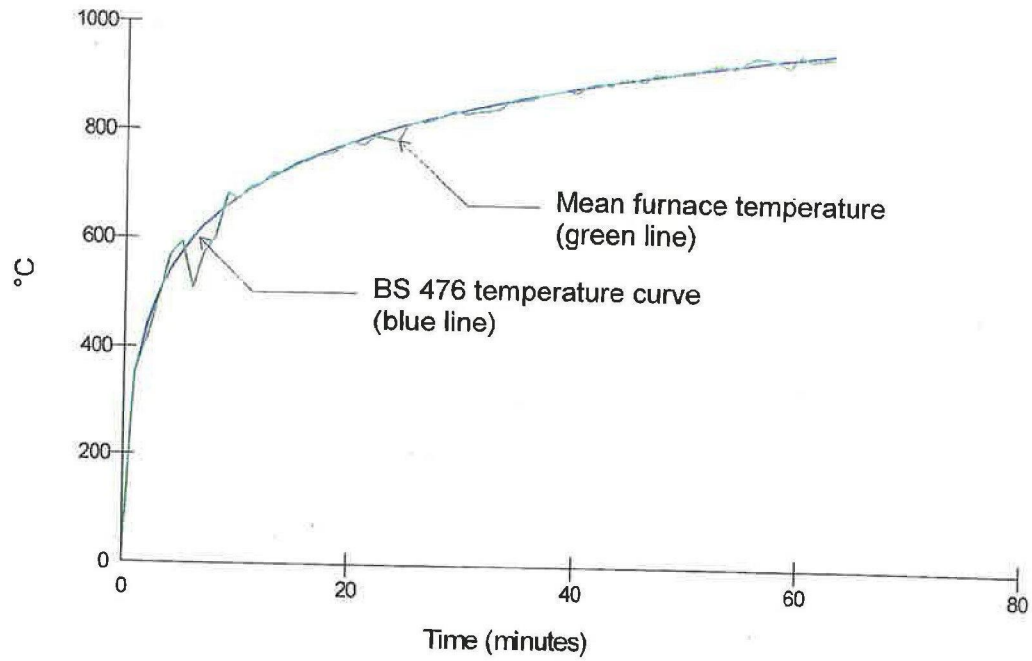
The ambient temperature of the laboratory at the start of the test was 17°C.



+ : Furnace Thermocouples

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# Furnace temperature curves

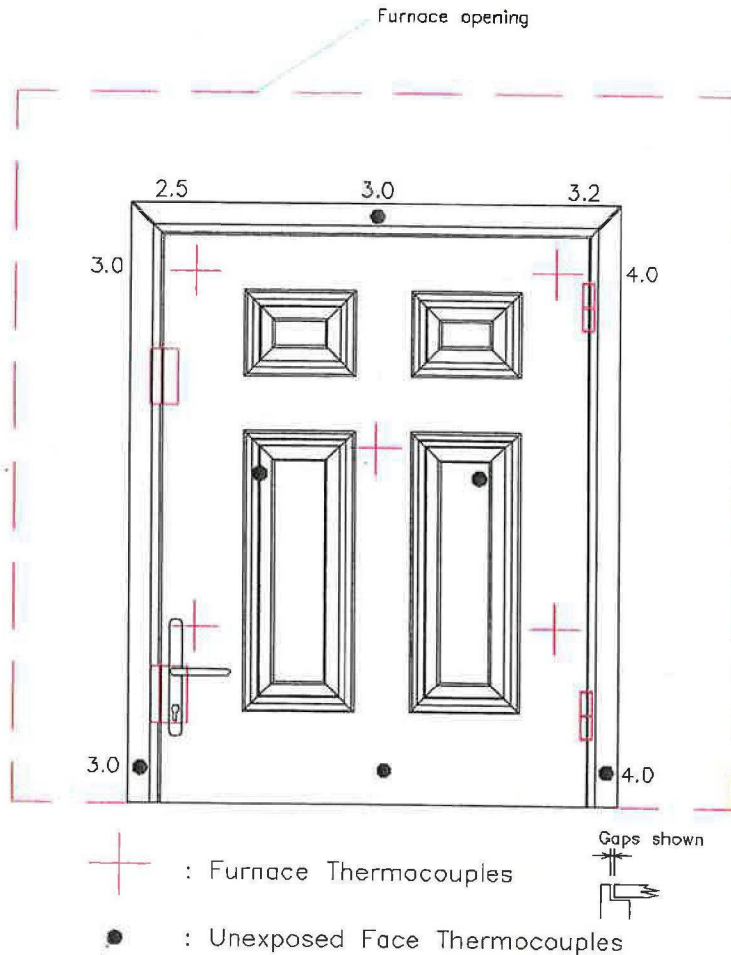


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## Unexposed face thermocouples and leaf/frame perimeter gaps

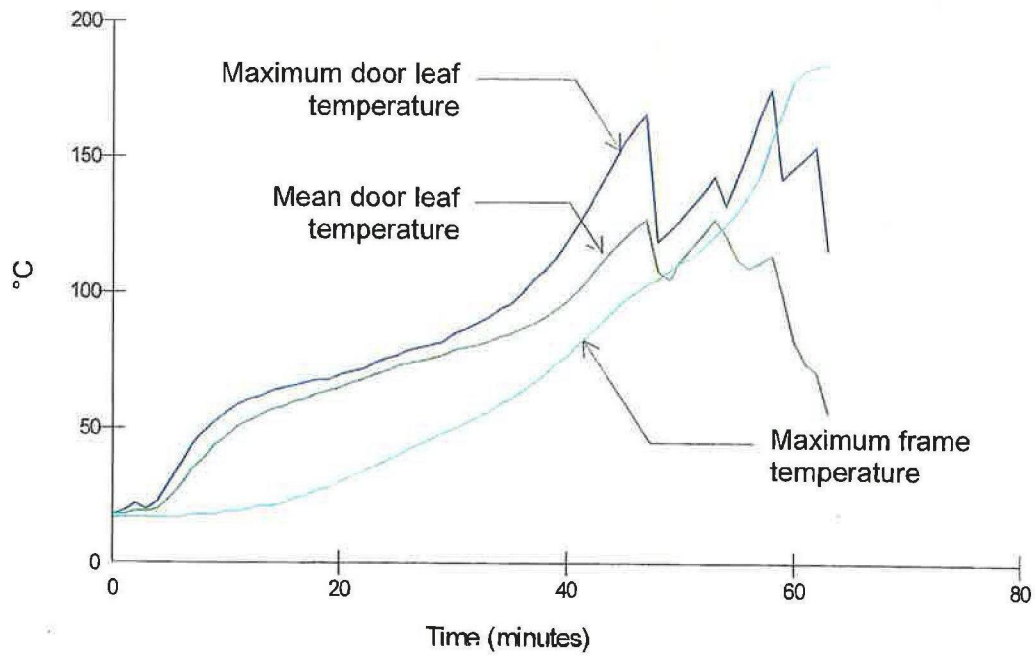
The temperature of the unexposed face of the doorset was monitored by means of three thermocouples fixed to the frame and three thermocouples fixed to the leaf. The locations of the thermocouples are shown below. The temperatures recorded are shown graphically below.

The leaf to frame gaps were measured prior to test, the measurements are shown below and are recorded in millimetres.



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# Unexposed face temperature curves



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# Photographs

At start of test



At 15 minutes



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At 30 minutes



At 45 minutes

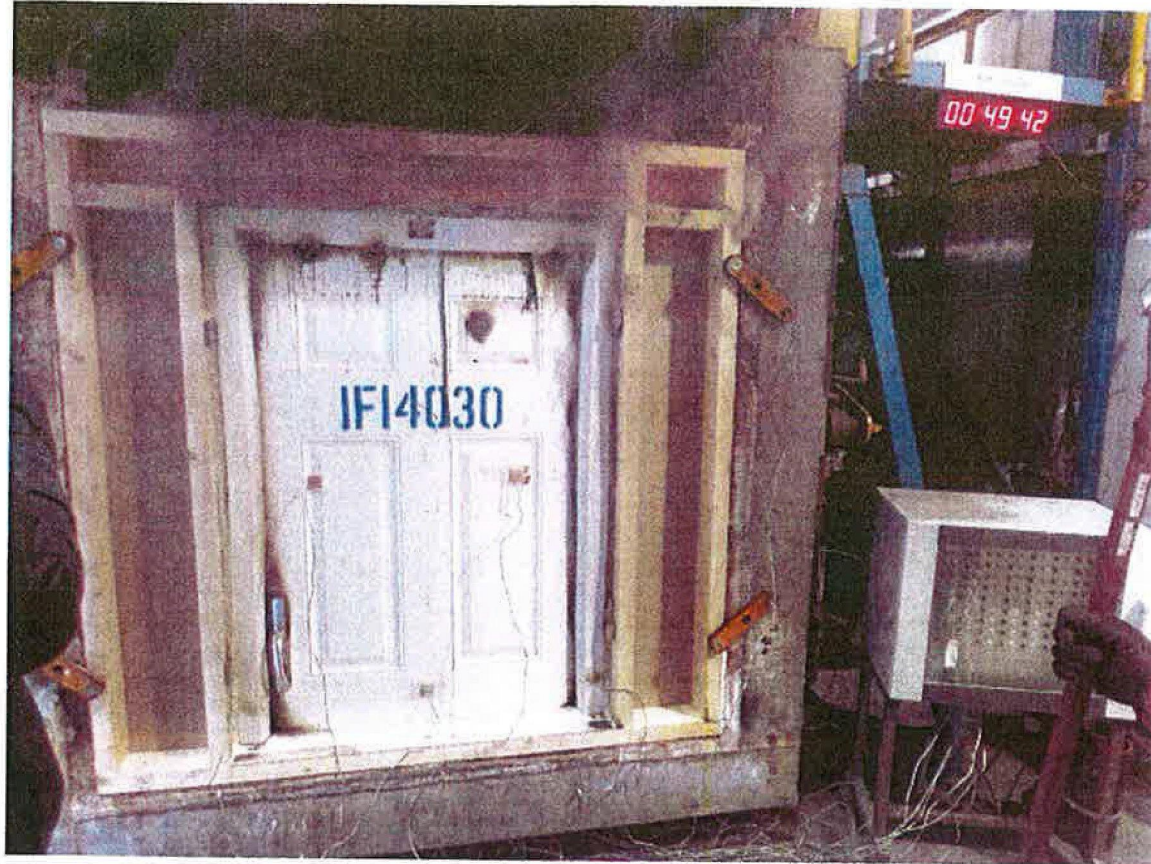


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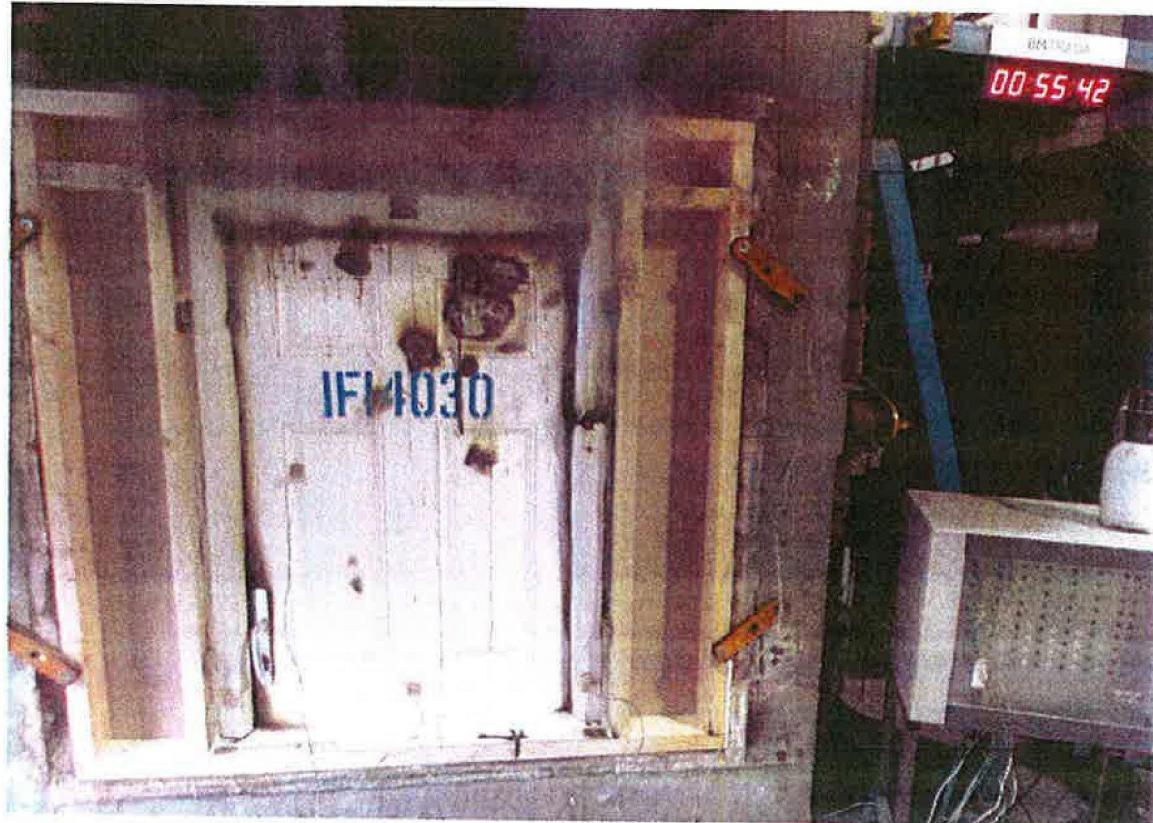
Test for: LB Plastics Ltd  
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After 49 minutes



After 55 minutes



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After 60 minutes



After 62 minutes



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## Observations

All comments refer to the unexposed face unless stated otherwise.

Time (minutes)	
00.00	Test started.
02.45	There is smoke issuing from the top hinge position.
03.10	Smoke is issuing from the top half of the closing edge.
04.00	Smoke is issuing from the hanging edge.
05.40	There is discolouration to the leaf at the top hanging corner.
06.10	Smoke is issuing from the latch position.
07.15	Smoke is issuing from the top closing corner and from across the head of the leaf.
07.40	There is discolouration at the top closing corner of the leaf.
08.15	There is discolouration of the leaf at the latch position.
08.40	There is discolouration across the head of the leaf.
09.15	The smoke issuing from the top hanging corner of the leaf has increased.
09.50	The smoke issuing from the top closing corner of the leaf has increased.
11.20	The smoke issuing from the leaf's latch position has increased.
13.10	There is discolouration to the leaf at its bottom hinge position.
13.50	There is further discolouration to the leaf at the top hanging corner.
15.00	The smoke issuing from across the head of the leaf has increased.
15.40	There is discolouration to the frame near both the top hanging and top closing corners of the leaf.
16.10	The smoke issuing from the bottom hinge position has increased.
18.50	There is further discolouration across the head of the leaf.
20.40	There is discolouration around the handle.
25.10	There is further discolouration to the leaf at its latch position.
28.57	The seal is starting to fall out of the frame head.
35.00	Both the top hanging and top closing corners of the leaf have deflected inwards by approximately 10-12mm

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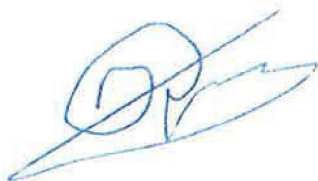
- 40.00 The smoke issuing from the top closing corner and the top half of the hanging edge, has increased.
- 41.00 Smoke is issuing from the perimeter of the handle.
- 43.40 The head of the frame is starting to drop at its centre.
- 44.30 The frame jambs are beginning to melt and distort.
- 47.45 There is discolouration to the perimeter of the leaf's panels.
- 50.00 Charring is evident at the top right panel.
- 50.30 A glow is visible at the top right panel.
- 50.45 A cotton pad integrity test was carried out the top right panel. No failure is observed.
- 51.10 There is smoke issuing from a crack in the bottom right panel.
- 52.00 The smoke issuing from the perimeter of the leaf has increased.
- 52.15 There has been discolouration to the leaf around the top right panel.
- 53.00 Multiple hot spots are appearing across the leaf.
- 53.30 There is a glow visible through the frame at the hanging edge.
- 53.50 A cotton pad integrity test was carried out at the right jamb. No failure is observed.
- 55.30 A cotton pad integrity test was carried out at the right jamb. No failure is observed.
- 56.00 There is a glow visible at the top hanging corner of the leaf.
- 56.30 The smoke issuing from across the leaf has increased.
- 57.49 There is flaming in excess of 10 seconds across the head of the leaf.
- 60.20 A cotton pad integrity test was carried out at the right jamb. No failure is observed.
- 61.45 There is further discolouration across the face of the leaf.
- 62.50 There is intermittent flaming from the right frame jamb.
- 63.20 There is flaming in excess of 10 seconds from the right frame jamb.
- 63.30 Testing terminated.

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**Primary Observations**

<b>Time (minutes)</b>	<b>Comments</b>
50.30	A glow is visible at the top right panel.
56.00	There is a glow visible at the top hanging corner of the leaf.
57.49	There is flaming in excess of 10 seconds across the head of the leaf.
62.50	There is intermittent flaming from the right frame jamb.
63.20	There is flaming in excess of 10 seconds from the right frame jamb.
63.30	Testing terminated.

This test report relates to an investigation which utilised the test methodology given in BS 476: Part 22: 1987; the full requirements of the Standard were not, however, complied with. The information is provided for the test sponsor's information only and should not be used to demonstrate performance against the Standard nor compliance with a regulatory requirement. The test was not conducted under the requirements of UKAS accreditation.



**Robert Axe**  
**Lead Technical Officer**

23-07-2014



**Vincent Kerrigan**  
**Technical Manager**

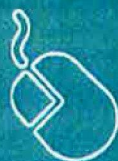
23-07-2014

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### CONFIDENTIAL

**Report:** BMT/MTP/F15168

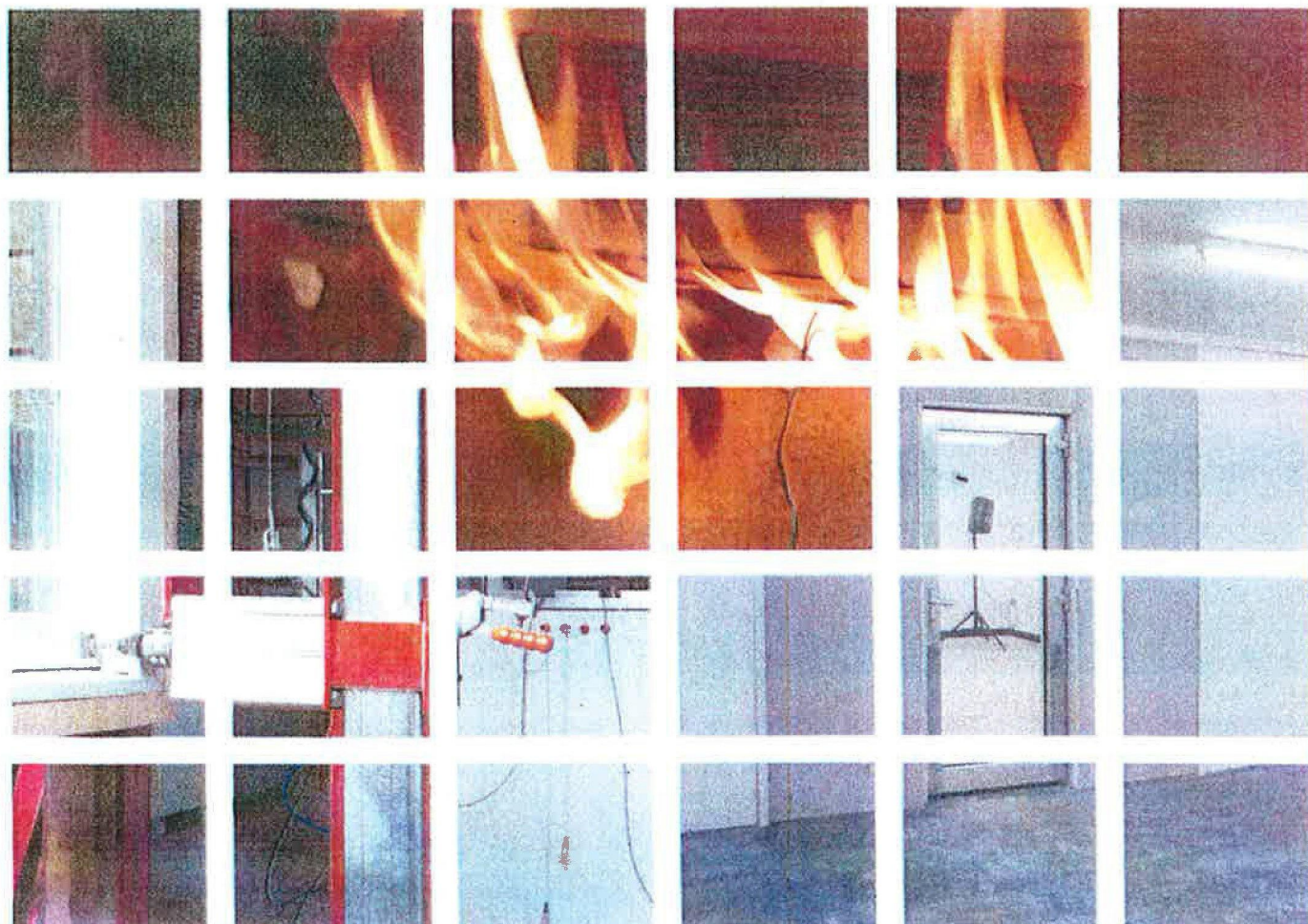
Report on testing a single leaf, single acting doorset (inward opening) - within a British Gypsum steel stud partition in accordance with BS EN 1634-3

**Issue date:** July 2015



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...WHEN EXPERIENCE MATTERS

# BM TRADA

## Test Report

Sponsor:  
Masterdor Ltd  
Firs Work  
Nether Heage  
Derbyshire  
DE56 2JJ

### CONFIDENTIAL

Report: BMT/MTP/F15168/Rev1

Report on testing a single leaf, single acting doorset (inward opening) - within a British Gypsum steel stud partition in accordance with BS EN 1634-3

Issue date: March 2018

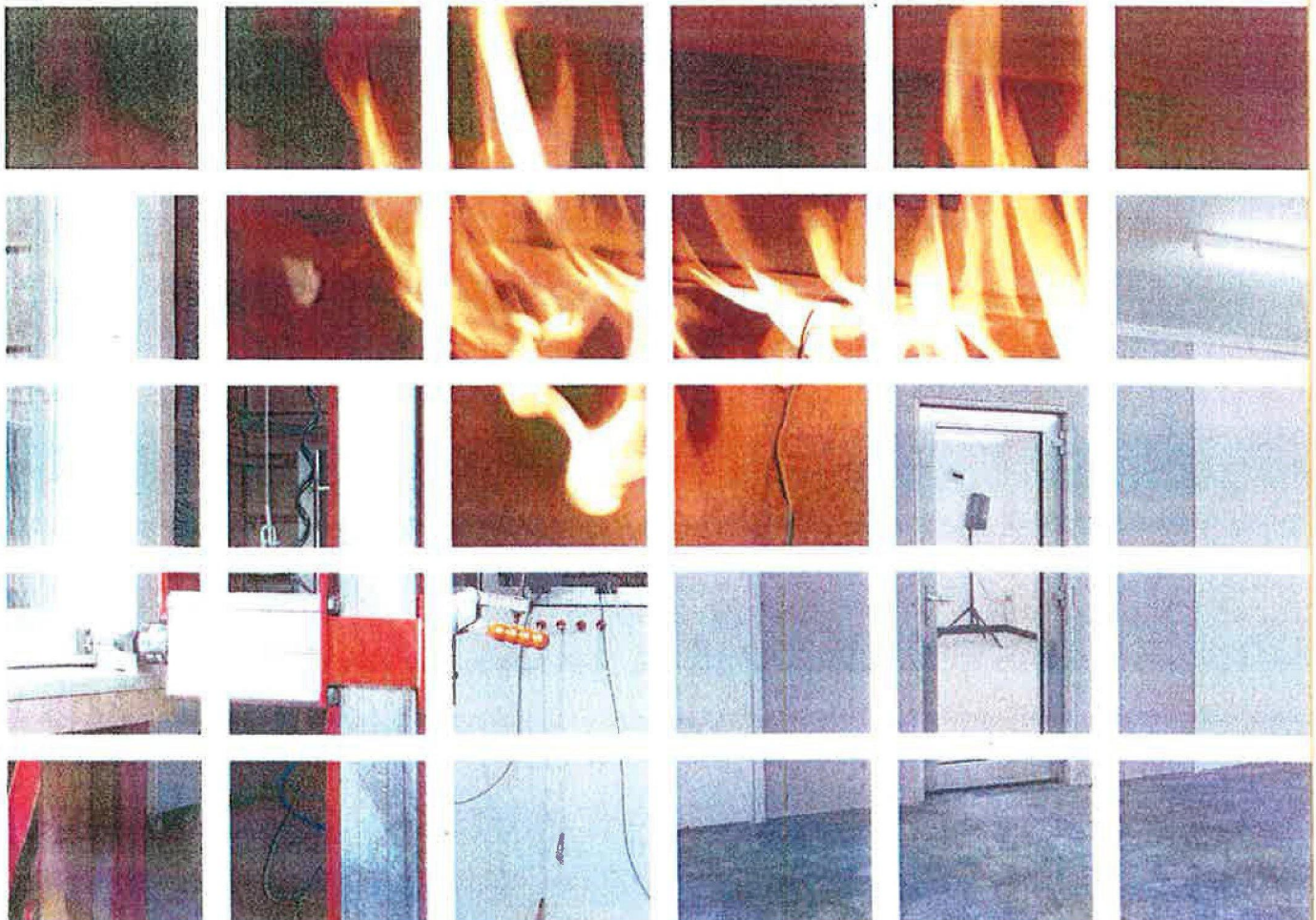
This report is a revision to that issued as BMT/MTP/F15168 and dated 25<sup>th</sup> July 2015. The details of the test report BMT/MTP/F15168 are held on file by Exova (formerly T/A BM TRADA). The original report is replaced by the revised report BMT/MTP/F15168/Rev1

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...WHEN EXPERIENCE MATTERS

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# BM TRADA

## Results of Test: BMT/MTP/F15168/Rev1

### Masterdor Ltd

Firs Works  
Nether Heage  
Derbyshire  
DE56 2JJ

This document confirms that performance testing was conducted on 8 July 2015. Testing was conducted to the following standard:

- BS EN 1634-3: 2004 Incorporating corrigendum no. 1 Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware – Part 3: Smoke control test for door and shutter assemblies.

The following results were achieved:


BS EN 1634-3: 2004		Product tested	Masterdor Benchmark / Suredor Single leaf doorset (inward opening)			
No. of test	Face exposed to pressure	Temperature	Leakage rate $Q_{spec}$ ( $m^3/h$ ) at pressure difference of		Linear leakage rate $Q_1$ ( $m^3/h/m$ ) at pressure of	
			10Pa	25Pa	10Pa	25Pa
1.	Side A (Internal)	Ambient	7.14	11.89	1.51	2.52
2.	Side B (External)	Ambient	6.07	10.63	1.29	2.25


Testing was carried out at ambient temperature only: temperature of the test chamber was measured using a calibrated digital thermometer before and after testing. From approved document B Fire Safety, doors should have a leakage rate not exceeding  $3m^3/m/hour$  (head and jamb only) when tested at 25Pa. For this test the threshold and letter plate was sealed.

The perimeter length of leaf/frame gap was 4.715m.

The results relate only to the specimens tested, as detailed in the technical specification

**Rev 1 – Amendment to page number on page 1 and footer on page 2**

  
Issued by:  
Martin Durham  
Lab Manager

  
Authorised by:  
Lee Grant-Riach  
Lead Technical Officer  
Issue date: 26<sup>th</sup> March 2018

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## **1 Introduction**

Performance testing to BS EN 1634-3:2004 incorporating corrigendum no. 1 was conducted on your doorset on 8 July 2015. The specimen was configured as a single leaf, single acting doorset (inward opening). The specimen was installed opening out of the test chamber. In accordance with BS EN 1634-3: 2004 section 10.1.1, the leaf was pre-cycled before the smoke leakage test.

## **2 Specimen Verification**

The specimen was delivered to BM TRADA on 25 June 2015. The component parts of the specimens were identified based on nominal information provided by the sponsor.

### **2.1 Conditioning**

The specimen was conditioned for a minimum of 24 hours at 19°C and 48% relative humidity.

### **2.2 Sampling**

Not applicable

## **3 Description of supporting construction**

The overall dimensions of the supporting construction were 1500mm wide x 2500mm high x 62.5mm thick. It was comprised of a British Gypsum steel stud partition with 50mm thick 30kg/m<sup>3</sup> density insulation fitted between the studs, built in accordance with Clause 7.2.2.4 (table 1 group A) of BS EN 1363: Part 1, for a flexible supporting construction. The vertical studs surrounding the apertures created for the doorset incorporated a 47mm x 29mm softwood timber infill to facilitate the fixings for the specimen. The specimen tested is a 30 minute fire resistant product with an anticipated Category B performance, therefore intended fire resistance is 36 minutes and one layer of 12.5mm thick Gypsum plasterboard type F is required on each face.

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Sponsor: Masterdor Ltd  
Ref: BMT/MTP/F15168/Rev1

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#### 4 Description of construction

The doorset was identified as a Masterdor Benchmark / Suredor single leaf doorset (inward opening). The overall frame dimensions were 900mm wide x 2100mm high x 70mm deep and leaf dimensions were 790mm wide x 2014mm high x 44mm thick. The specimen was latched but not locked.

##### Leaf (Identified as a Nan-Ya FD30 Door slab)

		Species/type	Dimensions (mm)	Density (kg/m <sup>3</sup> )
Stiles		Mixed wood# finger jointed lamels	41 wide x 38 thick	640*
Rails		Mixed wood# finger jointed lamels	41 wide x 38 thick	640*
Core		Phenolic foam	38 thick reducing to 15 thick at fielded areas	75*
Facings	Exposed	Moulded GRP	3 thick	-
	Unexposed	Moulded GRP	4 thick	-
Lippings		None fitted	-	-

# Mixed wood consisting of pine, acacia and styrax

\*Stated by manufacturer, not verified by the laboratory

##### Frame - leaf

	Material	Dimensions (mm)
Head and jambs	Sheerframe PVC extrusion (Ref. SR77950)*	70 deep x 80 wide including a 22 high integral stop
Frame reinforcement	Sheerframe Steel box section (Ref. 5119)*	30 deep x 35 wide x 1.5 thick
Frame jointing detail	Mitred – fully fusion welded	-
Frame to supporting construction fire stopping detail	Tightly packed rock mineral fibre capped with intumescent mastic	Nominally 5 wide x 10-15 deep
Frame to supporting construction fixing detail	Steel wood screws	100 long fitted at not more than 150 from corners at 600 centres (max)
Architrave	None fitted	-
Threshold	Masterguard 25 extruded aluminium*	75 wide x 25 high

\*Stated by manufacturer, not verified by the laboratory

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## Intumescent materials

	Make/type	Size (mm)	Location
Leaf edges	None fitted	-	-
Frame reveal – head and jambs	Sealed Tight Solutions (Ref. ST25 x 2.5)*	25 x 2.5	Fitted in the frame reveal 13mm from the exposed face
	Sealed Tight Solutions (Ref. ST10 x 2.0)*	10 x 2.0	Fitted in the frame reveal 39mm from the exposed face
Rear of frame	Sealed Tight Solutions (Ref. ST30 x 2.5)*	30 x 2.5	Fitted at the rear of the frame
Weather seal	Schlegel Q-Ion (Ref. 5473045)*	5 wide	Fitted in the upstand groove of the stop
	Schlegel (Ref. 5W1248)* brush seal	8 wide	Fitted in the profile of the frame reveal
Glazing perimeter	Sealed Tight Solutions (Ref. ST30 x 2.5)*	30 x 2.5	Fitted around the glazing aperture

\*Stated by manufacturer, not verified by the laboratory

## Interruptions and hardware protection

	Make/type	Size (mm)	Location
Around hinges	Partially interrupted	-	Hinge blade fully interrupts 1 <sup>st</sup> seal in frame reveal leaving 2 <sup>nd</sup> seal continuous
Under hinge blade	STS graphite	1 thick	Fitted under hinge blade on frame and leaf
Encasing latch body	STS graphite	1 thick	Fitted around the body of the latch
Under latch forend	None fitted	-	-
Around latch keeps	Partially interrupted	-	Latch keeps fully interrupts 1 <sup>st</sup> seal in frame reveal leaving 2 <sup>nd</sup> seal continuous
Under latch keeps	STS graphite	1 thick	Fitted under top, centre and bottom keeps

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## Hardware

	Make/type	Size (mm)	Fixing details
Hinges	3No. Masterdor stepped butt type hinge*	100 x 35 x 3 (blade size)	Fitted 175mm, 940mm and 1725mm from the leaf threshold
Closer	Rutland (Ref. TS3204)* overhead type closer	220 x 59 (footprint size)	Fitted on the exposed face as per the manufacturer's instructions
Lock/latch - engaged at all points	Winkhaus AV2 multi point lock/latch*	1770 x 20 (forend size) 235 x 25 (centre keep size)	Centre lock/latch fitted 1020mm from the threshold of the leaf
		175 x 24 (top and bottom keep size)	Top keep fitted 140mm from the leaf head Bottom keep fitted 130mm from the leaf threshold
Furniture	Aluminium lever type handle (Ref. SDL-SX)*	250 x 34 (footprint size)	Fitted appropriate to the centre lock/latch

\*Stated by manufacturer, not verified by the laboratory

## Glazing

		Make/type		Dimension (mm)
Glass type	Double glazed unit	GWPP glass fitted on the unexposed face		7 thick
		Laminated glass fitted on the exposed face		6.4 thick
		Stainless steel spacer		12 thick
		Overall aperture size (mm)	Glass size (mm)	Sight size (mm)
Leaf		922 high x 568 wide	912 high x 558 wide	880 high x 530 wide
Expansion allowance		2-3mm on all edges		
Glazing bead		ODL glazing cassette (Ref: ½ glazed)*		
Glazing clips – leaf		None fitted		

\*Stated by manufacturer, not verified by the laboratory

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## 5 Pre-test Measurements

### 5.1 Operational check

Operability test of 10 manual cycles was completed on the leaf in accordance with BS EN 1634-3: 2004 section 10.1.1.

Minimum angle of opening	30°
Number of operation cycles completed	10

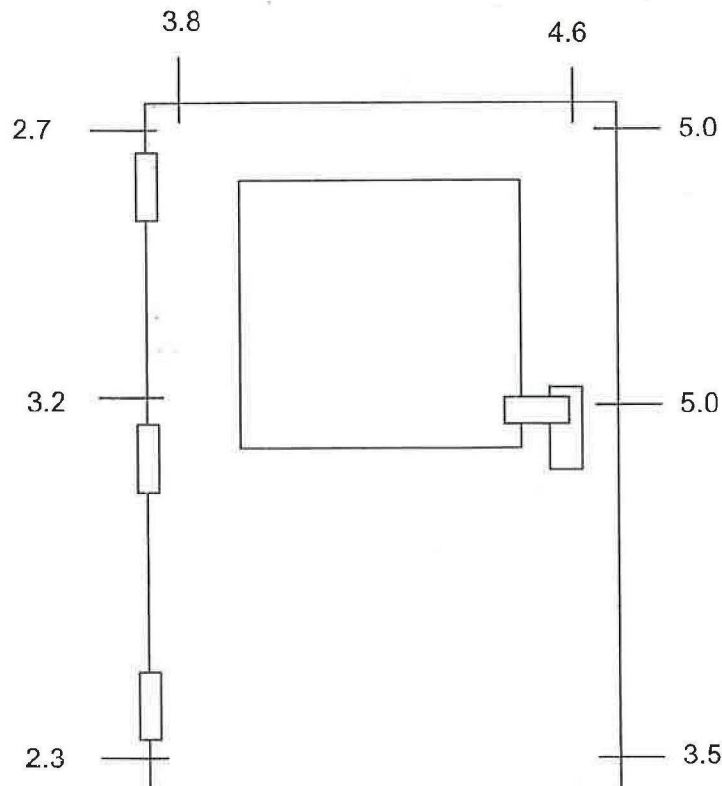
### 5.2 Retention forces

Measured in accordance with BS EN 1634-3: 2004 section 10.1.2.

Opening Forces
26.6 @ handle position

### 5.3 Door Gaps

The leaf/frame gaps and letter plate gaps were measured before testing commenced – See diagram below (Gaps were taken within 20mm from corners and centre of stiles).



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# BM TRADA

## Test Report

Sponsor  
Masterdor Ltd  
Firs Work  
Nether Heage  
Derbyshire  
DE56 2JJ

CONFIDENTIAL

**Report:** BMT/MTP/F15168/Rev1

Report on testing a single leaf, single acting doorset (inward opening) - within a British Gypsum steel stud partition in accordance with BS EN 1634-3

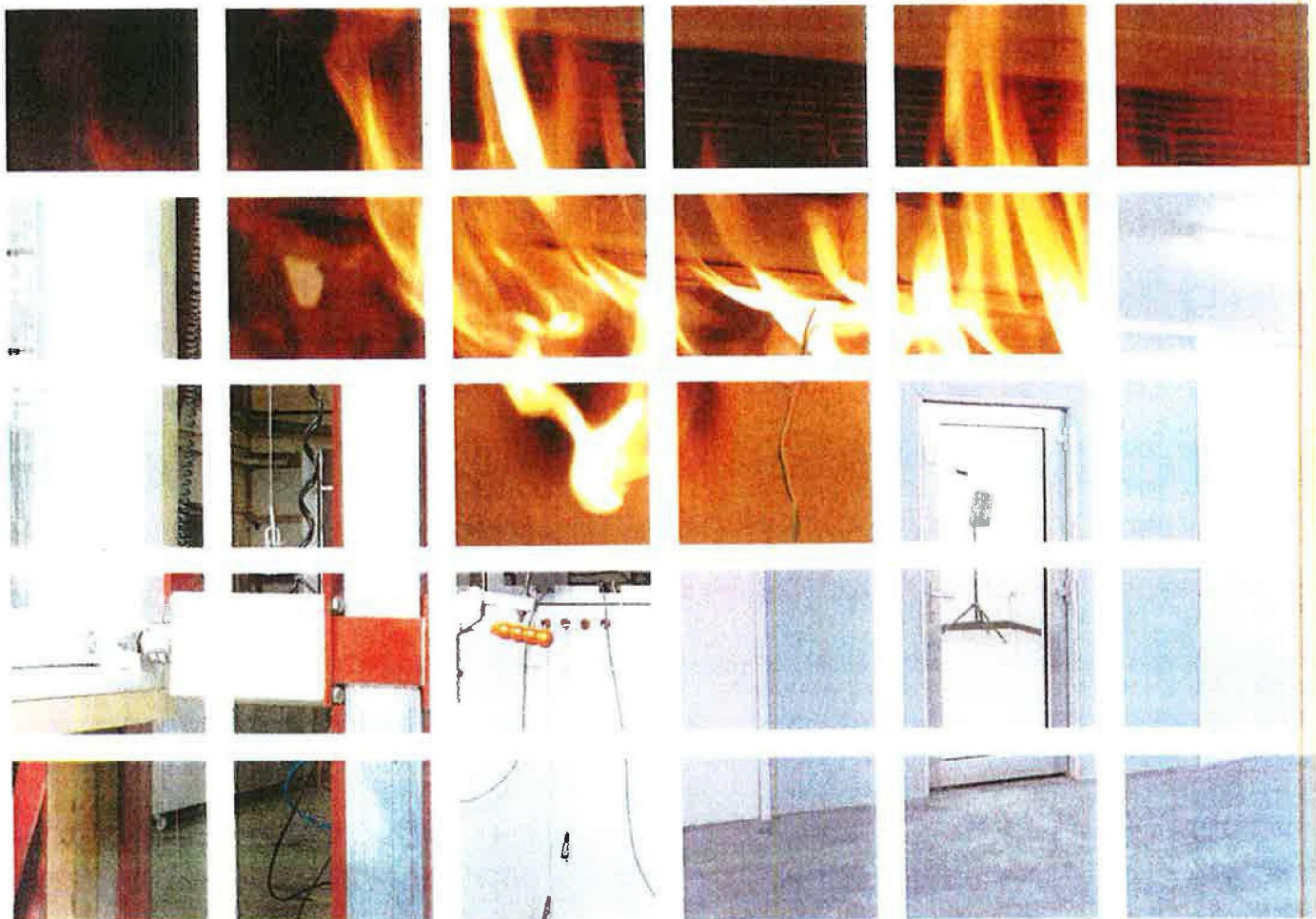
**Issue date:** March 2018

This report is a revision to that issued as BMT/MTP/F15168 and dated 25<sup>th</sup> July 2015. The details of the test report BMT/MTP/F15168 are held on file by Exova (formerly T/A BM TRADA). The original report is replaced by the revised report BMT/MTP/F15168/Rev1

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...WHEN EXPERIENCE MATTERS

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# BM TRADA

## Results of Test: BMT/MTP/F15168/Rev1

### Masterdor Ltd

Firs Works  
Nether Heage  
Derbyshire  
DE56 2JJ

This document confirms that performance testing was conducted on 8 July 2015. Testing was conducted to the following standard:

- BS EN 1634-3: 2004 Incorporating corrigendum no. 1 Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware – Part 3: Smoke control test for door and shutter assemblies.

The following results were achieved:

BS EN 1634-3: 2004		Product tested	Masterdor Benchmark / Suredor Single leaf doorset (inward opening)			
No. of test	Face exposed to pressure	Temperature	Leakage rate $Q_{spec}$ (m³/h) at pressure difference of		Linear leakage rate $Q_1$ (m³/h/m) at pressure of	
			10Pa	25Pa	10Pa	25Pa
1.	Side A (Internal)	Ambient	7.14	11.89	1.51	2.52
2.	Side B (External)	Ambient	6.07	10.63	1.29	2.25

Testing was carried out at ambient temperature only: temperature of the test chamber was measured using a calibrated digital thermometer before and after testing. From approved document B Fire Safety, doors should have a leakage rate not exceeding 3m³/m/hour (head and jamb only) when tested at 25Pa. For this test the threshold and letter plate was sealed.

The perimeter length of leaf/frame gap was 4.715m.

The results relate only to the specimens tested, as detailed in the technical specification

**Rev 1 – Amendment to page number on page 1 and footer on page 2**

Issued by:  
Martin Durham  
Lab Manager

Authorised by:  
Lee Grant-Riach  
Lead Technical Officer  
Issue date: 26<sup>th</sup> March 2018

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## **1 Introduction**

Performance testing to BS EN 1634-3:2004 incorporating corrigendum no. 1 was conducted on your doorset on 8 July 2015. The specimen was configured as a single leaf, single acting doorset (inward opening). The specimen was installed opening out of the test chamber. In accordance with BS EN 1634-3: 2004 section 10.1.1, the leaf was pre-cycled before the smoke leakage test.

## **2 Specimen Verification**

The specimen was delivered to BM TRADA on 25 June 2015. The component parts of the specimens were identified based on nominal information provided by the sponsor.

### **2.1 Conditioning**

The specimen was conditioned for a minimum of 24 hours at 19°C and 48% relative humidity.

### **2.2 Sampling**

Not applicable

## **3 Description of supporting construction**

The overall dimensions of the supporting construction were 1500mm wide x 2500mm high x 62.5mm thick. It was comprised of a British Gypsum steel stud partition with 50mm thick 30kg/m<sup>3</sup> density insulation fitted between the studs, built in accordance with Clause 7.2.2.4 (table 1 group A) of BS EN 1363: Part 1, for a flexible supporting construction. The vertical studs surrounding the apertures created for the doorset incorporated a 47mm x 29mm softwood timber infill to facilitate the fixings for the specimen. The specimen tested is a 30 minute fire resistant product with an anticipated Category B performance, therefore intended fire resistance is 36 minutes and one layer of 12.5mm thick Gypsum plasterboard type F is required on each face.

## 4 Description of construction

The doorset was identified as a Masterdor Benchmark / Suredor single leaf doorset (inward opening). The overall frame dimensions were 900mm wide x 2100mm high x 70mm deep and leaf dimensions were 790mm wide x 2014mm high x 44mm thick. The specimen was latched but not locked.

### Leaf (Identified as a Nan-Ya FD30 Door slab)

		Species/type	Dimensions (mm)	Density (kg/m <sup>3</sup> )
Stiles		Mixed wood <sup>#</sup> finger jointed lamels	41 wide x 38 thick	640*
Rails		Mixed wood <sup>#</sup> finger jointed lamels	41 wide x 38 thick	640*
Core		Phenolic foam	38 thick reducing to 15 thick at fielded areas	75*
Facings	Exposed	Moulded GRP	3 thick	-
	Unexposed	Moulded GRP	4 thick	-
Lippings		None fitted	-	-

# Mixed wood consisting of pine, acacia and styrax

\*Stated by manufacturer, not verified by the laboratory

### Frame - leaf

	Material	Dimensions (mm)
Head and jambs	Sheerframe PVC extrusion (Ref. SR77950)*	70 deep x 80 wide including a 22 high integral stop
Frame reinforcement	Sheerframe Steel box section (Ref. 5119)*	30 deep x 35 wide x 1.5 thick
Frame jointing detail	Mitred – fully fusion welded	-
Frame to supporting construction fire stopping detail	Tightly packed rock mineral fibre capped with intumescent mastic	Nominally 5 wide x 10-15 deep
Frame to supporting construction fixing detail	Steel wood screws	100 long fitted at not more than 150 from corners at 600 centres (max)
Architrave	None fitted	-
Threshold	Masterguard 25 extruded aluminium*	75 wide x 25 high

\*Stated by manufacturer, not verified by the laboratory

*The legal validity of this report can only be claimed on presentation of the complete report*

Sponsor: Masterdor Ltd  
Ref: BMT/MTP/F15168/Rev1

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## Intumescent materials

	Make/type	Size (mm)	Location
Leaf edges	None fitted	-	-
Frame reveal – head and jambs	Sealed Tight Solutions (Ref. ST25 x 2.5)*	25 x 2.5	Fitted in the frame reveal 13mm from the exposed face
	Sealed Tight Solutions (Ref. ST10 x 2.0)*	10 x 2.0	Fitted in the frame reveal 39mm from the exposed face
Rear of frame	Sealed Tight Solutions (Ref. ST30 x 2.5)*	30 x 2.5	Fitted at the rear of the frame
Weather seal	Schlegel Q-Ion (Ref. 5473045)*	5 wide	Fitted in the upstand groove of the stop
	Schlegel (Ref. 5W1248)* brush seal	8 wide	Fitted in the profile of the frame reveal
Glazing perimeter	Sealed Tight Solutions (Ref. ST30 x 2.5)*	30 x 2.5	Fitted around the glazing aperture

\*Stated by manufacturer, not verified by the laboratory

## Interruptions and hardware protection

	Make/type	Size (mm)	Location
Around hinges	Partially interrupted	-	Hinge blade fully interrupts 1 <sup>st</sup> seal in frame reveal leaving 2 <sup>nd</sup> seal continuous
Under hinge blade	STS graphite	1 thick	Fitted under hinge blade on frame and leaf
Encasing latch body	STS graphite	1 thick	Fitted around the body of the latch
Under latch forend	None fitted	-	-
Around latch keeps	Partially interrupted	-	Latch keeps fully interrupts 1 <sup>st</sup> seal in frame reveal leaving 2 <sup>nd</sup> seal continuous
Under latch keeps	STS graphite	1 thick	Fitted under top, centre and bottom keeps

*The legal validity of this report can only be claimed on presentation of the complete report*

## Hardware

	Make/type	Size (mm)	Fixing details
Hinges	3No. Masterdor stepped butt type hinge*	100 x 35 x 3 (blade size)	Fitted 175mm, 940mm and 1725mm from the leaf threshold
Closer	Rutland (Ref. TS3204)* overhead type closer	220 x 59 (footprint size)	Fitted on the exposed face as per the manufacturer's instructions
Lock/latch - engaged at all points	Winkhaus AV2 multi point lock/latch*	1770 x 20 (forend size) 235 x 25 (centre keep size)	Centre lock/latch fitted 1020mm from the threshold of the leaf
		175 x 24 (top and bottom keep size)	Top keep fitted 140mm from the leaf head Bottom keep fitted 130mm from the leaf threshold
Furniture	Aluminium lever type handle (Ref. SDL-SX)*	250 x 34 (footprint size)	Fitted appropriate to the centre lock/latch

\*Stated by manufacturer, not verified by the laboratory

## Glazing

		Make/type		Dimension (mm)
Glass type	Double glazed unit	GWPP glass fitted on the unexposed face		7 thick
		Laminated glass fitted on the exposed face		6.4 thick
		Stainless steel spacer		12 thick
		Overall aperture size (mm)	Glass size (mm)	Sight size (mm)
Leaf		922 high x 568 wide	912 high x 558 wide	880 high x 530 wide
Expansion allowance		2-3mm on all edges		
Glazing bead		ODL glazing cassette (Ref: ½ glazed)*		
Glazing clips – leaf		None fitted		

\*Stated by manufacturer, not verified by the laboratory

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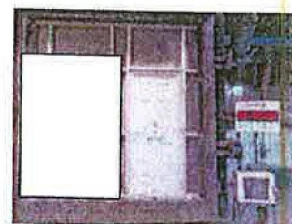


**Title:**

The fire resistance performance of a single leaf single acting doorsets, when tested in accordance with BS 476: Part 20/22: 1987

**WF Report No:**

391787



**Prepared for:**

**Sealed Tight Solutions Ltd**

Unit 1B, 1C & 1D  
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**Test date:**

10<sup>th</sup> November 2017



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## Summary of Performance

The following performance was achieved from the specimen tested. Full details of the testing and specimen construction are described in the report.

<b>Results:</b>  <b>Fire resistance test in accordance with BS476: Part 20/22: 1987</b>	<b>Times to failure:</b> <table border="1" data-bbox="762 526 1222 772"><thead><tr><th></th><th>Doorset B</th></tr></thead><tbody><tr><td>Integrity</td><td>45 (forty five) minutes*</td></tr><tr><td>Insulation</td><td>45 (forty five) minutes*</td></tr></tbody></table> <p data-bbox="544 790 879 824">* No failure at test termination</p>		Doorset B	Integrity	45 (forty five) minutes*	Insulation	45 (forty five) minutes*
	Doorset B						
Integrity	45 (forty five) minutes*						
Insulation	45 (forty five) minutes*						

 <p data-bbox="371 1077 604 1137">Not Subject to this report</p>	<b>Summary of specimens:</b> <p data-bbox="1066 994 1398 1106"><b>A latched single leaf single acting doorsets, hung opening in towards the furnace</b></p> <p data-bbox="1066 1176 1425 1301">The doorset on the left of the furnace was designated doorset A and is not subject to this report.</p> <p data-bbox="1066 1335 1425 1424">Leaf size: doorset B - 2015mm high x 785mm wide x 45mm thick.</p>
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## 1 Introduction

The doorset was manufactured and supplied for test by the client and delivered during November 2017.

Exova Warringtonfire constructed a plasterboard clad timber stud supporting construction and installed the specimens into the wall.

## 2 Specification

Details of the specimens are shown in the Appendix.

### 2.1 Door leaf

The left doorset was designated doorset A and is not subject to this report. The right doorset was designated doorset B and the leaf measured 2015mm high x 785mm wide x 45mm thick. Both doorsets were hung to open in towards the furnace. The result of this test was obtained from doorsets fitted with a latch which was engaged for the test.

### 2.2 Door perimeter gaps

The gaps between the edge of the door and frame were measured prior to test. A total of 12 readings were taken. The measurements (in mm) are given in Figure 4 of the Appendix.

### 2.3 Closer forces

Measured in accordance with FTSG Resolution No 63.

	Opening force (Nm)	Closing force (Nm)
Doorset B	34	17

### 3 Description of Construction (Refers to Figures 1 to 4 of the Appendix)

**Leaf – doorset B – Stated by the client to be constructed from a Nanya FD30 door blank with a width of 838mm (Prior to trimming)**

		Species/type	Dimensions (mm)	Density (kg/m <sup>3</sup> )	Moisture % w/w)	Key to figures
Stiles	Outer	Mixed wood finger jointed lamels**	44 wide x 40 thick* (untrimmed dimensions)	400-600*	10.5	1
	Inner	Mixed wood finger jointed lamels**	30 wide x 40 thick*	400-600*	-	2
Rails – top and bottom	Top Outer	Mixed wood finger jointed lamels**	70 wide x 40 thick* (untrimmed dimensions)	400-600*	9.5-10.6	3
	Top Inner	Mixed wood finger jointed lamels**	30 wide x 40 thick*	400-600*	-	4
	Bottom Outer	Mixed wood finger jointed lamels**	70 wide x 40 thick* (untrimmed dimensions)	400-600*	-	5
	Bottom Inner	Mixed wood finger jointed lamels**	30 wide x 40 thick*	400-600*	-	6
Core Including 2mm thick glass fibre reinforcement to one of the facings as detailed within appendix 1#		Phenolic foam*	40 thick reducing to 15 thick at fielded areas	75*	-	7
Facings		Compression moulded thermoset GRP (glass reinforced polyester)	2 thick	-	-	8
Lippings		None fitted	-	-	-	-
Adhesive	Between Inner and Outer Stiles and rails	PUR*	-	-	-	-
	Facings	PUR*	-	-	-	-
	Jointing Stiles and Rails	PUR*	-	-	-	-

\* Stated by client, not verified by laboratory

\*\*Mixed wood consisting of pine, acacia and styrax

# Orientation of the tested blank was identified by the laboratory post-test, it is therefore believed that the 2mm thick reinforcement was fitted to the unexposed facing at the time of the test.

### Frame – doorset B

	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)	Key to figures
Head and jambs	Sheerframe Profiled PVC extrusion Product reference SH77950*	70 wide x 70 deep including a 22 high integral stop	-	-	9
Frame reinforcement	Steel box section Ref.S119*	30 x 35 x 1.5 thick	-	-	10
Frame jointing details	Mitred – fully plastic welded with steel angle bracket at the back of the frame	-	-	-	-
Stops – integral	-	-	-	-	-
Frame to supporting construction fire stopping detail	Sealed Tight Solutions ST99 Fire Foam	Fitted fully filling the gap between the frame and supporting construction 13.5 – 19.6 wide x full depth of frame	-	-	-
Frame to supporting construction fixing details – Through frame reinforcement	4No. steel wood screws per jamb with BroadFix Polypropylene plastic packers fitted to full depth of the frame at each fixing location	5Ø x 100 long, fitted at 600-800mm centres	-	-	-
Architrave	PVC Architrave fitted to both faces of the sample with silicon	6 thick x 60 wide to exposed face 6 thick x 45 wide to unexposed face	-	-	21
Threshold	Masterguard 25 aluminium extrusion* (see photo on page 16).	22 high x 80 deep	-	-	11

\* Client stated reference, not verified by laboratory

### Intumescent and sealing materials – doorset B

		Make/type	Size (mm)	Location	Key to figures
Leaf edge		None fitted	-	-	-
Frame reveal	Head and jambs	Sealed Tight Solutions Ltd STS302 trimmed to 20mm wide	20 x 2	Fitted 13mm from the exposed face in the frame reveal	12
Behind frame		Sealed Tight Solutions Ltd STS302	30 x 2	Fitted in the frame profile at the back of the frame	13
Weather seal		Rubber buffer seal Client stated product reference 77950 C0-EX* Manufacturer Synseal Extrusions*	8 x 10*	Fitted in the upstand of the stop pre fitted to frame	14
		2No. Brush seals Client Stated Product reference SW1248* Manufacturer Exitex*	9 x 11*	Fitted 5mm and 33mm from the exposed face in the frame reveal	15

\* Stated by client, not verified by laboratory

### Intumescent interruptions and additional hardware protection – doorset B

	Make/type	Size (mm)	Location
Around hinges	Fully interrupted	-	Hinge blade fully interrupts seal in frame reveal
Under hinge blade	Sealed Tight Solutions graphite sheet	1 thick	Fitted under the hinge blade on frame and leaf
Around closer	Fully interrupted	-	Closer plate fully interrupts seal in frame reveal
Under closer	Sealed Tight Solutions graphite sheet	1 thick	Fitted under the closer plate in the frame reveal
Encasing closer body	Sealed Tight Solutions graphite sheet	1 thick	Fitted encasing the closer body
Encasing lock/ latch bodies	Sealed Tight Solutions graphite sheet	1 thick	Fitted around lock/latch cases on the exposed side only
Under lock/latch forend	Sealed Tight Solutions graphite sheet	1 thick	Fitted under the lock/latch forend (as photo on page 16)
Around all latch keeps	Fully interrupted	-	Latch keeps fully interrupt seal in frame reveal
Under latch keeps	Sealed Tight Solutions graphite sheet	1 thick	Fitted at the bottom of all keeps

## Hardware – doorset B

	Make/type	Size (mm)	Location	Key to figures
Hinges	3No. S.E.A steel butt type hinges*	101 x 30 x 3 (blade size fitted to leaf)	Fitted 150mm, 955mm and 1755mm from the head of the leaf	16
Closer	Astra 4000 series leaf edge/jamb fitted concealed type closer*	110 x 32 (forend size)	Fitted in the leaf edge/frame jamb as per the manufacturer's instructions	17
Lock/latch – fully engaged at all three locations	Winkhaus AV2 multi-point lock /latch	20 wide x 1768 high (forend size) 175 x 24 (case size)	Centre latch fitted 1020mm from the threshold of the leaf	18
	Centre keep	235 x 30 (keep size)		
	Top and bottom keeps	180 x 30 (keep size)	Fitted 285mm and 1730mm from the leaf threshold	19
Furniture	Stainless steel lever type handle	215 x 30 (footprint size)	Fitted appropriate to the centre lock/latch	20

\* Stated by client, not verified by laboratory

#### 4 Test Conditions

Where areas of the test specification are ambiguous or open to interpretation the Fire Test Study Group Resolutions No's 51, 63, 70, 71, 72 and 78 have been followed (further specific details are available on request). These Resolutions provide basis of common agreements between the fire test laboratories which are members of this Group.

The ambient temperature of the test area at commencement of test was 11°C.

After the first 5 minutes of the test, the furnace pressure was maintained at  $-4.25 \pm 2$  Pa with respect to atmosphere, at a point 0.5m from the notional floor level, equating to 0Pa at a point 1m above the notional floor level.

The furnace was controlled to follow the temperature/time relationship specified in BS 476: Part 20: 1987 as closely as possible, using the average of nine thermocouples suitably distributed within the furnace. The temperatures recorded are shown graphically in Section 5.1.

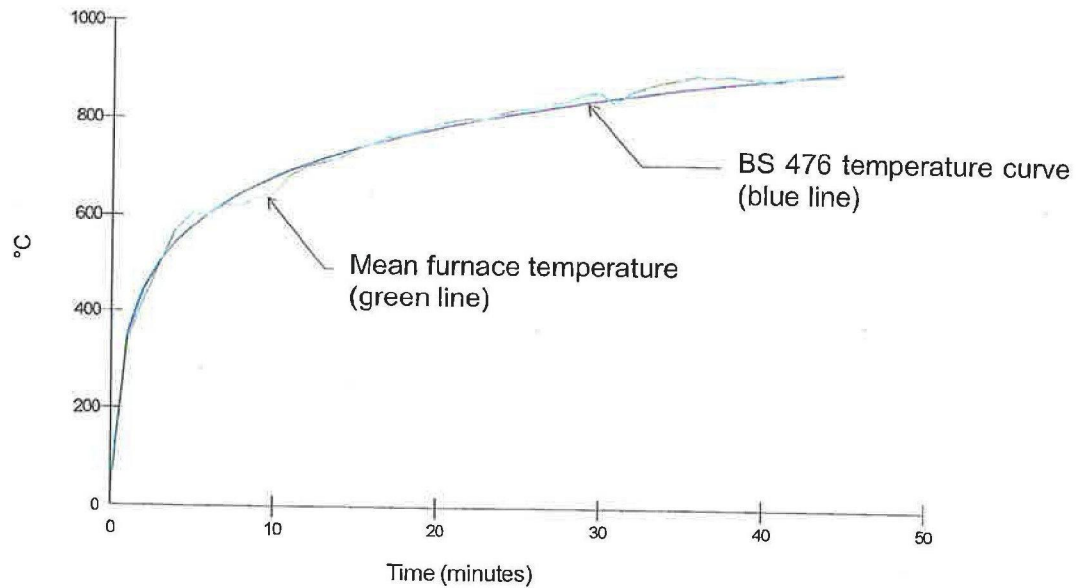
The temperature of the unexposed face of doorset B was monitored by means of five thermocouples fixed to the surface of the door leaf, and three thermocouples attached to the frame, one at midheight on each jamb and one centrally located above the leaf on the frame head.

The thermocouple positions are shown in Figure 4 of the appendix. The average temperature of the door leaf and maximum temperature of the doorsets are shown graphically in Section 5.2.

## 5 Test results

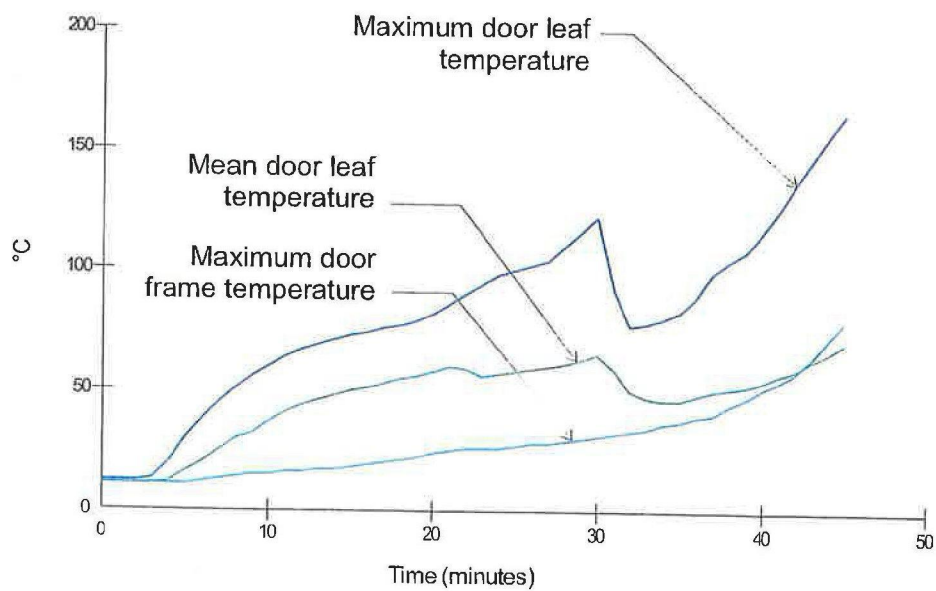
The following data and observations were recorded during the test.

### 5.1 Furnace Temperature Curve



### 5.2 Unexposed Face Temperature Curves

Doorset B



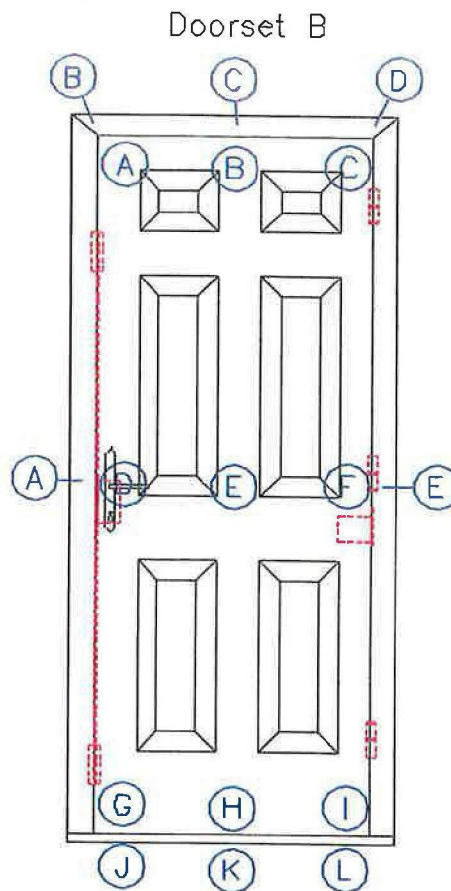
### 5.3 Frame and Door Distortion Data

The following tables show the distortion of the frame and door in mm with an accuracy of  $\pm 1\text{mm}$ .

A positive measurement indicates distortion towards the furnace.

A negative measurement indicates distortion away from the furnace.

J, K and L give vertical movement of the door, a negative reading indicates that the door has dropped.



**Doorset B – frame**

Time	A	B	C	D	E
10	15	7	3	6	2
20	14	16	3	6	3
30	14	16	3	5	2
40	14	3	0	5	2

**Doorset B - leaf (hung on the right and opening in towards the furnace)**

Time	A	B	C	D	E	F	G	H	I	J	K	L
10	14	9	7	5	-5	2	3	-4	-14	0	0	1
20	7	10	8	2	-5	4	6	-4	-8	-1	0	1
30	11	11	10	0	-3	7	4	-4	-7	-1	-3	-2
40	14	11	13	6	-2	8	9	-2	-5	-5	-2	-1

#### 5.4 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	Comments
00:00	Test started
04:03	Doorset B, there is smoke issuing at the head and top closing corner.
11:10	Doorset B, there is discolouration at the top closing corner across the head and at the top hanging corner.
17:45	Doorset B, there is smoke issuing and discolouration at the top hinge position.
25:00	No Change.
31:00	Doorset B, there is intermittent flaming at the bottom closing corner.
32:00	Doorset B, there is smoke issuing at the keyhole.
32:50	Doorset B, there is smoke issuing and discolouration at the middle hinge position.
33:30	Doorset B, the seal has fallen away at the top hanging corner.
33:50	Doorset B, there is erosion starting at the bottom closing corner.
34:00	Doorset B, a cotton pad integrity test was performed at the bottom closing corner which did not result in the ignition of the cotton pad, no failure.
35:30	Doorset B, exposed face, the facing has fallen away at the top half of the leaf.
36:11	Doorset B, the seal is falling away at the top closing corner.
36:21	Doorset B, is starting to discolour at the panel fielded areas.
37:40	Doorset B, there is smoke issuing at the latch position.
38:27	Doorset B, exposed face, the facing has fallen away.
40:00	Doorset B, there is smoke issuing and discolouration at the threshold.
42:00	Doorset B, the head of the frame is starting to drop.
43:11	Doorset B, there is discolouration at the latch position.
43:59	Doorset B, there is a glow visible at the head.
44:58	Doorset B, A cotton pad integrity test was performed at the head which did not result in the ignition of the cotton pad, no failure.
45:45	Test terminated.

## 5.5 Times to Failure

When doorset B was tested in accordance with BS 476: Part 22: 1987, Method 6, determination of fire resistance of insulated doorsets and shutter assemblies, the requirements of the standards were satisfied for the following periods:

	Doorset B
<b>Integrity</b>	45 (forty five) minutes*
<b>Insulation</b>	45 (forty five) minutes*




\* No failure at test termination at 45 minutes

## 6 Limitations

The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires.

The results of this test were obtained using the door to frame gaps recorded in Figure 4 of the appendix. The fire resistance performance of doors of this design may change if substantially different gaps are employed.

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over 5 years old should be considered by the user. Exova Warringtonfire will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

	Written by:	Checked by:	Authorised by:
<b>Signature:</b>			
<b>Name:</b>	Christian Tottman	Nikolas Whitelock	Jonathan Osborn
<b>Title:</b>	Technical Officer	Lead Technical Officer	Technical Director
<b>Date of issue:</b>	06/03/2018	06/03/2018	06/03/2018

## Photographs

Intumescent interruptions by hardware

Fire Stopping to the rear of frame – Doorset B



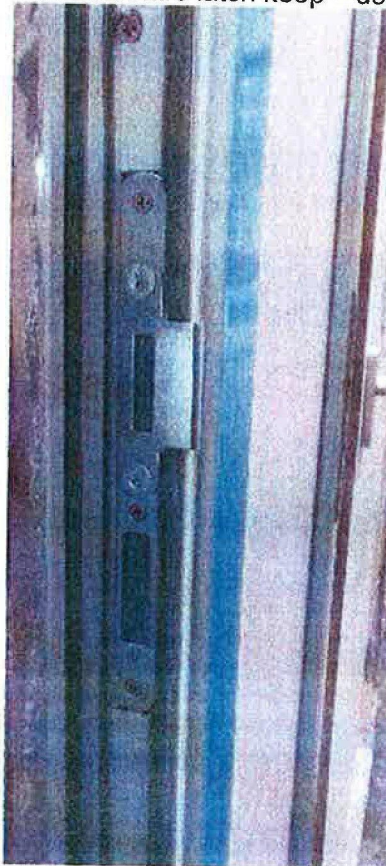
Around hinge blade – doorset B



Around bottom hook keep – doorset B



Around centre latch keep – doorset B



Around top hook keeps – doorset B



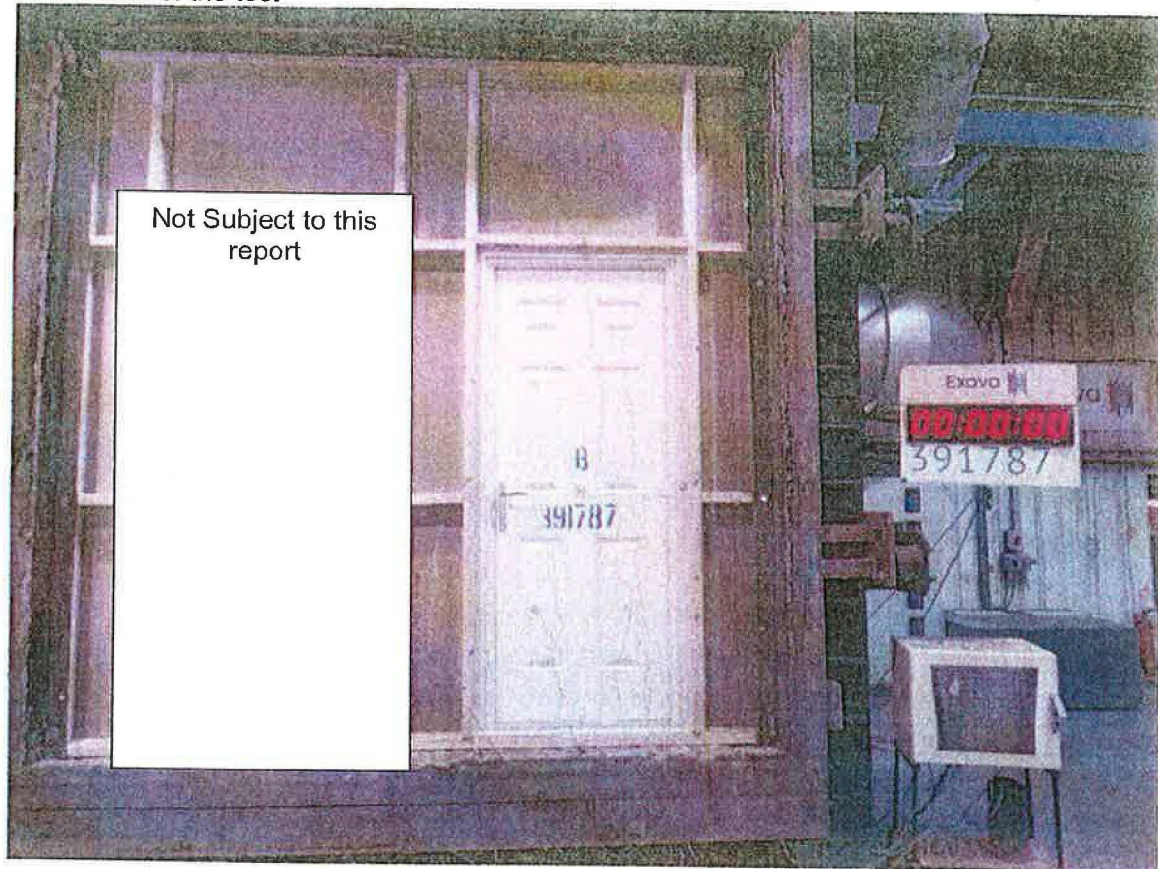
Protection under latch forend – doorset B



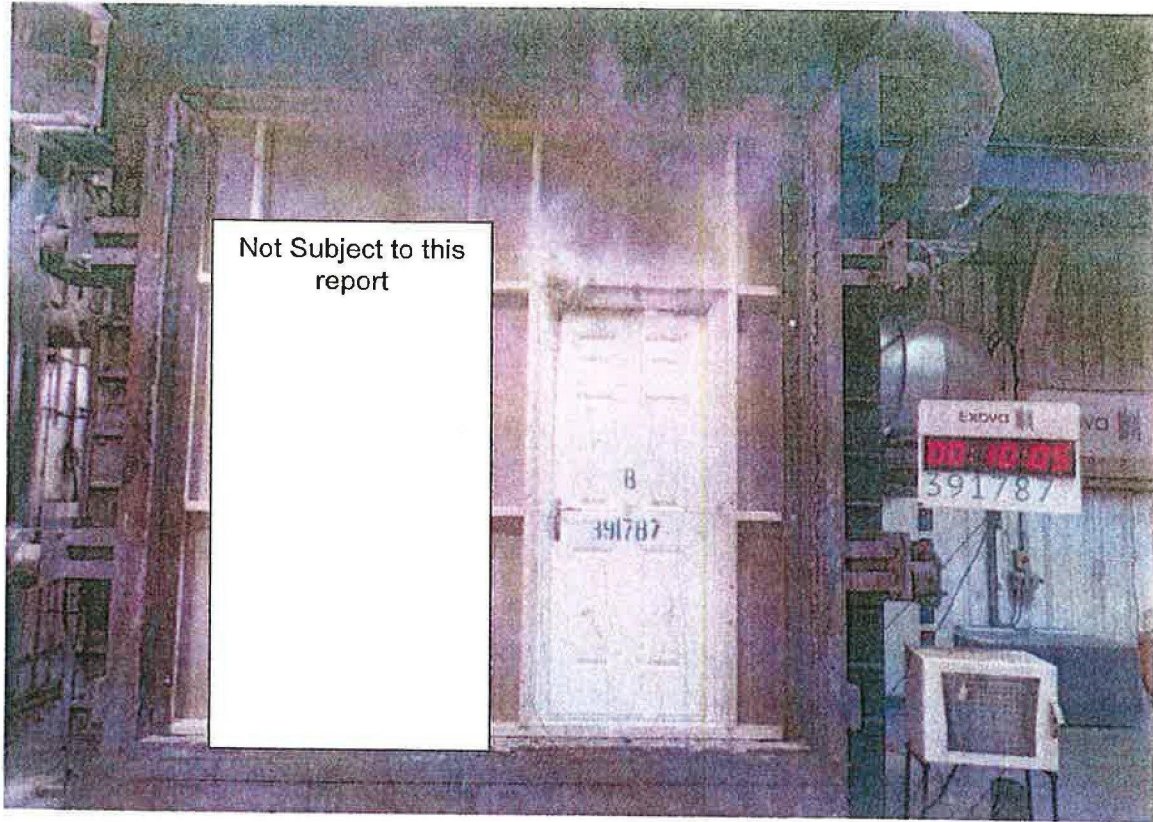
Aluminium Threshold profile



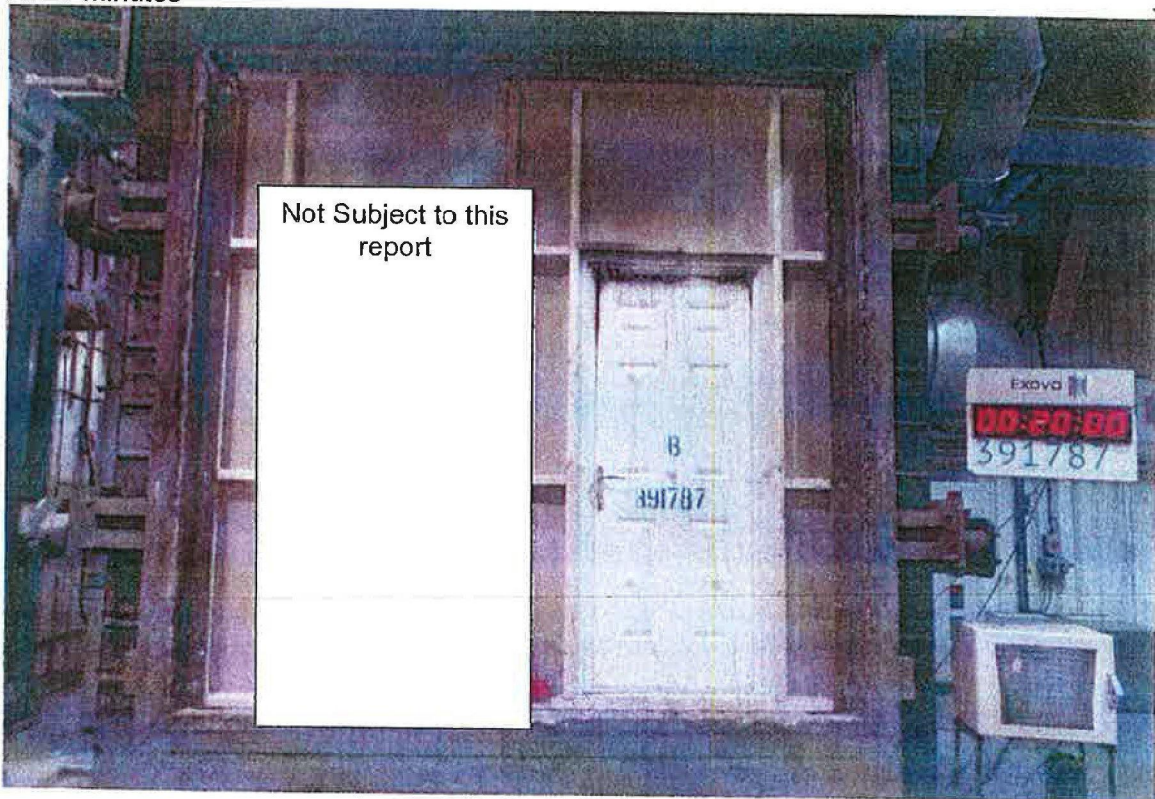
At the start of the test



After 10 minutes



At 20 minutes



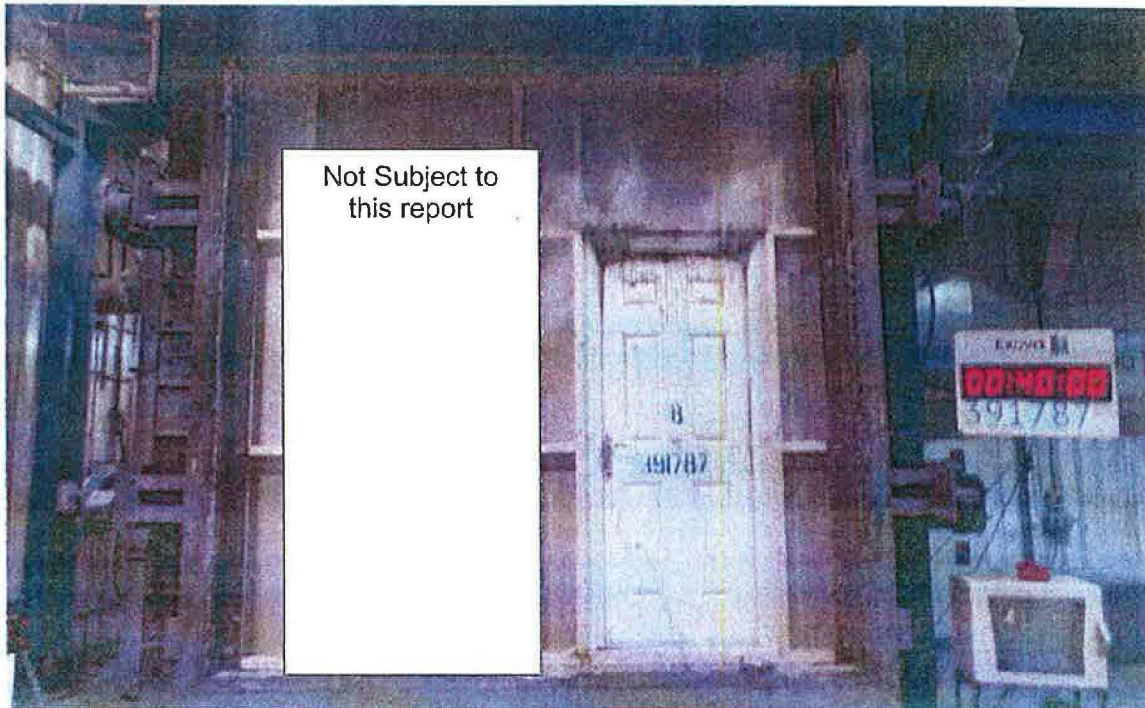
At 30 minutes

Not  
Subject  
to this  
report



At 40 minutes

Not Subject to  
this report

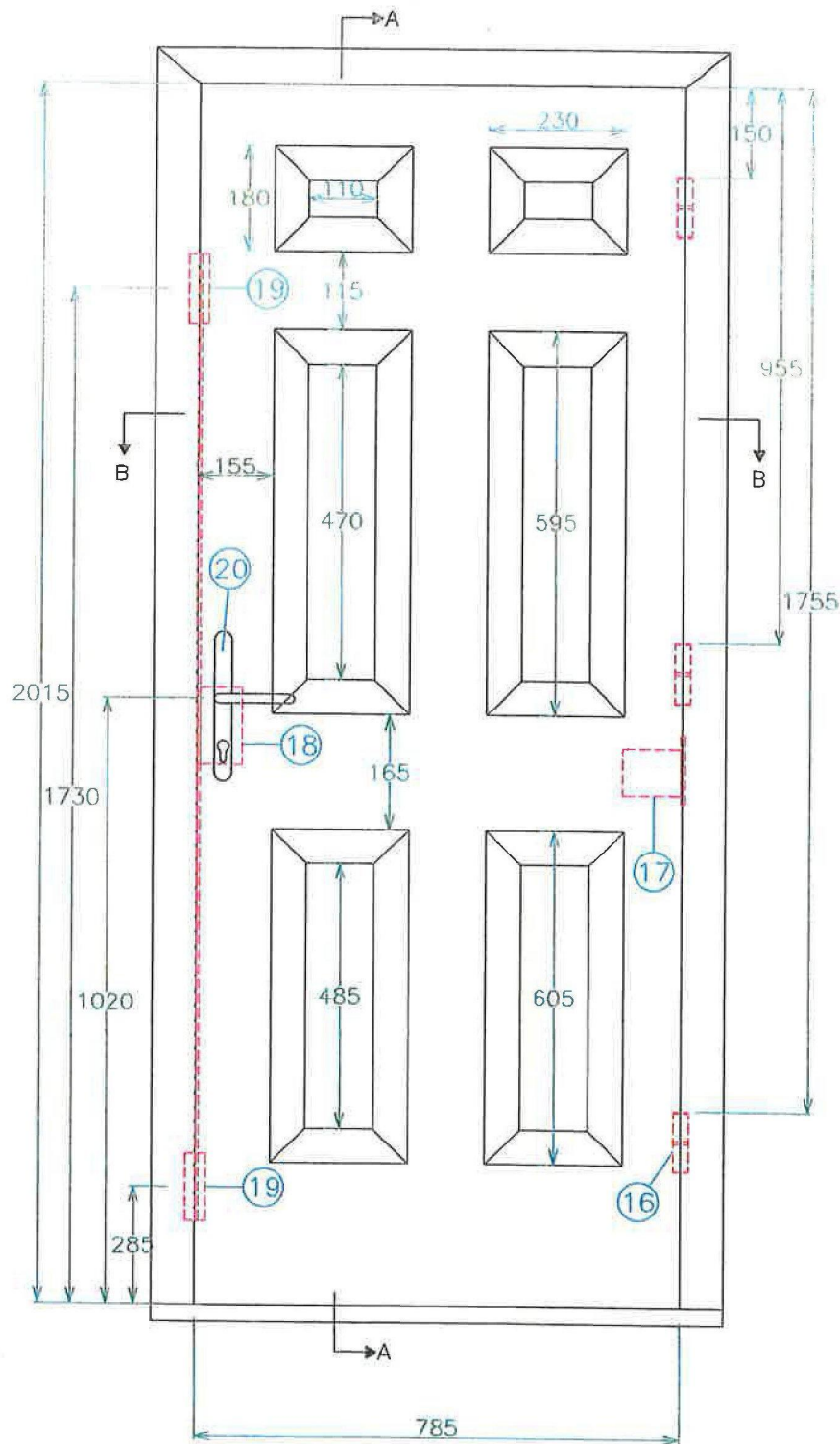


Секция двери (размер 1000x2100)

DW	1	60	836
	22	60	836

-30 min fire rated door fiberglass reinforcement location-

## Doorset B



Exova Warrington, Building and  
Engineering Services Ltd

Exova Warrington, Building and  
Engineering Services Ltd

Title Unexposed face elevation  
showing hardware positions  
(All dimensions in mm)

Date Drawn  
19/01/18

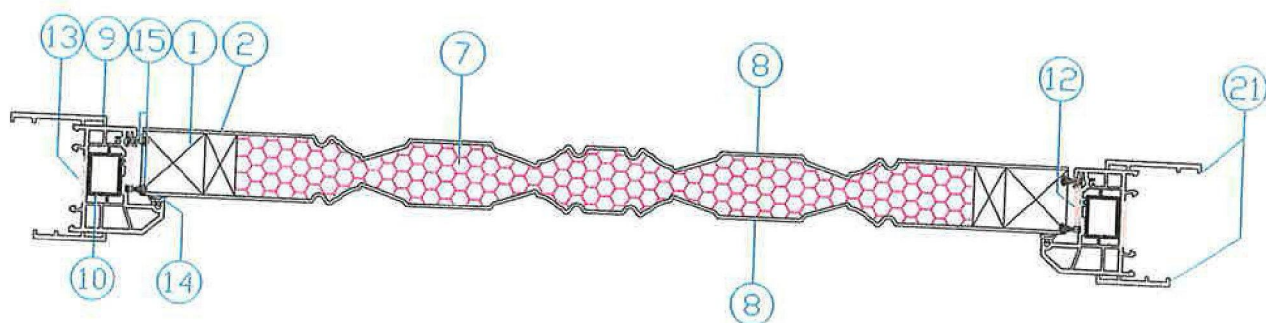
Drawn By  
ARD

Scale  
NTS

Project No.  
WF 391787

Appendix

## Section B-B



**Exova**  
Warrington



Exova Warrington, Trading as  
Warrington Energy Efficiency Centre  
Warrington, Cheshire, WA1 1AB

For more information contact  
Tel: 01925 555 555 or visit our website

Title

Horizontal cross-section  
(All dimensions in mm)

Date Drawn

19/01/18

Drawn By

ARD

Scale

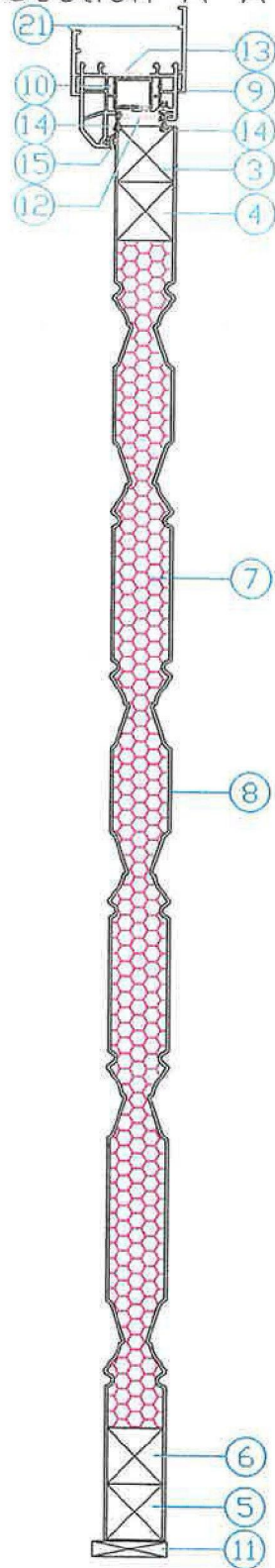
NTS

Project No.

WF 391787

Appendix

Section A-A



**EXOVA**  
Warrington, Cheshire



Exova Warrington, Cheshire, UK  
Telephone: 01925 831111  
Email: info@exova.co.uk

Exova Warrington, Cheshire, UK  
Telephone: 01925 831111  
Email: info@exova.co.uk

Title

Vertical cross-section  
(All dimensions in mm)

Date Drawn

19/01/18

Drawn By

ARD

Scale

NTS

Project No.

WF 391787

Appendix