



Fire resistance test report

Issuing laboratory: Warringtonfire Testing and Certification Limited

Test standard: BS EN 1634-1:2014+A1:2018

Test sponsor: Frisco Uk Sales Ltd

Product:

Report number: 535128

Test date: 29 August 2023


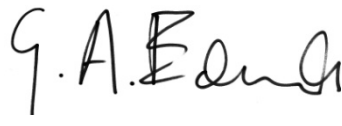
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Warringtonfire, accredited for compliance with ISO/IEC 17025:2017 – Testing



Approved Body Number 0833

Quality management

Version	Date	Information about the report	
1	6 October 2023	Description	Initial issue
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Signed for and on behalf of Warringtonfire Testing and Certification Limited

Executive summary

This report documents the findings of the fire resistance test of doorsets in accordance with BS EN 1634-1:2014+A1:2018 with deviations as described in Table 3.

Warringtonfire Testing and Certification Limited (Warringtonfire) performed the test on 29 August 2023 at the request of Frisco Uk Sales Ltd.

Table 1 provides a summary of the test specimen, Table 2 gives details of the supporting construction and Table 3 describes the summary of the test results.

Table 1 Test specimen

Item	Detail	Opening direction
Doorset A	Hardware Test	Away from the furnace
Doorset B	Hardware Test	Towards the furnace
Latching conditions	Engaged Doorset A no latch. Doorset B Latched. Bottom lock disengaged	

Table 2 Supporting construction

Item	Detail		
Supporting construction	150 mm thick low-density concrete wall with a low-density concrete lintel at the head as described in section 7.2 of EN 1363-1: 2020.		
Dimensions	Width	3000 mm	
	Height	3000 mm	
	Thickness	150 mm	
Aperture dimensions		Width	Height
	Doorset A	1020 mm	2100 mm
	Doorset B	1020 mm	2100 mm
Restraint conditions	Restrained on all edges		

Table 3 Summary of test results

Item	Criteria		Results
Doorset A	Integrity		36 Minutes (Doorset Blanked Off)
	Insulation	I ₁	36 Minutes
		I ₂	36 Minutes
Doorset B	Integrity		66 minutes
	Insulation	I ₁	66 minutes
		I ₂	66 minutes
Notes:			
The test results for the specimen only apply to the tested orientation. The test was discontinued after 72 minutes. (***) indicates failure due to integrity failure.			

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1. Introduction

This report documents the findings of the fire resistance test of doorsets in accordance with BS EN 1634-1:2014+A1:2018.

Warringtonfire performed the test on 29 August 2023 at the request of the test sponsor listed in Table 4.

Table 4 Test sponsor(s) details

Test sponsor(s)	Address
Frisco Uk Sales Ltd	Unit 14 Pindar Road Hoddesdon, Herts EN11 0DE United Kingdom

2. Test specimen and supporting construction

2.1 Drawings of test assembly

The description of the test specimen and supporting construction are detailed in Section 2.2 and illustrated in **Figure 1** to **Figure 12**. All measurements are in millimetres – unless indicated otherwise.

The drawings were supplied by the test sponsor and were amended and verified by Warringtonfire (unless stated otherwise in Section 2.2).

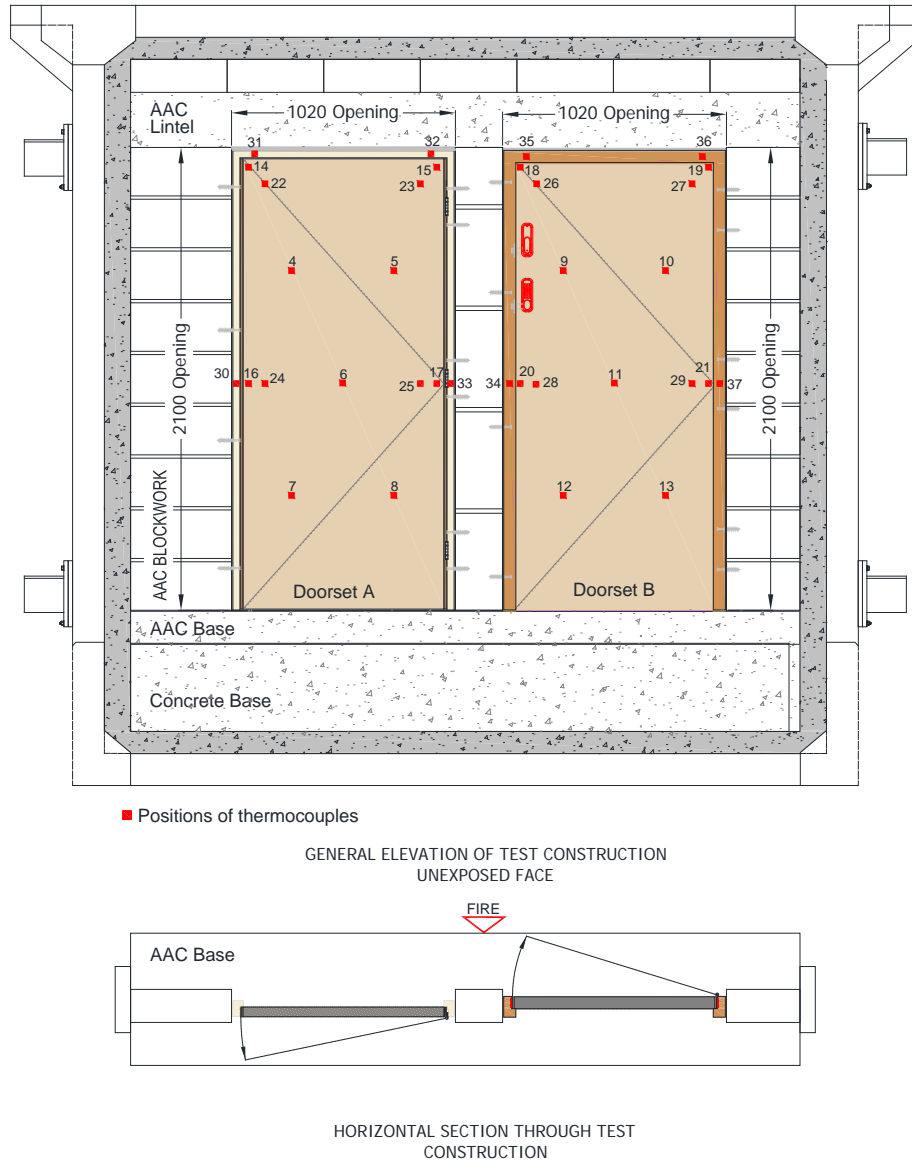
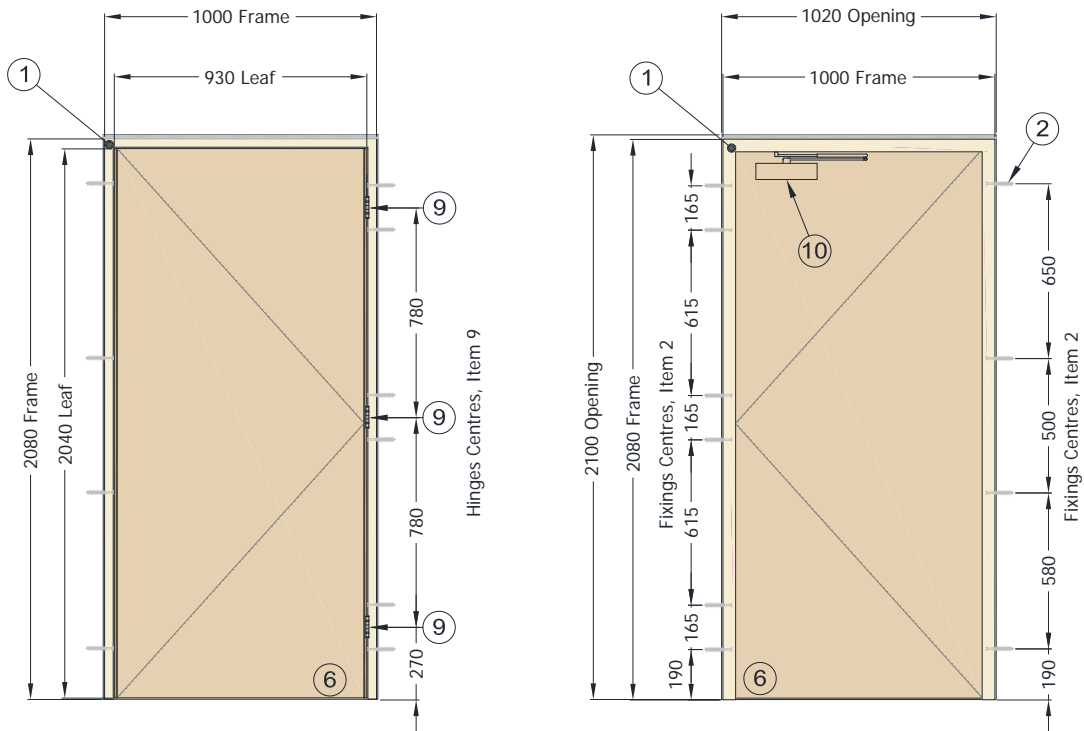
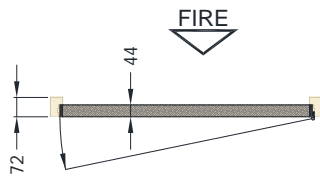


Figure 1 General Elevation of Test Construction – Unexposed Face



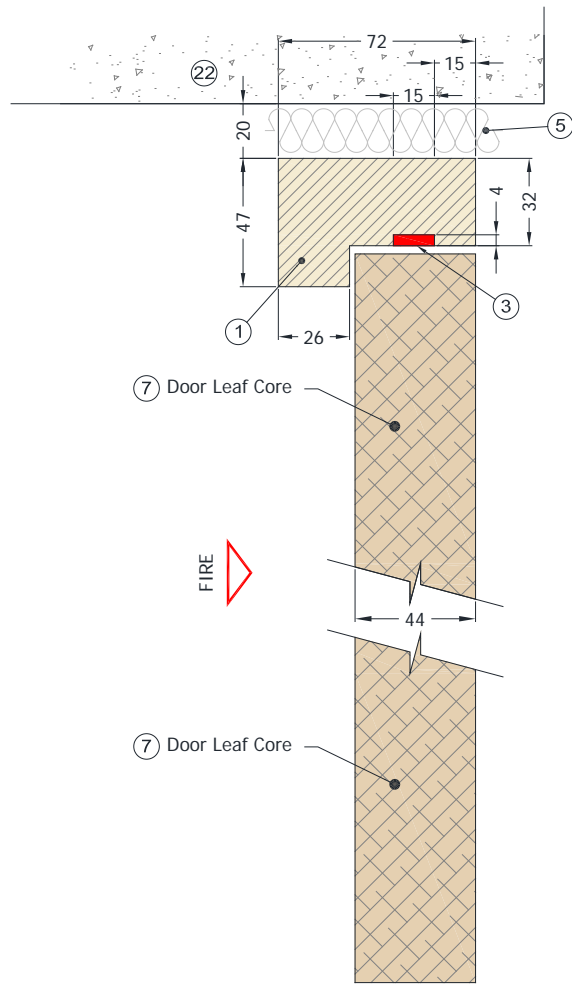
VIEW FROM UNEXPOSED FACE

VIEW FROM EXPOSED FACE



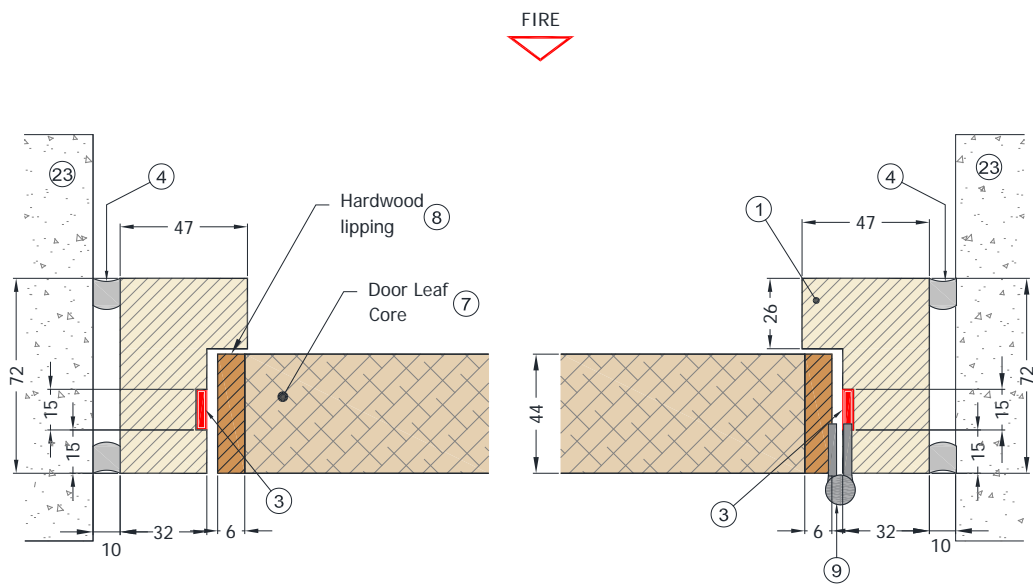
DETAILS OF DOORSET 'A'

Figure 2 Details of Doorset 'A'



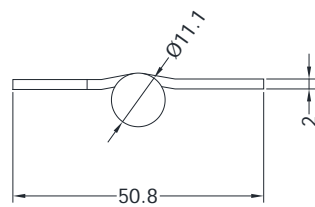
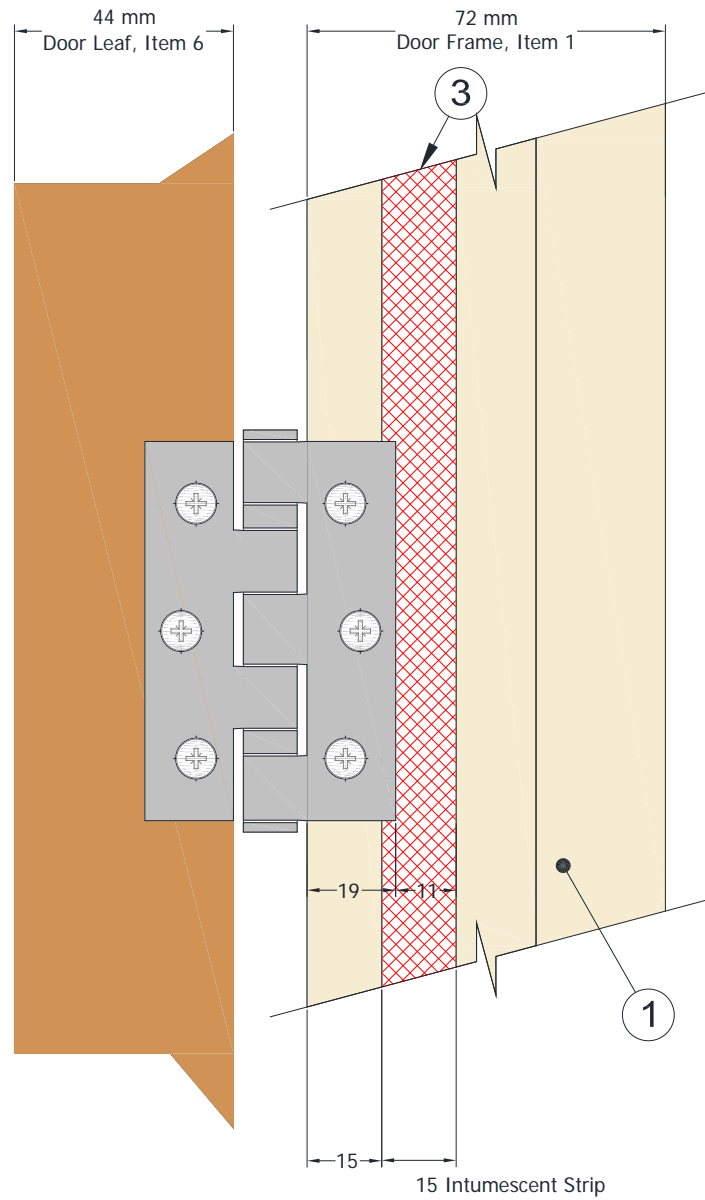
TYPICAL VERTICAL SECTION

Figure 3 Doorset A – Typical Vertical Section



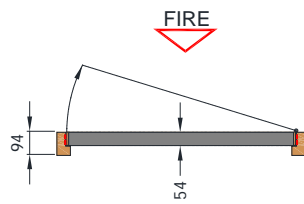
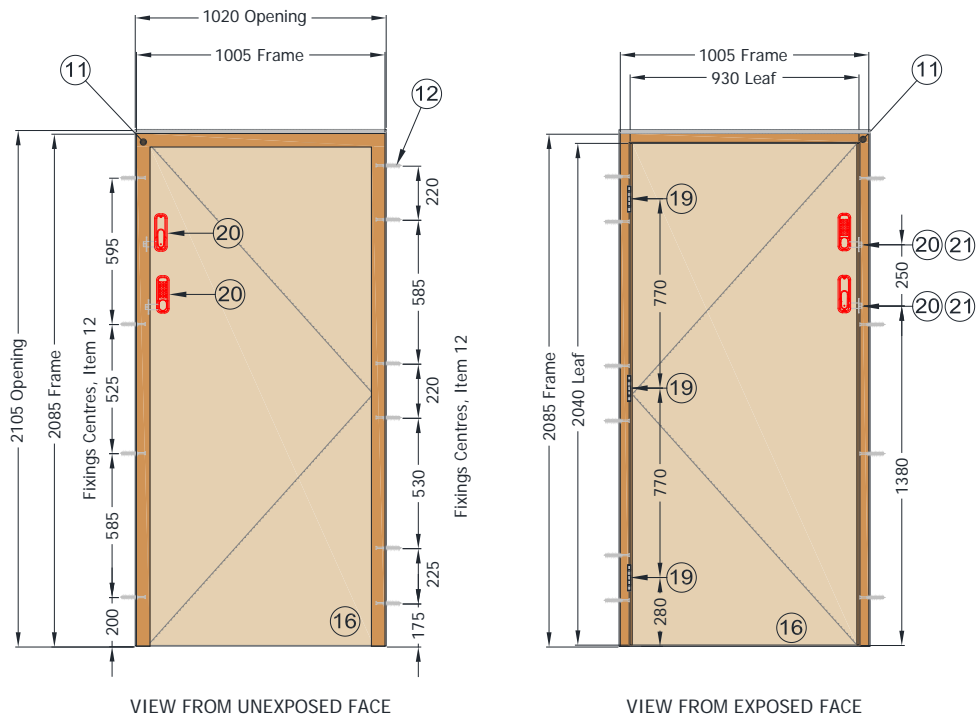
TYPICAL HORIZONTAL SECTION THROUGH DOORSET 'A' JAMBS

Figure 4 Doorset A – Typical Horizontal Section



TYPICAL ELEVATION OF
DOOR HINGE, Item 9

Figure 5 Typical Elevation of Door Hinge, Item 9



DETAILS OF DOORSET 'B'

Figure 7 Details of Doorset 'B'

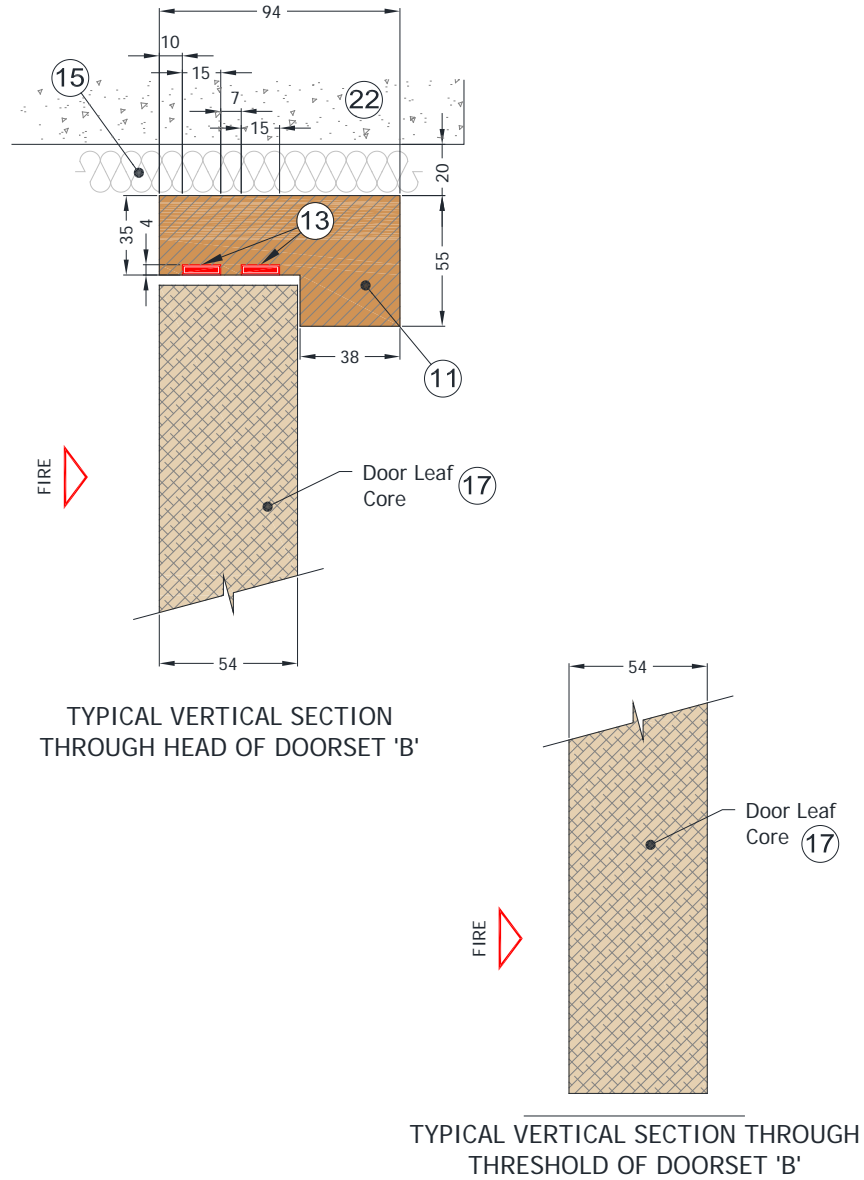
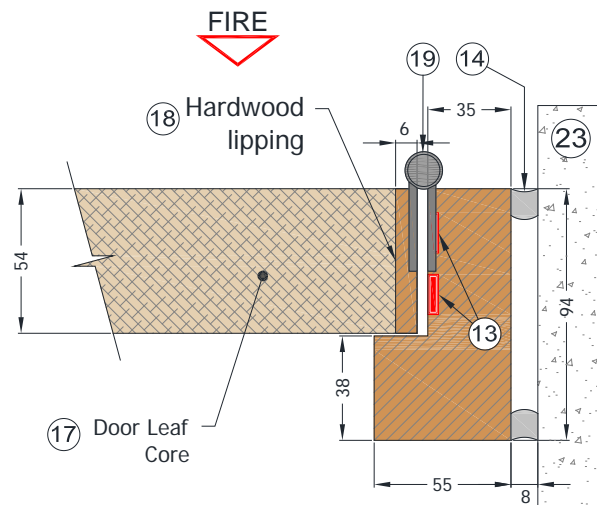
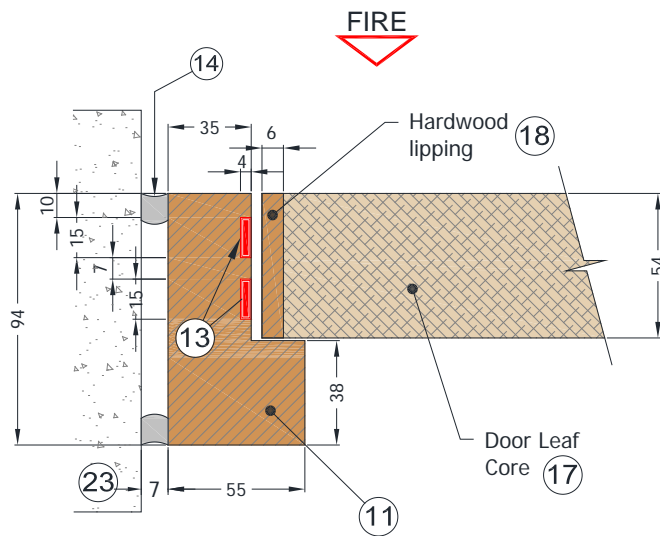


Figure 8 Doorset B – Typical Vertical Section

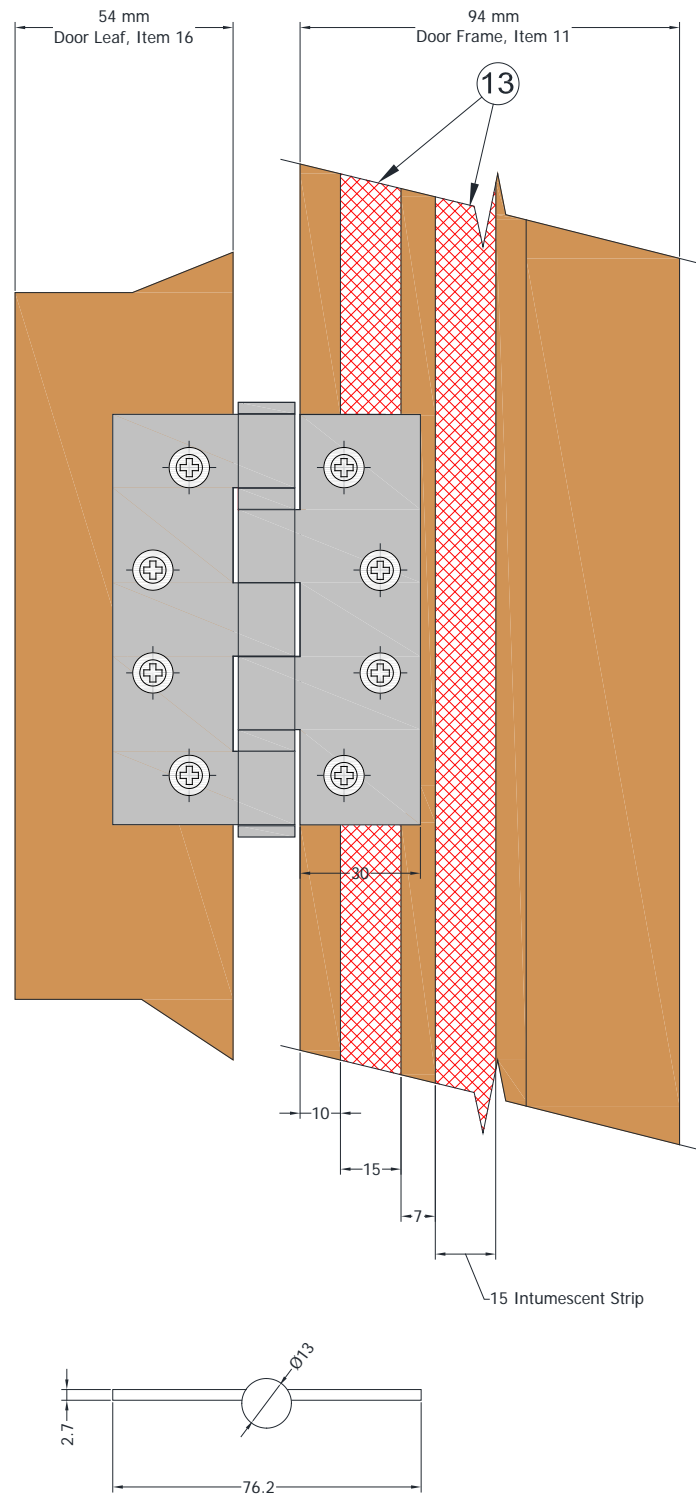


TYPICAL HORIZONTAL SECTION THROUGH HINGE JAMB OF DOORSET 'B'



TYPICAL HORIZONTAL SECTION THROUGH LATCH JAMB OF DOORSET 'B'

Figure 9 Doorset 'B' – Typical Horizontal Section



TYPICAL ELEVATION OF
DOOR HINGE, Item 19

Figure 10 Typical Elevation of Door Hinge, Item 19

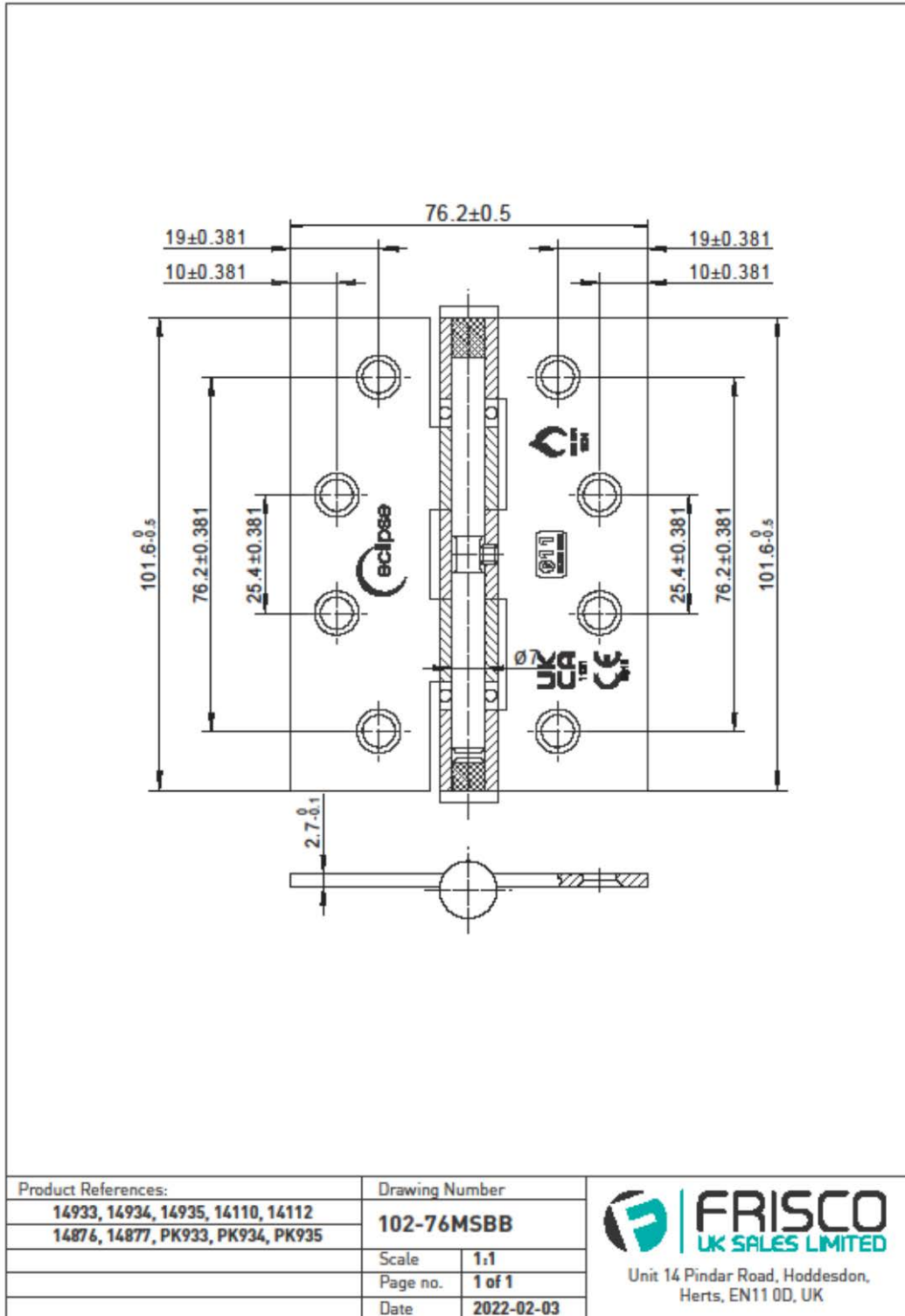
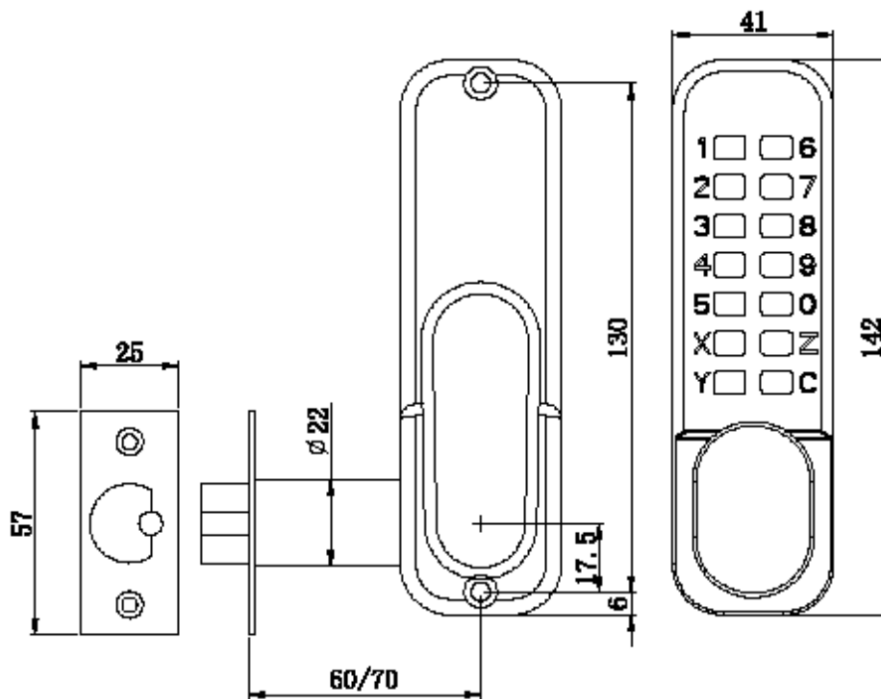


Figure 11 Client Inward Drawings – Details of Item 19 – Door Hinge



(U201#)

Figure 12 Client Inward Drawings – Details of Item 20 – Digital Lock

2.2 Schedule of components

Table 5 details the schedule of components which describes the test specimen and lists the components used in the construction of the test specimen. These were provided by the test sponsor and surveyed by Warringtonfire.

All measurements were verified by Warringtonfire unless stated otherwise in the schedule of components. All components marked with an “*” have not been verified by Warringtonfire.

Table 5 Schedule of components

Doorset A – Door frame

1. Door Frame	
Manufacturer	SA Joinery Ltd
Reference	FD 30
Material	Pine Softwood
Density	510 ~ 550 kg/m ³ , nominal*
Moisture content	10.1% (measured with a Protimeter by Warringtonfire)
Overall size	1000 mm x 2080 mm x 72 mm
Frame (Head & Jambs)	72 mm wide x 47 mm thick with 46 mm wide x 15 mm deep rebate
Jamb to Head jointing method, fixing detail and location	Stub mortice & screwed, using 75 mm long x 4.6 mm diameter countersunk head wood screws*
Presence of Adhesives	No
2. Frame Fixing Method to Supporting Construction	
Manufacturer	The Famous Turbo Silver
Type & material	Carbon steel single thread woodscrews with plastic plugs
Overall size	6 mm diameter x 100 mm long
Spacing	180 mm from top corner of jamb, 190 mm from bottom corner of jamb and at no more than 650 mm centres
Does the fixing penetrate intumescent seal within frame reveal	No
Packing Material	Wood packers, protruding from either side
Packing Material Dimension	Pine Softwood

3. Intumescent to frame reveal	
Quantity	1
Manufacturer	Pyroplex Ltd*
Reference	8700 (CF355)*
Material	Graphite intumescent seal within a PVC carrier
Overall section size	15 mm wide x 4 mm thick
Application method	Self-adhered into grooves within rebate of frame. Strips were interrupted at Hinges positions
Location	15 mm relative to the opening face of the door leaf

Doorset A – Fire stopping

4. Frame to supporting construction fire stopping detail	
Manufacturer	Rockwool
Reference	FirePro Acoustic Intumescent Sealant
Material	Intumescent Acrylic Sealant
Overall dimension	approximate 10 mm bead
Application method	Cartridge gunned around perimeter of the door frame to both faces
5. Ceramic Fibre Gasket	
Manufacturer	Morgan Advanced Materials
Reference	Superwool Plus
Material	High temperature insulation wool
Thickness	25 mm, uncompressed
Density	96 kg/m ³ (stated)
Fixing method	Compressed within the gap between the specimen and the restraint frame

Doorset A – Door Leaf

6. Door Leaf	
Manufacturer (blank)	Halspan
Reference	Prima FD30
Quantity of leaves on doorset	1
Overall leaf size supplied for testing	930 mm wide x 2040 mm high x 44 mm thick
Operation	Opening outwards furnace
7. Core element	
Material	3-layer particle board, unfinished
Moisture content	9.2% (measured with a Protimeter by Warringtonfire)
Density	655 kg/m ³ (measured by Warringtonfire)
8. Lippings	
Material	Sapele, Hardwood
Density	759 kg/m ³ (measured by Warringtonfire)
Overall size	2040 mm high x 44 mm wide x 6 mm thick
Location	Vertical edges only
Adhesives	
i. Manufacturer	Polyvine
ii. Type	Formalhyde
iii. Reference	Casamite
iv. Curing method	Cold press
v. Application method	Brushed
vi. Presence of Mechanical Fixings	No

Doorset A – Hardware

9. Hinges	
Supplier	Frisco UK Sales Limited
Reference	Eclipse, 14102,
Quantity	3
Primary material	Mild Steel
Type	Ball bearing butt hinge
Overall Size	
i. Knuckle	82 mm high x 11 diameter mm
ii. Blades	76 mm high x 51 mm wide x 2 mm thick
Details of Fixings	
i. Type	Wood Screws
ii. Material	Stainless Steel
iii. Sizes	3.8 mm diameter x 25 mm long
iv. Number off per blade	3
Position of each hinge	Figure 2 for details
Details of intumescent protection	1 mm intender behind each leaf
Interruptions to Intumescent within the frame reveal	As per height and width of the hinges, Figure 5 for details

10. Door Closer	
Manufacturer	Frisco UK Sales Limited
Reference	Eclipse 28530
Material	
i. Body	Aluminium
ii. Closer arm	Steel
iii. Cover	Aluminium
Configuration	Parallel installation outside the door
Overall size	227 mm high x 60 mm wide x 40 mm deep
Closer Body Fixing method	Closer body fixed to door leaf surface on exposed side and connected to door frame with closer arm through parallel plate
Fixings Closer Body to Door Leaf	
i. Type	Self-drilling screw
ii. Size	5 mm diameter x 60 mm machine screws.
iii. Quantity	4
Fixings Parallel Plate to Door Frame	
i. Type	Self-drilling screw
ii. Size	6 mm diameter x 25 mm
iii. Quantity	4
Maximum opening moment	45.2 Newton metre (Nm) (Measured by Warrington Fire)
Maximum closer moment	22.7 Newton metre (Nm) (Measured by Warrington Fire)

Doorset B – Door frame

11. Door Frame	
Manufacturer	SA Joinery Ltd
Reference	FD 60
Material	Sapele Hardwood
Density	620 ~ 660 kg/m ³ , nominal*
Moisture content	9.8 % (measured with a Protimeter by Warringtonfire)
Overall size	2085 mm x 1005 mm x 94 mm
Frame (Head & Jambs)	94 mm x 55 mm, with 56 mm x 20 mm deep rebate
Jamb to Head jointing method, fixing detail and location	Stub mortice & screwed, using 75 mm long x 4.6 mm diameter countersunk head wood screws*
Presence of Adhesives	No

12. Frame Fixing Method to Supporting Construction

Manufacturer	The Famous Turbo Silver
Type & material	Carbon steel single thread woodscrews with plastic plugs
Overall size	6 mm diameter x 100 mm long
Spacing	180 mm from top corner of jamb, 175 mm from bottom corner of jamb and at no more than 595 mm centres
Does the fixing penetrate intumescent seal within frame reveal	No
Packing Material	Wood packers, protruding from either side
Packing Material Dimension	Sapele Hardwood

13. Intumescent to frame reveal

Quantity	2
Manufacturer	Pyroplex Ltd
Reference	8700 (CF355)
Material	Graphite intumescent seal within a PVC carrier
Overall section size	15 mm wide x 4 mm thick
Application method	Self-adhered into grooves within rebate of frame strips were interrupted at furniture positions
Location	10 mm and 32 mm from the leaf face to the seals

Doorset B – Fire stopping

14. Frame to supporting construction fire stopping detail

Manufacturer	Rockwool
Reference	FirePro Acoustic Intumescent Sealant
Material	Intumescent Acrylic Sealant
Overall dimension	approximate 10 mm bead
Application method	Cartridge gunned around perimeter of the door frame to both faces

15. Ceramic Fibre Gasket	
Manufacturer	Morgan Advanced Materials
Reference	Superwool Plus
Material	High temperature insulation wool
Thickness	25 mm, uncompressed
Density	96 kg/m ³ (stated)
Fixing method	Compressed within the gap between the specimen and the restraint frame

Doorset B – Door leaf

16. Door Leaf	
Manufacturer (blank)	Halspan
Reference	Prima FD60
Quantity of Leaves on Doorset B	1
Overall leaf size supplied for testing	930 mm wide x 2040 mm high x 54 mm thick
Operation	Opening towards furnace
17. Core Element	
Material	3-layer particle board, unfinished
Average moisture content	7.7% (measured with a Protimeter by Warringtonfire)
Density	624 kg/m ³ (measured by Warringtonfire)
18. Lippings	
Material	Sapele, Hardwood
Density	620 ~ 660 kg/m ³ , nominal*
Moisture content	759 kg/m ³ (measured by Warringtonfire)
Overall size	2040 mm high x 44 mm wide x 6 mm thick
Location	Vertical edges only
Adhesives	
i. Manufacturer	Polyvine*
i. Type	Formalhyde*
ii. Reference	Casamite*
iii. Curing method	Cold press*
iv. Application method	Brushed*
v. Presence of Mechanical Fixings	No

Doorset B – Hardware

19. Hinges	
Supplier	Frisco UK Sales Limited
Reference	Eclipse 14934
Quantity	3
Primary material	Mild Steel
Type	Ball bearing butt hinge
Size	
i. Knuckle	106 mm high x 13 diameter mm
ii. Blades	102 mm high x 76 mm wide x 2.7 mm thick
Details of Fixings	
i. Type	Wood Screws
ii. Material	Stainless Steel
iii. Sizes	Ø4 mm x 30 mm long
iv. Number off per blade	4
v. Position of each hinge	Figure 7 for details
Details of intumescent protection	1 mm intender behind each leaf
Interruptions to Intumescent within the frame reveal	Fully interrupts 1 st intumescent seal, Figure 10 for details

20. Digital Lock	
Manufacturer	Frisco UK Sales Limited
Reference	70253 Eclipse ED20
Material	
i. Lockcase	Zinc
ii. Forend plate	Steel
iii. Latch bolt / Lock bolt	Zinc
iv. Gasket	Rubber Cushion
Overall sizes	
i. Keypad	142 mm high x 41 mm wide
ii. Gasket	152 mm high x 51 mm wide
iii. Lockcase	22 mm diameter, 60 mm backset
iv. Forend plate	57 mm x 25 mm
v. Latch bolt	18 mm wide x 11 mm throw
Lock Fixing method	Recessed in the door leaf fixed with 2 No. woodscrews
Latch Operation	
i. Top Digital Lock	Engaged (auto lock)
ii. Bottom Digital Lock	Disengaged
Latch force of Top Digital Lock	8.9 N
Details of intumescent protection	2 Graphite Based Intumescent
Location of the Top Digital Lock	Centre of the Latch measures 1630 mm from the bottom of the leaf
Location of the Bottom Digital Lock	Centre of the Latch measures 1380 mm from the bottom of the leaf

21. Keeps	
Manufacturer	Frisco UK Sales Limited
Reference	70253 Eclipse ED20
Material	Steel
Overall sizes	70 mm high x 41 mm wide
Fixing method	Recessed in the door frame fixed with 2 No. woodscrews
Details of intumescent protection	2mm Graphite Based Intumescent
Interruptions to Intumescent within the frame reveal	Fully interrupts 1 st intumescent seal and 8 mm interrupts 2 nd intumescent seal

Supporting Construction

22. Concrete Lintel	
Type	Steel reinforced concrete lintel
Material	Concrete slabs
Overall size	3000 mm long x 215 mm deep x 215 mm wide
23. Masonry brickwork	
Type	Single skin
Material	Commons brick
Wall thickness	215 mm
Fixing method	Ordinary sand/cement mortar, mix 3:1

2.3 Supporting construction

Table 6 details the supporting construction used for this fire resistance test.

Table 6 Supporting construction

Item	Detail		
Supporting construction	150 mm thick low-density concrete wall with a low-density concrete lintel at the head as described in section 7.2 of EN 1363-1: 2020.		
Dimensions	Width	3000 mm	
	Height	3000 mm	
	Thickness	150 mm	
Aperture dimensions		Width	Height
	Doorset A	1020 mm	2100 mm
	Doorset B	1020 mm	2100 mm
Restraint conditions	Restrained on all edges		

3. Test procedure

Table 7 details the test procedure for this fire resistance test.

Table 7 Test procedure

Item	Detail	
Test standard	The test was performed in accordance with BS EN 1634-1:2014+A1:2018.	
Product standard and/or EAD	EN 16034: 2014	
EGOLF agreements and/or recommendations	Certain aspects of some fire test specifications are open to different interpretations. EGOLF have identified a number of these areas and have agreed on resolutions which define a common agreement of interpretations between fire test laboratories that are members of the group. If such resolutions apply to this test, they have been followed.	
Deviations from test method	None	
Instrumentation and equipment	The instrumentation was provided in accordance with BS EN 1634-1:2014+A1:2018, BS EN 1363-1:2020, and where appropriate BS EN 1363-2:1999.	
Pre-test conditioning	The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of 5 days. Throughout this period of time both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 18.5°C to 29°C and 35% to 64.5% respectively.	
Functionality test	Gap measurements	According to clause 10.1.2 of BS EN 1634-1:2014+A1:2018, these measurements were completed before the start of the fire test. They are shown in Figure 15 and Table 20 and Table 21 in Appendix C.
	Operability test	According to clause A.2.2 of EN 16034, the door(s) were subjected to a series of 25 opening and closing cycles of at least 90° for side-hung doorset(s).
	Self-closing	According to clause A.4 of EN 16034, the door(s) were subjected to 1 cycle which was completed.
	Final setting	According to clauses 10.1.4 of BS EN 1634-1: 2018 and A.2.2 of EN 16034, the door(s) were subjected to 1 cycle which was completed.
Pre-test measurements	Doorset A	
	Opening force	44.7 N
	Closing force	22.4 N
	Closing speed	N/A m/s
	Doorset B	
	Latching force	8.4 N
Installation details	Delivery date of the test specimen	
	Start date for construction of supporting construction	23 August 2023
	Completion date for construction of supporting construction	24 August 2023
	Start date for installation of test specimen	25 August 2023
	Completion date for installation of	25 August 2023

Item	Detail		
	test specimen		
	Supporting construction constructed by	Representatives of Warringtonfire	
	Doorset installed by	Representatives of Warringtonfire	
Symmetry	Asymmetrical: <ul style="list-style-type: none"> • Doorset A opened away from the furnace • Doorset B opened into the furnace. The direction of exposure was decided by the test sponsor.		
Ambient laboratory temperature	Start of the test	18.0 °C	
	Minimum temperature	17.0 °C	
	Maximum temperature	18.0 °C	
Sampling / specimen selection	Appendix E includes the sampling report. A representative of Warringtonfire sampled and selected the following components of the tested specimen: Copies of the sample reports are kept in the job folder.		
	Product	Date	Job Number
	28530 EN Size 2-5 Overhead Door Closer	26/06/2023	533702
	70253 Mechanical Door Lock.	02/08/2023	535128
	1mm Flexifire Intumescent Kit o suit	02/08/2023	535128
	14934 Hinges	02/08/2023	535128
	14102	02/08/2023	535128

4. Test measurements and results

Table 8 summarises the results achieved by the test specimen against the performance criteria listed in BS EN 1634-1:2014+A1:2018 for the following parameters:

- Integrity – The specimen must retain its separating function, without causing either ignition of a cotton pad when applied, or permitting the penetration of a gap gauge as specified in BS EN 1634-1: 2014 + A1:2018, or resulting in sustained flaming on the unexposed surface.
- Insulation (I_1) – The test specimen must be evaluated against the maximum temperature rise criteria specified in EN 1363-1: 2020 (180°C).
- Insulation (I_2) – The mean temperature rise (ΔT_m) of the unexposed surface must not be greater than 140°C and the maximum temperature rise (ΔT_M) must not be greater than 180°C, with the exception that the limit for temperature rise for any frame member or transom member adjacent to the leaf/leaves of the doorset or openable window must be 360°C. Insulation failure also occurs simultaneously with integrity failure as specified in BS EN 1634-1: 2014 + A1:2018.

Appendix A includes observations of any significant behaviour of the specimen and details of the occurrence of the relevant performance criteria.

Appendix B details the location of the instrumentation used during the test.

Appendix C includes details of the measurements taken during the test.

Appendix D includes photographs of the test specimen before, during and after the test.

Appendix E includes the sampling report.

Table 8 Detailed test results

Criteria	Doorset A	Doorset B
Thermal insulation		
Supplementary procedure – I₁	36 Minutes	66 minutes
ΔTM = 180°C	36 Minutes	66 minutes
ΔTM = 180°C on the frame	36 Minutes	66 minutes
Normal procedure – I₂	Please enter manually	66 minutes
ΔTm = 140°C	36 Minutes	66 minutes
ΔTM = 180°C	36 Minutes	66 minutes
ΔTM = 360°C on the frame	36 Minutes	66 minutes
Integrity	36 minutes doorset Blanked off	66 minutes
Sustained flaming	No integrity failure for this criteria at the termination of the test	66 minutes
Failure with gap gauge	No integrity failure for this criteria at the termination of the test	No integrity failure for this criteria at the termination of the test
Cotton pad failure	No integrity failure for this criteria at the termination of the test	No integrity failure for this criteria at the termination of the test
Notes:		
The test results for the specimen only apply to the tested orientation. The test was discontinued after 72 minutes. ‘**’ indicates failure due to integrity failure.		

5. Application of test results

5.1 Field of direct application

The field of direct application of the test results for these test specimens is set forth in paragraph 13 of the European standard EN 1634-1:2014+A1:2018.

The field of direct application may only be defined following the identification of classification(s). The field of (direct and, where applicable, extended) application should be included in the classification report.

5.2 Validity

This document is the original version of this test report and is written in English. In case of doubt, the original version prevails over a translation. This document is issued subject to Warringtonfire's standard terms and conditions, which are available at: [Terms and Conditions | Element](#).

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criteria for assessing the potential fire hazard of the product in use, nor can the results be extrapolated and applied to other products.

Reports are statements of fact(s) prepared in accordance with the referenced version of the standard(s) stated in Section 3 of this report. Reports are based upon the information provided to Warringtonfire. Warringtonfire takes no responsibility for the accuracy or completeness of such information.

The results stated in this report apply to the test specimens as received.

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in BS EN 1634-1:2014+A1:2018, BS EN 1363-1:2020, and where appropriate BS EN 1363-2:1999.

Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

Any differences in relation to the aforementioned characteristics may significantly affect the performance and will therefore invalidate the application of the test results to the variant product. It is recommended that any proposed variation to the tested configuration or product should be referred to the test sponsor. The test sponsor should then obtain appropriate documentary evidence of compliance from Warringtonfire or another accredited testing authority. The supplier of the product is responsible for ensuring that the product which is supplied for use is identical to the test specimens that were tested.

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The report is issued for the benefit of Warringtonfire's direct customer only, and may not be relied upon by any third parties without Warringtonfire's express written consent.

5.3 Uncertainty of measurement

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

Appendix A Test observations

Table 9 shows the observations of any significant behaviour of the specimen during the test.

Table 9 Test observations

Min	Sec	System	Observation
00	00	Doorset A & B	Commencement of test
00	42	Doorset B	Steam/Smoke release coming from both vertical edges of Doorset B
01	53	Doorset A	Steam/Smoke release coming from the leading edge and the head of Doorset A
03	49	Doorset A	Steam/Smoke release from the hinged edge of Doorset A
04	35	Doorset A	Doorset A unrestrained
06	45	Doorset B	When viewed from the exposed face, both button locks on Doorset B are melting
14	47	Doorset B	Brown liquid dripping from the bottom button lock on Doorset B
16	00	Doorset B	Both button locks on Doorset B have fully melted away when viewed from the exposed face
19	00	Doorset A	When viewed from the exposed face, the door closer on Doorset A is starting to melt away
24	08	Doorset A	Black discolouration along the hinge side of Doorset A.
30	31	Doorset A	Discolouration at the sill on Doorset A
32	05	Doorset B	Discolouration along the leading edge of Doorset B
36	00	Doorset A	Doorset A is blanked off to continue the test for Doorset B
41	00	Doorset B	Black discolouration around both button locks on Doorset B
51	37	Doorset B	Discolouration at the head of Doorset B
65	52	Doorset B	Flicker of flame at the sill of Doorset B
66	00	Doorset B	Sustained flaming at the left side head of Doorset B. This means cotton pad and sustained flaming integrity failure is deemed to have occurred
67	00	Doorset B	Sustained flaming has now occurred at the right side of Doorset B
70	00	Doorset B	Glowing is starting around the top button handle on Doorset B
72	00	Doorset B	Glowing has now started at the bottom button lock also on Doorset B
72	50	Doorset B	Test discontinued at request of the test sponsor

Appendix B Instrumentation locations

Figure 2 shows the instrumentation locations for this fire resistance test.

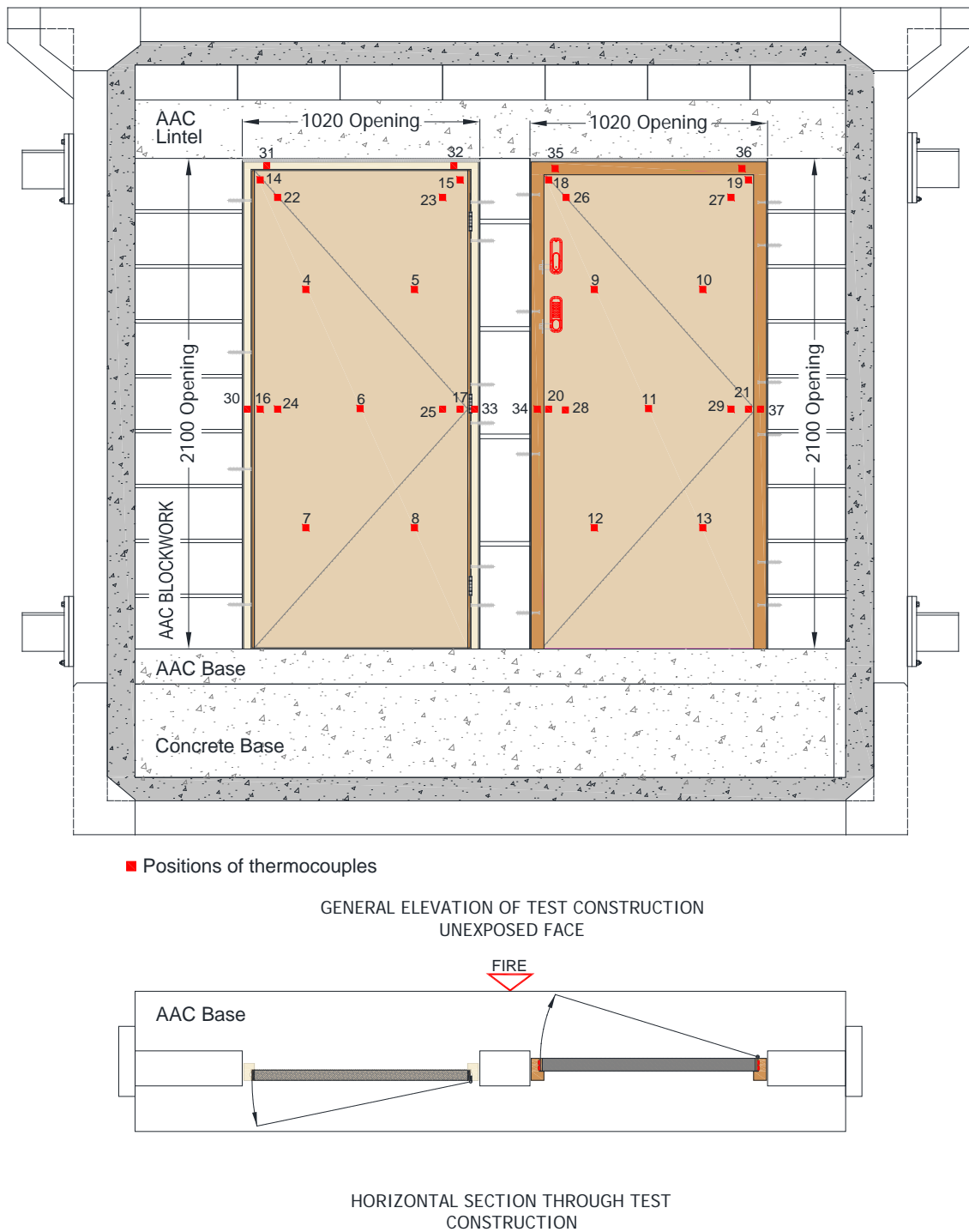


Figure 2 Instrumentation locations

Appendix C Test data

C.1 Furnace temperature and deviation

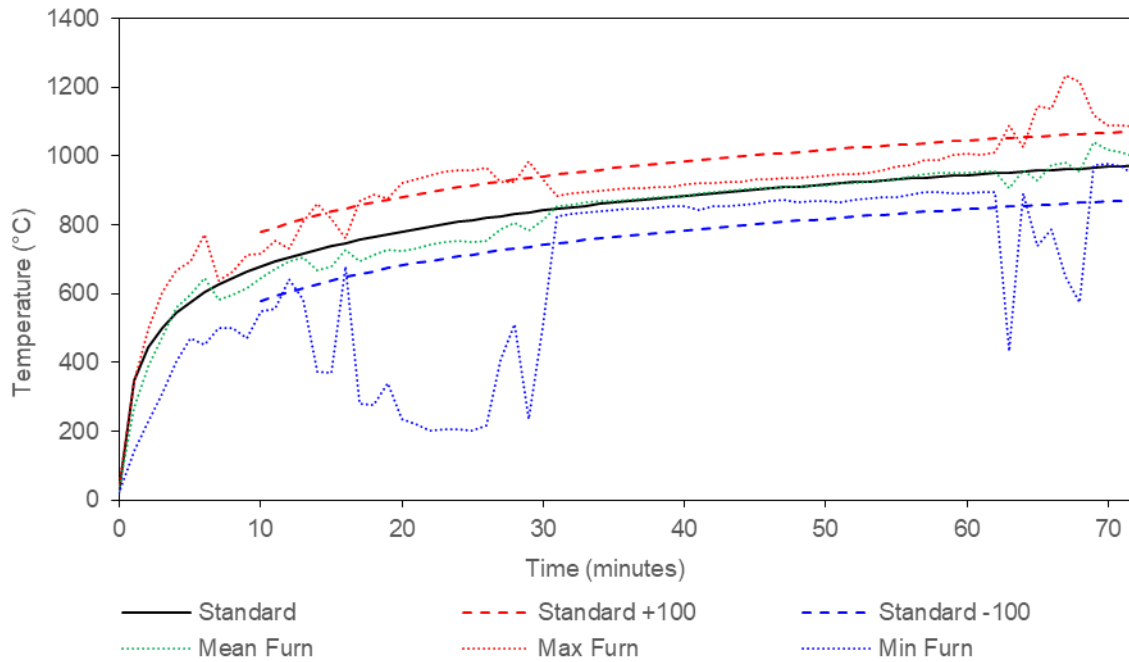


Figure 3 Furnace thermocouple temperature vs time

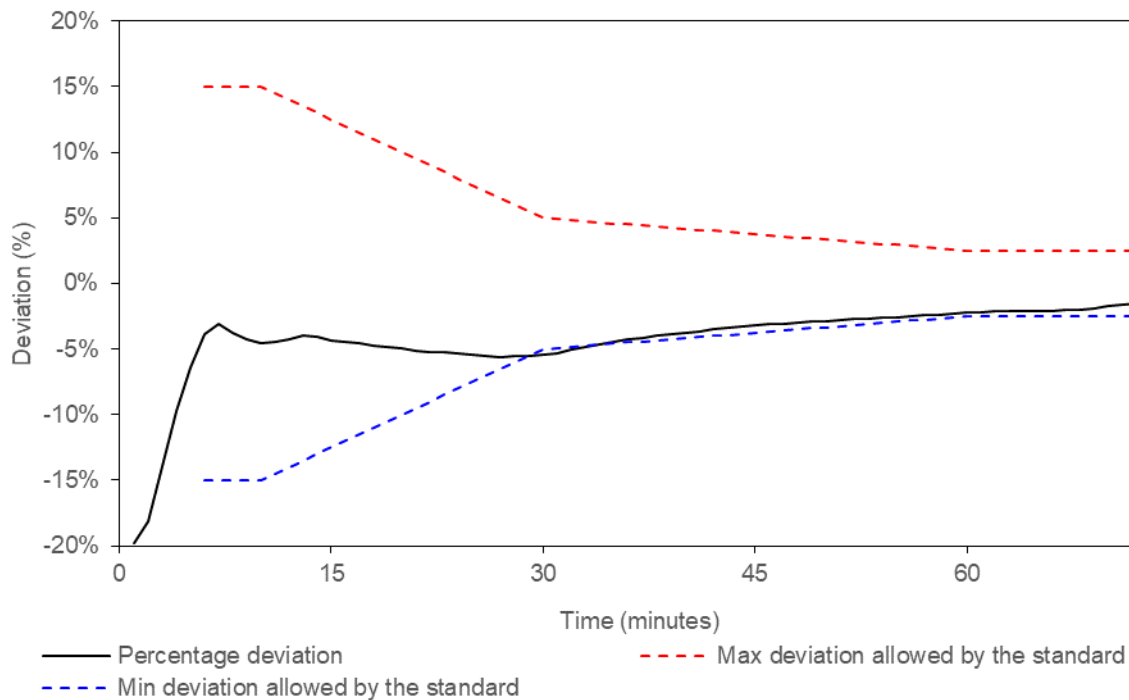


Figure 4 Percentage deviation of exposure severity vs time

C.2 Furnace pressure

The furnace pressure was taken at 2700 mm above the sill of the test specimen.

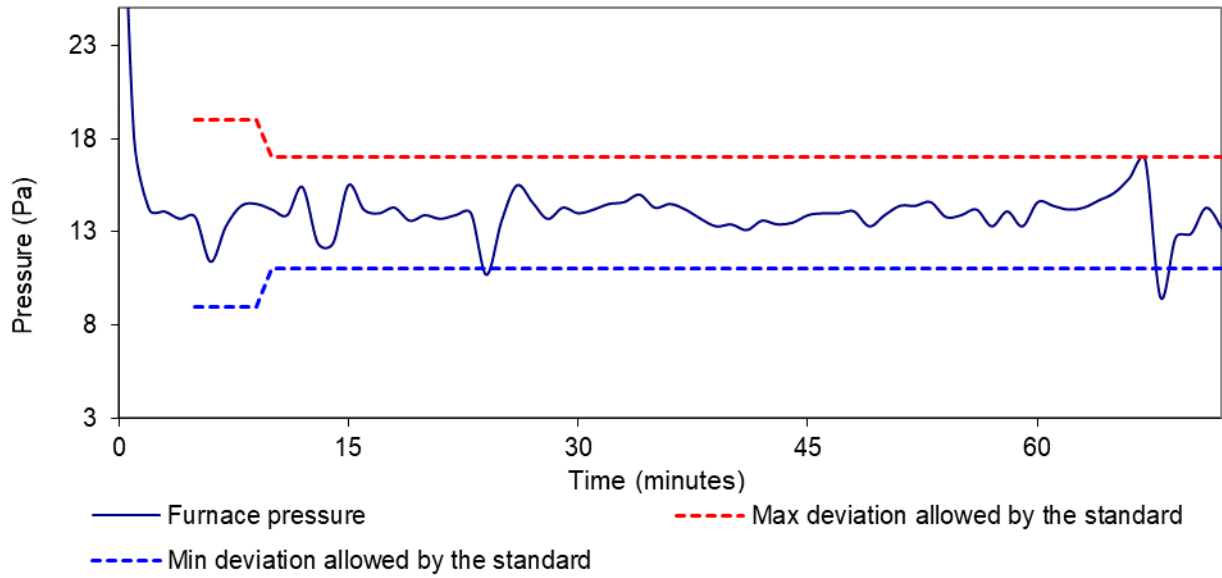


Figure 5 Furnace pressure

C.3 Specimen temperatures

Table 10 Individual And Mean Temperatures Recorded On The Unexposed Surface Of Doorset B

Time (mins)	Tc 009 (°C)	Tc 010 (°C)	Tc 011 (°C)	Tc 012 (°C)	Tc 013 (°C)	Average (°C)
0	19.0	19.0	19.0	20.0	20.0	19.4
3	20.0	20.0	20.0	20.0	20.0	20.0
6	20.0	20.0	20.0	20.0	20.0	20.0
9	20.0	20.0	20.0	20.0	20.0	20.0
12	20.0	20.0	20.0	20.0	20.0	20.0
15	22.0	20.0	20.0	21.0	21.0	20.8
18	24.0	22.0	22.0	22.0	22.0	22.4
21	27.0	23.0	23.0	24.0	23.0	24.0
24	30.0	25.0	26.0	26.0	25.0	26.4
27	33.0	27.0	28.0	28.0	27.0	28.6
30	36.0	30.0	31.0	31.0	30.0	31.6
33	40.0	33.0	34.0	34.0	33.0	34.8
36	43.0	37.0	38.0	38.0	36.0	38.4
39	47.0	41.0	42.0	41.0	40.0	42.2
42	51.0	45.0	46.0	46.0	45.0	46.6
45	55.0	50.0	51.0	50.0	50.0	51.2
48	59.0	55.0	56.0	55.0	55.0	56.0
51	62.0	60.0	60.0	60.0	61.0	60.6
54	66.0	65.0	64.0	64.0	66.0	65.0
57	69.0	69.0	69.0	68.0	70.0	69.0
60	72.0	73.0	72.0	72.0	74.0	72.6
63	75.0	76.0	76.0	75.0	77.0	75.8
66	78.0	79.0	78.0	77.0	80.0	78.4
69	68.0	81.0	79.0	80.0	82.0	78.0
72	63.0	83.0	82.0	82.0	85.0	79.0

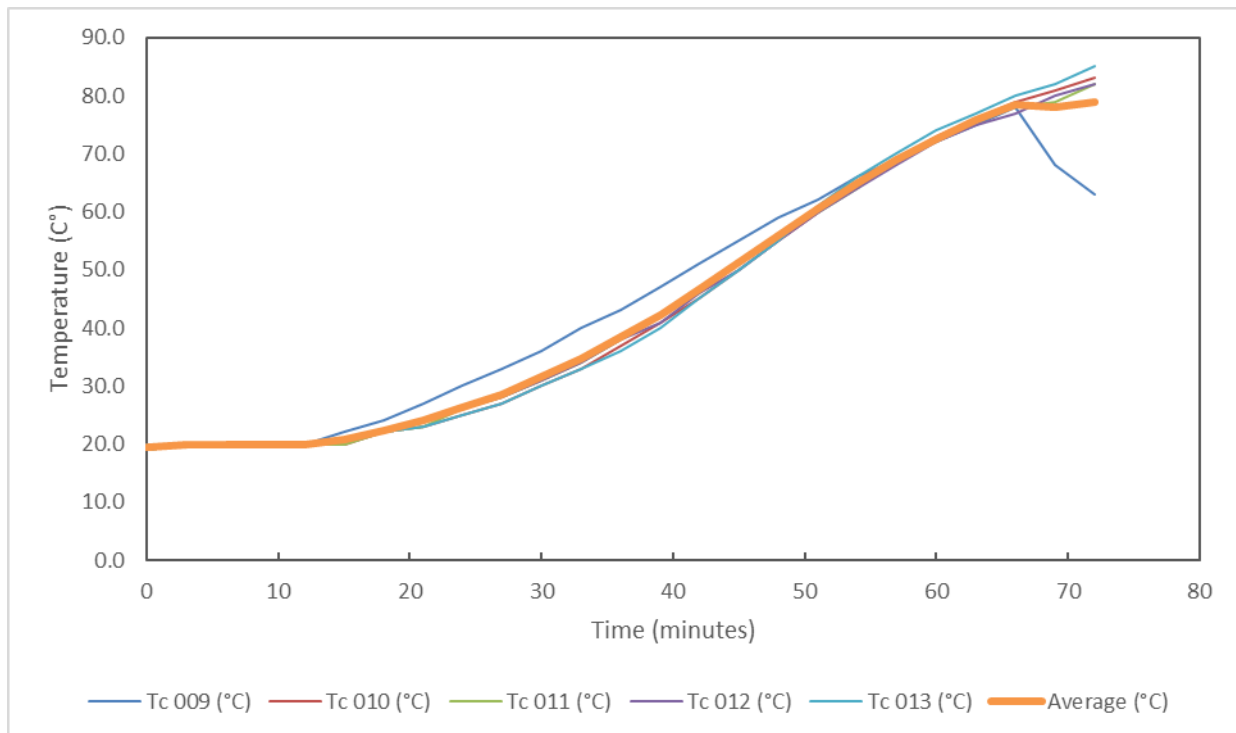


Figure 6 Individual And Mean Temperatures Recorded On The Unexposed Surface Of Doorset B

Table 11 Individual Temperatures Recorded On The Leaf Of Doorset B 25 mm Away From The Edges

Time (mins)	Tc 018 (°C)	Tc 019 (°C)	Tc 020 (°C)	Tc 021 (°C)
0	20.0	20.0	21.0	21.0
3	21.0	21.0	34.0	21.0
6	26.0	21.0	29.0	21.0
9	27.0	22.0	26.0	21.0
12	31.0	24.0	26.0	21.0
15	39.0	30.0	26.0	22.0
18	51.0	42.0	28.0	25.0
21	61.0	54.0	30.0	29.0
24	65.0	64.0	33.0	35.0
27	80.0	74.0	37.0	40.0
30	83.0	83.0	41.0	45.0
33	85.0	85.0	46.0	51.0
36	83.0	85.0	51.0	56.0
39	79.0	84.0	55.0	61.0
42	78.0	83.0	59.0	65.0
45	82.0	83.0	63.0	69.0
48	85.0	83.0	67.0	72.0
51	87.0	85.0	70.0	74.0
54	91.0	89.0	73.0	76.0
57	93.0	96.0	75.0	77.0
60	96.0	101.0	79.0	79.0
63	104.0	118.0	83.0	81.0
66	125.0	181.0	84.0	84.0
69	63.0	150.0	85.0	86.0
72	35.0	27.0	87.0	94.0

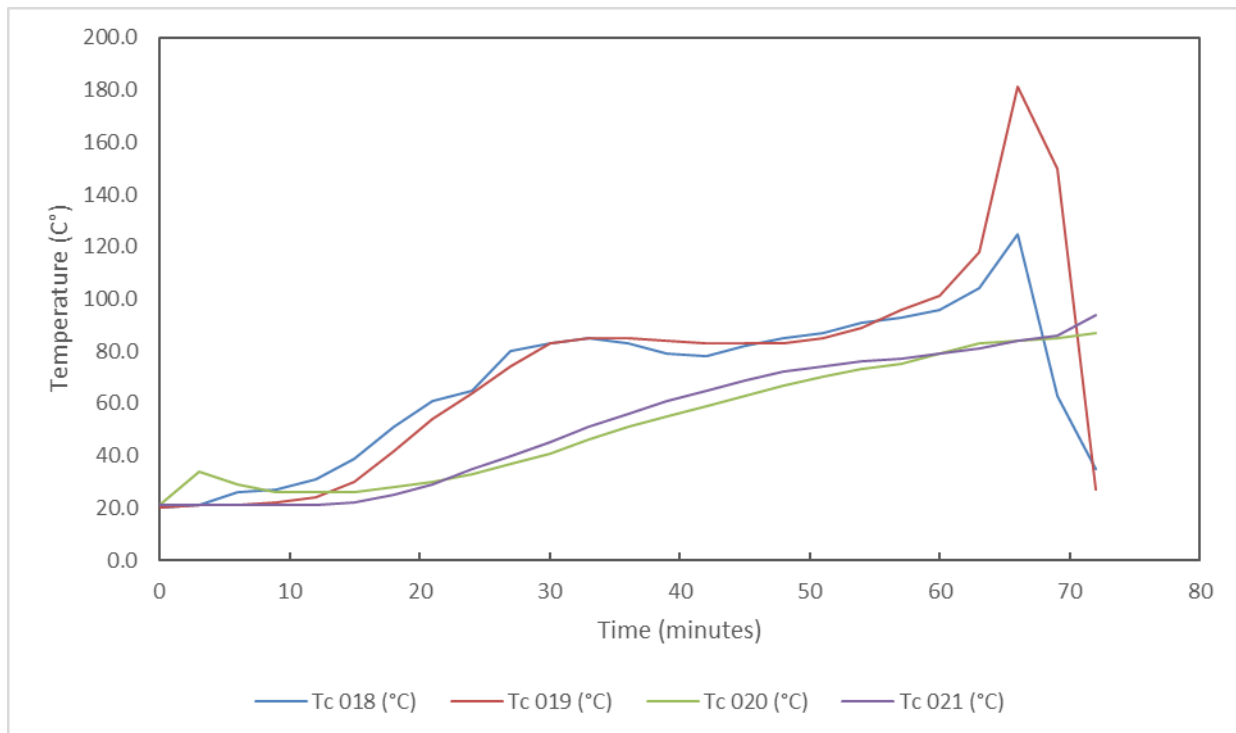


Figure 7 Individual Temperatures Recorded On The Leaf Of Doorset B 25 mm Away From The Edges

Table 12 Individual Temperatures Recorded On The Leaf Of Doorset B 100 mm Away From The Edges

Time (mins)	Tc 026 (°C)	Tc 027 (°C)	Tc 028 (°C)	Tc 029 (°C)
0	16.0	16.0	16.0	20.0
3	17.0	16.0	18.0	21.0
6	16.0	17.0	17.0	21.0
9	16.0	17.0	17.0	21.0
12	17.0	17.0	17.0	21.0
15	20.0	19.0	18.0	21.0
18	23.0	21.0	19.0	22.0
21	27.0	24.0	22.0	24.0
24	31.0	27.0	24.0	26.0
27	35.0	31.0	28.0	28.0
30	39.0	34.0	31.0	31.0
33	43.0	38.0	34.0	34.0
36	47.0	41.0	37.0	37.0
39	51.0	45.0	41.0	41.0
42	54.0	49.0	45.0	45.0
45	57.0	52.0	49.0	50.0
48	60.0	56.0	53.0	54.0
51	63.0	59.0	58.0	59.0
54	66.0	63.0	63.0	64.0
57	69.0	66.0	67.0	68.0
60	71.0	69.0	71.0	71.0
63	74.0	73.0	74.0	75.0
66	79.0	77.0	77.0	77.0
69	67.0	74.0	79.0	79.0
72	59.0	77.0	81.0	80.0

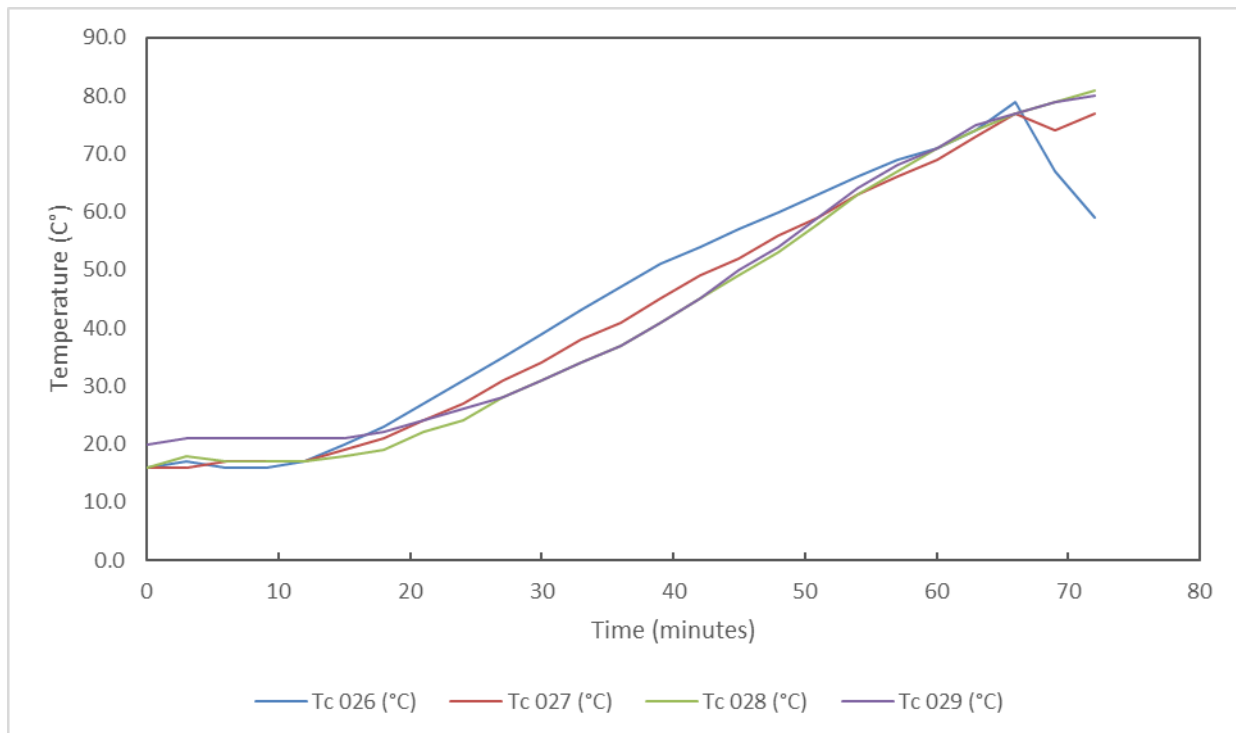


Figure 8 Individual Temperatures Recorded On The Leaf Of Doorset B 100 mm Away From The Edges

Table 13 Individual Temperatures Recorded On The Unexposed Surface Of Door Frame B

Time (mins)	Tc 034 (°C)	Tc 035 (°C)	Tc 036 (°C)	Tc 037 (°C)
0	21.0	21.0	20.0	19.0
3	21.0	22.0	20.0	19.0
6	21.0	22.0	20.0	19.0
9	21.0	22.0	20.0	19.0
12	21.0	22.0	20.0	19.0
15	22.0	24.0	21.0	19.0
18	22.0	27.0	26.0	19.0
21	22.0	30.0	29.0	20.0
24	23.0	34.0	32.0	20.0
27	25.0	41.0	38.0	21.0
30	26.0	44.0	42.0	22.0
33	28.0	44.0	40.0	23.0
36	30.0	40.0	40.0	25.0
39	31.0	38.0	39.0	27.0
42	33.0	40.0	37.0	29.0
45	35.0	43.0	37.0	31.0
48	36.0	44.0	38.0	33.0
51	38.0	47.0	39.0	34.0
54	39.0	50.0	42.0	36.0
57	40.0	54.0	47.0	38.0
60	42.0	61.0	52.0	39.0
63	43.0	66.0	58.0	41.0
66	44.0	73.0	74.0	43.0
69	45.0	78.0	157.0	44.0
72	40.0	94.0	79.0	45.0

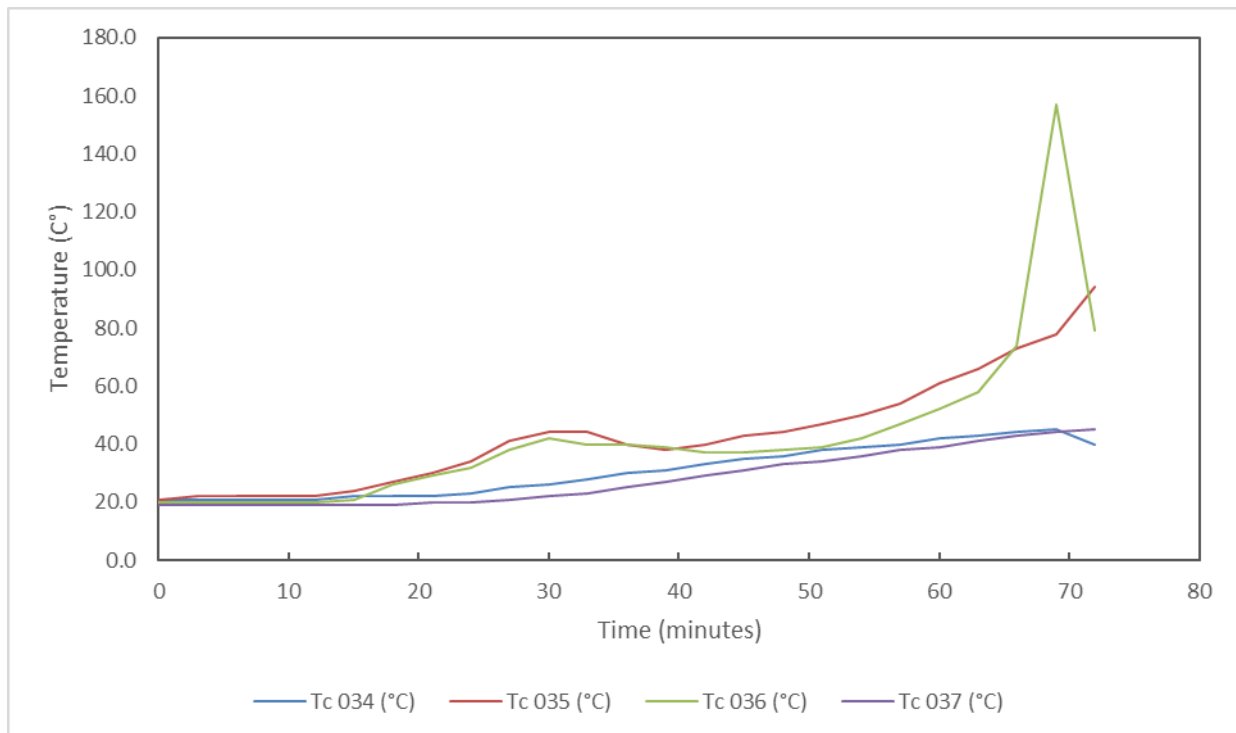


Figure 9 Individual Temperatures Recorded On The Unexposed Surface Of Door Frame B

Table 14 Individual And Mean Temperatures Recorded On The Unexposed Surface Of Doorset A

Time (mins)	Tc 004 (°C)	Tc 005 (°C)	Tc 006 (°C)	Tc 007 (°C)	Tc 008 (°C)	Average (°C)
0	19.0	19.0	19.0	19.0	19.0	19.0
1	19.0	20.0	20.0	20.0	19.0	19.6
2	19.0	19.0	20.0	20.0	19.0	19.4
3	19.0	19.0	19.0	20.0	19.0	19.2
4	19.0	19.0	19.0	20.0	19.0	19.2
5	19.0	19.0	19.0	20.0	19.0	19.2
6	19.0	20.0	19.0	20.0	19.0	19.4
7	19.0	19.0	20.0	20.0	19.0	19.4
8	19.0	20.0	20.0	20.0	19.0	19.6
9	19.0	20.0	20.0	20.0	19.0	19.6
10	20.0	20.0	20.0	20.0	20.0	20.0
11	20.0	20.0	21.0	21.0	20.0	20.4
12	21.0	21.0	21.0	22.0	21.0	21.2
13	22.0	22.0	23.0	22.0	22.0	22.2
14	23.0	23.0	24.0	24.0	24.0	23.6
15	24.0	24.0	25.0	25.0	25.0	24.6
16	26.0	25.0	27.0	26.0	27.0	26.2
17	27.0	27.0	28.0	28.0	28.0	27.6
18	29.0	28.0	30.0	29.0	30.0	29.2
19	30.0	29.0	31.0	31.0	31.0	30.4
20	31.0	31.0	33.0	32.0	33.0	32.0
21	33.0	32.0	35.0	34.0	34.0	33.6
22	34.0	33.0	36.0	35.0	36.0	34.8
23	36.0	34.0	38.0	37.0	37.0	36.4
24	37.0	36.0	40.0	38.0	39.0	38.0
25	39.0	37.0	41.0	40.0	41.0	39.6
26	40.0	39.0	43.0	42.0	42.0	41.2
27	42.0	40.0	44.0	43.0	44.0	42.6
28	43.0	42.0	46.0	45.0	46.0	44.4
29	45.0	44.0	48.0	47.0	47.0	46.2
30	46.0	45.0	50.0	48.0	49.0	47.6
31	48.0	47.0	51.0	50.0	51.0	49.4
32	50.0	49.0	53.0	51.0	53.0	51.2
33	51.0	51.0	55.0	53.0	54.0	52.8
34	53.0	52.0	57.0	54.0	56.0	54.4
35	55.0	54.0	58.0	56.0	57.0	56.0
36	57.0	56.0	60.0	57.0	59.0	57.8

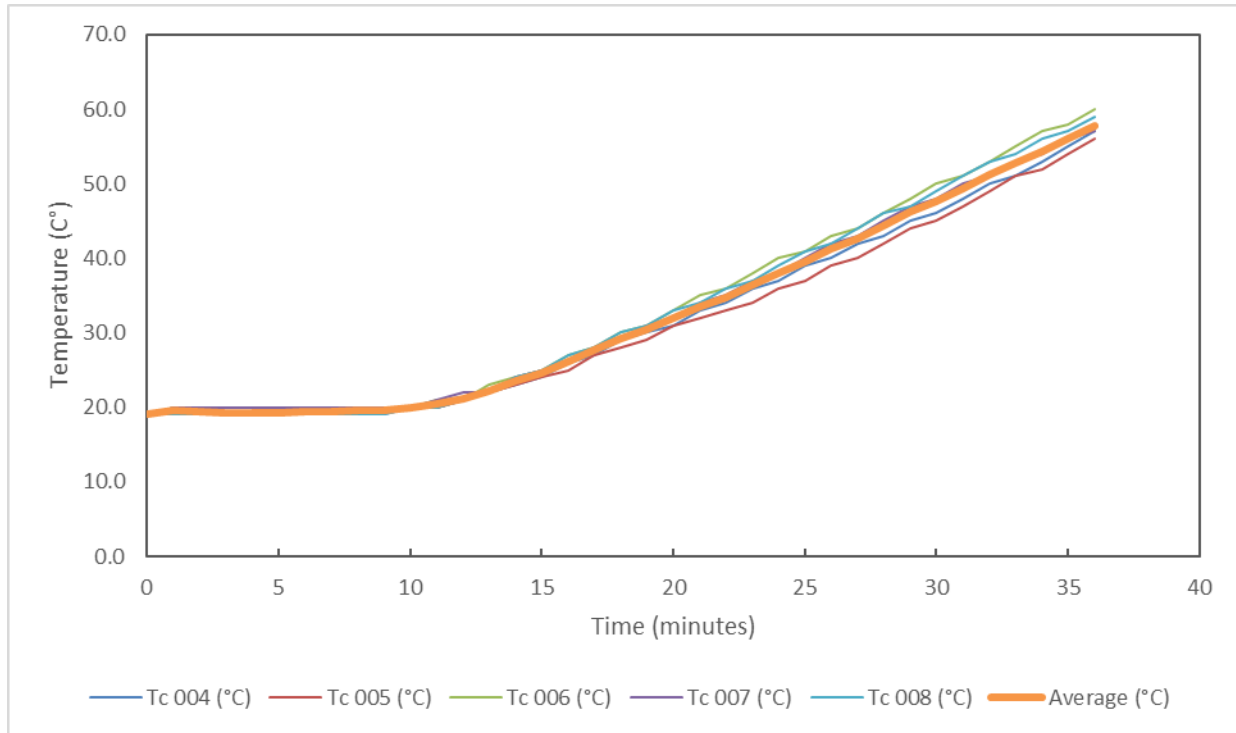


Figure 10 Individual And Mean Temperatures Recorded On The Unexposed Surface Of Doorset A

Table 15 Individual Temperatures Recorded On The Leaf Of Doorset A 25 mm Away From The Edges

Time (mins)	Tc 014 (°C)	Tc 015 (°C)	Tc 016 (°C)	Tc 017 (°C)
0	20.0	20.0	17.0	20.0
1	21.0	20.0	17.0	20.0
2	23.0	20.0	17.0	20.0
3	25.0	21.0	17.0	20.0
4	28.0	22.0	17.0	20.0
5	30.0	23.0	17.0	20.0
6	32.0	25.0	17.0	20.0
7	34.0	26.0	17.0	20.0
8	35.0	27.0	17.0	20.0
9	37.0	28.0	17.0	20.0
10	38.0	30.0	17.0	20.0
11	40.0	32.0	17.0	21.0
12	42.0	39.0	17.0	22.0
13	45.0	45.0	17.0	23.0
14	47.0	50.0	17.0	24.0
15	49.0	49.0	17.0	26.0
16	52.0	50.0	17.0	28.0
17	54.0	52.0	17.0	30.0
18	56.0	53.0	17.0	32.0
19	59.0	55.0	17.0	34.0
20	60.0	57.0	17.0	35.0
21	62.0	59.0	17.0	37.0
22	64.0	60.0	17.0	39.0
23	65.0	62.0	17.0	41.0
24	67.0	64.0	17.0	43.0
25	68.0	66.0	17.0	45.0
26	69.0	67.0	17.0	46.0
27	70.0	69.0	17.0	48.0
28	71.0	70.0	17.0	50.0
29	72.0	71.0	18.0	51.0
30	73.0	72.0	18.0	53.0
31	74.0	73.0	18.0	54.0
32	74.0	74.0	18.0	55.0
33	75.0	74.0	17.0	
34	76.0	75.0	51.0	
35	77.0	76.0	53.0	
36	77.0	76.0	55.0	

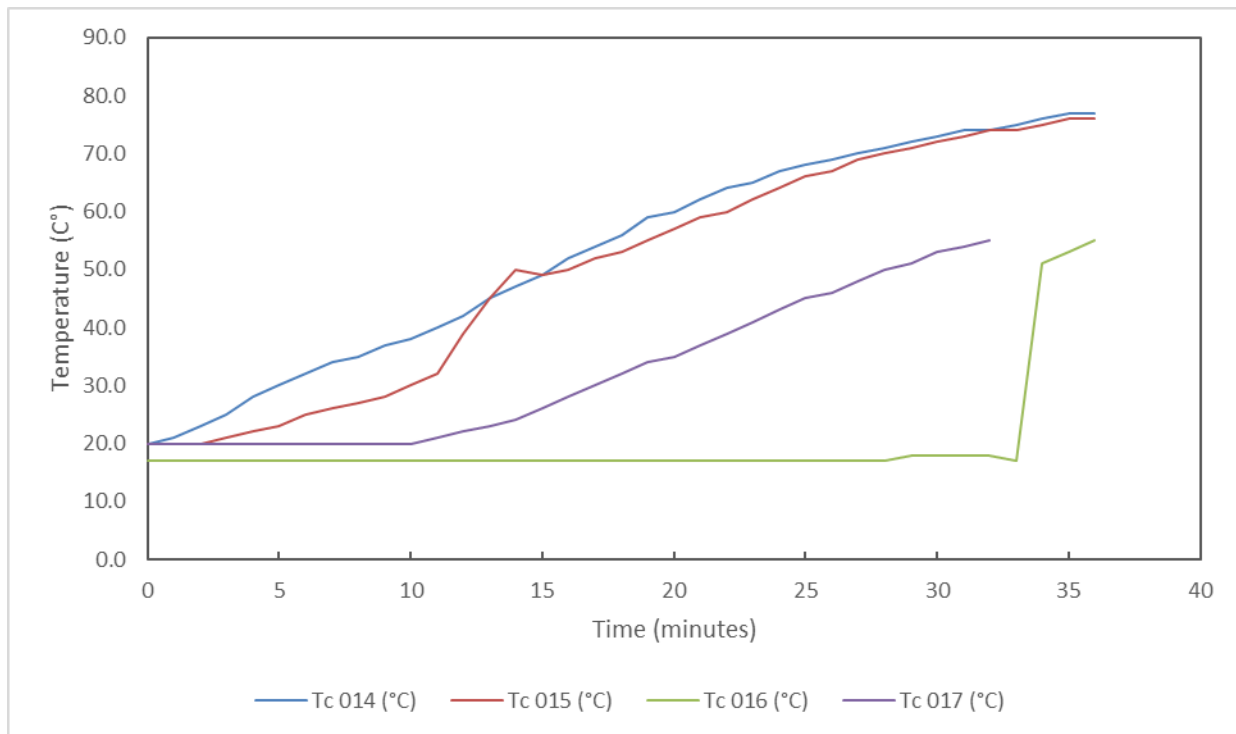


Figure 11 Individual Temperatures Recorded On The Leaf Of Doorset A 25 mm Away From The Edges

Table 16 Individual Temperatures Recorded On The Leaf Of Doorset A 100 mm Away From The Edges

Time (mins)	Tc 022 (°C)	Tc 023 (°C)	Tc 024 (°C)	Tc 025 (°C)
0	16.0	15.0	16.0	16.0
1	16.0	16.0	16.0	16.0
2	16.0	16.0	16.0	16.0
3	16.0	16.0	16.0	16.0
4	16.0	16.0	16.0	16.0
5	16.0	16.0	16.0	16.0
6	16.0	16.0	16.0	16.0
7	16.0	16.0	16.0	16.0
8	16.0	16.0	16.0	16.0
9	16.0	16.0	16.0	16.0
10	17.0	16.0	16.0	16.0
11	18.0	17.0	17.0	17.0
12	19.0	19.0	18.0	18.0
13	20.0	20.0	19.0	19.0
14	21.0	21.0	20.0	20.0
15	23.0	22.0	22.0	21.0
16	25.0	23.0	23.0	22.0
17	26.0	25.0	24.0	23.0
18	28.0	27.0	26.0	25.0
19	30.0	28.0	27.0	26.0
20	31.0	30.0	29.0	27.0
21	33.0	32.0	30.0	29.0
22	35.0	34.0	32.0	30.0
23	36.0	36.0	33.0	32.0
24	38.0	37.0	35.0	33.0
25	40.0	39.0	36.0	35.0
26	41.0	40.0	38.0	37.0
27	43.0	42.0	39.0	38.0
28	44.0	43.0	41.0	40.0
29	46.0	45.0	43.0	42.0
30	47.0	46.0	44.0	44.0
31	49.0	47.0	46.0	46.0
32	50.0	49.0	48.0	47.0
33	51.0	50.0	50.0	49.0
34	53.0	51.0	51.0	51.0
35	54.0	53.0	53.0	53.0
36	55.0	54.0	55.0	55.0

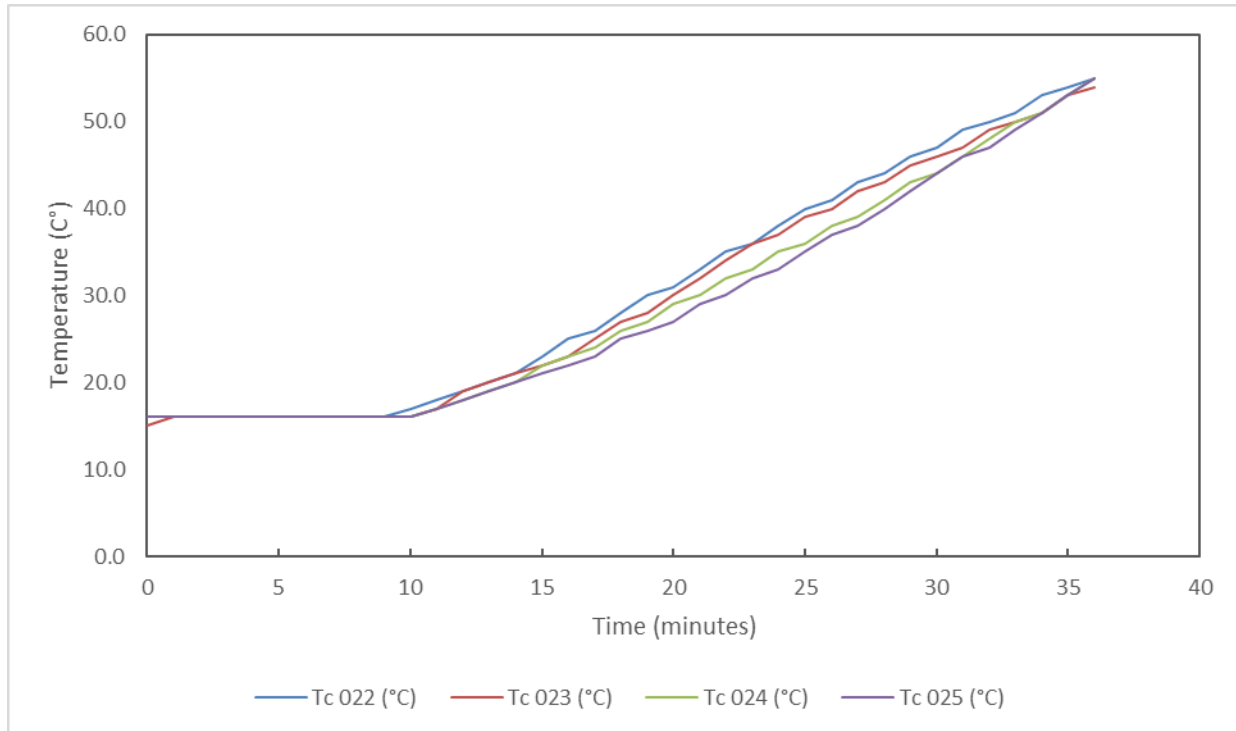


Figure 12 Individual Temperatures Recorded On The Leaf Of Doorset A 100 mm Away From The Edges

Table 17 Individual Temperatures Recorded On The Unexposed Surface Of Door Frame A

Time (mins)	Tc 030 (°C)	Tc 031 (°C)	Tc 032 (°C)	Tc 033 (°C)
0	19.0	20.0	21.0	21.0
1	20.0	27.0	32.0	21.0
2	20.0	35.0	38.0	21.0
3	20.0	40.0	44.0	21.0
4	20.0	44.0	51.0	21.0
5	20.0	47.0	57.0	21.0
6	20.0	50.0	60.0	21.0
7	20.0	52.0	59.0	21.0
8	20.0	52.0	59.0	21.0
9	20.0	53.0	61.0	21.0
10	20.0	53.0	62.0	22.0
11	20.0	53.0	61.0	25.0
12	20.0	53.0	62.0	32.0
13	20.0	54.0	64.0	35.0
14	20.0	54.0	62.0	34.0
15	21.0	55.0	62.0	37.0
16	21.0	55.0	61.0	38.0
17	21.0	56.0	61.0	38.0
18	22.0	56.0	61.0	39.0
19	22.0	56.0	61.0	38.0
20	23.0	57.0	60.0	38.0
21	23.0	57.0	60.0	39.0
22	24.0	58.0	60.0	39.0
23	25.0	58.0	61.0	39.0
24	26.0	58.0	61.0	40.0
25	26.0	59.0	60.0	40.0
26	27.0	59.0	61.0	41.0
27	28.0	59.0	61.0	42.0
28	29.0	60.0	62.0	43.0
29	30.0	60.0	62.0	44.0
30	32.0	60.0	62.0	46.0
31	33.0	60.0	63.0	47.0
32	34.0	61.0	63.0	49.0
33	36.0	61.0	64.0	50.0
34	38.0	62.0	64.0	52.0
35	40.0	63.0	64.0	54.0
36	43.0	63.0	65.0	56.0

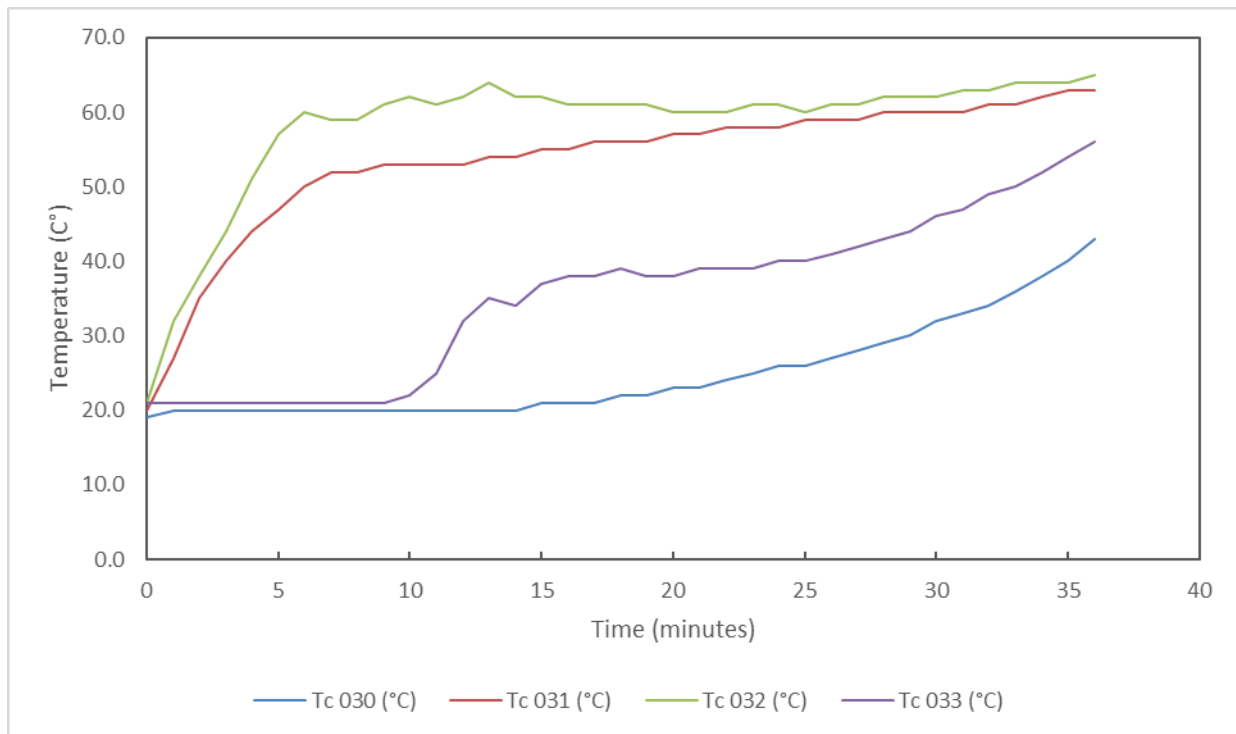


Figure 13 Individual Temperatures Recorded On The Unexposed Surface Of Door Frame A

C.4 Specimen deflections

Table 18 and Table 19 detail the deflection measurements of the test specimen at locations given in Figure 14.

Negative measurements show movement of the test specimen away from the furnace. Positive measurements show movement of the test specimen towards the furnace.

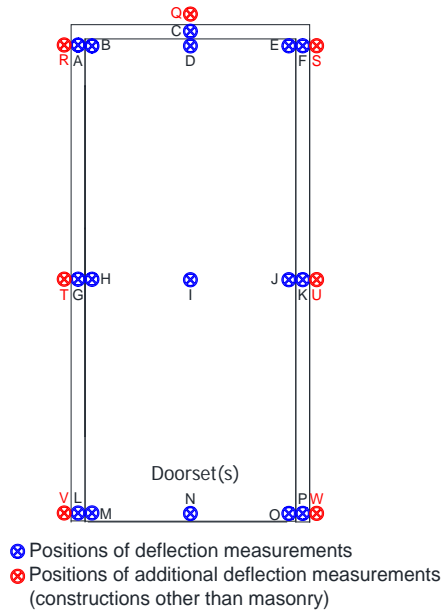


Figure 14 Position of deflection measurements

Table 18 Deflections – Doorset A

Deflections (mm)																
Time (mins)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	-4	1	3	0	2	-3	-4	-5	-6	-11	-1	-1	-1	-3	-2	-1
10	4	4	2	1	-2	-8	-7	-9	-7	-11	1	-1	-2	-4	-3	-1
15	-1	6	3	5	-9	-9	-6	-5	-8	-15	-3	0	0	-5	-4	-1
20	1	8	3	6	3	-5	-1	-10	-8	-9	-1	4	4	-2	0	2
25	1	5	3	1	-24	5	-3	-5	-10	-9	-4	5	4	-2	0	3
30	1	6	2	1	3	3	-4	-5	-14	-11	-4	2	3	-4	-1	1
35	2	13	4	-2	2	1	-5	-4	-18	-12	-4	4	2	-8	0	1
Max	-4	13	4	6	-24	-9	-7	-10	-18	-15	-4	5	4	-8	-4	3

Table 19 Deflections – Doorset B

Deflections (mm)																
Time (mins)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	-8	-2	-2	-3	-3	6	-1	-2	-1	-7	1	-2	-1	-1	-1
20	4	-3	0	-3	1	-4	3	2	-5	-2	-6	6	2	1	-2	-2
30	0	-3	-2	-4	-5	-5	-3	0	-7	-27	-11	4	3	-6	-5	-8
40	-2	-5	-2	-3	-12	-12	-13	-5	-14	-12	-17	-1	1	-10	-13	-6
50	0	-10	-6	-8	-8	-7	-1	-5	-22	-13	-14	1	3	-8	1	-1
60	-6	-15	-3	-9	-3	-7	0	-5	-34	-7	-11	3	2	-15	4	-3
70	-6	-35	-8	-10	-7	-4	-8	-13	-49	-22	-15	5	5	-22	7	2
Max	-6	-35	-8	-10	-12	-12	-13	-13	-49	-27	-17	6	5	-22	-13	-8

C.5 Gap measurements

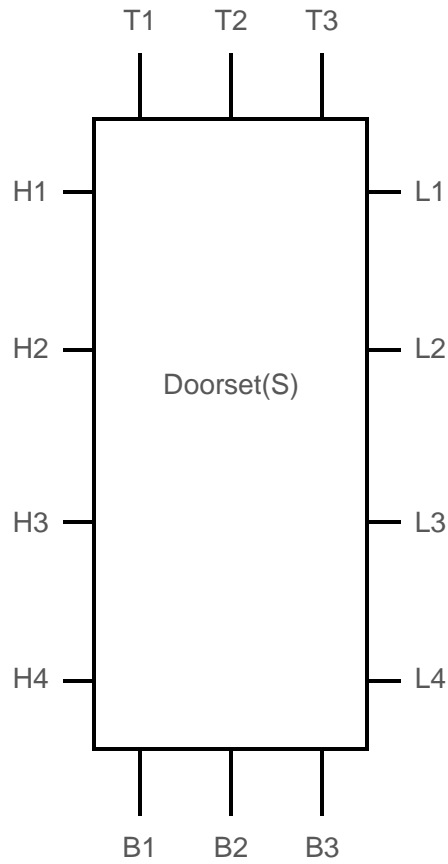


Figure 15 Gap measurements, Doorset A and B (unexposed side shown)

Table 20 Measured and calculated gap sizes for Doorset A

Doorset A (mm)					
Hinge side	Primary	Leaf to stop	Leading edge	Primary	Leaf to stop
H1	2.8	0.2	L1	2.9	0.2
H2	1.6	0.4	L2	2.4	0.2
H3	2.1	1.3	L3	2.2	0.3
H4	1.2	1.7	L4	2.5	0.4
Mean	1.9		Mean	2.5	
Max	2.8		Max	2.9	
Min	1.2		Min	2.2	
Max permitted	4.4		Max permitted	4.7	
Top edge	Primary	Leaf to stop	Threshold	Primary	
T1	3.4	2.6	B1	6.1	
T2	2.3	2.4	B2	6.5	
T3	2.7	2.6	B3	7.0	
Mean	2.8		Mean	6.5	
Max	3.4		Max	7.0	
Min	2.3		Min	6.1	
Max permitted	5.1		Max permitted	8.7	

Table 21 Measured and calculated gap sizes for Doorset B

Doorset B (mm)					
Hinge side	Primary	Leaf to stop	Leading edge	Primary	Leaf to stop
H1	2.2	0.3	L1	2.7	0.5
H2	2.2	0.3	L2	2.2	0.3
H3	3.0	0.4	L3	2.5	0.1
H4	3.1	0.1	L4	2.8	0.1
Mean	2.6		Mean	2.5	
Max	3.1		Max	2.8	
Min	2.2		Min	2.2	
Max permitted	4.9		Max permitted	4.7	
Top edge	Primary	Leaf to stop	Threshold	Primary	
T1	1.1	0.5	B1	7.5	
T2	1.2	0.4	B2	7.7	
T3	1.2	0.4	B3	7.5	
Mean	1.2		Mean	7.5	
Max	1.2		Max	7.7	
Min	1.1		Min	7.5	
Max permitted	3.2		Max permitted	9.6	

Appendix D Photographs

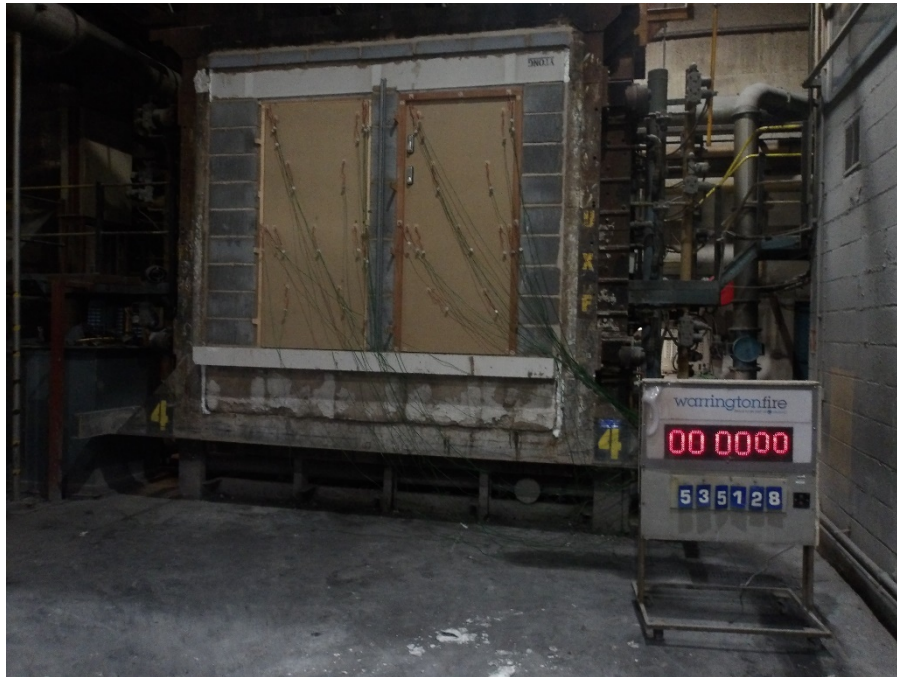


Figure 16 Unexposed face of the specimen before the start of the test



Figure 17 Exposed face of the specimen before the start of the test



Figure 18 Unexposed face of the specimens after 10 minutes of testing.



Figure 19 Unexposed face of the specimens after 20 minutes of testing.



Figure 20 Unexposed face of the specimens after 30 minutes of testing.



Figure 21 Unexposed face of the specimens after 36 minutes of testing prior to blanking off Doorset A.



Figure 22 Unexposed face of the Doorset B after 40 minutes of testing



Figure 23 Unexposed face of the Doorset B after 50 minutes of testing

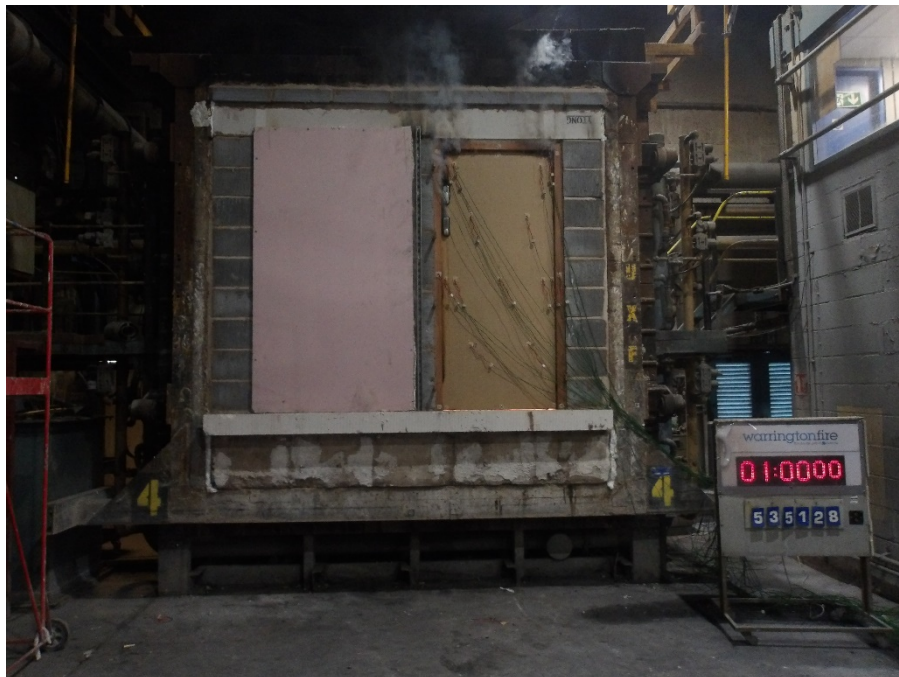


Figure 24 Unexposed face of Doorset B after 60 minutes of testing prior



Figure 25 Unexposed face of Doorset B after 70 minutes of testing prior



Figure 26 Unexposed face of Doorset B after 72 minutes of testing prior



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