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Title:

The fire resistance performance of two single-leaf, single-acting doorsets, when tested in accordance with BS 476: Parts 20 and 22: 1987

WF Report No:

403596

PANEL PRODUCTS

Prepared for:

Sealed Tight Solutions

- 2, 10 - Court
- Prudhoe Industrial
- state
- Prudhoe
- Northumberland
- NE42 6PL
- 20m August 2018
- State





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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.

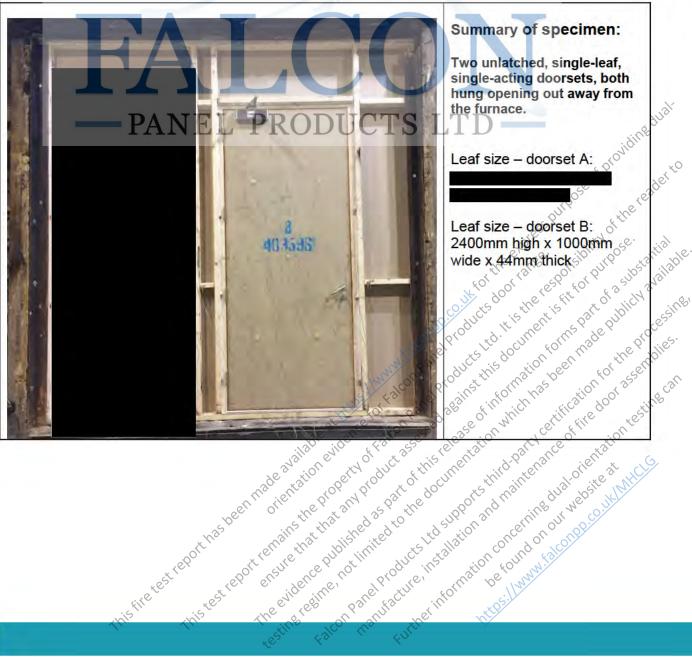
Results:

Fire resistance test in accordance with BS476: Part 20/22: 1987

Times to failure:

	Doorset A	Doorset B
Integrity		39 (thirty nine) minutes
Insulation		39 (thirty nine) minutes **

* No failure at the termination of the test ** Failure by virtue of integrity failure



Summary of specimen:

Two unlatched, single-leaf, single-acting doorsets, both hung opening out away from the furnace.

Leaf size - doorset A:

Leaf size – doorset B: 2400mm high x 1000 Leaf size – doorset B: 2400mm high x 1000mm so wide x 44mm thicks with the size of the siz

1 Introduction

The doorsets were manufactured and supplied for test by the client and delivered during August 2018.

Warringtonfire constructed a plasterboard clad timber stud supporting construction and at the request of the client 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 the leaf measured . The right doorset was designated doorset B and the leaf measured 2400mm high x 1000mm wide x 44mm thick. Both doorsets were hung to open out away from the furnace. The results of this test were obtained from doorsets fitted with a latch which was, disengaged 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 24 readings were taken. The measurements (in mm) are given in Section 5.4 of this

Closer force ANEL PRODUCTS LTD = 2.3

Measured in accordance with FTSG Resolution No 63.

sured in accordance with FTSG Resolution No 63.							
	Opening force (Nm)	Closing force (Nm)	ose of eader				
Doorset A			Spurpe Ethere				
Doorset B	43	27	es willity Ose. atial se				
This file test teach that the test to	PRODUCT th FTSG Resolution No 6 Opening force (Nm) 43 43	Julia le do currentation concernation de found adutes line allation and mainte acture installation and maintenance	Essouth of the establish of the establish of the establish of a substantial ble entire for purpose in a substantial ble entire for purpose in a substantial ble entire for the establish of a substantial ble entire for the establish of a substantial ble entire establish of a substantial ble entire establish of a substantial ble entire establish established in the establish established in the established establish				

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

Leaf - Doorset A



* Stated by client, not verified by laboratory

** Nominal density –TRADA Timber database

Door frame - Doorset A



* Stated by client, not verified by laboratory

Leaf - Doorset B

	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)	Key to figures
Stiles and rails	None fitted	9	14-14-1-1	10.00	- 40
Core	Strebord 44 particleboard *	44 thick	550*	6.3	5
Facings	None fitted	<u> </u>	4		20
Adhesive Lippings	Technomelt polyurethane resin*	-	÷	1.51	3
Lippings – all edges	Sapele*	6 thick	640**	7.9	6

^{*} Stated by client, not verified by laboratory

Door frame - Doorset B

Stop - planted (pinned) European Redwood* 12 high x 32 wide 510* 10.2 8		Species/type	Dimensions (mm)	Density (kg/m³)		Key to figures
Head to jamb jointing detail Half lap jointed —	Head and jambs	European Redwood*	95 wide x 32 deep	510*	10.9	7
Frame to supporting construction fire stopping detail Stone based mineral fibre capped with 10mm deep ST88 intumescent mastic on the both sides Nominally 10-18 wide x mineral fibre with 10mm ST88 intumescent capping to each face	Stop - planted (pinned)	European Redwood*	12 high x 32 wide	510*	10.2	8
stopping detail tibre capped with 10mm x mineral fibre with 10mm ST88 10mm ST88 10mm stic on the both sides 10mm state 10m	Head to jamb jointing detail		DUCTS L	TD-		- C-\$-7"
Frame to supporting construction fixing detail Architrave MDF fitted on the exposed face only Threshold Promat Supalux Stated by client, not verified by laboratory 4No. steel screws per jamb with Broadfix Polyproprelene plastic packers fitted to the full depth of the frame at each fixing location* 45 wide x 18 thick 750** 9.8. 2 - 1.1. 45 wide x 18 thick 8 - 750** 9.8. 2 - 1.1. 45 wide x 18 thick 8 - 1.1. 46 wide x 18 thick 8 - 1.1. 47 wide x 18 thick 8 - 1.1. 48 wide x 18 thick 8 wide x 18 thick 9 wide x	Frame to supporting construction fire stopping detail	fibre capped with 10mm deep ST88 intumescent mastic on the both sides	Nominally 10-18 wide x mineral fibre with 10mm ST88 intumescent capping to each face	יַם	- III POSS	of pros
Architrave MDF fitted on the exposed face only Threshold Promat Supalux 9 thick Stated by client, not verified by laboratory *** Nominal density Threshold Stated by client, not verified by laboratory *** Nominal density Threshold Stated by client, not verified by laboratory *** Nominal density Threshold Stated by client, not verified by laboratory *** Nominal density Threshold Stated by client, not verified by laboratory	construction fixing	4No. steel screws per jamb with Broadfix Polyproprelene plastic packers fitted to the full depth of the frame at each fixing location*	5Ø x 100 long fitted at 600 to 800mm centres.*	July for the ed	the "self to	Outose.
Threshold Promat Supalux 9 thick with the promat Supalux ** Nominal density to the document of the promate supalux stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density to the promate supalus stated by client, not verified by laboratory ** Nominal density stated by client, not verified by laboratory stated by client, not verified by client	Architrave	MDF fitted on the exposed face only	45 wide x 18 thick	750** [*]	10 9.8 ns	896 Br
Stated by client, not verified by laboratory ** Nominal density		Promat Supalux	9 thick	July Kris	ation been	40' e
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^{*} Stated by client, not verified by laboratory

^{**} Nominal density -TRADA Timber database

Intumescent and sealing materials - both doorsets

	Make/type	Size (mm)	Location	Key to figures
Leaf edge	None fitted	132	-	1.50
Frame reveal – head and jambs	Sealed Tight Solutions STS154FO (Fire only)	15 x 4	Fitted centrally in the frame reveal	9
1	Sealed Tight Solutions STS1009 acoustic/smoke seal	11 x 5*	Fitted to the upstand of the stop	10

^{*} Stated by client, not verified by laboratory

Intumescent interruptions and additional hardware protection – both doorsets

	Make/type	Size (mm)	Location
Around hinge blade	Partially interrupted by the thickness of the hinge		Hinge blade partially interrupts the seal in the frame reveal – leaving nominally 1mm remaining continuous. See picture on page 17
Under hinge blades	None fitted		
Encasing latch body	None fitted	-	-
Under latch forend	None fitted	-	-
Around latch keep	Fully interrupted	DIIO	Latch keep fully interrupts the seal in the frame reveal
Under keep	None fitted PKO	DUCT	2 LID

Hardware - both doorsets

Make/type	Size (mm)	Location	Key to figures
4No. Jedo 102 bearing butt type hinge – stainless steel construction	102 x 31 x 3 (blade size)*		sio 11, o
Synergy Hardware overhead type closer Ref: s 800 EN 2-5*	260 x 75 (footprint)	manufacturer's instructions	Patz Pi
Harbrine steel mortice lock/latch with Eurocylinder with thumbturn	235 x 20 (forend size) 235 x 85 x 20 (case size)	Centre of the latch nib fitted 975mm from the bottom edge of	130
Ref: Hoppe Arrone AR8100*	170 x 25 (keep size)	of Fall assess release ation batty oce of duct as serance of	orientati
Harbrine lever type handle and lock escutcheon Ref: Instinct Hardware IH - 1912	Ø50 ⁰ (rose size)	Fitted appropriate to the lock/latch	pelo M
	4No. Jedo 102 bearing butt type hinge – stainless steel construction Synergy Hardware overhead type closer Ref: s 800 EN 2-5* Harbrine steel mortice lock/latch with	4No. Jedo 102 bearing butt type hinge – stainless steel construction Synergy Hardware overhead type closer Ref: s 800 EN 2-5* Harbrine steel mortice lock/latch with Synergy Hardware overhead type closer Ref: s 800 EN 2-5* Harbrine steel mortice (forend size)	4No. Jedo 102 bearing butt type hinge – stainless steel construction Synergy Hardware overhead type closer Ref: s 800 EN 2-5* Harbrine steel mortice lock/latch with Eurocylinder with thumbturn Ref: Hoppe Arrone AR8100* Harbrine lever type handle and lock escutcheon Fitted 150mm, 800mm, 1445mm and 2095mm from the head of the leaf Surface fitted on the unexposed face of the leaf as per the manufacturer's instructions Centre of the latch nib fitted 975mm from the bottom edge of the leaf Fitted 150mm, 800mm, 1445mm and 2095mm from the head of the leaf Surface fitted on the unexposed face of the leaf as per the manufacturer's instructions Centre of the latch nib fitted 975mm from the bottom edge of the leaf Fitted appropriate to the lock/latch frose size)

^{*} 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 23°C.

After the first 5 minutes of the test, the furnace pressure was maintained such that it complied with the requirements of BS 476-20:1987 clause 3.2.2 (including allowance for transient occurrences in line with clause 12 (L)) at 4.25 ± 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 - 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.

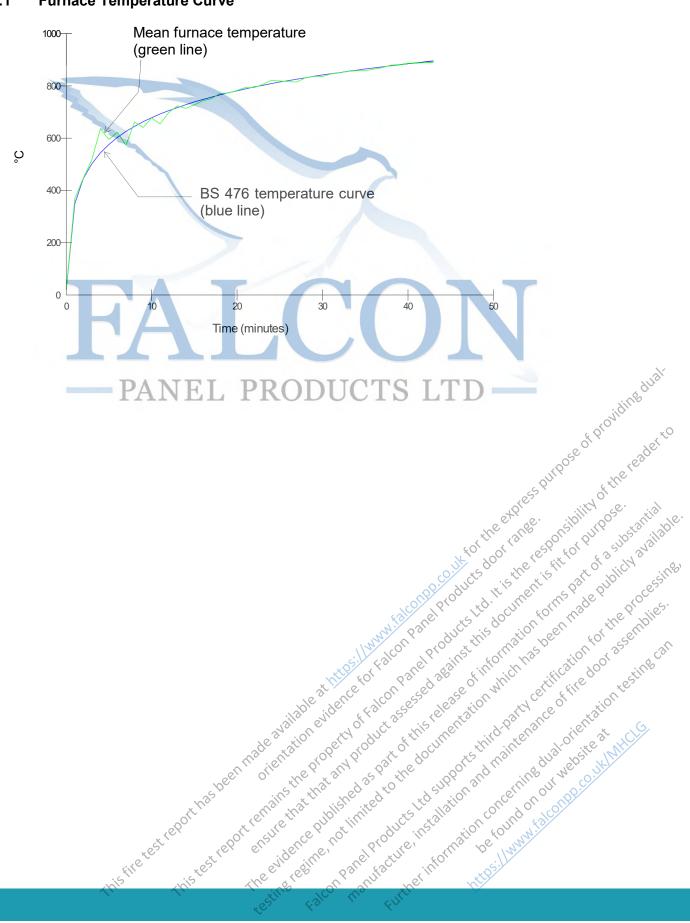
The temperature of the unexposed face of both doorsets was monitored by means of five thermocouples fixed to the surface of the door leaf and three thermocouples attached to the frame, one at midheight on each jamb and one centrally located above the leaf on the frame head, an additional thermocouple was fixed to the closer body.

Wishester teacht as been made asalation entered to factor to be a selected to the control of the The thermocouple positions are shown in Figure 4 of the appendix. The average temperature of the door leaves and maximum temperature of the doorsets are shown this test report terrains the trait and product assessed against this document is the product that the trains the trait and product assessed against this document is the product and product assessed against this document is the product and product assessed against this document is the product and product assessed against this document is the product and product assessed against this document is the product against the product against the product against the product against this document is the product against the product aga graphically in Section 5.2. L PKODUCTS LTD avidence published as fait of the documentation which has been made publicly available. Tabling of Panel Products the supports third party certification for the products the support is the support of the support

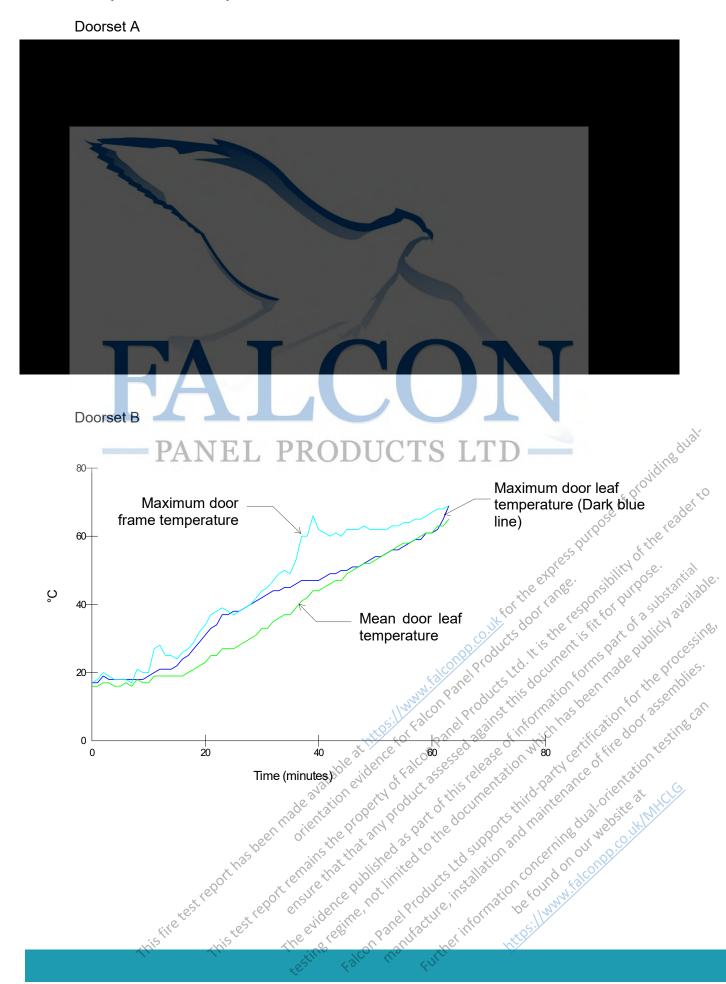
5 Test results

The following data and observations were recorded during the test.

5.1 Furnace Temperature Curve



5.2 Unexposed Face Temperature Curves



5.3 **Door Distortion Data**

The following tables show the distortion of the door in mm with an accuracy of ±1mm.

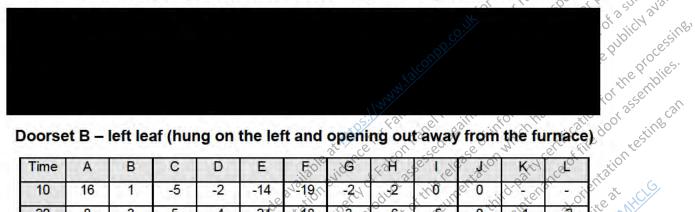
A positive measurement indicates distortion towards the furnace.

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.

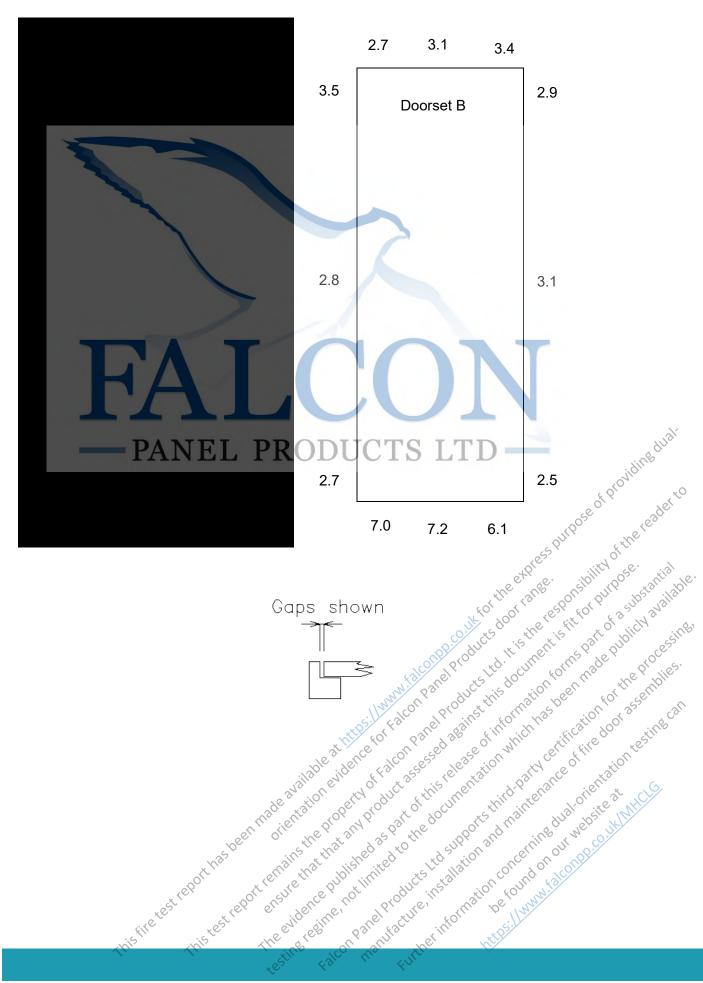


Doorset A - leaf (hung on the left and opening out away from the furnace)



Time	Α	В	С	D	Е	Fole	N/G	KOH C	6,16	, Wo	Kol	Con.
10	16	1	-5	-2	-14	190	-24	2	100	0,0	19.6- TEN	- oil
20	8	3	5	-4	-24	18	083,0	-60	¿5°	0	Maria	11/2
30	8	5	11	-4,0	2 -29	-18	× 3	35 - O	10	0 0 VC	inin	U.Zhe
		Thisfire	, test repo	it has t	Port fell the	ing tegind	alcoubage in	el Produl	its Linstall	Ation of the state	oncord of sillming	, alconid

5.4 Door leaf to frame gaps



5.5 Observations

All comments relate to the unexposed face unless otherwise specified.

Time	Comments
(minutes) 00:00	Test started
02:41	Doorset B, There is smoke issuing from the head.
03:56	Doorset B, There is smoke issuing from the closing edge.
07:09	Doorset B, There is smoke issuing from the hanging edge.
14:28	Doorset B, The door has distorted out at the centre point 16mm.
16:38	Doorset B, There is a visual bow outwards in the door leaf.
24:58	Doorset B, There is a glow visible at the hanging edge.
26:08	Doorset B, There is a glow visible at the latch position.
26:40	Exposed face, The architrave has fallen away.
27:18	Doorset B, There is a glow at the hanging edge allowing visibility into the furnace.
28:53	Doorset B, A cotton pad integrity test was performed at the latch position meeting edge which did not result in the ignition of the cotton pad. No failure Both doorsets. There is discolouration around the too two hinge positions on both
	Solve of the second of the sec
30:50	Both doorsets, There is discolouration around the top two hinge positions on both doorsets and the third hinge on doorset B. Doorset B. A cotton had integrity test was performed at the head which did not result.
34:40	Doorset B, There is a glow visible at the head.
35:17	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
36:24	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
37:22	Both doorsets, There is discolouration around the top two hinge positions on both doorsets and the third hinge on doorset B. Doorset B, There is a glow visible at the head. 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 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 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

- 38:12 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
- 39:04 Doorset B, A cotton pad integrity test was performed at the head which resulted in the ignition of the cotton pad, thereby constituting integrity failure.
- 39:41 Doorset B, There is intermittent flaming at the head.
- 40:11 Doorset B, There is a glow visible down the entire hanging edge.
- 40:56 Doorset B, There is continuous flaming at the head, thereby constituting further integrity failure.
- 42:12 Doorset B, There is continuous flaming down the entire hanging edge, thereby constituting further integrity failure.

Test terminated.

Times to Failure 5.6

When 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 standard were satisfied for the following periods:

ndard were satis	fied for the following periods		
	Doorset A	Doorset B	~
Integrity	NEL PRODU	39 (thirty nine) minutes	Hingdua
Insulation		39 (thirty nine) minutes **	of provide
** Failure by * No failure	y virtue of integrity failure at the termination of the tes	t et	ress purposees willity of the readle
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- ** Failure by virtue of integrity failure
- avidence published as part of the documentation which has been made publicly airallable. * No failure at the termination of the test

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.

Further, where information in relation to the specimen has been provided to us but not verified by us, we have assumed that it is correct; and where comments above identify particular materials or substances comprised in the specimen those comments are based on information supplied to us and/or on general visual inspection undertaken during the process of testing of the sample, and in either case have not been verified by reference to materials testing or documentary evidence except as described above. The fire resistance performance of doors of this design may be different if any aspect of the design or construction differs from that tested. This includes, by way of example only, any difference as a result of (i) any deviation from the information supplied to us, or (ii) the employment of different door to frame gaps. The tested assembly was asymmetrical and was tested such that both door leaves from both doorset A and B, where tested opening away from the heating conditions of the test. The test result may not be appropriate to situations where by the samples tested have been installed in a different configuration to that which they are tested.

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. No assurance can be given that this test or its results will reflect current practice, and/or be consistent with prevailing legislative / regulatory requirements, at any time after the date of this report. Warringtonfire will be able to offer the addressee of this report, at any time on request, 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. It is strongly recommended that, at the latest, such a review be sought at intervals of no more than five years.

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Signature:	June 1	C Carring Page Pro	auce this did the long been the
Name:	Liam Dunk	Courtney Clifford	Nik Whitelock
Title:	Technical Officer	Technical Officer	Technical Manager
Date of issue:	24/01/2019 CALLER OF THE PROPERTY OF THE PROPE	² 24/01/2019 2010 2010 2010 2010 2010 2010 2010	24/01/2019

Photographs

Intumescent interruptions by hardware

Around hinge blade – both doorsets



Hinges - both doorsets



Keep - both doorsets



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Appendix - figures 1 to 4





