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Title:

Field of Application for Lignum
International Panelled and Glazed
Timber Based 30 Minute Fire
Resisting Doorsets

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1 Foreword

This field of application report has been commissioned by Lignum International Ltd and relates to the fire resistance of 30 minute panelled doorset designs.

The report is for National Application and has been written in accordance with the general principles outlined in BS EN 15725: 2010; *Extended application reports on the fire performance of construction products and building elements*.

This field of application (scope) uses established empirical methods of extrapolation and experience of fire testing similar door assemblies, in order to extend the scope of application by determining the limits for the designs based on the tested constructions and performances obtained. The scope is an evaluation of the potential fire resistance performance, if the variations specified herein were to be tested in accordance with BS 476: Part 22: 1987 and therefore can neither be considered for a CE marking application nor can the conclusion be used to establish a formal classification against EN13501-2.

This field of application has been written using appropriate test evidence generated at UKAS accredited laboratories, to the relevant test standard. The supporting test evidence has been deemed appropriate to support the manufacturers stated door design and is summarised in section 3 and appendix A.

The scope presented in this report relates to the behaviour of the proposed door design variations under the particular conditions of the test; they are not intended to be the sole criterion for considering the potential fire hazard of the door assembly in use.

This field of application has been prepared and checked by product assessors with the necessary competence, who subscribe to the principles outlined in the Passive Fire Protection Forum (PFPF) guidelines to undertaking assessments. The aim of the PFPF guidelines is to give confidence to end-users that assessments that exist in the UK are of a satisfactory standard to be used for building control and other purposes.

The PFPF guidelines are produced by the UK Fire Test Study Group (FTSG) an association of the major fire testing laboratories in the UK and are published by the PFPF, the representative body for the passive fire protection industry in the UK.

2 Proposal

It is proposed to consider the fire resistance performance of 30 minute panelled doorset designs described in the technical specification in section 4 of this assessment report, for 30 minutes fire resistance, if the doorsets were to be tested to the requirements of BS 476: Part 22: 1987, *Fire tests on building materials and structures – Part 22: Method for determination of the fire resistance of non-load bearing elements of construction*.

The field of application defined in this report is based on the fire resistance test evidence for the doorset design, which is summarised in section 3. Analysis of specific construction details that require assessment are given within this report against the relevant element of construction, as appropriate.

3 Test Evidence

The test evidence summarised below has been generated to support the fire resistance performance of the door design that is the subject of this field of application.

Note: dimensions are in mm unless otherwise stated.

Abbreviations: (h) = height; (w) = width; (t) = thickness; (d) = depth.

3.1 Test report WF387293

The referenced test report, the essential details of which are summarised below, is the primary data for designs 1A & 2, 2 unlatched, single acting, single doorsets with particleboard core with mock stile and rails and decorative groove designs, being considered for assessment in this report.

Date of test	24 th August 2017	
Identification of test body:	Exova Warringtonfire now trading as Warringtonfire Testing and Certification Ltd. UKAS Notified Body 1762.	
Sponsor:	Lignum International Ltd.	
Tested Product:	Fully insulated single leaf, single acting timber, solid core doorsets. For the purpose of the test the doorsets were referenced 'A and B'	
Summary of test specimen:	<p>Dimensions leaf A: 1983 (h) x 840 (w) x 44 (t) Dimensions leaf B: 1983 (h) x 840 (w) x 44 (t)</p> <p>Doorset A: Luli China Oak veneered particleboard 25 (t), Luli China Oak veneered Particleboard Mock Stile and Rails 9 (t), White Oak lipping 6 (t) fitted on all edges, the door leaf was hung in a European Redwood frame 32 (w) on 3No. Steel hinges.</p> <p>Doorset B: Luli China Oak veneered particleboard 44 (t), fitted with White Oak Decorative grooved inlays 14 (w) x 7 (d) incorporating a 5 (d) tapered groove, White Oak lipping 6 (t) fitted on vertical edges only, the door leaf was hung in a European Redwood frame 32 (w) on 3No. Steel hinges.</p> <p>Both doorsets were oriented to open towards heat conditions. Doorsets including a mortise latch, positioned at approximately mid-height of the doorset. The door leaves were unlatched for the duration of the test.</p>	
Test Standard:	BS 476: Part 22: 1987	
Performance	Doorset A	Integrity: 32 minutes Insulation: 32 minutes
	Doorset B	Integrity: 45 minutes Insulation: 45 minutes

3.2 Test report WF387294

The referenced test report, the essential details of which are summarised below, is the primary data for designs 1A, 2 unlatched, single acting, single doorsets with particleboard core with glazing designs, being considered for assessment in this report.

Date of test	25 th August 2017	
Identification of test body:	Exova Warringtonfire now trading as Warringtonfire Testing and Certification Ltd. UKAS Notified Body 1762.	
Sponsor:	Lignum International Ltd.	
Tested Product:	Single leaf, single acting timber, solid core doorsets. For the purpose of the test the doorsets were referenced 'A and B'	
Summary of test specimen:	<p>Dimensions leaf A: 1981 (h) x 838 (w) x 44 (t) Dimensions leaf B: 1981 (h) x 838 (w) x 44 (t)</p> <p>Doorset A: Luli China Oak veneered particleboard 44 (t), White Oak lipping 6 (t) fitted on all edges, with 4 glazed apertures incorporating LEBEX CFG Toughened glass 6 (t), top aperture size of 384 (h) x 656 (w) fitted with White Oak beading 24 (h) x 19 (d) including an 11 (h) x 2 (w) rebate to incorporate the intumescent protection, 2nd aperture down size 352 (h) x 625 (w) fitted with White Oak beading 15 (h) x 19 (d) including a 11 (h) x 2 (w) rebate to incorporate the intumescent protection, 3rd aperture down size 254 (h) x 625 (w) fitted with White Oak square beading 15 (h) x 19 (d) including an 11 (h) x 2 (w) rebate to incorporate the intumescent protection, bottom aperture size 323 (h) x 595 (w) fitted with White Oak beading 20 (h) x 22 (d) including a 3 (h) x 5 (w) bolection return and a 11 (h) x 2 (w) rebate to incorporate the intumescent protection, all glazed apertures included a strip of Foshan Nanhai Pingzhi Graphite Based Intumescent 10 (w) x 2 (t) fitted between the glass and bead on both faces, the door leaf was hung in a European Redwood frame 32 (w) on 3No. Steel hinges.</p> <p>Doorset B: Luli China Oak veneered particleboard 44 (t), White Oak lipping 6 (t) fitted on vertical edges only, with a glazed aperture incorporating LEBEX CFG Toughened glass 6 (t) aperture size 1735 (h) x 626 (w) fitted with 5Deg chamfered White Oak beading 17 (h) x 22 (d) including a 5 (h) x 5 (w) bolection return, glazed aperture included a strip of Foshan Nanhai Pingzhi Graphite Based Intumescent 10 (w) x 2 (t) fitted between the glass and bead on both faces, the door leaf was hung in a European Redwood frame 32 (w) on 3No. Steel hinges.</p> <p>Both doorsets were oriented to open towards heat conditions. Doorsets including a mortise latch, positioned at approximately mid-height of the doorset. The door leaves were unlatched for the duration of the test.</p>	
Test Standard:	BS 476: Part 22: 1987	
Performance	Doorset A	Integrity: 29 minutes ¹ Insulation: 0 minutes ²
	Doorset B	Integrity: 37 minutes Insulation: 0 minutes ²

¹ There was continuous flaming on doorset A at 29:07 minutes to the 3rd aperture down. There were no more failures until a cotton pad test at the latch position at 32:49 minutes which resulted in ignition of the cotton pad.

² In accordance with Section 8.6.1 of BS 476: Part 22: 1987, the specimen has not been evaluated for insulation.

3.3 Test report RF10048

The referenced test report, the essential details of which are summarised below, is the primary data for designs 3A & 1C, 2 unlatched, single acting, leaf and a half doorsets with particleboard core with mock stile and rails and decorative groove designs, being considered for assessment in this report.

Date of test	10 th May 2010	
Identification of test body:	Chiltern International Fire now trading as Warringtonfire Testing and Certification Ltd. UKAS Notified Body 1762.	
Sponsor:	Lignum International Ltd.	
Tested Product:	Fully insulated leaf and a half, single acting timber, solid core doorsets. For the purpose of the test the doorsets were referenced 'A and B'	
Summary of test specimen:	<p>Dimensions leaf A: 2096 (h) x 926 (w) x 44 (t) Dimensions leaf B: 2096 (h) x 926 (w) x 44 (t)</p> <p>Doorset A: Dare wood-based panel group Particleboard 28 (t), Dare wood-based panel group particleboard mock stile and rails 8 (t), African Mahogany lipping 5 (t) fitted to all edges, the door leaf was hung in a European Redwood frame 22 (w) on 3No. Steel hinges.</p> <p>Doorset B: 2no Dare wood-based panel group particleboard 22 (t) each, with 10 () x 3.4 (d) decorative grooves, African Mahogany lipping 5 (t) fitted to all edges, the door leaf was hung in a European Redwood frame 22 (w) on 3No. Steel hinges.</p> <p>Both doorsets were oriented to open towards heat conditions. Doorsets including a mortise latch, positioned at approximately mid-height of the doorset. The door leaves were unlatched for the duration of the test.</p>	
Test Standard:	BS 476: Part 22: 1987	
Performance	Doorset A	Integrity: 37 minutes Insulation: 37 minutes
	Doorset B	Integrity: 38 minutes Insulation: 38 minutes

3.4 Test report RF10072

The referenced test report, the essential details of which are summarised below, is the primary data for designs 1B & 3B, 2 unlatched, single acting, leaf and a half doorsets with particleboard core with mock stile and rails and decorative groove designs, being considered for assessment in this report.

Date of test		30 th June 2010
Identification of test body:		Chiltern International Fire now trading as Warringtonfire Testing and Certification Ltd. UKAS Notified Body 1762.
Sponsor:		Lignum International Ltd.
Tested Product:		Fully insulated leaf and a half, single acting timber, solid core doorsets. For the purpose of the test the doorsets were referenced 'A and B'
Summary of test specimen:		<p>Dimensions leaf A: 2200 (h) x 926 (w) x 44 (t) Dimensions leaf B: 2096 (h) x 926 (w) x 44 (t)</p> <p>Doorset A: Linex Particleboard 44 (t), including 10 (w) x 3.5 (d) grooves, Douglas fir lipping 5 (t) fitted to all edges, the door leaf was hung in a European Redwood frame 22 (w) on 3No. Steel hinges.</p> <p>Doorset B: Linex particleboard 28 (t), incorporating Wan Hua Chinese straw board mock stile and rails 8 (t), Douglas fir lipping 5 (t) fitted to all edges, the door leaf was hung in a European Redwood frame 22 (w) on 3No. Steel hinges.</p> <p>Both doorsets were oriented to open towards heat conditions. Doorsets including a mortise latch, positioned at approximately mid-height of the doorset. The door leaves were unlatched for the duration of the test.</p>
Test Standard:		BS 476: Part 22: 1987
Performance	Doorset A	Integrity: 34 minutes Insulation: 34 minutes
	Doorset B	Integrity: 37 minutes Insulation: 37 minutes

3.5 Test report WF412734

The referenced test report, the essential details of which are summarised below, is the supplementary data for designs 1A, with LEBEX CFG Toughened glass incorporating square beading, considered for assessment in this report.

Date of test	11 th July 2019	
Identification of test body:	Warringtonfire Testing and Certification Ltd. UKAS Notified Body 1762.	
Sponsor:	Lignum International Ltd.	
Tested Product:	Unframed glazed door leaf section. For the purpose of the test the leaf was referenced 'A'	
Summary of test specimen:	<p>Dimensions leaf A: 1127 (h) x 870 (w) x 43 (t)</p> <p>Doorset A: Luli China Oak veneered particleboard 43 (t), Douglas Fir lipping 6 (t) fitted to all edges, with a glazed aperture incorporating LEBEX CFG Toughened glass 6 (t) aperture size 916 (h) x 696 (w) fitted with Douglas Fir beading 15 (h) x 17 (d) glued using PVAc adhesive Akzo, glazed aperture included a strip of Foshan Nanhai Pingzhi Graphite Based Intumescent 10 (w) x 2 (t) fitted between the glass and bead on both faces and centrally into the core and glazing edge, which had been rebated into the core, the door leaf was fixed directly into the supporting construction.</p>	
Test Standard:	Indicative fire resistance test utilizing the temperature and pressure conditions of BS 476: Part 20: 1987 and the principles of BS 476: Part 22: 1987 (and current FTSG Resolutions where applicable)	
Performance	Doorset A	Integrity: 35 minutes Insulation: 0 minutes ¹

¹ In accordance with Section 8.6.1 of BS 476: Part 22: 1987, the specimen has not been evaluated for insulation.

3.6 Test report IF10072

The referenced test report, the essential details of which are summarised below, is the supplementary data for designs 3B, with Pilkington Pyroshield 2 glazing, considered for assessment in this report.

Date of test	21 st September 2010	
Identification of test body:	Chiltern International Fire now trading as Warringtonfire Testing and Certification Ltd. UKAS Notified Body 1762.	
Sponsor:	Lignum International Ltd.	
Tested Product:	Section of door leaf, hung within a door frame with a glazed aperture. For the purpose of the test the leaf was referenced 'A'	
Summary of test specimen:	<p>Dimensions leaf A: 1010 (h) x 1010 (w) x 44 (t)</p> <p>Doorset A: Linex particleboard 28 (t), incorporating Wan Hua Chinese Strawboard 8 (t), Douglas Fir lipping 5 (t) fitted to all edges, with a glazed aperture incorporating Pilkington Pyroshield 2 6 (t) aperture size 800 (h) x 800 (w) fitted with a 13Deg chamfered Sapele beading 20 (h) x 22 (d) including a 5 (h) x 5 (w) bolection return, glazed aperture included a Sealmaster Fireglaze compound 2 (t) fitted between the glass and bead on both faces, leaf was hung in a European Redwood frame 22 (w) on 2No. Steel hinges.</p>	
Test Standard:	Indicative fire resistance test utilizing the temperature and pressure conditions of BS 476: Part 20: 1987 and the principles of BS 476: Part 22: 1987 (and current FTSG Resolutions where applicable)	
Performance	Doorset A	Integrity: 35 minutes ¹ Insulation: 0 minutes ²

¹ A cotton pad test was performed at the top hinge position at 35:23 minutes, which resulted in ignition of the cotton pad. No failures occurred to the glazed unit until continuous flaming at the top left corner of the beading at 41:10 minutes.

² In accordance with Section 8.6.1 of BS 476: Part 22: 1987, the specimen has not been evaluated for insulation.

3.7 Test report IF10073

The referenced test report, the essential details of which are summarised below, is the supplementary data for designs 3A, with Pilkington Pyroshield 2 glazing, considered for assessment in this report.

Date of test	20 th September 2010	
Identification of test body:	Chiltern International Fire now trading as Warringtonfire Testing and Certification Ltd. UKAS Notified Body 1762.	
Sponsor:	Lignum International Ltd.	
Tested Product:	Section of door leaf, hung within a door frame with a glazed aperture. For the purpose of the test the leaf was referenced 'A'	
Summary of test specimen:	<p>Dimensions leaf A: 1010 (h) x 1010 (w) x 44 (t)</p> <p>Doorset A: Dare Global particleboard 28 (t), incorporating Dare Global Particleboard facings 8 (t), Douglas Fir lipping 5 (t) fitted to all edges, with a glazed aperture incorporating Pilkington Pyroshield 2 6 (t) aperture size 800 (h) x 800 (w) fitted with a 13Deg chamfered Sapele beading 20 (h) x 22 (d) including a 5 (h) x 5 (w) bolection return, glazed aperture included a Sealmaster Fireglaze compound 2 (t) fitted between the glass and bead on both faces, leaf was hung in a European Redwood frame 22 (w) on 2No. Steel hinges.</p>	
Test Standard:	Indicative fire resistance test utilizing the temperature and pressure conditions of BS 476: Part 20: 1987 and the principles of BS 476: Part 22: 1987 (and current FTSG Resolutions where applicable)	
Performance	Doorset A	Integrity: 42 minutes Insulation: 0 minutes ¹

¹ In accordance with Section 8.6.1 of BS 476: Part 22: 1987, the specimen has not been evaluated for insulation.

3.8 Test report IF10074

The referenced test report, the essential details of which are summarised below, is the supplementary data for designs 1C with Pilkington Pyroshield 2 glazing, considered for assessment in this report.

Date of test	20 th September 2010	
Identification of test body:	Chiltern International Fire now trading as Warringtonfire Testing and Certification Ltd. UKAS Notified Body 1762.	
Sponsor:	Lignum International Ltd.	
Tested Product:	Section of door leaf, hung within a door frame with a glazed aperture. For the purpose of the test the leaf was referenced 'A'	
Summary of test specimen:	<p>Dimensions leaf A: 1010 (h) x 1010 (w) x 44 (t)</p> <p>Doorset A: 2No Dare Global particleboard 22 (t) each, incorporating Dare Global Particleboard facings 8 (t), Douglas Fir lipping 5 (t) fitted to all edges, with a glazed aperture incorporating Pilkington Pyroshield 2 6 (t) aperture size 800 (h) x 800 (w) fitted with a 13Deg chamfered Sapele beading 20 (h) x 22 (d) including a 5 (h) x 5 (w) bolection return, glazed aperture included a Sealmaster Fireglaze compound 2 (t) fitted between the glass and bead on both faces, leaf was hung in a European Redwood frame 22 (w) on 2No. Steel hinges.</p>	
Test Standard:	Indicative fire resistance test utilizing the temperature and pressure conditions of BS 476: Part 20: 1987 and the principles of BS 476: Part 22: 1987 (and current FTSG Resolutions where applicable)	
Performance	Doorset A	Integrity: 57 minutes Insulation: 0 minutes ¹

¹ In accordance with Section 8.6.1 of BS 476: Part 22: 1987, the specimen has not been evaluated for insulation.

3.9 Test report IF10075

The referenced test report, the essential details of which are summarised below, is the supplementary data for designs 1B with Pilkington Pyroshield 2 glazing, considered for assessment in this report.

Date of test	20 th September 2010	
Identification of test body:	Chiltern International Fire now trading as Warringtonfire Testing and Certification Ltd. UKAS Notified Body 1762.	
Sponsor:	Lignum International Ltd.	
Tested Product:	Section of door leaf, hung within a door frame with a glazed aperture. For the purpose of the test the leaf was referenced 'A'	
Summary of test specimen:	<p>Dimensions leaf A: 1010 (h) x 1010 (w) x 44 (t)</p> <p>Doorset A: Linex particleboard 44 (t), Douglas Fir lipping 5 (t) fitted to all edges, with a glazed aperture incorporating Pilkington Pyroshield 2 6 (t) aperture size 800 (h) x 800 (w) fitted with a 13Deg chamfered Sapele beading 20 (h) x 22 (d) including a 5 (h) x 5 (w) bolection return, glazed aperture included a Sealmaster Fireglaze compound 2 (t) fitted between the glass and bead on both faces, leaf was hung in a European Redwood frame 22 (w) on 2No. Steel hinges.</p>	
Test Standard:	Indicative fire resistance test utilizing the temperature and pressure conditions of BS 476: Part 20: 1987 and the principles of BS 476: Part 22: 1987 (and current FTSG Resolutions where applicable)	
Performance	Doorset A	Integrity: 47 minutes ¹ Insulation: 0 minutes ²

¹ A cotton pad test was performed at the top hinge position, which resulted in ignition at 47:20 minutes. No failures occurred to the glazing until continuous flaming at the top closing corner caused ignition of the glazing beading at 52:30 minutes.

²In accordance with Section 8.6.1 of BS 476: Part 22: 1987, the specimen has not been evaluated for insulation.

4 Technical Specification

4.1 General

The technical specification for the proposed door assembly is given in the following sections and is based on the test evidence for the door design, summarised in section 3.

4.2 Intended use

The intended use of the proposed door assembly is summarised below:

A pedestrian doorset including any frame, door leaf or leaves which is provided to give a fire resisting capability when used for the closing of permanent openings in fire resisting separating elements, which together with the building hardware and any seals (whether provided for the purpose of fire resistance or smoke control or for other purposes such as draught or acoustics) form the assembly.

The construction of door leaves covered by this assessment comprises the following specifications:

5 Summary

5.1 Door Design Summary Matrix Table

The following table summarises the different design options for each of the door types summarised in section 3.

Door Configuration	Raised and fielded (see section 8)	Mock Stile and Rail (see section 8)	Grooving (see section 9)	LEBEX CFG Toughened Glass (with square and splayed beads)	Pilkington Pyroshield 2 and Pyrobelite (with splayed beads)
Design 1A: Luli Particleboard flush doorset (44mm core)	N/A	N/A	✓	✓	✓
Design 1B: Linex particleboard (44mm core)	N/A	N/A	✓	N/A	✓
Design 1C: 2No layers Dare wood-based panel group Particleboard (44mm core)	N/A	N/A	✓	N/A	✓
Design 2: Luli particleboard and facings with Mock Stile and Rail Doorset (25mm Core)	✓	✓	N/A	N/A	N/A
Design 3A: Particleboard core with Particleboard facing with Mock Stile and Rail Doorset (28mm core)	N/A	✓	N/A	N/A	N/A
Design 3B: Particleboard core with Strawboard facing with Mock Stile and Rail Doorset (28mm core)	N/A	✓	N/A	N/A	N/A

6 General Description of Construction

The basic tested construction of door leaves covered by this assessment comprises the following elements: The scope given in this assessment applies to all of the door leaf designs unless stated otherwise in a particular section.

6.1 Design 1A: Flush Doorset - Luli Particleboard

Element		Material	Dimensions (mm)	Density (kg/m ³)
Stiles and rails		None fitted	-	-
Core		Luli Particleboard(3)	44mm thick overall	420(1)
Adhesive	Lipping	AkzoNobel EPI System 1911 with Hardener 1990(3)	-	-
	Veneer	AkzoNobel EPI System 1911 with Hardener 1990(3)	-	-
	Core	Urea Formaldehyde(3)		
Lippings- all edges		White Oak	6 thick	700(2)

(1) Determined by laboratory at 12% moisture content database (3) Stated by client, not verified by laboratory

(2) Nominal density = TRADA Timber

6.2 Design 1B: Flush Doorset - Linex Particleboard

Element		Species/type	Dimensions (mm)	Density (kg/m ³)
Stiles and rails		None fitted	-	-
Core		Linex particleboard	44 thick including 10mm wide x 3.5mm deep grooves in the leaf faces	530(1)
Facings		None fitted	-	-
Adhesive	Lipping	PVA	-	-
Lippings – all edges		Douglas fir	5 thick	530(2)

(1) Stated by client, not verified by laboratory

(2) Stated by client, not verified by laboratory

6.3 Design 1C: Flush Doorsets - 2No layers of Dare wood-based panel group Particleboard

Element		Species/type	Dimensions (mm)	Density (kg/m ³)
Stiles and Rails		None fitted	-	-
Core		2No layers Dare wood-based panel group Particleboard	22 thick each layer with 10 wide x 3.5mm deep decorative grooves	640(1)
Adhesive	Lipping	PVAc	-	-
	Core	PVAc	-	-
Lippings – All edges		African mahogany	5 thick	500-550(1)

(1) Stated by client, not verified by laboratory

6.4 Design 2: Mock Stile and Rail Doorset (25mm Core)

Element		Species/type	Dimensions (mm)	Density (kg/m ³)
Stiles and Rails		None fitted	-	-
Core		Luli particleboard	25 thick overall	650-700 ⁽²⁾
'Mock' stile facings		Luli particleboard	9 thick overall x 103 wide	700-800 ⁽²⁾
'Mock' top rail facings		Luli particleboard	9 thick overall x 103 wide	700-800 ⁽²⁾
'Mock' bottom rail facings		Luli particleboard	9 thick overall x 166 wide	700-800 ⁽²⁾
'Mock' 'stiles and rails edge capping		White Oak ⁽²⁾	6 thick	695 ⁽¹⁾
Adhesive	Lippings	AkzoNobel EPI System 1911 with Hardener 1999 ⁽²⁾	-	-
	Veneer	AkzoNobel EPI System 1911 with Hardener 1999 ⁽²⁾	-	-
	Core	Urea Formaldehyde ⁽²⁾	-	-
Lippings – all edges		White Oak	6 thick	640 ⁽¹⁾

(1) Determined by laboratory at 12% moisture content (2) Stated by client, not verified by laboratory

6.5 Design 3A: Mock Stile & Rail Particleboard facing (28mm core)

Element		Material	Dimensions (mm)	Density (kg/m ³)
Stiles and Rails		None fitted	-	-
Core		Particleboard (specification held by Exova Warringtonfire in confidence)	28mm thick	630 ⁽¹⁾
Mock Panel (surface applied stiles and rails to both sides)		Particleboard (specification held by Exova Warringtonfire in confidence)	8 thick	720 ⁽¹⁾
Adhesive	Lipping	PVAc	-	-
	Facing	PVAc	-	-
Lippings (all edges)		African mahogany	5 thick	500-550 ⁽²⁾

(1) Stated density not checked by laboratory (2) Nominal density

6.6 Design 3B: Mock Stile & Rail strawboard facing (28mm core)

Element		Material	Dimensions (mm)	Density (kg/m ³)
Stiles and Rails		None fitted	-	-
Core		Particleboard (specification held by Exova Warringtonfire in confidence)	28mm thick	530 ⁽¹⁾
Mock Panel (surface applied stiles and rails to both sides)		Strawboard (specification held by Exova Warringtonfire in confidence)	8 thick	480-530 ⁽²⁾
Adhesive	Lipping	PVAc	-	-
	Facing	PVAc	-	-
Lippings (all edges)		Douglas fir	5 thick	530 ⁽³⁾

(1) Measured density

(2) Stated density not checked by laboratory

(3) Nominal density

7 Leaf Sizes

The approval for increased leaf dimensions is based on the tests listed in appendix A and takes into account the margin of over performance above 30 minutes integrity for the design and the characteristics exhibited during test. Data sheets specifying the maximum approved leaf sizes and graphs showing the permitted gradient between maximum height and width, are contained in appendix D.

Doorsets with reduced dimensions are deemed to be less onerous, therefore doors manufactured with dimensions that are less than those tested and stated in appendix D, are covered by this assessment.

8 Configurations

Based on the test evidence listed in appendix A, this assessment covers the following doorset configurations:

Abbreviation	Door Designs	Description
LSASD & ULSASD	All designs	Latched & unlatched single acting single doorset
DASD		Double acting single doorset
LSADD & ULSADD	1B, 1C, 3A and 3B	Latched & unlatched single acting double doorset
DADD		Double acting double doorset

9 Leaf Size Adjustment

Door leaves may be altered as follows:

Element	Reduction
Leaf	The manufactured dimensions of the leaf may not be reduced in height or width (smaller doors may be manufactured - see section 7)
Timber lippings	The lipping dimensions stated in section 15 may be reduced by 20% for fitting purposes

10 Overpanels

10.1 Solid

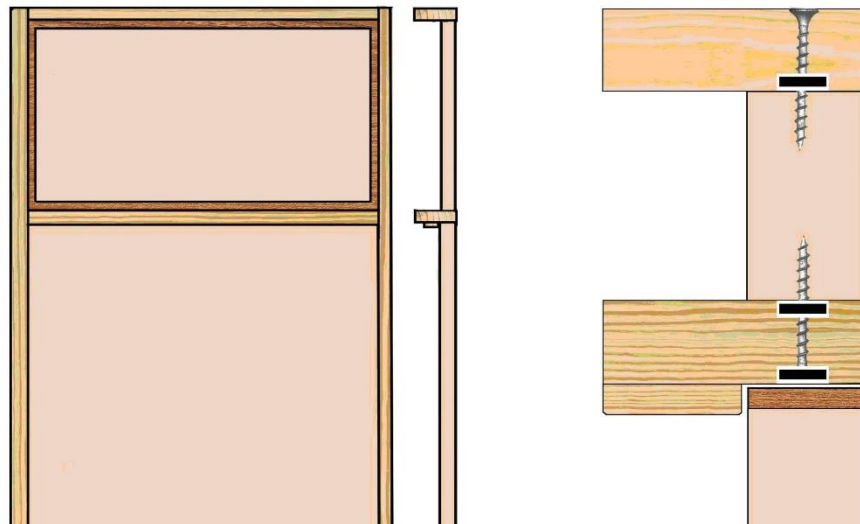
Overpanels of the same construction as the door leaves may be used when a transom is fitted separating the door leaves from the overpanel. Transoms must be softwood or hardwood, of a minimum density of 510 kg/m³ and a minimum section of 70mm x 32mm. Joints must be mortice and tenon, mortice housed or butt jointed and glued (urea formaldehyde) and screwed. Overpanels must be fixed using the following method:

- Screwing through the rear of the frame with steel screws passing at least 30mm into the centre line of the overpanel. Fixings must be no more than 100mm from each corner and a maximum of 250mm centres in between.

The intumescent seal specification for overpanel assemblies is to be as the jamb for vertical edges and the head for horizontal edges and must be on all 4 edges of the overpanel as defined in appendix D for the different designs and configurations.

Maximum assessed overpanel heights are as follows:

Configuration	Max Overpanel Height (mm)
Single doorsets	2000
Double Doorsets	1000



Note: Drawing is representative of doorset construction. Exact construction must comply with the specification contained in this document.

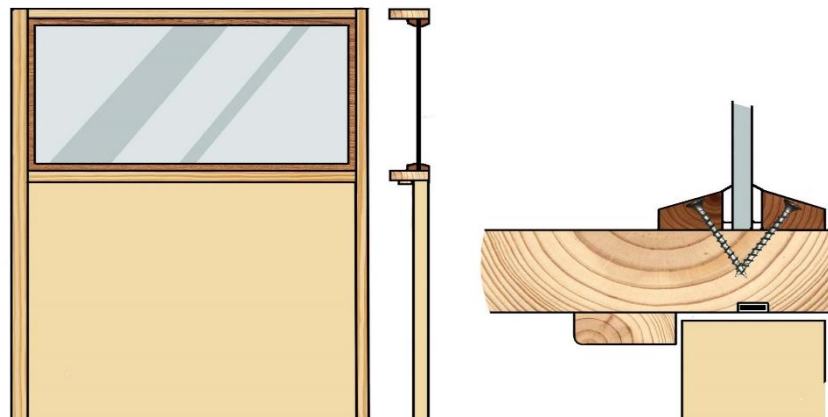
10.2 Glazed Fanlights

Doorsets including a transom may have the overpanel section glazed in lieu of a section of door. The timber frame and glazing beads must be hardwood with a minimum density of 640 kg/m³ and the transom section must be a minimum of 70mm x 44mm.

The maximum assessed fanlight dimensions are detailed in the table below, subject to the following restriction:

- The glazing system and glass must be able to demonstrate adequate performance when tested as a window or screen in accordance with BS 476: Part 22: 1987 or BS EN 1634-1, at the pane dimensions to be installed.

Configuration	Height (mm)	Width (mm)
Single & double doorsets	≤600	Overall door width



Note: Drawing is representative of doorset construction. Exact construction must comply with the specification contained in this document.

11 Panels- Design 2, 3A and 3B

The tested specimens comprised a single panel door design which represents the most onerous configuration, since the minimum amount of panel framing contributes to stability. The single panel design has the minimum amount of solid leaf framing. Leaf distortion is known to be a function of leaf thickness, as a thinner leaf has less timber to resist thermally induced bow and distortion as the leaf begins to char in fire test conditions. Therefore, removing more material from the leaf to create the panelled areas will also increase the potential for leaf distortion. Based on the test data, assessment is therefore made that the number of panels may be increased to a maximum of 6 by applying additional framing to the surface of the particleboard core. Panels can be used with door configuration designs 2, 3A and 3B, which are illustrated in sections 6.4, 6.5 and 6.6, with the different panel designs being specified in the sections below. The minimum framing dimensions must meet the following dimensions where applicable:

11.1 Design 2 – Mock Stile and Rails (Raised & Fielded)

Raised and fielded doorsets must be constructed of a 25mm particleboard core, with Luli China particleboard facings only, as detailed in section 6.4, design 2. Based on the testing conducted, this door design may include a minimum of 2 and a maximum of 6 panels with a maximum single panelled area of 1.026m² for all configurations mentioned above and designs depicted in 11.1.2.

11.1.1 Design 2 – Minimum Frame Dimensions

The minimum framing dimensions must meet the following dimensions where applicable.

Element	Dimension (mm wide)	
	Minimum	Maximum
Top rails	100	145
Stiles	100	145
Mid rail	50	145
Intermediate Framing	50	130
Bottom rail	180	250

In addition to the applied panel framing detailed above, any profile of MDF or timber moulding may be added to the perimeter of the panels.

11.1.2 Raised and Fielded Panel Applications

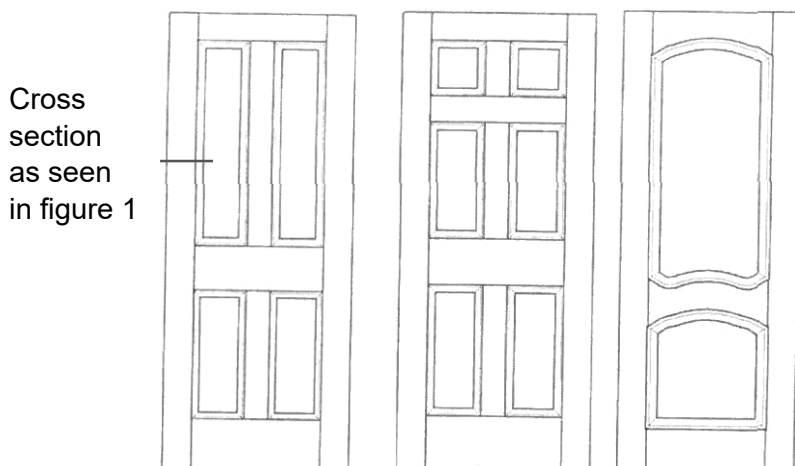
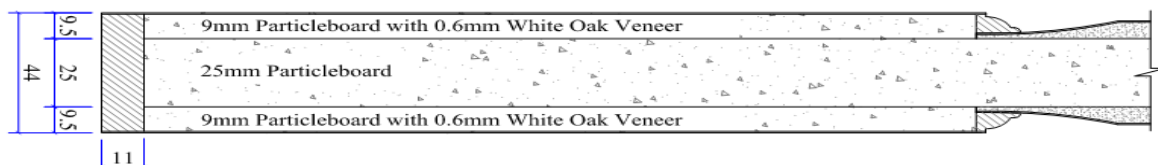


Figure 1:



11.2 Flat Panels

Designs 2, 3A and 3B are permitted with flat panels meeting the specification below. The door leaves must be constructed as detailed in sections 6.4, 6.5 and 6.6, as appropriate. The door designs may include a minimum of 1 and a maximum of 6 panels with a maximum single panelled area of 1.026m² for all configurations mentioned above and depicted in section 11.2.2.

11.2.1 Framing Dimensions

The minimum framing dimensions must meet the following dimensions where applicable.

Element	Dimension (mm wide)	
	Minimum	Maximum
Mock top rail	100	145
Mock stiles	100	145
Mock mid rail	50	145
Mock intermediate framing	50	130
Mock bottom rails	180	250

In addition to the applied panel framing detailed above, any profile of MDF or timber moulding may be added to the perimeter of the panels.

11.2.2 Flat Panel Applications

Assessed Mock Stile and Rail applications with flat panels:

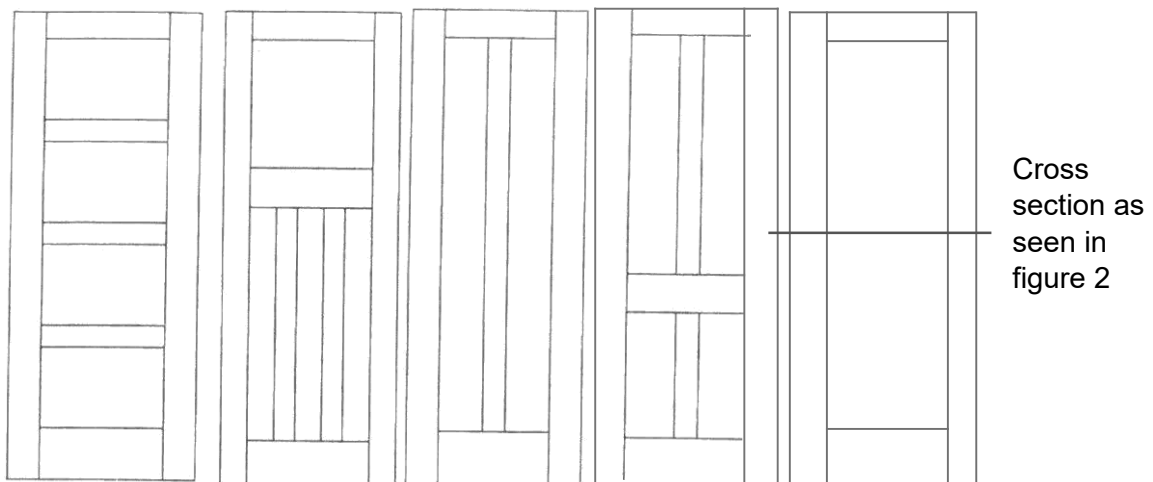
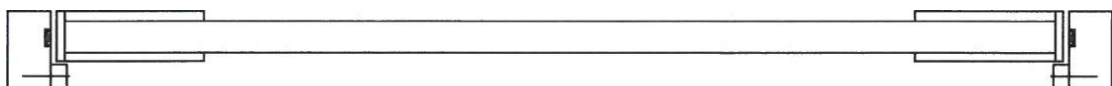


Figure 2:



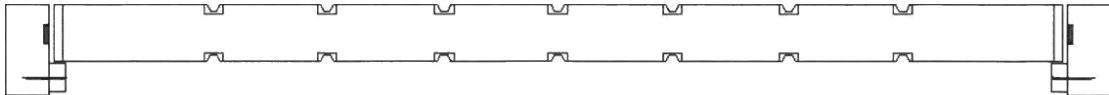
12 Grooving – Designs 1A, 1B and 1C

Grooves can only be incorporated with door constructions specified in section 6.1, 6.2 and 6.3 in this report.

12.1 Grooving Detail

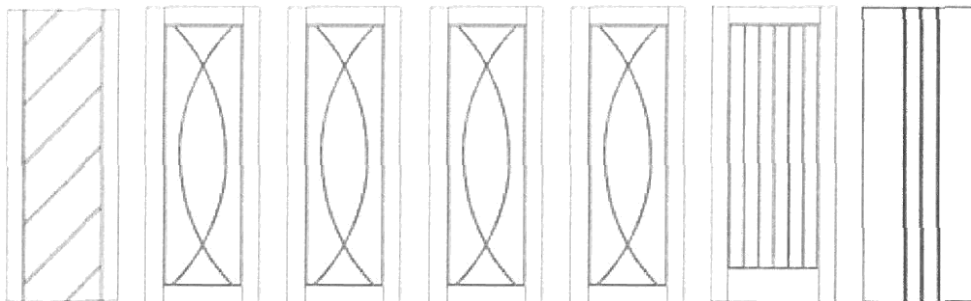
- The use of grooving can be applied across the entire face of the doorset subject to the following. Acceptable grooving applications are illustrated in section 12.2:
 - Vertical grooves must be no closer than 90mm to the vertical edges of the door and spaced a minimum of 90mm apart.
 - Horizontal grooves must be no closer than 90mm to the horizontal edges of the door and spaced a minimum of 90mm apart
- A maximum number of 7 grooving details can implemented vertically or horizontal on a single door leaf. Vertical and horizontal grooves can intersect one another. Vertical and horizontal grooves can run to the edge of the door leaf
- Grooving detailing must not exceed 10mm in width and to a depth of 3.5mm as tested,
 - A decorative grooving inlay is permitted with design 1A meeting the following specification: The grooved inlay must be a White Oak construction and bonded in place as tested, or a hardwood with a density of at least 640 kg/m, also incorporating a 5mm deep tapered groove.
 - The inlay (14mm x 7mm) can include a grooves measuring a maximum of 10mm (w) x 5mm (d)

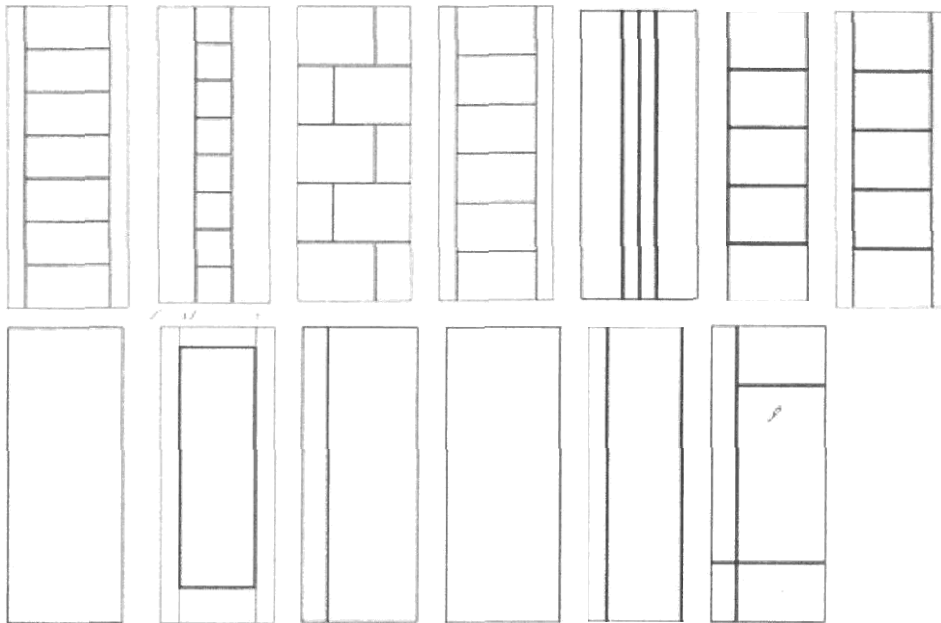
Figure 3



12.2 Grooving Applications

Assessed Grooving applications:





13 Glazing – Designs 1A, 1B and 1C

The doorset must be a Design 1 construction, as specified in Section 6.1, 6.2 and 6.3, to incorporate glazing. Based on the testing conducted in WF387294, door design 1A may include a maximum glazed area of 1.026m² for all glazing configurations in this assessment. Based on tests conducted in reports IF10074 and IF10075, door designs 1B and 1C may include a maximum glazed area of 0.592m² of Pilkington Pyroshield 2 only.

13.1 Framing Dimensions

Single and multiple glazed apertures are permitted meeting the dimensional requirements stated below:

- Glazed apertures must be located a minimum of 100mm from the head and long edges of the door leaf (i.e. hanging/closing edge)
- Glazed apertures must be located a minimum of 135mm from the bottom of the door leaf
- A minimum of 100mm of door core must separate multiple apertures

13.2 Glazing Matrix

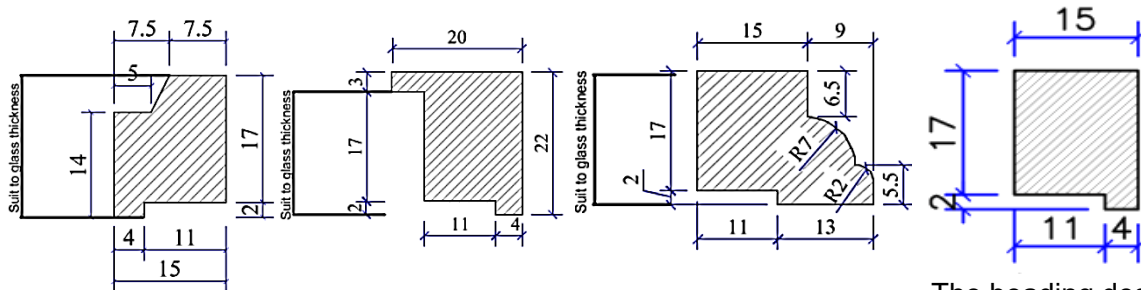
Door Type	Glass Type	Glazing system	Bead Geometry	Maximum Glazed Area (m ²)
Design 1A	6mm LEBEX CFG Toughened Glass - Shenzhen Longdian SCI-tech	Foshan Nanhai Pingzhi - Sealing materials Co Ltd	See section 13.3.1	1.026 ¹
	1. 6mm Pilkington Pyroshield 2 2. 7mm Pyrodur – Pilkington 3. 7mm Pyrobelite – AGC Flat Glass	Sealmaster Fireglaze compound	See section 13.3.2	
	Insulating Glass Types with false beading	See section 13.6	See section 13.6	
Design 1B & 1C	1. 6mm Pilkington Pyroshield 2 2. 7mm Pyrodur – Pilkington 3. 7mm Pyrobelite – AGC Flat Glass	Sealmaster Fireglaze compound	See section 13.3.2	0.592

Notes:

1. See section 13.5.1 for limitations when using adhesive fix for glazing beads

13.3 Acceptable Beading Applications

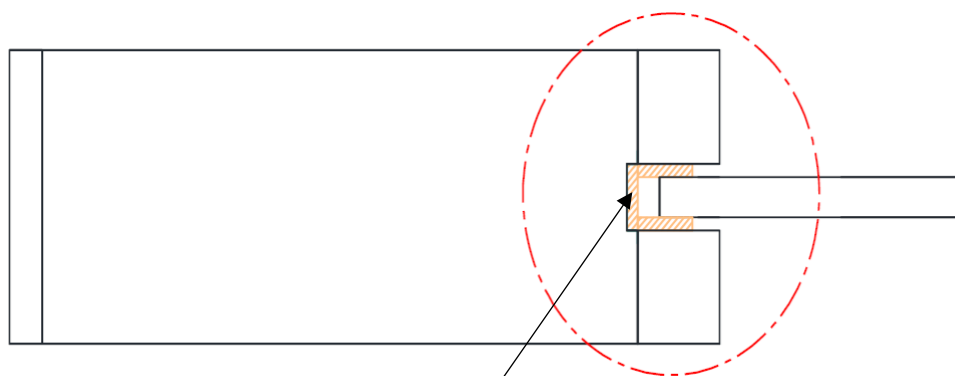
13.3.1 Beading Applications for LEBEX



The beading designs depicted above can only be incorporated with the 6mm CFG Toughened Glass and glazing system listed in section 13.2, as these have been successfully tested.

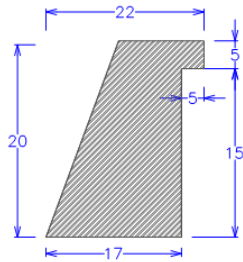
For all bead types, the 6mm LEBEX CFG glass edge cover must be between a minimum of 11mm and a maximum of 20mm, as appropriate and tested for the bead shapes and dimensions depicted above, and taking into account the required 4mm expansion allowance to all edges, as per the supporting test evidence.

For glazing apertures fitted with the 17mm x 15mm square beading an additional 10mm x 2mm Foshan Nanhai Pingzhi Graphite based intumescent strip must be recessed into the core underneath the glazing edges as per test report WF412734 (see below).



Additional 10mm x 2mm Foshan Nanhai Pingzhi graphite based strip must be recessed into the core when using the 17mm x 15mm square beading and when using the adhesive fix for beads (see section 13.5.1 for additional information)

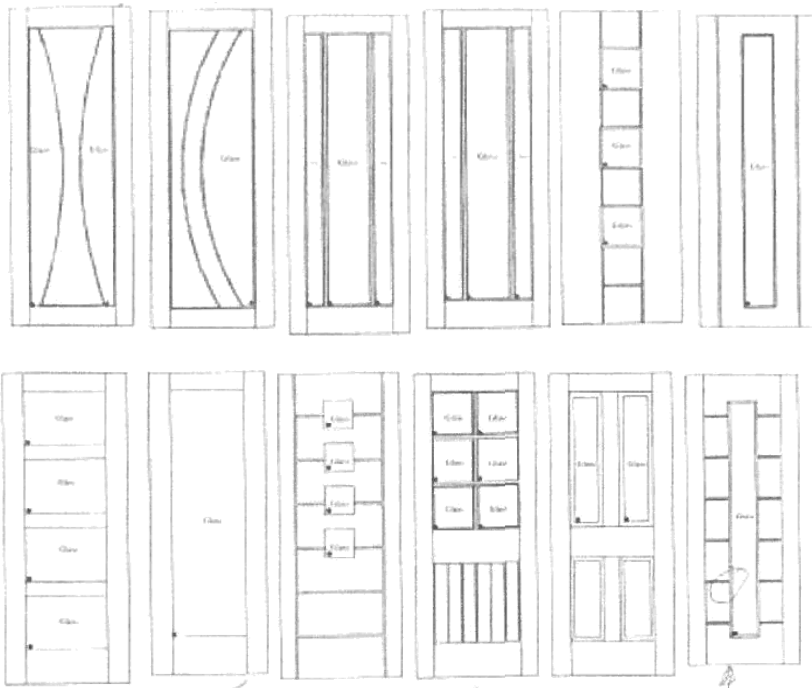
13.3.2 Beading Applications for Pyroshield, Pyrobelite and Pyrodur Glass



The tested beading design depicted above can be incorporated with 6mm Pyroshield, 7mm Pyrodur and 7mm Pyrobelite Glass using the glazing system listed in section 13.2 and depicted in appendix B.

13.4 Glazing Applications

The following glazing applications are approved for the glass and glazing systems listed in the glazing matrix in section 13.2, providing all other details are complied with in this assessment, as appropriate (i.e. permitted grooving, glazed aperture positioning, false glazing bars etc.) It is permitted to have curvilinear glazed apertures providing the glazing beads, glass and glazing system can accommodate the shape and comply with the requirements of this assessment.



13.5 Glazing Bead Installation

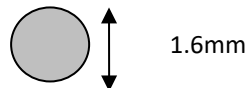
Timber for glazing beads must be joinery quality straight grained hardwood, free from knots, splits and checks of minimum density 640 kg/m³

Glazing bead shape/profile must be in accordance with section 13.3.

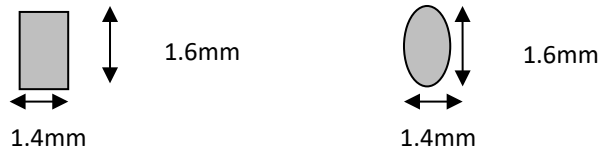
Glazing beads must be retained in position with 50mm long x 2mm diameter steel pins or 40mm long No 6-8 screws, inserted at 35-40° to the vertical at no more than 50mm from each corner and at 150mm maximum centres.

Pneumatically (gun) fired steel pins are acceptable providing the pins meet the specifications shown below and are a minimum of 50mm long.

Round pin diameter (mm) = minimum 1.6mm:



Oval/rectangular pin minimum linear dimensions (cross section) = 1.6mm x 1.4mm:



Permitted aperture positioning and spacing is given in section 13.1 and permitted glazing applications are in section 13.4

13.5.1 Adhesive Fix for Glazing Beads

Based on the test evidence in report WF412734, glazing beads incorporating 6mm LEBEX CFG Toughened Glass can be retained using PVAc adhesive AkzoNobel EPI System 1911 with Isocyanate hardener 1999.

The maximum glazed area when using the adhesive fix for glazing beads is 0.59m².

An additional 10mm x 2mm Foshan Nanhai Pingzhi Graphite based intumescent strip must be recessed into the core underneath the glazing edges as per test report WF412734 when using the adhesive fix for glazing beads (see diagram in section 13.3.1).

Providing all other details are followed in section 13, as appropriate, and subject to restrictions stated in this section, all glazing bead applications depicted in section 13.3.1 can be retained using the adhesive fix.

13.6 False timber beads and insulating glass

False timber beads may be bonded to the glass face when using the following glass types:

1. 7mm Pyrodur – Pilkington
2. 7mm Pyrobelite – AGC Flat Glass

False timber beads may be applied to the above glass types using one of the following intumescent glazing products: This can be used on the 6 pane design illustrated in section 13.4.

Glazing System	Manufacturer
1. Therm-A-Strip 30	Intumescent Seals Ltd
2, 2mm Pyrostrip 300ISA	Mann McGowan
2. Fireglaze 30	Sealmaster Ltd
3. Firestrip 30	Hodgson Sealants Ltd
4. Envirograf Product 77 - G10/10	Intumescent Systems Ltd

All seals must be a minimum of 10mm wide x 0.5 - 3mm thick. Preformed strip systems 1-4 may be self-adhesive and grooved in to the rear of the glazing bars.

All other glazing details must meet the specification given in the relevant sections above i.e. maximum permitted glazed area, bead geometry, bead specification and fixing details

14 Leaf Facing Materials

14.3 General

The different door types tested and listed in section 6 of this assessment require specific structural facings and therefore alternative facings are not permitted. The following sections provide options for alternative outer decorative and protective facings.

14.4 Decorative and Protective Materials

The following materials are permitted for this door design since they would degrade rapidly under test conditions without significant effect:

Facing Material	Maximum Permitted Thickness (mm)
Paint	0.5
Timber veneers	2
Plastic laminates	2
Cellulosic foils	0.5

Notes:

1. Metallic facings are not permitted (except for push plates and kick plates)
2. The door leaf thickness must not be reduced to accommodate the finish
3. Materials must not conceal intumescent strips
4. Plastic laminates must not be applied to the edges of leaves

15 Lippings

Doors require lipping on all edges. Lippings must meet the specification contained in the following table:

Type	Dimensions (mm)	Min Density (kg/m ³)
Flat lipping	5 - 10	≥ 530
Rounded lipping	5 - 12 with a maximum of 2 rounding to the edges	
Rebated lippings	Not permitted	

15.1 Lipping Material

Each door design must be lipped with the material specification contained in the following table:

Designs	Material	Min Density (kg/m ³)
3B & 1B	Douglas Fir	530
1C & 3A	African Mahogany	(530-550)
1A & 2	White Oak	(640-770)

16 Door Frames

16.1 Door Frame Construction

Door frames for this design must meet the following specification:

Material	Section Size (mm)	Minimum Density (kg/m ³)
Softwood or hardwood	70 wide x 22 thick (excluding the stop depth)	≥ 510

Timber for door frames must be joinery quality straight grained softwood or hardwood, free from knots, splits and checks.

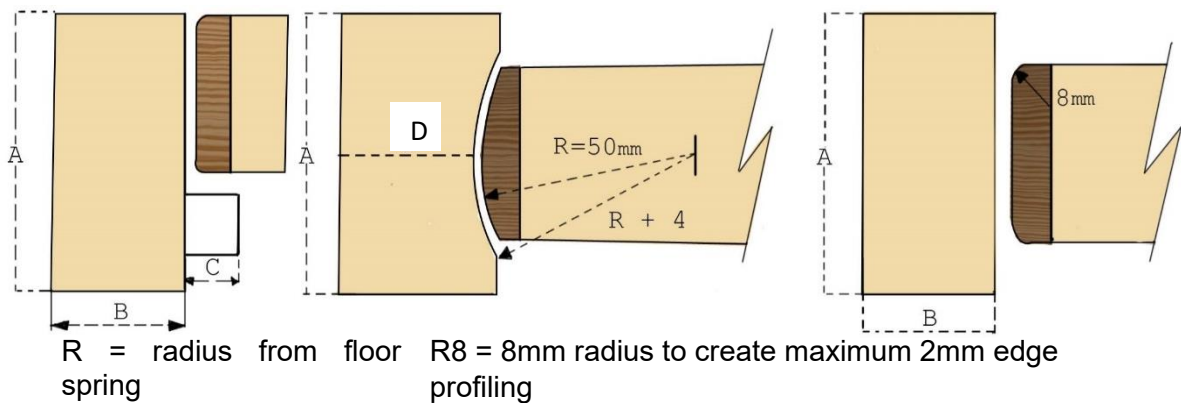
For double acting doorsets designs, the thickness of the frame must be extended to 32mm thick and the minimum thickness of the frame (where the frame has been scalloped) must be no less than 28mm.

The following diagram depicts the assessed frame profiles and dimensions:

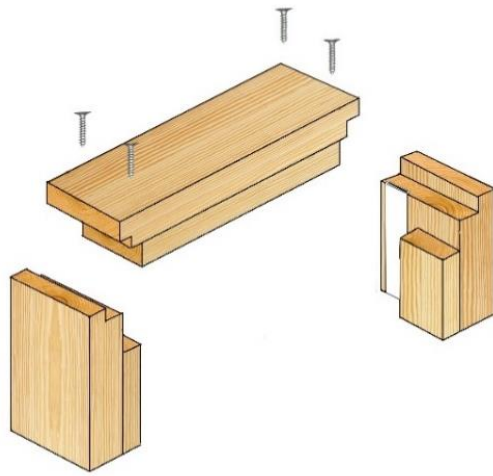
A = min 70mm
 D = min 28mm

B = min 22mm

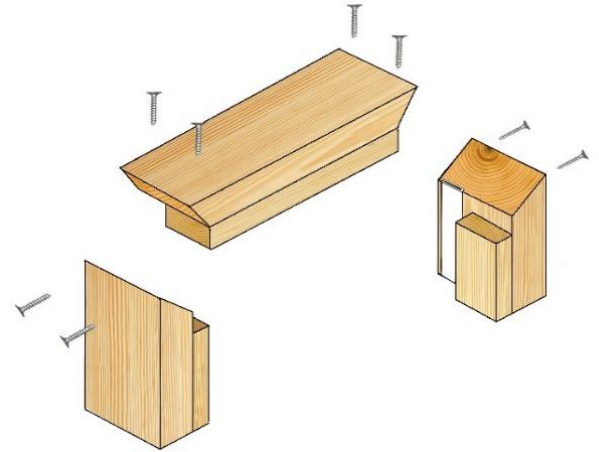
C = min 12mm



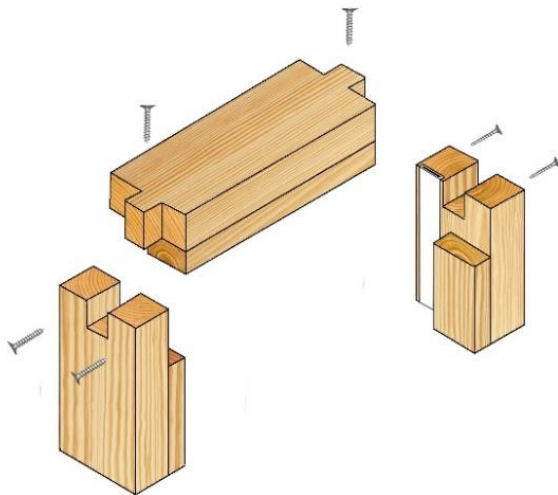
16.2 Door Frame Joints



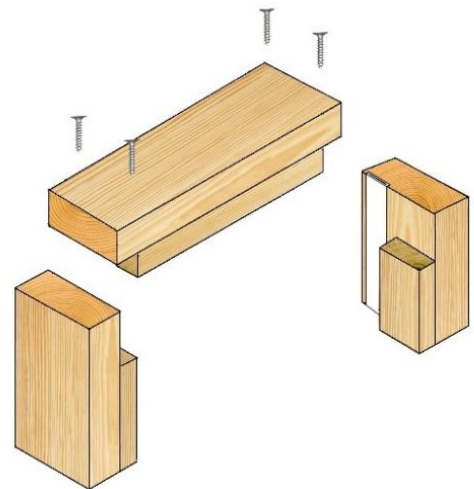
Half Lapped Joint



Mitre Joint



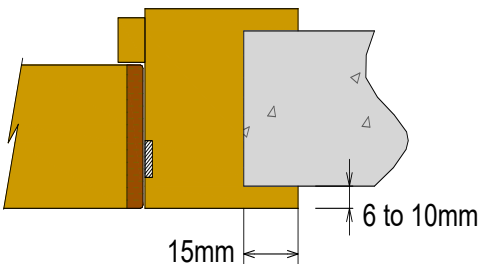
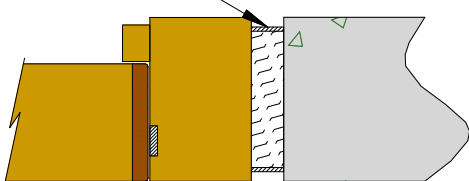
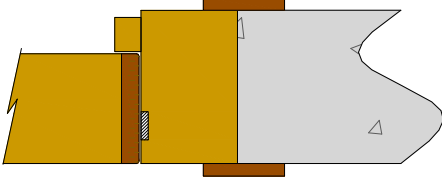
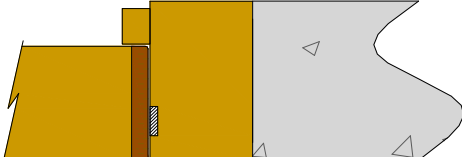
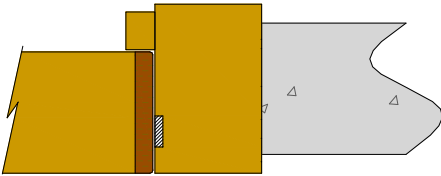
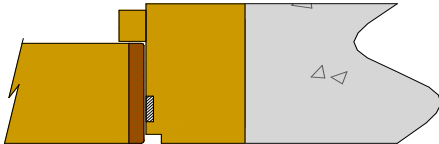
Mortice and Tenon Joint



Butt Joint

16.3 Door Frame Installation

The following diagrams indicate acceptable door frame installations:

Permitted Installations	
 <p>15mm</p> <p>6 to 10mm</p>	<p>Max 10 x 10mm shadow gap with 2mm intumescent mastic capping or 10 x 4mm PVC encased intumescent seal</p>  <p>Shadow gaps are permitted as shown in the above diagram providing the frame to structural surround is infilled with timber of the same density as the frame or a non combustible material such as plasterboard. Other shadow gap dimensions will require specific test evidence or assessment.</p>
	
<p>Architraves overlapping the frame to structural surround junction are always permitted where required but may be mandatory depending on the size of frame to surround junction gap and the fire stopping used. See section on Sealing to the Structural Surround.</p>	<p>Depending on the size of the frame to surround junction gap and the fire stopping methods used, it may be permitted to install doorsets without architraves. See section on Sealing to the Structural Surround.</p>
Installations Not Permitted	
	
<p>Projecting frames without bolection returns are not permitted without specific test evidence or assessment due to the potential for increased charring to the back of the frame.</p>	<p>Quirks between the leaf and frame are not permitted without specific test evidence or assessment due to the potential for increased charring of the leaf to frame gap.</p>

17 Adhesives

The following adhesives may be used in construction of this doorset design:

Element	Adhesive Type
Lipping	PVA, PU or UF
Panel facings	PVA, PU or UF

18 Intumescent Materials

The intumescent materials tested and assessed for use with this door design are as follows:

Element	Product	Size (mm)	Location
Meeting edges (Double Doors) without locks or with lock forends and keeps <150mm (h)	Pyroplex Rigid Box Seal FO8700	15 x 4	Centrally fitted in the meeting edge of smaller leaf.
Meeting edges (Double Doors) with locks forends and keeps exceeding 150mm	Pyroplex Rigid Box Seal FO8700	2 x 10 x 4	Fitted 10mm either side of the centre line on the meeting edge of the leaf containing the lock.
Head & Jambs	Pyroplex Rigid Box Seal FO8700 or Lorient Polyproducts Ltd Lp1405 Type 617	15 x 4	Centrally fitted in the frame reveal or leaf edges
Under hinge blade	Not required	-	-
Encasing latch body	Not required	-	-
Lock/latches	Fitted under the forend and keep for components that exceed 60mm high x 25mm wide	-	<ol style="list-style-type: none"> 1mm Interdens - Dufaylite Developments Ltd 1mm MAP paper - Lorient Polyproducts Ltd 1mm Pyrostrip 300 - Mann McGowan 1mm Therm-A-Strip - Intumescent Seals Ltd 1mm G30 – Sealmaster Ltd
Flush Bolts and Pivots	Lining all the sides of the mortices	-	<ol style="list-style-type: none"> 2mm Map paper – Lorient Polyproducts Ltd 2mm Interdens – Dufaylite Developments Ltd 2mm Therm-A-Strip – Intumescent Seals Ltd

The required seal specification for each configuration is contained in appendix D.

19 Tested Hardware

The following hardware has been successfully incorporated in the tests on this design:

Element	Product	Size (mm)	Location
Hinges	3No Royde & Tucker H105 lift off type hinge	100 x 35 (blade size)	Fitted 150mm, 1000mm and 1855mm from the head of the leaf
Closer	Dorma UK Ltd TS71 overhead type closer	232 x 68 (footprint size)	Fitted on the exposed face as per the manufactures instructions
Latch	E * S tubular steel mortice latch	57 x 26 (forend size)	Fitted 1135mm from the head of the leaf
Furniture	Aluminium lever type handle	100 x 38 (footprint size)	Fitted appropriate to the latch

20 Additional & Alternative Hardware

The following sections detail the permitted scope and constraints for fitting hardware to this door design.

Additionally, the following items of hardware must also bear the CE Mark:

- Latches & locks: Test Standard EN 12209
- Single axis hinges: Test Standard EN 1935
- Controlled door closing devices: Test Standard EN 1154
- Panic exit hardware: Test Standard EN 1125

20.1 Hinges

Door leaves must be hung on a minimum of 3 hinges, whilst leaves over 2300 must be hung on a minimum of 4 hinges. Hinges with the following specification are acceptable:

Element	Dimensions (mm)	
Blade height:	90 – 120mm	
Blade width (excluding knuckle):	30 – 35 mm	
Blade thickness:	2.5 - 4 mm	
Fixings:	Minimum of 4 No. 30mm long No. 8 or No.10 steel wood screws per blade	
Materials:	Steel or stainless steel	
Hinge positions	Top:	150 –200mm from the head to top of blade
	Bottom	180 – 250mm from foot to bottom of blade
	Remainder	Equispaced between top and bottom hinges

20.2 Latches & Locks

Based on the testing conducted and the required intumescent specification given in section 18, latches and locks must either be as tested, or alternatively components with the following specification are acceptable:

Element	Dimensions (mm)
Maximum forend and strike plate dimensions:	235 high by 25 wide by 4 thick
Maximum body dimensions:	18 thick by 100 wide by 180 high.
Materials:	All parts essential to the locking/latching action (including the latch bolt, forend and strike) to be steel or stainless steel
Position	800mm – 1200mm up from threshold.
Intumescent protection	See section 18

20.3 Automatic Closing

Automatic closing devices, must either be as tested or components of equal specification that have demonstrated contribution to the required integrity performance of this type of doorset design, when tested to BS 476: Part 22: 1987 or BS EN 1634-1.

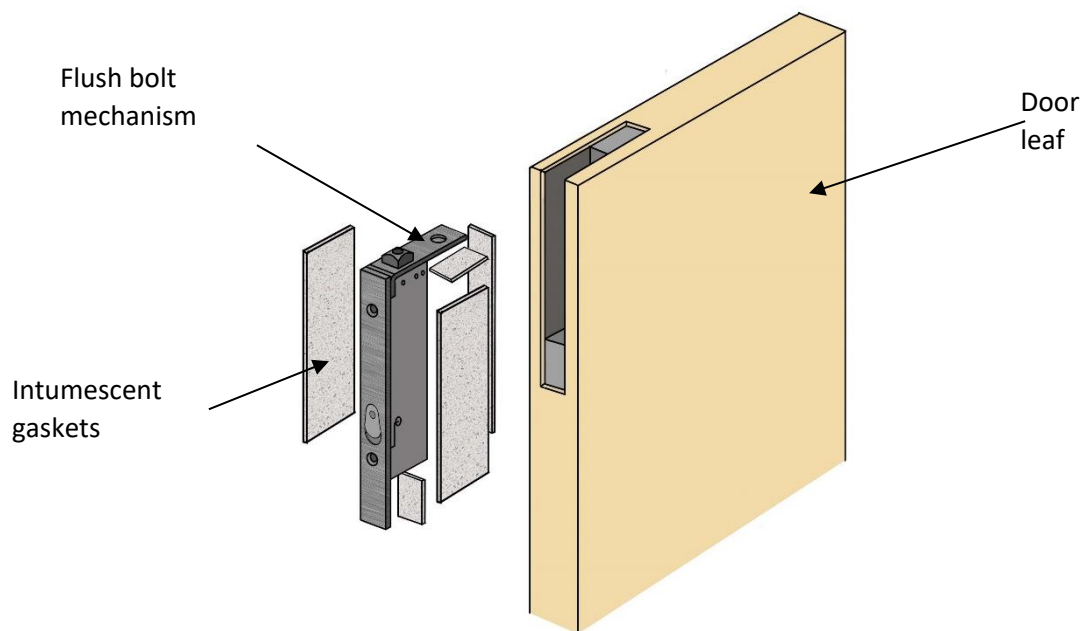
Floor spring top pivots and all mounting plates must be protected with one of the products specified for Flush Bolts and Pivots protection in section 18. Alternatively the hardware manufacturers tested gaskets may be used.

20.4 Flush bolts

Flush bolts may be incorporated centrally into the top and bottom of one meeting edge, providing the following maximum dimensions are not exceeded and the components are fitted opposite the edge fitted with intumescent strips:

- 200mm long x 20mm deep x 20mm wide.

Flush bolts must be steel and the mortice must be as tight to the mechanism as is compatible with its operation. All edges of the mortices, including keep plates, must be protected with intumescent gaskets as specified in section 18. Alternatively the hardware manufacturers tested gaskets may be used.



20.5 Pull Handles

Handles may be surface-fixed or bolted through the door leaf, providing they are stainless steel, steel or brass and the length is limited to 1200 mm between the fixing points. If through fixed, there must be no more than 1mm clearance between the hole and stud.

20.6 Push Plates & Kick Plates

Steel and stainless steel face-fixed hardware such as push plates and kick plates may be fitted to the doorsets provided that their fitting requires the removal of no part of the door leaf. These items of hardware are permitted up to a maximum of 20% of the door leaf area if mechanically fixed and a maximum of 30% if bonded with a thermo-softening contact adhesive. Plates must not return around the door edges.

20.7 Panic Hardware

Panic hardware may be fitted, providing the installation does not require the removal of any timber from the leaf, stop or frame reveal and it does not interfere with the self-closing action of the door leaf.

20.8 Door Security Viewers

Door security viewers with brass or steel bodies of a diameter less than or equal to 15mm may be used provided that the through-hole is bored tight to the case of the viewer (maximum tolerance +1 mm). Lenses must be glass, whilst the item must be bedded in to a tested intumescent mastic and fitted through a 44mm thick section of leaf.

20.9 Environmental Seals

Silicon based flame retardant acoustic, weather and dust seals may be fitted to this doorset design without compromising the performance, providing fitting does not interfere with the activation of the intumescent seals or hinder the self closing function of the leaves.

20.10 Threshold Seals

The following types of automatic threshold drop seals may be recessed in to the bottom rail of leaves to this design without compromising the performance:

Manufacturer	Product
Lorient Polyproducts	IS8010si
Raven	RP8
Athmer	Schall-Ex Duo L-15
Norsound	810

21 Supporting Construction

The supporting construction must provide the required level of fire resistance designated for the doorset design and be a suitable medium to permit adequate fixity.

22 Fixings

The frame jambs are to be fixed to the supporting construction using steel fixings at 500mm maximum centres. The fixings must be of the appropriate type for the supporting construction and must penetrate to a minimum depth of 50mm. It is not necessary to fix the frame head, although packers must be inserted.

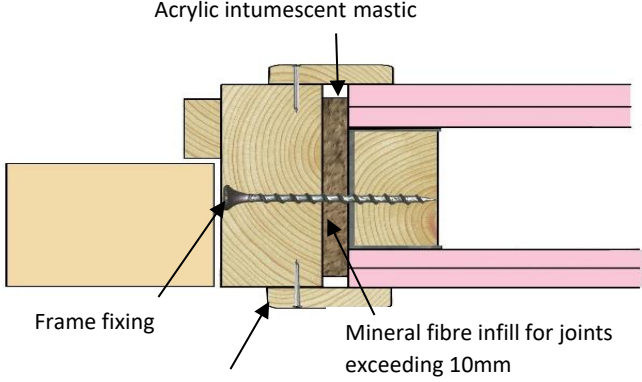
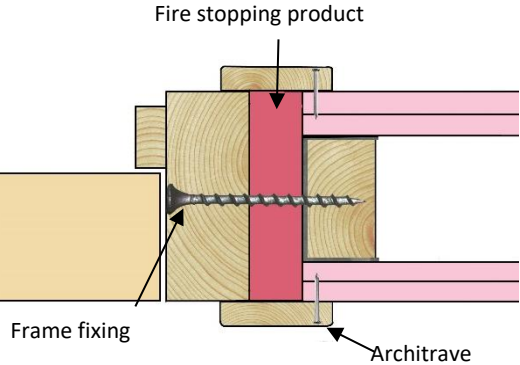
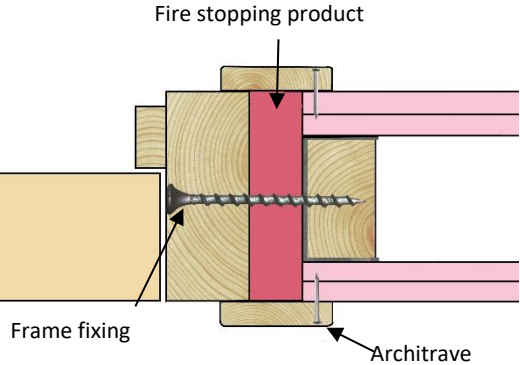
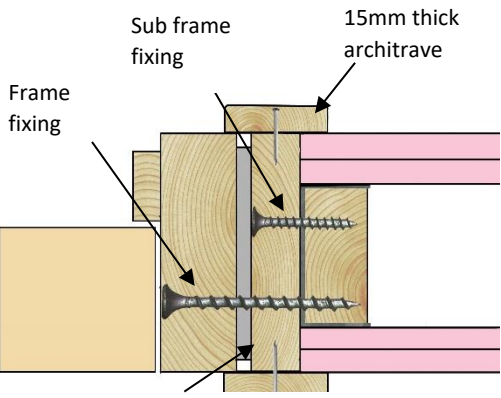
23 Door Gaps

Door edge gaps and alignment tolerances must be set within the range defined in the following table:

Location	Dimension
Door edge gaps	A minimum of 2mm and a maximum of 4mm.
Alignment tolerances	Leaves must not be proud of from the door frame or from each other by more than 1mm.
Threshold gap	A maximum of 10mm between bottom of leaf and top of floor covering. For smoke control refer to Section 26.

24 Sealing to Structural Opening

The door frame to structural opening gap must be protected using one of the following methods:

<p>1. Gaps up to 10mm must be sealed on both sides with a 10mm depth of acrylic intumescent mastic, fire tested for this application to BS 476: Part 22: 1987 or BS EN 1634-1. Joint must be fitted with 15mm thick architraves overlapping at least 15mm each side.</p>	 <p>Acrylic intumescent mastic</p> <p>Frame fixing</p> <p>Mineral fibre infill for joints exceeding 10mm</p> <p>Architrave for joints not filled with mineral wool and optional for filled joints</p>
<p>2. Gaps between 10mm and 20mm must be tightly packed with mineral fibre capped on both sides with a 10mm depth of acrylic intumescent mastic, fire tested for this application to BS 476: Part 22: 1987 or BS EN 1634-1. Architraves are optional.</p>	 <p>Frame fixing</p> <p>Architrave</p>
<p>3. Gaps up to 20mm filled with proprietary fire stopping product (e.g. expanding PU foam or preformed compressible intumescent foam). Products must be tested for this application to BS 476: Part 22: 1987 or BS EN 1634-1. Joint must be fitted with 15mm thick architraves overlapping at least 15mm each side.</p>	 <p>Frame fixing</p> <p>Architrave</p>
<p>4. Timber based or non-combustible subframe up to 50mm thick, with gaps up to 10mm between the components filled on both sides with 10mm depth of acrylic intumescent mastic or full depth expanding PU foam, fire tested for this application to BS 476: Part 22: 1987 or BS EN 1634-1. Joint must be fitted with 15mm thick architraves overlapping at least 15mm each side.</p>	 <p>Frame fixing</p> <p>Sub frame fixing</p> <p>15mm thick architrave</p> <p>10mm of acrylic intumescent mastic or full depth PU foam</p>

Guidance for various methods of sealing the frame to structural opening gap is also given in BS 8214: 2016, "*Timber-based fire door assemblies. Code of practice*", which may be referred to where appropriate.

25 Insulation

Insulation performance may be claimed for a doorset to this design meeting the following:

Type	Details
Partially insulating	Doorsets with timber frames incorporating up to 20% of non-insulating glazing
Fully insulating	Doorsets unglazed

26 Smoke Control

26.1 General

If the doorset design is required to provide a smoke control function to comply with Building Regulations, in the absence of a suitable pressurisation system, the doorset must meet one of the following criteria:

(a) have a leakage rate not exceeding 3m³/m/hour (head and jambs only) when tested at 25Pa under BS 476 *Fire tests on building materials and structures*, Section 31.1 - *Methods for measuring smoke penetration through doorsets and shutter assemblies, Method of measurement under ambient temperature conditions*; or

(b) meet the additional classification requirement of Sa when tested to BS EN 1634-3: 2004 - *Fire resistance tests for door and shutter assemblies*, Part 3 – *Smoke control doors*.

Smoke seals or combined intumescent/smoke seals that are fitted to the door to achieve the performance requirements specified above, must have been tested in accordance with the associated test method. Providing the smoke seals, any interruptions, door gaps, and the type/configuration of the doorset are consistent with the detail tested, the doorset will comply with current smoke control legislation under approved document B; and a suffix 'S' or 'Sa', as appropriate, may be added to the designation. Any other components installed where smoke leakage may occur must also be taken into account.

Note: The incorrect specification and fitting of smoke seals may impair the operation of a doorset and therefore compromise the fire resistance performance. Advice should be sought from the seal manufacturers regarding the correct specification and installation of smoke seals or combined smoke and intumescent seals.

26.2 Further Considerations

Note that there is other guidance available, including BS EN 9999-2017 - *Code of practice for fire safety in the design, management and use of buildings*, which may impose different or additional requirements, such as consideration of the gap between door leaf and threshold.

Responsibility for the appropriate smoke sealing specification and performance of the doors should be agreed between the relevant parties (i.e. specifier, manufacturer, contractor) prior to commencing manufacture and/or installation.

27 Conclusion

If the panelled doorset designs, constructed in accordance with the specification documented in this assessment report, were to be tested in accordance with BS 476 : Part 22 : 1987, it is our opinion that it would provide a minimum of 30 minutes integrity and insulation (subject to section 25).

28 Declaration by the Applicant

1. We the undersigned confirm that we have read and comply with obligations placed on us by FTSG Resolution No 82: 2001.
2. We confirm that the component or element of structure, which is the subject of this assessment, has not to our knowledge been subjected to a fire test to the Standard against which this assessment is being made.
3. We agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test to the Standard against which this assessment is being made.
4. We are not aware of any information that could adversely affect the conclusions of this assessment.
5. If we subsequently become aware of any such information we agree to ask the assessing authority to withdraw the assessment.

Signed

Name:

For and on behalf of: Lignum International Ltd



29 Limitations

The following limitations apply to this assessment:

1. This assessment addresses itself solely to the elements and subjects discussed and does not cover any other criteria. All other details not specifically referred to should remain as tested or assessed.
2. This assessment is issued on the basis of test data and information to hand at the time of issue. If contradictory evidence becomes available, Warringtonfire reserves the right to withdraw the assessment unconditionally but not retrospectively.
3. This assessment has been carried out in accordance with Fire Test Study Group Resolution No 82: 2001.
4. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
5. This assessment relates only to those aspects of design, materials and construction that influence the performance of the element(s) under fire resistance test conditions. It does not purport to be a complete specification ensuring fitness for purpose and long-term serviceability. It is the responsibility of the client to ensure that the element conforms to recognised good practice in all other respects and that, with the incorporation of the guidance given in this assessment, the element is suitable for its intended purpose.
6. This assessment represents our opinion as to the performance likely to be demonstrated on a test in accordance with BS 476: Part 22: 1987, on the basis of the evidence referred to in Appendix A. We express no opinion as to whether that evidence, and/or this assessment, would be regarded by any Building Control authority as sufficient for that or any other purpose. This assessment is provided to the client for its own purposes and we cannot opine on whether it will be accepted by Building Control authorities or any other third parties for any purpose.
7. This report may only be reproduced in full. Extracts or abridgements of reports shall not be published without permission of Warringtonfire. All work and services carried out by Warringtonfire Testing and Certification Limited are subject to, and conducted in accordance with, the Standard Terms and Conditions of Warringtonfire Testing and Certification Limited, which are available at <https://www.element.com/terms/terms-and-conditions> or upon request.

30 Validity

1. The assessment is initially valid for five years after which time it must be submitted to Warringtonfire for technical review and revalidation.
2. This assessment report is not valid unless it incorporates the declaration contained in Section 28 duly signed by the applicant.

Signature:		
Name:	Dr K D S Towler	P Barker
Title:	Technical Manager	Senior Product Assessor

Appendix A Performance Data

Primary Data

Report No	Configuration	Leaf Size (mm)	Standard	Performance (mins)	
				Integrity:	Insulation:
WF387293 (Design 1A&2)	Doorset A: ULSASD (Luli China Oak Veneered Particleboard 25mm core)	1983	BS 476 : Pt 22 : 1987	Integrity:	32
		840		Insulation:	32
	44	Doorset B: ULSASD (Luli China Oak Veneered Particleboard 44mm core grooved)		Integrity:	45
	1983			Insulation:	45
WF387294 (Design1) A multiglazed B- single large opening	Doorsets : ULSASD (Luli China Oak Veneered Particleboard 44mm core with LEBEX CFG toughened glazing)	1981	BS 476 : Pt 22 : 1987	Integrity:	29 ¹
		838		Insulation:	0
		44		Integrity:	37
		44		Insulation:	0
RF10048 (Design 3A&1C)	Doorset A: ULSADD (Particleboard facings and Particleboard 28mm core)	2090	BS 476 : Pt 22 : 1987	Integrity:	37
		926+296		Insulation:	37
	44	Doorset B: ULSADD (2No layers Dare wood- based panel group Particleboard 22mm thick each core with grooves)		Integrity:	38
	2096			Insulation:	38
RF10072 (Design 1B&3B)	Doorset A: ULSADD (Linex particleboard 44mm thick core with grooves)	2200	BS 476 : Pt 22 : 1987	Integrity:	34
		926+296		Insulation:	34
	44	Doorset B: ULSADD (Strawboard facings and Particleboard 28mm core)		Integrity:	37
	2200			Insulation:	37
		926+296	BS 476 : Pt 22 : 1987		
		44			

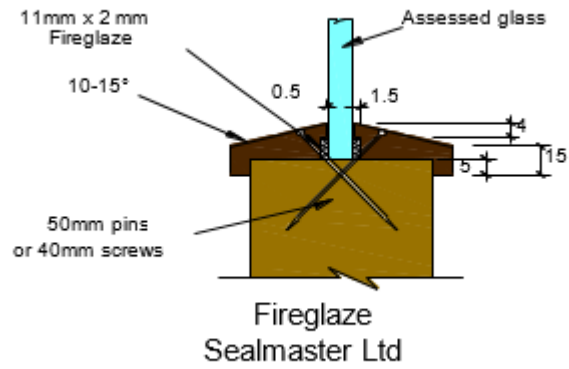
Note 1 –

Glazed aperture referenced C failed at 29 minutes, all other apertures (A, B and D) maintained in excess of 30 minutes integrity performance. The glazing details for all four apertures tested were essentially the same, apart from the bead shape and dimensions. To allow a positive assessment using the referenced test evidence, the glazing bead design tested with aperture C has not been given as an option in this assessment. Glazing bead design for Aperture C was the smallest section without a bolection return, which represents the most onerous design, particularly with non-insulating glass types. This has been deemed as the likely reason for the premature failure observed for Aperture C.

Supplementary Data

Report No	Configuration	Leaf Size (mm)	Standard	Performance (mins)	
WF412734	LSASD (Luli China Veneered Particleboard 43mm core with LEBEX CFG toughened glazing 916 x 696)	1127 870 43	BS 476 : Pt 22 : 1987	Integrity:	35
				Insulation:	0
IF10072 (Design 3B)	LSASD (Strawboard facings and Particleboard 28mm core with Pilkington Pyroshield 2 glazing 800 x 800)	1010 1010 44	BS 476 : Pt 22 : 1987	Integrity:	41
				Insulation:	0
IF10073 (Design 3A)	LSASD (Particleboard facings and Particleboard 28mm core with Pilkington Pyroshield 2 glazing 800 x 800)	1010 1010 44	BS 476 : Pt 22 : 1987	Integrity:	46
				Insulation:	0
IF10074 (Design 1C)	LSASD (2 No layers Dare Global particleboard 22mm core with Pilkington Pyroshield 2 800 x 800)	1010 1010 44	BS 476 : Pt 22 : 1987	Integrity:	57
				Insulation:	0
IF10075 (Design 1B)	LSASD (Linex particleboard 44mm thick core with Pilkington Pyroshield 2 800 x 800)	1010 1010 44	BS 476 : Pt 22 : 1987	Integrity:	47
				Insulation:	0

Appendix B Glazing Systems



Appendix C

Revisions

Revision No	Warringtonfire Reference	Date	Description
A	WF409098	21/01/19	Updated into the Warringtonfire format and incorporate test evidence IF10074, IF10075, RF11048 and RF10072 as test evidence. Increase glazing and grooving scope on designs 1B and 1A and add door configurations 1B and 1C.
B	WF419326	22/10/19	Update assessment in line with the general principles of BS EN 15725 and the inclusion of test report WF412734 to allow smaller square beading in conjunction with LEBEX CFG Toughened Glass.

Appendix D

Data Sheets for:

Lignum International Ltd

Panelled Doorsets

30 Minute Fire Resistance Performance

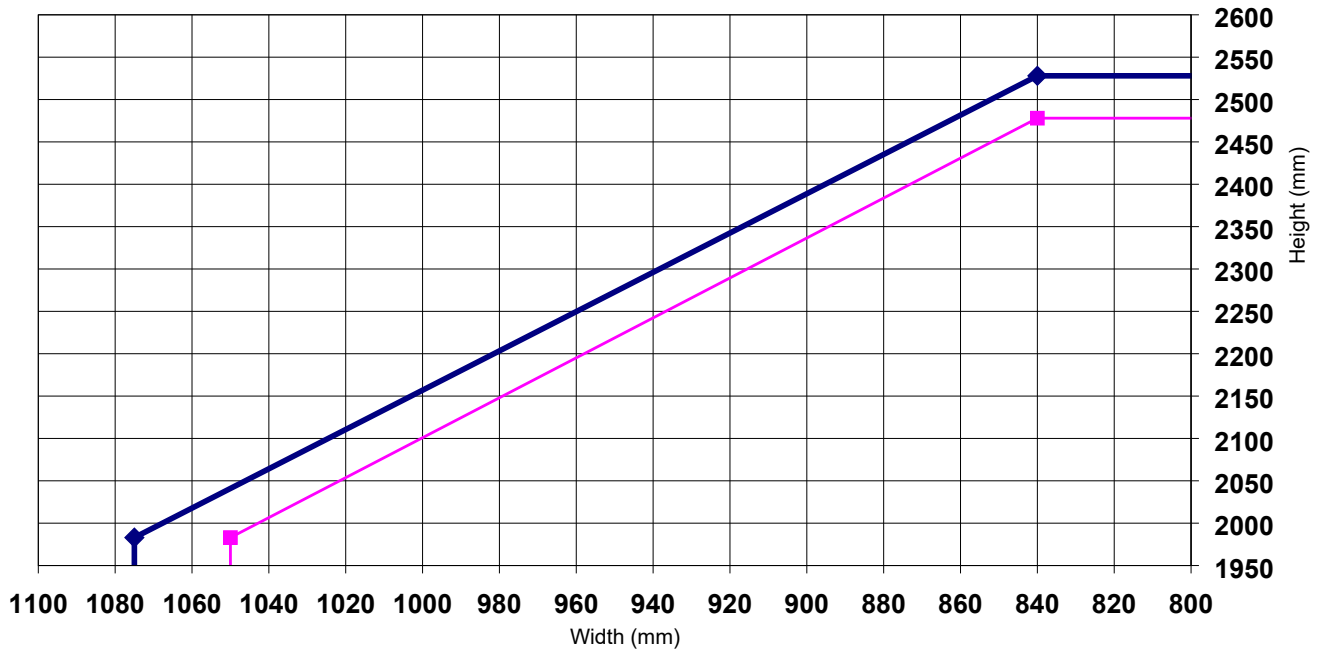
Lignum International Ltd – Design 1A 30 Minute Fire Resisting Doorsets

Latched and Unlatched Single Acting & Double Acting Single Doorsets

	Configuration		Height (mm)	Width (mm)
Leaf Sizes	LSASD	From:	1983	x 1075
		To:	2528	x 840
	ULSASD & DASD	From:	1983	x 1050
		To:	2478	x 840
Maximum Overpanel height (mm)	Transomed	2000		
Glazing	Maximum Glazed Area:	1.026m ² (see section 13 for details)		
	Approved systems:	See section 13		
Frame specification (see section 16)	Material:	Softwood or hardwood		
	Min. Section (mm):	70 x 32		
	Min. Density(kg/m ³):	510		
Intumescent Materials: Pyroplex Rigid Box seal FO8700				
Head: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal.				
Jamb: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal				
Hardware Protection: See section 18				

Maximum Door Leaf Size

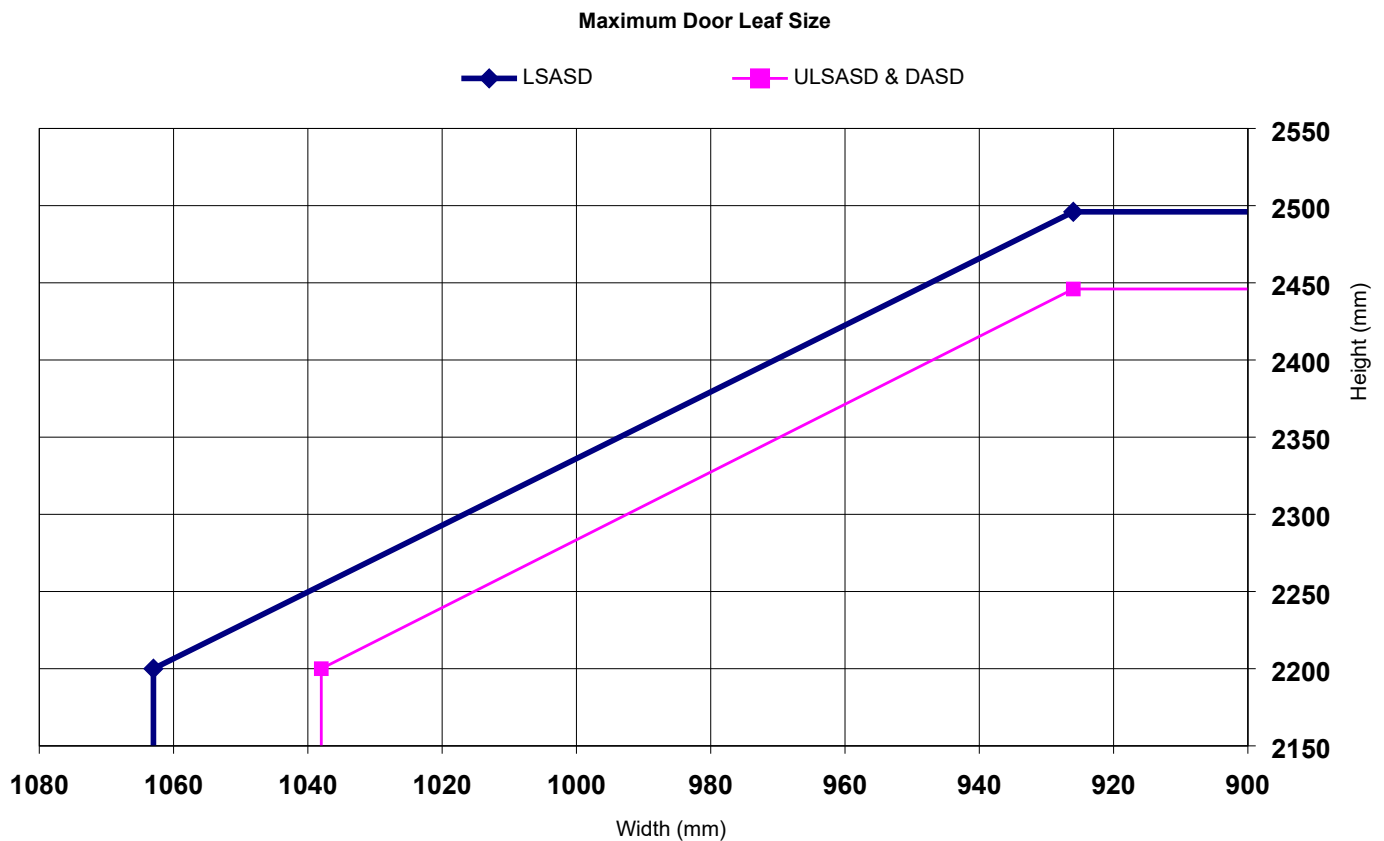
◆ LSASD ■ ULSASD & DASD



Lignum International Ltd – Design 1B 30 Minute Fire Resisting Doorsets

Latched and Unlatched Single Acting & Double Acting Single Doorsets

	Configuration		Height (mm)	Width (mm)
Leaf Sizes	LSASD	From:	2200	x 1063
		To:	2496	x 926
	ULSASD & DASD	From:	2200	x 1038
		To:	2446	x 926
Maximum Overpanel height (mm)	Transomed	2000		
Glazing	Maximum Glazed Area:	0.592m ² (see section 13 for details)		
	Approved systems:	See section 13		
Frame specification (see section 16)	Material:	Softwood or hardwood		
	Min. Section (mm):	70 x 22		
	Min. Density(kg/m ³):	510		
Intumescent Materials: Pyroplex Rigid Box seal FO8700				
Head: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal.				
Jamb: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal				
Hardware Protection: See section 18				



Lignum International Ltd – Design 1B 30 Minute Fire Resisting Doorsets

Latched and Unlatched Single Acting & Double Acting Double Doorsets

	Configuration		Height (mm)	Width (mm)
Leaf Sizes	LSADD	From:	2200	x 1013
		To:	2396	x 926
	ULSADD & DADD	From:	2200	x 988
		To:	2346	x 926
Maximum Overpanel height (mm)		Transomed	2000	
Glazing		Maximum Glazed Area:	0.592m ² (see section 13 for details)	
		Approved systems:	See section 13	
Frame specification (see section 16)		Material:	Softwood or hardwood	
		Min. Section (mm):	70 x 22	
		Min. Density(kg/m ³):	510	

Intumescent Materials: Pyroplex Rigid Box seal FO8700

Head: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal.

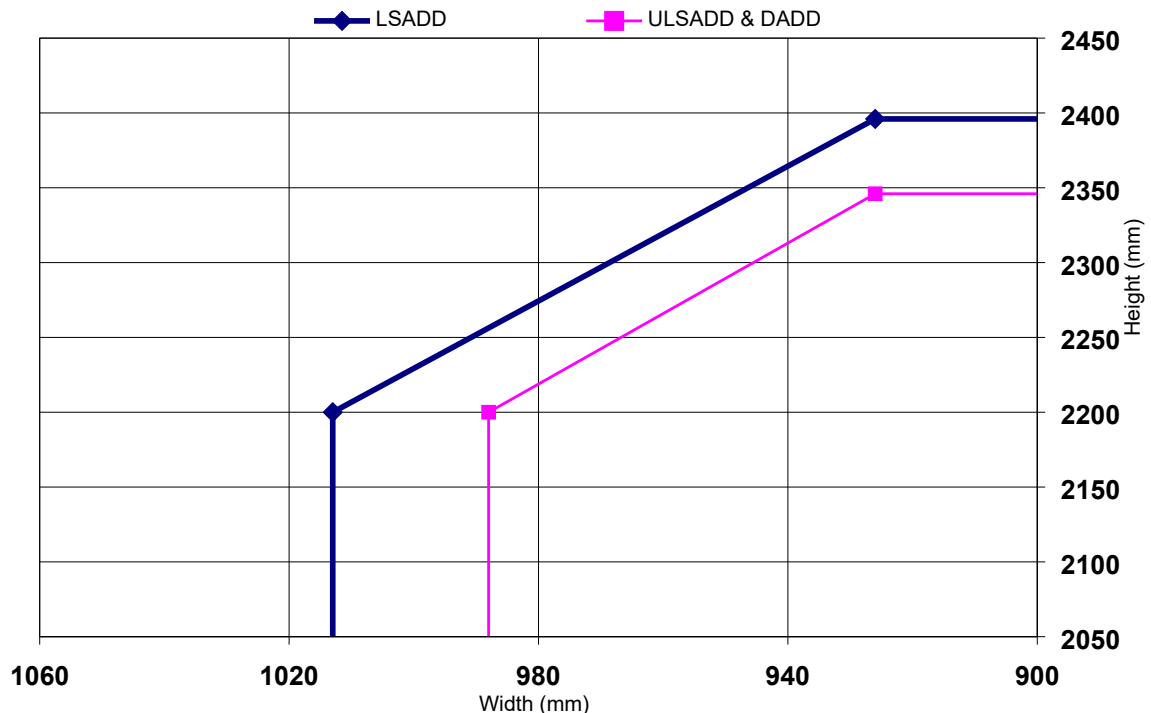
Jambs: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal

Meeting edge: 1No 15 x 4mm strip fitted centrally in the smaller leaf edge.

Meeting edge (for lock forends exceeding 150mm): 2No 10 x 4mm strip both fitted 5mm either side of the centre line on the meeting edge of the leaf containing the lock.

Hardware Protection: See section 18

Maximum Door Leaf Size

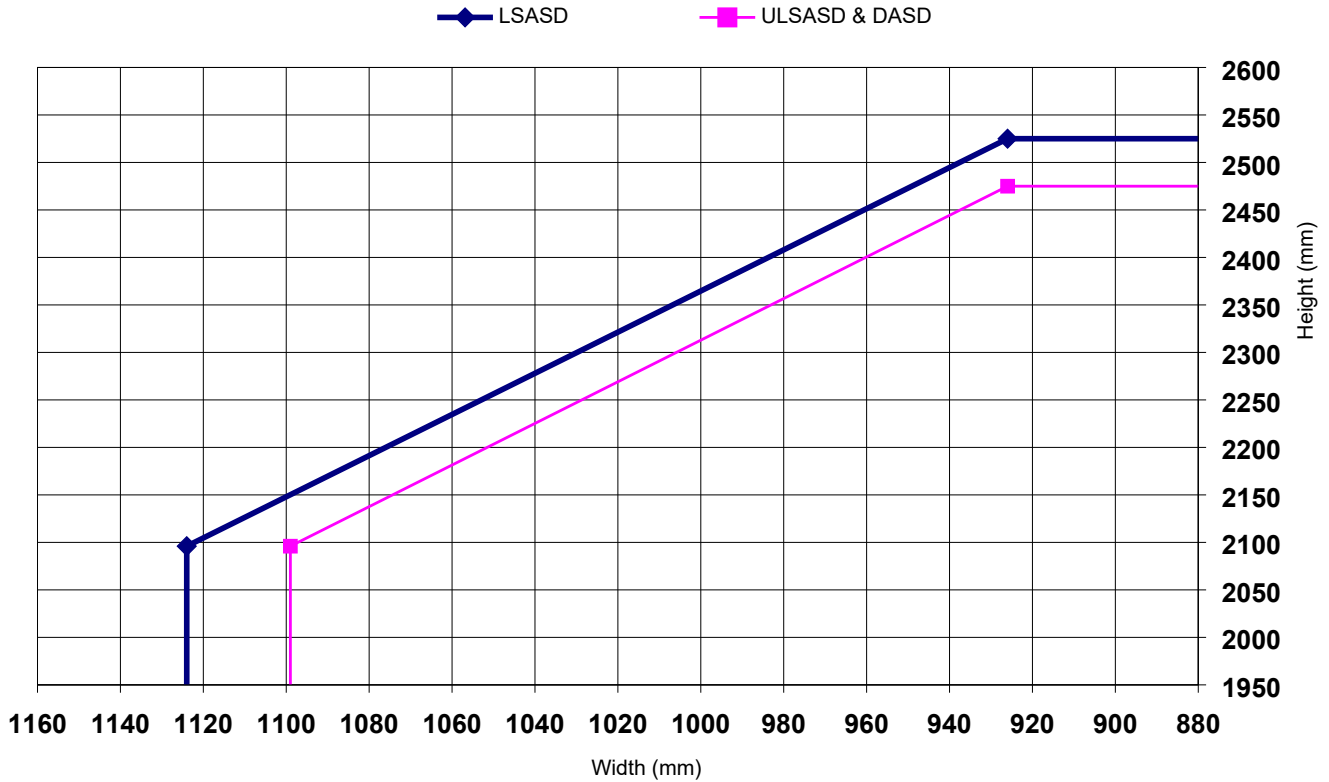


Lignum International Ltd – Design 1C 30 Minute Fire Resisting Doorsets

Latched and Unlatched Single Acting & Double Acting Single Doorsets

	Configuration		Height (mm)	Width (mm)
Leaf Sizes	LSASD	From:	2096	x 1124
		To:	2525	x 926
	ULSASD & DASD	From:	2096	x 1099
		To:	2475	x 926
Maximum Overpanel height (mm)		Transomed	2000	
Glazing		Maximum Glazed Area:	0.592m ² (see section 13 for details)	
		Approved systems:	See section 13	
Frame specification (see section 16)		Material:	Softwood or hardwood	
		Min. Section (mm):	70 x 22	
		Min. Density(kg/m ³):	510	
Intumescent Materials: Pyroplex Rigid Box seal FO8700				
Head: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal.				
Jambs: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal				
Hardware Protection: See section 18				

Maximum Door Leaf Size



Lignum International Ltd – Design 1C 30 Minute Fire Resisting Doorsets

Latched and Unlatched Single Acting & Double Acting Double Doorsets

	Configuration		Height (mm)	Width (mm)
Leaf Sizes	LSADD	From:	2096	x 1074
		To:	2425	x 926
	ULSADD & DADD	From:	2096	x 1049
		To:	2375	x 926
Maximum Overpanel height (mm)		Transomed	2000	
Glazing		Maximum Glazed Area:	0.592m ² (see section 13 for details)	
		Approved systems:	See section 13	
Frame specification (see section 16)		Material:	Softwood or hardwood	
		Min. Section (mm):	70 x 22	
		Min. Density(kg/m ³):	510	

Intumescent Materials: Pyroplex Rigid Box seal FO8700

Head: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal.

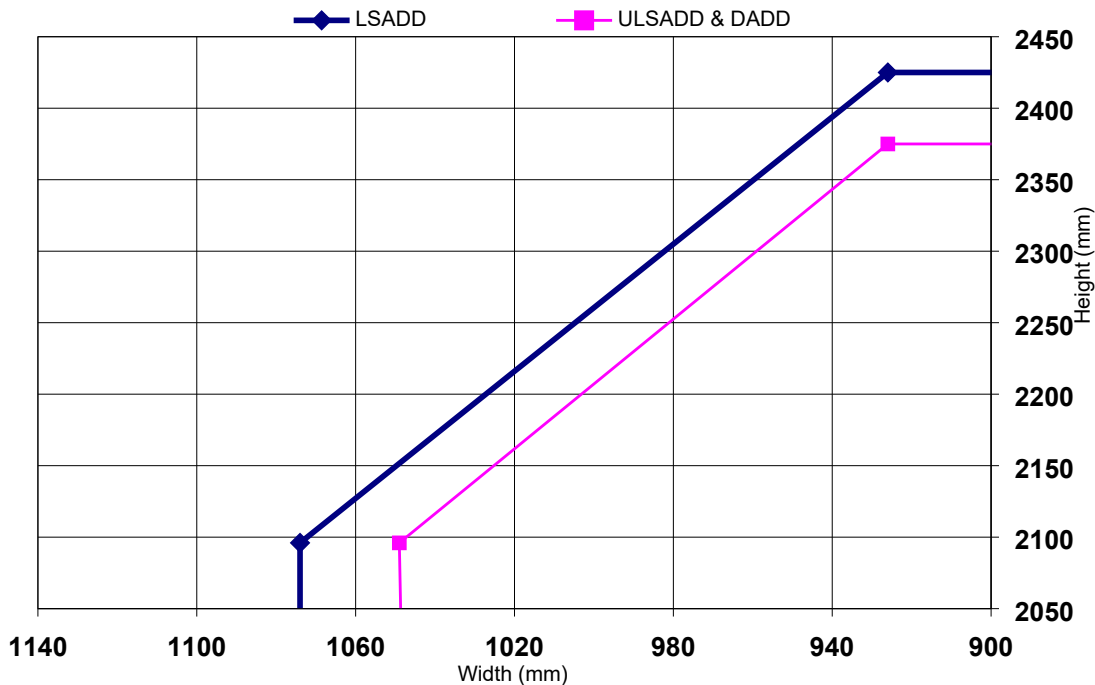
Jamb: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal

Meeting edge: 1No 15 x 4mm strip fitted centrally in the smaller leaf edge.

Meeting edge (for lock forends exceeding 150mm): 2No 10 x 4mm strip both fitted 5mm either side of the centre line on the meeting edge of the leaf containing the lock.

Hardware Protection: See section 18

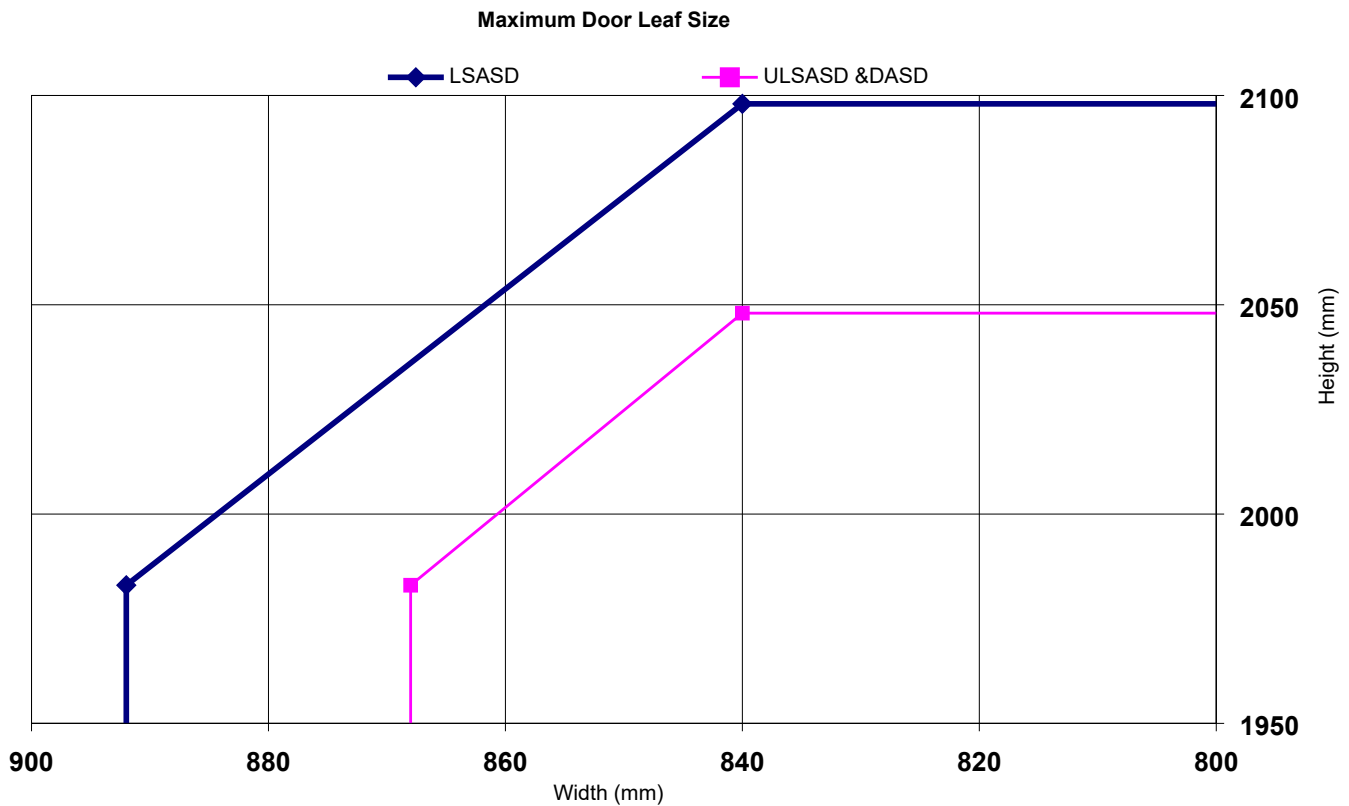
Maximum Door Leaf Size



Lignum International Ltd – Design 2 Minute Fire Resisting Doorsets

Latched and Unlatched Single Acting & Double Acting Single Doorsets

	Configuration		Height (mm)	Width (mm)	
Leaf Sizes	LSASD	From:	1983	x	892
		To:	2098	x	840
	ULSASD & DASD	From:	1983	x	868
		To:	2048	x	840
Maximum Overpanel height (mm)	Transomed		2000		
Glazing	Maximum Glazed Area:		Zero		
	Approved systems:		n/a		
Frame specification (see section 16 for details)	Material:		Softwood or hardwood		
	Min. Section (mm):		70 x 22		
	Min. Density(kg/m ³):		510		
Intumescent Materials: Pyroplex Rigid Box seal FO8700					
Square: 1No 15 x 4mm strip fitted centrally in one leaf edge only.					
Jamb: 1No 15 x 4mm strip fitted centrally in the leaf edge or frame reveal					
Hardware Protection: See section 18					

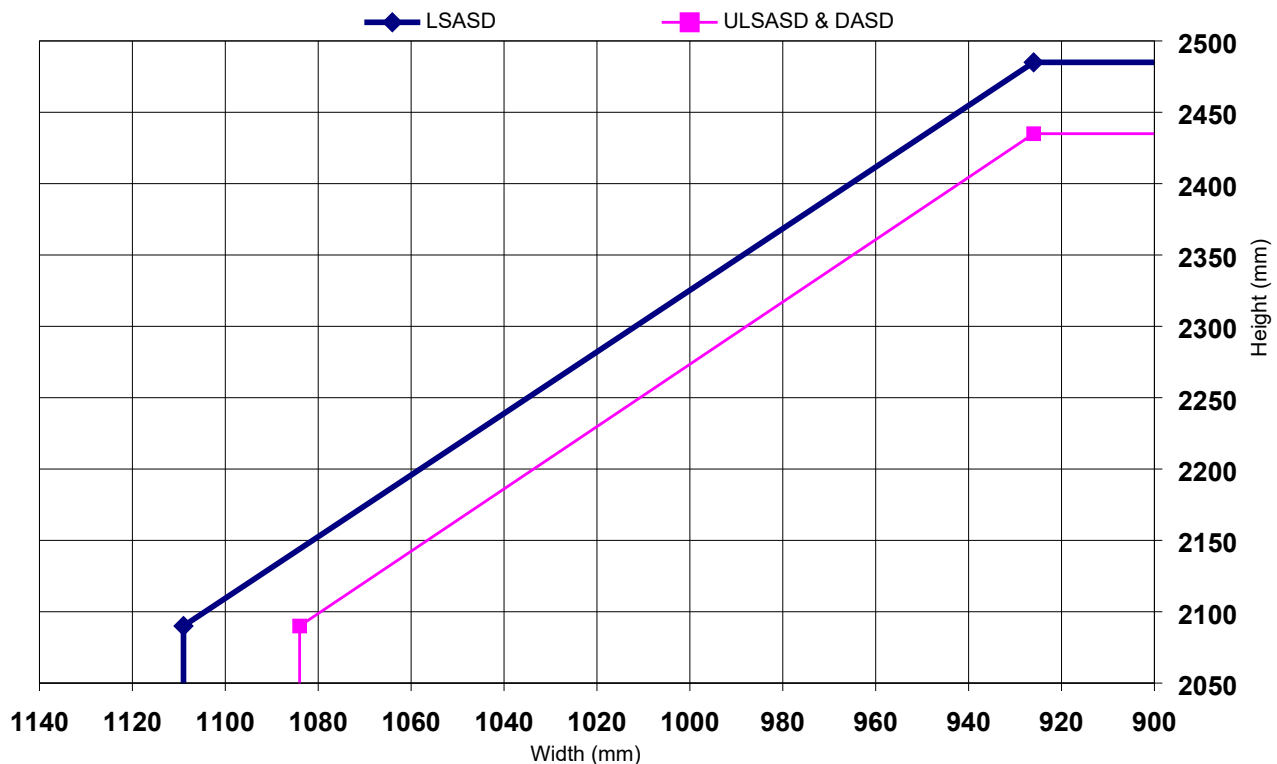


Lignum International Ltd – Design 3A 30 Minute Fire Resisting Doorsets

Latched and Unlatched Single Acting & Double Acting Single Doorsets

	Configuration		Height (mm)	Width (mm)	
Leaf Sizes	LSASD	From:	2090	X	1109
		To:	2485	X	926
	ULSASD & DASD	From:	2090	X	1084
		To:	2435	X	926
Maximum Overpanel height (mm)		Transomed	2000		
Glazing		Maximum Glazed Area:	zero		
		Approved systems:	n/a		
Frame specification (see section 16)		Material:	Softwood or hardwood		
		Min. Section (mm):	70 x 22		
		Min. Density(kg/m ³):	510		
Intumescent Materials: Lorient Polyproducts Ltd Lp1504 Type 617					
Head: 1No 15 x 4mm strip fitted 15mm from the exposed face in the frame reveal.					
Jamb: 1No 15 x 4mm strip fitted 15mm from the exposed face in the frame reveal.					
Hardware Protection: See section 18					

Maximum Door Leaf Size



Lignum International Ltd – Design 3A 30 Minute Fire Resisting Doorsets

Latched and Unlatched Single Acting & Double Acting Double Doorsets

	Configuration		Height (mm)	Width (mm)	
Leaf Sizes	LSADD	From:	2090	x	1059
		To:	2385	x	926
	ULSADD & DADD	From:	2090	x	1034
		To:	2335	x	926
Maximum Overpanel height (mm)		Transomed	1500		
Glazing		Maximum Glazed Area:	zero		
		Approved systems:	n/a		
Frame specification (see section 16)		Material:	Softwood or hardwood		
		Min. Section (mm):	70 x 22		
		Min. Density(kg/m ³):	510		

Intumescent Materials: Lorient Polyproducts Ltd Lp1504 Type 617

Head: 1No 15 x 4mm strip fitted 15mm from the exposed face in the frame reveal.

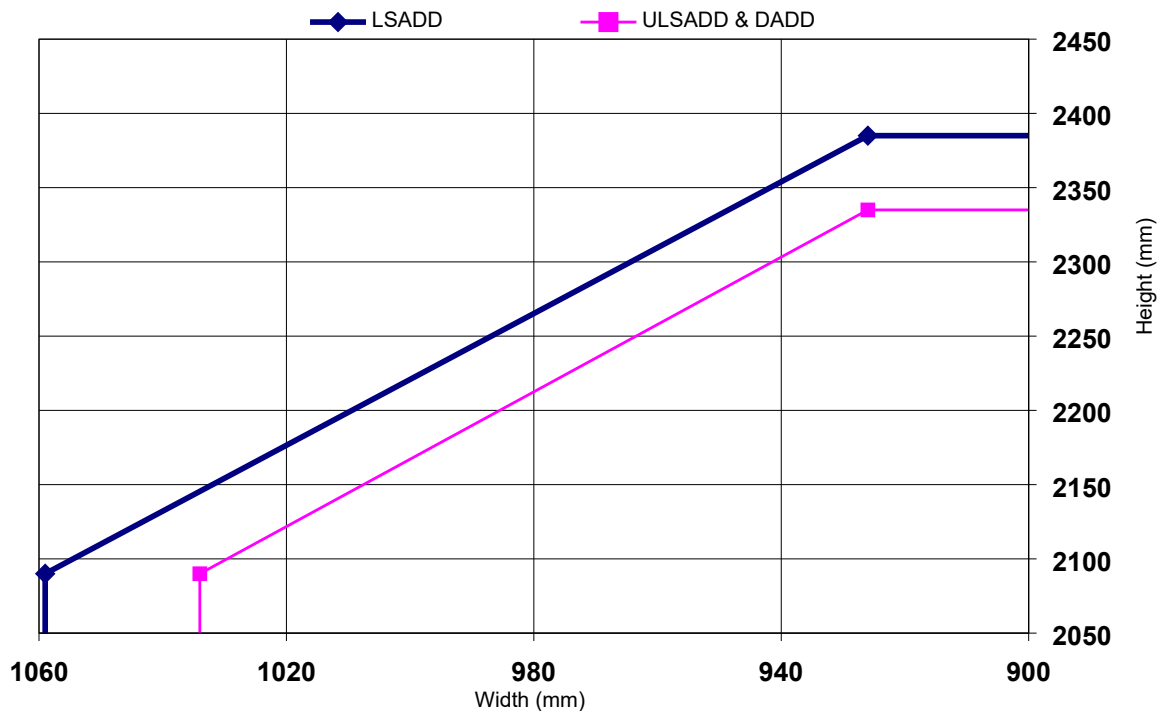
Jamb: 1No 15 x 4mm strip fitted 15mm from the exposed face in the frame reveal.

Meeting edge: 1No 15 x 4mm strip fitted centrally in the smaller leaf edge.

Meeting edge (for lock forends exceeding 150mm): 2No 10 x 4mm strip both fitted 5mm either side of the centre line on the meeting edge of the leaf containing the lock.

Hardware Protection: See section 18

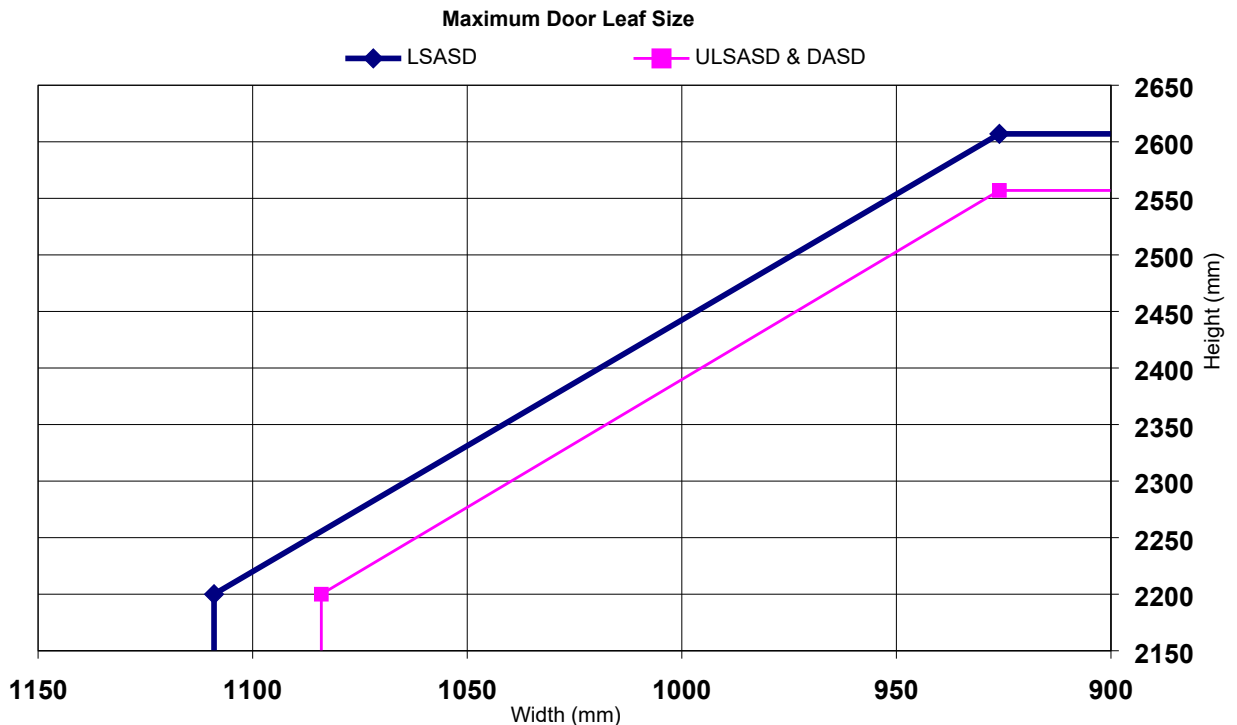
Maximum Door Leaf Size



Lignum International Ltd – Design 3B – 30 Minute Fire Resisting Doorsets

Latched and Unlatched Single Acting & Double Acting Single Doorsets

	Configuration		Height (mm)	Width (mm)
Leaf Sizes	LSASD	From:	2200	x 1109
		To:	2607	x 926
	ULSASD & DASD	From:	2200	x 1084
		To:	2557	x 926
Maximum Overpanel height (mm)	Transomed		2000	
Glazing	Maximum Glazed Area:		Zero	
	Approved systems:		n/a	
Frame specification (see section16)	Material:		Softwood or hardwood	
	Min. Section (mm):		70 x 22	
	Min. Density(kg/m ³):		510	
Intumescent Materials: Lorient Polyproducts Ltd Lp1504 Type 617				
Head: 1No 15 x 4mm strip fitted 15mm from the exposed face in the frame reveal.				
Jamb: 1No 15 x 4mm strip fitted 15mm from the exposed face in the frame reveal.				
Hardware Protection: See section 18				



Lignum International Ltd – Design 3B – 30 Minute Fire Resisting Doorsets

Latched and Unlatched Single Acting & Double Acting Double Doorsets

	Configuration		Height (mm)	Width (mm)
Leaf Sizes	LSADD	From:	2200	x 1059
		To:	2507	x 926
	ULSADD & DADD	From:	2200	x 1034
		To:	2457	x 926
Maximum Overpanel height (mm)	Transomed		1500	
Glazing	Maximum Glazed Area:		Zero	
	Approved systems:		n/a	
Frame specification (see section 16)	Material:		Softwood or hardwood	
	Min. Section (mm):		70 x 22	
	Min. Density(kg/m ³):		510	

Intumescent Materials: Lorient Polyproducts Ltd Lp1504 Type 617

Head: 1No 15 x 4mm strip fitted 15mm from the exposed face in the frame reveal.

Jamb: 1No 15 x 4mm strip fitted 15mm from the exposed face in the frame reveal.

Meeting edge: 1No 15 x 4mm strip fitted centrally in the smaller leaf edge.

Meeting edge (for lock forends exceeding 150mm): 2No 10 x 4mm strip both fitted 5mm either side of the centre line on the meeting edge of the leaf containing the lock.

Hardware Protection: See section 18

