Exova Warringtonfire
Chiltern House
Stocking Lane
Hughenden Valley
High Wycombe
Buckinghamshire
HP14 4ND

T: +44 (0) 1494 569 800
F: +44 (0) 1494 564 895
E: globalfire@exova.com
W: www.exova.com

Testing, calibrating, advising.

-

Fire Resistance Assessment of:

Moralt Laminesse FireSound 54mm & 59mm Doorsets for: 30 & 60 Minutes Fire Resistance

WF Report No:

Chilt/A13060 Revision E

WF Contract No:

BMT/CNA/F16025

Prepared For:

Moralt AG
Lenggrieser Str.52
D-83646 Bad Tölz
Germany

Valid From:

08 June 2016

Valid Until:

09 January 2019

Exova Warringtonfire – the new name for BM TRADA

On December 1st 2015, Chiltern International Fire Limited (trading as BM TRADA) commenced trading under the name Exova Warringtonfire.

To coincide with this change, our Technical Reports, Test Reports, Product Assessments, company stationery and marketing collateral have been updated to reflect the Exova Warringtonfire branding.

The validity of all documents previously issued by Chiltern International Fire Limited including certificates, test reports and product assessments is unaffected by this change. A letter to this effect is available upon request by e-mailing globalfire@exova.com.

About Exova Warringtonfire

Exova Warringtonfire is part of the Exova Group one of the world's leading laboratory-based testing groups, trusted by organisations to test and advice on the safety, quality and performance of their products and operations. Headquartered in Edinburgh, UK, Exova operates 143 laboratories and offices in 32 countries and employs around 4,500 people throughout Europe, the Americas, the Middle East and Asia/Asia Pacific. With over 90 years' experience, Exova specialises in testing across a number of key sectors from health sciences to aerospace, transportation, oil and gas, fire and construction.
Be assured that whilst the name will change, your service provision and primary contacts have not. What will be available to you is a wider team of testing experts and an extended range of testing capabilities including structural steelwork testing, ventilation duct and damper testing, ASTM testing, water mist system testing and smoke toxicity testing and covering additionally both the rail and marine sectors.
If you have any questions, please do not hesitate to contact a member of the team and we will do our best to answer them. We appreciate your business to date and we look forward to working with you in the future.

Kind regards

Exova Warringtonfire

T: +44 (0) 1494 569 800
E: globalfire@exova.com

Contents

1 Introduction

This document constitutes a global assessment relating to Laminesse FireSound 54mm & 59mm doorsets, manufactured by Moralt AG; for both 30 and 60 minute fire resisting performance. The assessment uses established extrapolation and interpretation techniques in order to extend the scope of application for the doorsets by determining the limits for the designs, based on the tested constructions and performances obtained. This assessment is an evaluation of the potential fire resistance performance, if the elements were to be tested in accordance with BS 476: Parts 20 & 22: 1987.

2 General Description of Construction

Full details of the tested and assessed leaf construction are held on file, in confidence, at Exova Warringtonfire.

This assessment considers the following design variations:

1. FireSound 54mm - 3mm MDF facings
2. FireSound 54mm - 3mm Chipboard facings
3. FireSound 59mm - 3mm MDF facings
4. FireSound 59mm - 3mm Chipboard facings.

2.1 Core Types

The testing cited in appendix A has successfully demonstrated that the core board required for the Laminesse FireSound 54mm & 59mm doorset designs may be supplied by either of two manufacturers (details of the suppliers and core make-ups are held, in confidence, at Exova Warringtonfire). Tests P1009/14-530, RF13181 and RF13225 compare the performances in the Laminesse FireSound 59mm design and tests PF15041 and RF10007 in the Laminesse FireSound 54mm.

Either core type may be used in the relevant Laminesse FireSound design without restriction, unless specifically excepted in the following sections.

3 Leaf Sizes

The approval for increased leaf dimensions is based on the results of the tests shown in appendix A and takes into account the margin of over performance above 30 and 60 minutes integrity for the design(s), 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 dimensions smaller than stated are deemed to be less onerous. Therefore, doors with dimensions that are less than those tested or assessed within appendix D may be manufactured.

4 Configurations

4.1 Firesound 54mm - 30 Minutes

For 30 minute integrity requirements, based on the test evidence cited in appendix A, this assessment covers the following doorset configurations for the Laminesse FireSound 54mm door design.

Abbreviation	Description
LSASD & ULSASD	Latched & unlatched, single acting, single doorset
DASD	Double acting, single doorset
LSASD+OP	Latched, single acting, single doorset with overpanel
LSADD & ULSADD	Latched & unlatched, single acting, double doorset
DADD	Double acting, double doorset
LSADD+OP	Latched, single acting, double doorset with overpanel

Unequal leaf double doorsets are covered by this assessment with no restriction on the smaller leaf dimension.

4.2 Firesound 54mm - 60 Minutes

For 60 minute integrity requirements, based on the test evidence cited in appendix A, this assessment covers the following doorset configurations for the Laminesse FireSound 54mm door design.

Abbreviation	Description
LSASD & ULSASD	Latched & Unlatched, single acting, single doorset
DASD	Double acting, single doorset
LSADD & ULSADD	Latched& Unlatched, single acting, double doorset
DADD	Double acting, double doorset

Unequal leaf double doorsets are covered by this assessment with no restriction on the smaller leaf dimension.

4.3 Firesound 59mm – 30 & 60 Minutes

For both 30 and 60 minute integrity requirements, based on the test evidence cited in appendix A, this assessment covers the following doorset configurations for the Laminesse FireSound 59mm door design.

Abbreviation	Description
LSASD & ULSASD	Latched & Unlatched, single acting, single doorset
DASD	Double acting, single doorset
LSADD & ULSADD	Latched& Unlatched, single acting, double doorset
DADD	Double acting, double doorset

Unequal leaf double doorsets are covered by this assessment with no restriction on the smaller leaf dimension.

5 Leaf Size Adjustment

Laminesse FireSound 54mm & 59mm door leaves may be altered as follows.

Element	Reduction
Leaf	The manufactured size of the leaf may be reduced in height or width without restriction, subject to the lipping requirements in section 10
Lipping	The dimensions stated in section 10 may be reduced by 20% for fitting purposes

6 Overpanels

6.1 General

Overpanels of the same construction as the door leaves may be used subject to the provisions within the following sections.

For FireSound 54mm, 30 minute applications - overpanels may be installed either with or without a transom. Doorsets utilising flush overpanels must incorporate rebated lippings at the head of the leaf; see section 10.

For FireSound 59mm at 30 minute applications - overpanels must be installed with a transom.

For FireSound 54mm & 59mm at 60 minute applications - overpanels must be installed with a transom.

Overpanels must be fully contained within the door frame (see following diagram).

6.2 Solid

If a transom is required to separate the leaf heads from the overpanel, it must be to the same specification as the door frame (see section 8).

The transom to door frame joint must utilise one of the following methods: mortise and tenon joints or butt joints (see section 8.2).

Either method requires frame joints to be tight, with no gaps, and require mechanical fixing with the appropriate size ring shank nails or screws. Butt joints must be additionally bonded with urea formaldehyde or equivalent.

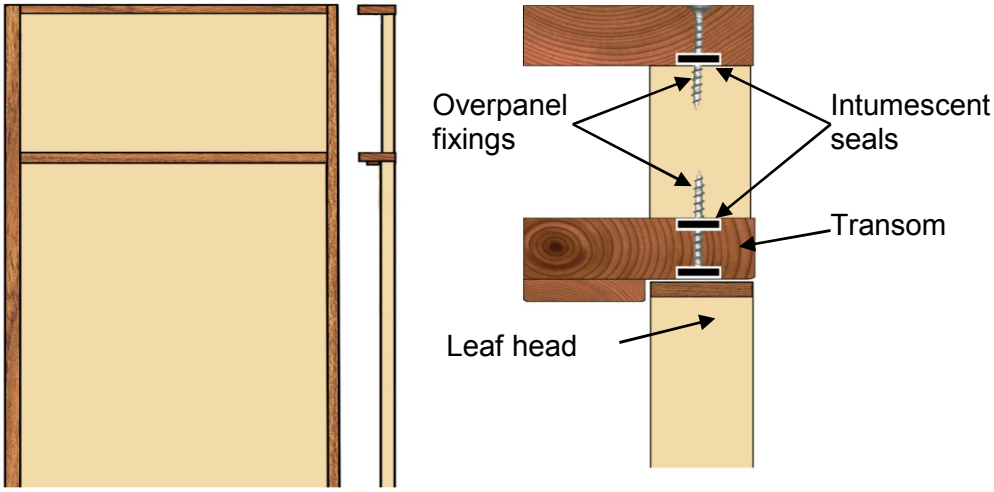
Overpanels must be fixed by screwing through the rear of the frame with steel screws passing at least 30mm into the centre line of the overpanel. Fixings must be no more than 100mm from each corner and a maximum of 250mm centres in between.

The intumescent seals specified for the jambs in appendix D, may be fitted in the overpanel edges or frame reveal, as required for the manufacturing process.

Providing the intumescent seals are fitted to all edges of the overpanel, the frame to overpanel junction is permitted to have a maximum 2mm gap tolerance.

Maximum overpanel heights are as follows.

Configuration	**Max. Overpanel Height** (mm)
Single doorsets	2000
Double doorsets	1500



Note: Drawing is representative of doorset construction only; actual construction must be as the text within this document specifies.

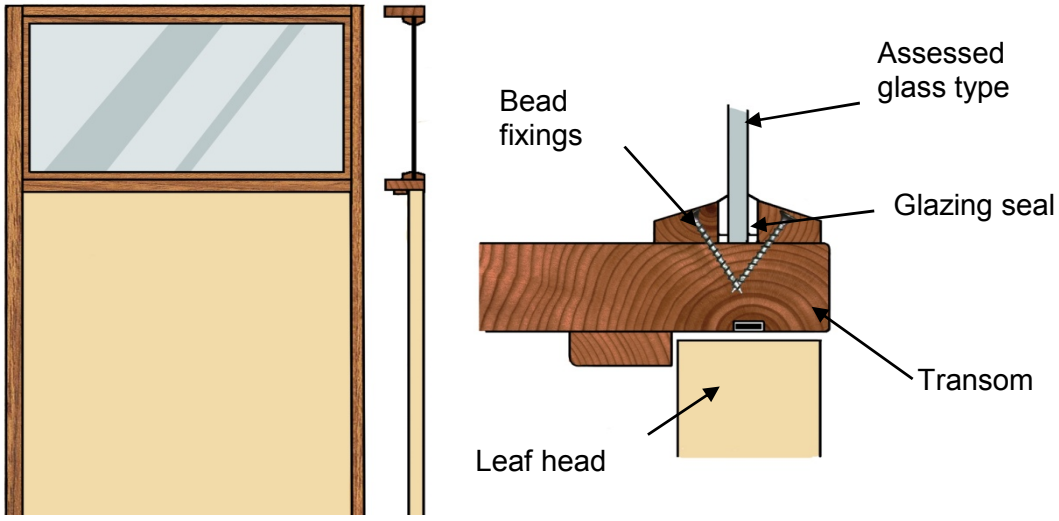
6.3 Fanlights

Timber frame doorsets including a transom may include a glazed fanlight. The timber frame and glazing beads must be joinery quality, straight grained hardwood, free from knots, splits and checks and with a minimum density of 640kg/m^3 (the use of Beech is not permitted for 60 minute applications), whilst the frame section for the transom must be a minimum of 70mm x 44mm. Timber door frame and transom construction method must comply with the specification contained in section 8.

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 at 30 or 60 minutes 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 only; actual construction must be as the text within this document specifies.

7 Glazing

The testing conducted on the Laminesse FireSound 54mm & 59mm doorset designs has demonstrated that the designs are capable of tolerating glazed apertures, whilst providing a margin of over performance.

7.1 30 minutes fire resistance

Glazing is therefore acceptable within the following parameters for 30 minutes fire resistance performance.

7.1.1 Glazing Systems

Approved Glazing Systems are listed below.

Glazing System	Manufacturer	Maximum Area (m^2)
1. Therm-A-Strip[1]	Intumescent Seals Ltd.	0.51
2. System 36 Plus[1]	Lorient Polyproducts Ltd.	0.51
3. ST105GT	Sealed Tight Solutions Ltd	0.51

Notes:

1. In both cases an intumescent aperture liner must be fitted to all 4 sides of the glazing aperture:
   - For Therm-A-Strip, 2mm thick Intumescent Seals Therm-A-Line
   - For System 36 Plus, 2mm thick Lorient LX5402 Palusol
2. Seals referenced ST105GT may be supplied as either 10 x 5mm or 9 x 3mm strips which must be fitted between both faces of the installed glass and the beads. The two seal sizes may be freely interchanged. It is not required to fit an additional intumescent aperture liner
3. Glazed apertures within the FireSound 59mm design must incorporate hardwood timber liners a minimum of 6mm thick; see sections 10.4 & 12.

7.1.2 Assessed Glass Products

Assessed glass types are as follows.

Glass Type	Manufacturer	Thickness (mm)	Maximum Area (m^2)
1. Pyrobelite 7	AGC Flat Glass Europe	7	0.51
2. Pyrodur 30-104	Pilkington Group Ltd.	7	0.51
3. Pyrodur 60-10	Pilkington Group Ltd.	10	0.51
4. Pyroguard EW MAXI	Pyroguard UK Ltd.	11	0.51
5. Pyrobelite 12	AGC Flat Glass Europe	12	0.51
6. Pyrodur 60-20	Pilkington Group Ltd.	13	0.51
7. Pyranova 15-S3.0	Schott UK Ltd.	15	0.51
8. 15mm Pyrostop 30-10	Pilkington Group Ltd.	15	0.51
9. Pyrobel 16	AGC Flat Glass Europe	16	0.51
10. Pyrostop 60-101	Pilkington Group Ltd.	23	0.51

Note: Glass types 7 - 10 are fully insulating for 30 minutes in terms of the criteria set out in BS 476: Part 20: 1987.

7.1.3 Glazing Beads & Installation

Glazing beads must be hardwood as specified in the following table.

Material	Profile	Min. Density (kg/m^3)	Application
Hardwood	Splayed	640	All systems detailed in 7.1.1 and appendix B
	Square[1]		System 3 detailed in section 7.1.1 and appendix B

Notes:

1. See appendix B for square bead options
2. Glazing beads must be retained in position with 60mm long steel pins or 60mm long No. 8 screws, inserted at 35 - 40º to the vertical at no more than 50mm from each corner and at 150mm maximum centres.

All other installation details must meet the requirements of the approved pneumatically fired pin specification given in section 7.4 and the additional installation requirements in section 7.5.

7.2 60 minutes fire resistance

Glazing is acceptable within the following parameters for 60 minutes fire resistance performance.

See section 7.3 for details of the applicable Sealed Tight Solutions glazing system.

7.2.1 FireSound 54mm for 60 Minutes Performance

7.2.1.1 Assessed Glazing Systems

Approved Glazing System is listed below.

Glazing System[1]	Manufacturer	Maximum Area (m^2)
Therm-A-Glaze 60	Intumescent Seals Ltd.	1.0

[1] See appendix B for full details

7.2.1.2 Assessed Glass Products

Assessed glass types are as follows.

Glass Type	Manufacturer	Thickness (mm)	Max. Area (m^2)
Pyrodur 60-101	Pilkington Group Ltd.	23	1.0

7.2.1.3 Glazing Beads

Glazing Beads for use with the glass and glazing system as above fitted within the FireSound 54mm must be hardwood (the use of Beech is not permitted) of minimum density 640 kg/m^3, the beads may be chamfered or square.

See sections 7.2.3 and 7.5 for installation requirements.

7.2.2 FireSound 59mm for 60 Minutes Performance

7.2.2.1 Assessed Glazing Systems

Approved Glazing Systems are listed below.

Glazing System[1]	Manufacturer	Maximum Area (m^2)
1. Therm-A-Glaze 60	Intumescent Seals Ltd.	1.3
2. Superwool & Therma Liner	Odice S.A.S.	1.3

[1] See appendix B for full details

7.2.2.2 Assessed Glass Products

Assessed glass types are as follows.

Glass Type	Manufacturer	Thickness (mm)	Max. Area (m^2)
1. Pyrodur 60-10	Pilkington Group Ltd.	10	1.3
2. Pyrostop 30-10	Pilkington Group Ltd.	15	1.3
3. Polflam EI60	Polflam Sp.	25	1.3

Note: Glass type 3 is fully insulating for 60 minutes and must be installed using glazing system 2 in section 7.2.2.1.

7.2.2.3 Glazing Beads

1. Glazing Beads for use within the FireSound 59mm must be hardwood of minimum density 640 kg/m^3 (the use of Beech is not permitted)
2. Glass types 1 & 2 in section 7.2.2.2 may be installed with chamfered beads; the glazing system must be Therm-A-Glaze 60
3. Glass type 2 in section 7.2.2.2 may alternatively be installed with square beads; the glazing system must be Therm-A-Glaze 60
4. Glass type 3 in section 7.2.2.2 may be installed with square or chamfered beads, as required; the glazing system must be Superwool & Therma Liner.

7.2.3 Installation

1. A square bead profile may be used as an alternative to the splayed beads required for the proprietary systems in sections 7.2.1 & 7.2.2, subject to the provisions in section 7.2.1.3 & 7.2.2.3 (see appendix B for square bead profile options)
2. For glazing system 2 in section 7.2.2.1 glazing beads must be retained in position with 40mm long M3.5 screws, inserted perpendicular to the bead splay at no more than 50mm from each corner and at 180mm maximum centres
3. For the Therm-A-Glaze glazing system shown in sections 7.2.1.1. & 7.2.2.1 glazing beads must be retained in position with 60mm long steel pins or 60mm long No. 6 - 8 screws, inserted at 35 - 40º to the plane of the glass (or perpendicular to the bead splay) at no more than 50mm from each corner and at 150mm maximum centres. Pins must meet the requirements of the approved pneumatically fired pin specification given in section 7.4
4. All other installation details must meet the additional installation requirements in section 7.5.

7.3 Sealed Tight Solutions Glazing System for 60 Minutes Performance

For either the Firesound 54mm or 59mm designs the following STS glazing system may be utilised, subject to the requirements of this section. See appendix B for details.

Glazing System	Manufacturer	Maximum Area (m^2)
ST105GT/ST30x2 liner	Sealed Tight Solutions Ltd	1.24

Note:

The seals referenced ST105GT may be supplied as either 10 x 5mm or 9 x 3mm strips which must be fitted between both faces of the installed glass and the beads. The two seal sizes may be freely interchanged.

7.3.1 Assessed Glass Products

Assessed glass types for use with the STS glazing system are as follows.

	Glass Type	Manufacturer	Thickness (mm)	Maximum Area (m^2)
1	Pyrobelite 12	AGC Flat Glass Europe	12	1.24
2	Pyrodur 60-20	Pilkington Group Ltd.	13	1.24
3	Pyroguard EI 30	Pyroguard UK Ltd.	15	1.24
4	Pyrostop 30-10	Pilkington Group Ltd.	15	1.24
5	Contraflam EW60	Vetrotech Saint Gobain Ltd	16	1.00
6	Pyrobel 16	AGC Flat Glass Europe	16	1.00

Notes:

1. All glass types must be fitted fully in accordance with the manufacturers' tested details/installation requirements, particularly with respect to edge cover and expansion tolerances
2. Glass types 3 – 6 are fully insulating for 30 minutes, only, in terms of the criteria set out in BS 476: Part 20: 1987.

7.3.2 Glazing Beads & Installation

Glazing beads must be as specified in the following table.

Material	Profile	Min. Density (kg/m^3)	Permitted Glass Type (section 7.3)
Hardwood	Splayed	640	1 - 6
Hardwood	Square	640	

Notes:

1. The use of Beech (*Fagus sylvatica*) is not permitted for 60 minute applications
2. Sectional drawings detailing the STS glazing system are contained in appendix B
3. Glazing beads must be retained in position with 50mm long steel pins or 50mm long No. 6 - 8 screws, inserted at 35 - 40º to the plane of the glass (or perpendicular to the bead splay) at no more than 50mm from each corner and at 150mm maximum centres. Pins must meet the requirements of the approved pneumatically fired pin specification given in section 7.4
4. A square bead profile may be used as an alternative to the splayed beads subject to the restricted glass types and glazing systems specified in the table above. See appendix B for square bead options
5. For 60 minute applications, glazed apertures within the FireSound 54mm & 59mm designs must incorporate hardwood timber liners, 6 - 10mm thick, glued in position using a UF, PVA or PU type adhesive, see section 10.4 for T-shaped liner option. The ST30x2 intumescent liner required for the STS glazing system must also be used, which may be recessed into the aperture liner and stop a maximum distance of 3mm from each edge
6. All other installation details must meet the additional installation requirements in section 7.5.

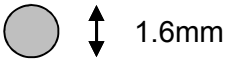
7.4 Pneumatically Fired Pins

The following minimum pin specification is permitted and is considered suitable for gun (pneumatically) fired applications for both 30 and 60 minute applications:

7.4.1 Option 1 – Round, Oval and Rectangular shaped pins:

- Minimum Standard Wire Gauge (SWG) 16
- Minimum cross section area of 2.03mm^2
- Minimum linear dimension 1.6mm in any direction

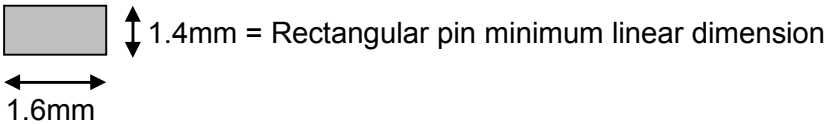
Round pin diameter (mm) = minimum 1.6mm



Oval/rectangular pin minimum diameter linear dimension = 1.6mm

7.4.2 Option 2 – Rectangular shaped pins:

- Minimum Standard Wire Gauge (SWG) 16
- Minimum cross section area of 2.24mm^2
- Minimum linear dimension 1.4mm in any direction



Note:

Pins with smaller dimensions than those listed above are not approved.

7.5 Additional Installation Details – FireSound 54mm and 59mm, for both 30 and 60 minute performance

1. Glazed openings must not be less than 165mm from any door edge. Multiple apertures are acceptable within the permitted glazed area, with a minimum dimension of 135mm of core between apertures
2. Glazed apertures within the FireSound 59mm design must incorporate hardwood timber liners 6mm thick (the use of Beech is not permitted for 60 minute applications); see section 12 for adhesive requirements and section 10 for T-shaped liner option
3. Aperture shape is not restricted, providing the glazing system and beads are compatible with that shape
4. Timber for glazing beads must be straight grained joinery quality hardwood, free from knots, splits and checks
5. Gaps between glass and framing, to permit expansion, should be set at 2 - 3mm on all edges, and using non-combustible or hardwood setting blocks at the bottom edge
6. False glazing beads must not be fitted to the face of the glass
7. Sectional drawings detailing the tested glazing systems are contained in appendix B.

8 Door Frames

8.1 Door Frame Construction

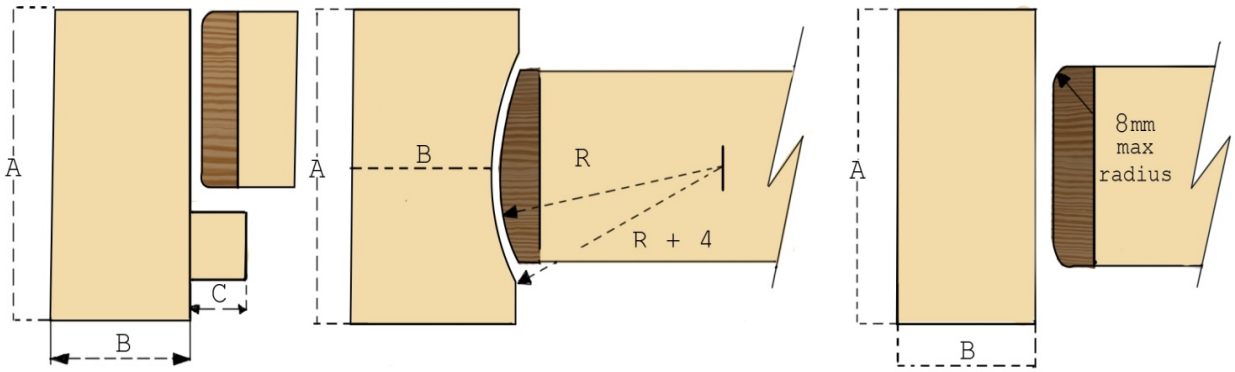
Door frames for Laminesse FireSound 54mm & 59mm doorsets must be constructed to meet the following specification:

Material	**Section Size** (mm)	**Min. Density** (kg/m^3)
Hardwood	70 x 32	640
WoodEx Redwood[2]	70 x 32	510
Hardwood WoodEx[3]	70 x 32	640

Notes:

1. The use of Beech (*Fagus sylvatica*) is not permitted for 60 minute applications
2. WoodEx Redwood may only be used for 30 minute applications
3. The various hardwood WoodEx products may be used for 30 and 60 minute applications
4. Timber for door frames must be straight grained joinery quality hardwood, free from knots, splits and checks
5. If the doorset features a transomed overpanel, the door frame must be hardwood (not WoodEx frames) with a minimum section of 70mm x 32mm and of the minimum density stated above
6. A 12mm (15mm for WoodEx frames) deep planted or integral stop is adequate for single acting frames
7. It is not permitted to round off the edges of the door frame at the junction with the leaf edge
8. Door frame joints must be utilise one of the 4 methods depicted in section 8.2. All methods require mechanical fixing with the appropriate length steel screws or ring shank nails.

The following diagram depicts the assessed frame profiles and dimensions:



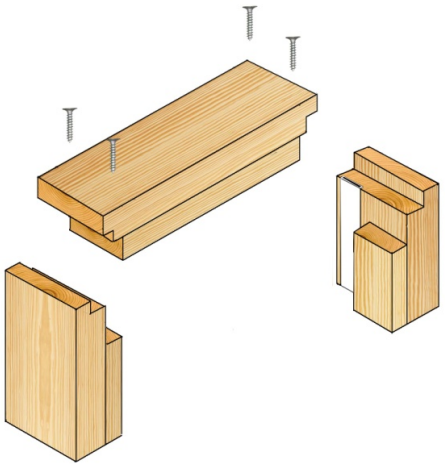
A = min. 70mm B = min. 32mm C = min. 12mm
R = radius from floor spring 8mm max radius to create a maximum 2mm edge

8.1.1 CS Group Acrovyn

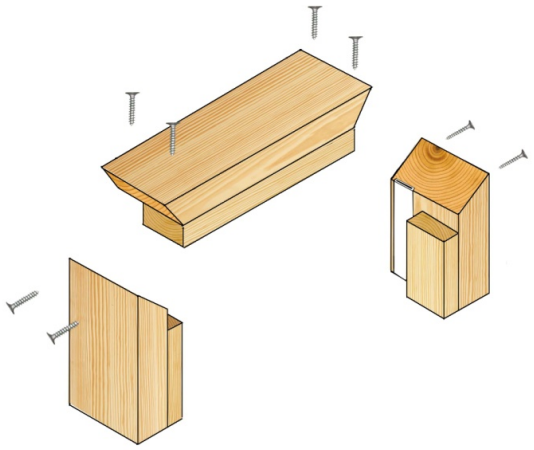
Based on the evidence generated in IF13094 and IF13095, timber and WoodEx door frames may be encapsulated in CS Group Acrovyn meeting the following specification. All other details must remain as required in section 8.1 above, as appropriate:

1. The intumescent detail as specified in section 11 and the relevant (CS Group headed) data sheets contained in Appendix D of this assessment must be replicated
2. CS Group Acrovyn must be bonded to the door frame using 3M Scotch-Grip cement 10 contact adhesive
3. See relevant (CS Group headed) data sheets in Appendix D of this assessment for maximum permitted leaf sizes
4. The maximum thickness of CS Group Acrovyn used must be 2mm, as per test evidence.

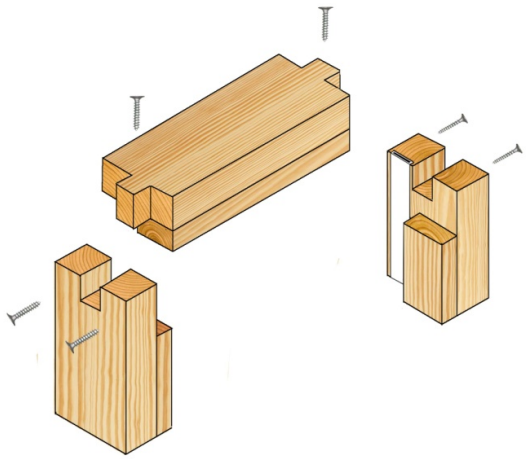
8.2 Door Frame Joints



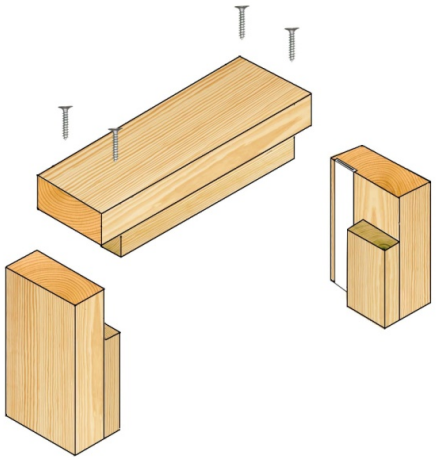
Half Lapped Joint



Mitre Joint



Mortice and Tenon Joint

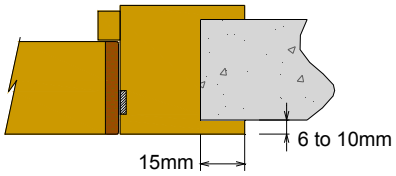


Butt Joint

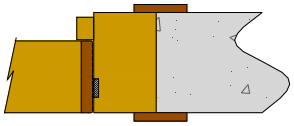
Note: Drawing is representative of each type of door frame joint only; actual construction in terms of intumescent seal location and material, etc. must be as the text within this document specifies.

8.3 Door Frame Installation

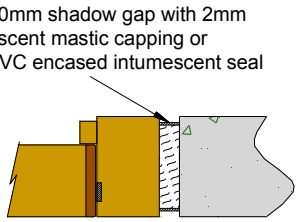
The following diagrams indicate acceptable and unacceptable door frame installations:



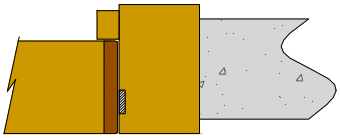
Permitted



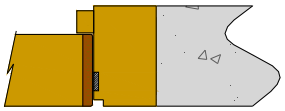
Permitted



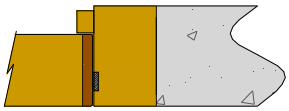
Permitted



Not Permitted



Not Permitted



Permitted

Notes:

1. Drawing is representative of door frame installation only; actual installation must be as the text within this document specifies. See section 17 for specification on sealing to structural opening
2. For shadow detail depicted (top right) the sub-frame material must be manufactured from one of the following materials, the subframe must be a tightly fit with no gaps against the rear of the frame, any gaps between the subframe and supporting construction must be made good in compliance with section 17:
    - timber with a density ≥ 510 kg/m³
    - plywood with a density ≥ 600 kg/m³
    - MDF with a density ≥ 700 kg/m³
    - particleboard with a density ≥ 600 kg/m^3
    - non-combustible board.

9 Leaf Facing Materials

9.1 General

The overall 54mm or 59mm thick leaf construction may result in the following leaf construction variations:

1. FireSound 54mm - 3mm MDF facings (minimum density 720kg/m^3)
2. FireSound 54mm - 3mm Chipboard facings (minimum density 700kg/m^3)
3. FireSound 59mm - 3mm MDF facings (minimum density 720kg/m^3)
4. FireSound 59mm - 3mm Chipboard facings. (minimum density 700kg/m^3)

9.2 Leaf Core

See section 2 for discussion on core types.

9.3 Decorative & Protective Facings

The following additional facing 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	2.0
PVC	2.0
Plastic laminates	2.0
Decorative paper / non-metallic foil	0.4

Notes:

1. Metallic facings are not permitted except for push plates and kick plates
2. Materials must not conceal intumescent strips
3. PVC and plastic laminates must not return around the leaf edges without specific test evidence.

9.4 PVC Edge Protectors & Post-Formed CS Group Acrovyn

9.4.1 General

It is possible to fit proprietary edge protectors to this doorset design providing they have suitable supporting test evidence to BS 476: Part 22: 1987 or BS EN 1634-1, when fitted to timber doorsets of similar construction to this design. The end user must satisfy themselves that the test evidence supports the proposed end use application.

9.4.2 CS Group Edge Protectors

The Moralt Firesound 54mm & 59mm designs have been assessed for use with CS Group edge protectors. CS Group edge protectors are supplied pre-formed with the approved intumescent material. The CS Group edge protectors must be used as part of a complete intumescent system and the required intumescent specification and leaf sizes are given in the relevant data sheets in Appendix D. CS Group must be contacted for precise installation and fixing details (www.c-sgroup.co.uk).

9.4.3 Post-Formed CS Group Acrovyn

It is possible to encapsulate the Moralt Firesound 54mm & 59mm designs by post-forming the leaf in CS Group Acrovyn, based on the supporting test evidence in Chilt/RF11059 for 30 minute applications and Chilt/RF11061 and IF13095 for 60 minute applications, and the following specification:

1. CS Group Acrovyn may be wrapped around the vertical edges of the leaf, or the leaf can be fully encapsulated on all four edges
2. The vertical edge detail prior to post-forming must either be lipped with 8mm thick PVC adhered to the leaf edge using WC127 PVC weld cement, or hardwood as detailed in this assessment (see sections 10.1 & 10.2). Rebated timber lippings are not permitted
3. The horizontal edge detail prior to post-forming does not require lipping but may be lipped with 8mm thick PVC adhered to the leaf edge using WC127 PVC weld cement, or hardwood as detailed in this assessment (see sections 10.1 & 10.2). Rebated timber lippings are not permitted
4. The maximum radius of the lipping at the corners of the vertical edges before post-forming must be 9mm, which provides for 11mm external radius after the CS Group Acrovyn has been applied
5. The intumescent detail as specified in section 11 and the relevant (CS Group headed) datasheets contained in Appendix D of this assessment must be replicated
6. CS Group Acrovyn must be bonded to the leaf using 3M Scotch-Grip cement 10 contact adhesive
7. See relevant (CS Group headed) datasheets in Appendix D of this assessment for maximum permitted leaf sizes
8. The maximum thickness of CS Group Acrovyn used must be 2mm, as per test evidence
9. The CS Group Acrovyn can be provided as pre-formed trays with dimensions to suit the proposed leaf sizes, as well as sheets for post-forming by the door manufacturer
10. It is permitted to hang leaves fitted with CS Group Acrovyn in timber or MDF door frames meeting the specification given in section 8.1 (not encapsulated with CS Group Acrovyn) or section 8.1.1 (encapsulated with CS Group Acrovyn).

10 Lipping Materials

10.1 General

The use of Beech (*Fagus sylvatica*) is not permitted for 60 minute applications

10.2 Laminesse FireSound 54mm

The lipping specifications for this design of door leaf are as follows.

Material	Size (mm)		Min. Density
Hardwood	1. Square (T-shape): 13 - 25 thick T-shape section with 5 -10mm deep x 26mm wide tongue into the core leaving 8 - 15mm exposed at the edges (see section 10.4) 2. Square = 8- 13 thick with a maximum of 2mm profiling permitted at corners of lipping (see section 8.1)		640 kg/m³
	2. Rounded	10 – 15 thick with a radius matching the distance between leaf edge and floor pivot (see section 8.1)	
	3. Rebated[1]	20 – 30 thick with 12mm deep x 40/14mm unequal rebates	

Notes:

1. Rebated lippings are permitted only at the junction between the head of door leaves and flush overpanels and for maximum 30 minutes integrity performance
2. Timber for lippings must be joinery quality, straight grained hardwood, free from knots, splits and checks
3. Vertical edges of the leaves must be lipped, but all edges may be lipped if required, rebated heads must be lipped as discussed in note 1
4. A 2.5^0 chamfer is permitted to the lipping at the leading edge of leaves providing the door gaps meet the requirements of section 15.

10.3 Laminesse FireSound 59mm

The lipping specifications for this design of door leaf are as follows.

Material	Size (mm)		Min. Density
Hardwood	1. Square (T-shape): 13 - 25 thick T-shape section with 5 -10mm deep x 26mm wide tongue into the core leaving 8 - 15mm exposed at the edges (see section 10.4) 2. Square = 8 - 25 thick		640 kg/m³
	3. Rounded	10 – 25 thick with a radius matching the distance between leaf edge and floor pivot (see section 8.1)	
	4. Rebated	Not permitted	-

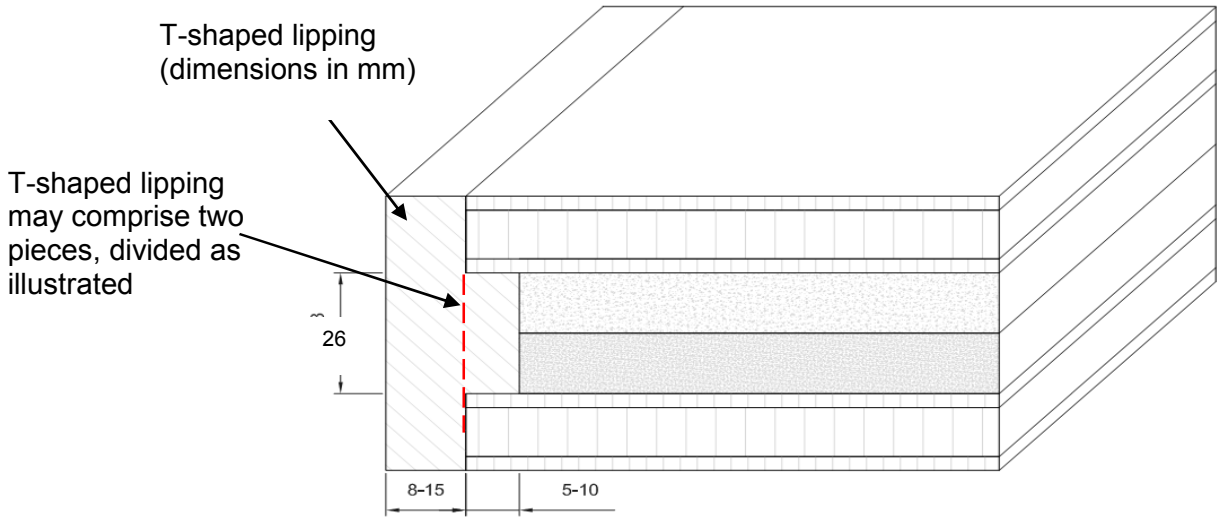
Notes:

1. A maximum of 2mm profiling is permitted at corners of lipping (see section 8.1)
2. Timber for lippings must be joinery quality, straight grained hardwood, free from knots, splits and checks
3. All edges of the leaves must be lipped
4. A 2.5^0 chamfer is permitted to the lipping at the leading edge of leaves providing the door gaps meet the requirements of section 15.

10.4 'T'-shaped Lipping Options

In certain circumstances, a 'T' section lipping may be required which will be bonded into a groove machined in the edge of the leaf. This option is acceptable providing the tongue is a maximum of 26mm wide and otherwise meets the specification given in sections 10.2 or 10.3. The 'T' section lipping may be in two sections with the exposed lipping being within the range of 6 – 10mm thick. All glue lines must be as stated in section 12.

Where glazed apertures require timber liners as detailed in section 7, the liner may also be 'T' shaped as detailed herein (the use of Beech (*Fagus sylvatica*) is not permitted for 60 minute applications).



11 Intumescent Materials

11.1 General

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

11.2 Laminesse FireSound 54mm

The intumescent materials tested and assessed for this doorset design are as follows.

Application	Location	Product/Manufacturer
Edge seals	Fitted in the frame jambs and leaf edges	1. Palusol 100 - Lorient Polyproducts Ltd. 2. Rigid Box Seal 8700FO – Pyroplex Ltd. 3. STS Fire – Sealed Tight Solutions Ltd. 4. 15mm wide x 1.8mm thick Flexilodice - Odice S.A.S.
Hinges	Under all hinge blades	1. 1mm Interdens – Dufaylite Developments Ltd. 2. 1mm MAP paper – Lorient Polyproducts Ltd. 3. 1mm Pyrostrip 300 – Mann McGowan Ltd. 4. 1mm Therm-A-Strip – Intumescent Seals Ltd. 5. 1mm ST60 Graphite gasket material - Sealed Tight Solutions Ltd
Lock/latches	Under forend & keep and encasing latch body	
Top Pivots & Flush bolts	Lining all sides of the mortice	1. 2mm Interdens – Dufaylite Developments Ltd. 2. 2mm MAP paper – Lorient Polyproducts Ltd. 3. 2mm Pyrostrip 300 – Mann McGowan Ltd. 4. 2mm Therm-A-Strip – Intumescent Seals Ltd. 5. 2mm ST60 Graphite gasket material - Sealed Tight Solutions Ltd

11.3 Laminesse FireSound 59mm

The intumescent materials tested for this doorset design are as follows:

Application	Location	Product/Manufacturer
Edge seals	Fitted in the frame jambs	1. 15mm wide x 4mm thick Pyroplex Ltd. - Rigid Box Seal 8700FO 2. STS Fire – Sealed Tight Solutions Ltd. 3. 15mm wide x 1.8mm thick Odice S.A.S. - Flexilodice
Hinges	Under all hinge blades	1. 1mm Interdens – Dufaylite Developments Ltd. 2. 1mm MAP paper – Lorient Polyproducts Ltd. 3. 1mm Pyrostrip 300 – Mann McGowan Ltd. 4. 1mm Therm-A-Strip – Intumescent Seals Ltd. 5. 1mm ST60 Graphite gasket material - Sealed Tight Solutions Ltd
Lock/latches	Under forend & keep and encasing latch body	
Top Pivots & Flush bolts	Lining all sides of the mortice	1. 2mm Interdens – Dufaylite Developments Ltd. 2. 2mm MAP paper - Lorient Polyproducts Ltd. 3. 2mm Pyrostrip 300 – Mann McGowan Ltd. 4. 2mm Therm-A-Strip – Intumescent Seals Ltd. 5. 2mm ST60 Graphite gasket material - Sealed Tight Solutions Ltd

12 Adhesives

The following adhesives must be used in the construction of Laminesse FireSound 54mm & 59mm.

Element	Product
Lipping	PVAc, Polyurethane
Hardwood glazed aperture liners	Polyurethane

Note: See section 7 for installations which require the use of hardwood glazed aperture liners.

13 Hardware

13.1 General

The following sections detail the scope and constraints for fitting hardware to the door designs.

The following items of hardware must also bear the CE mark: locks and latches (EN 12209), electro mechanically operated locks (EN 14846), single axis hinges (EN 1935), controlled door closing devices (EN 1154), electrically powered hold open devices (EN 1155), door co-ordinators (EN 1158), emergency exit hardware (EN 179), panic exit hardware (EN 1125).

13.2 Tested Hardware

The following hardware has been successfully incorporated in the tests on Laminesse FireSound 54mm & 59mm doorsets:

Element	Product	**Size** (mm)
Hinges	Royde & Tucker H207 steel butt hinges	101 x 29 (blade size)
	Royde & Tucker H101 lift-off type hinges	101 x 35 (blade size)
	TDSL bearing butt type hinges	100 x 31 (blade size)
	Phoenix bearing butt type	100 x 30 (blade size)
	Simonswerk Tectus TE527 3D[1]	155 x 2 (blade size)
Closers	Dorma TS83V overhead-type	293 x 60 (footprint size)
	Dorma TS71 overhead-type	232 x 68 (footprint size)
	Dorma ITS96 EN 2-4 concealed closer[1]	445 x 35 (closer arm slide)
		505 x 35 (closer body)
	Geze 3000 overhead type	260 x 60 (footprint size)
	Rutland TS3204 overhead-type	220 x 59 (footprint size)
Locks & latches	Ingersoll Rand mortice latch	235 x 20 (forend size)
	Arrone 3 lever mortice latch	155 x 22 (forend size) 125 x 24 (keep size)
	Aspex mortice sashlock/latch	235 x 19 (forend size) 170 x 24 (keep size)
	Glutz mortice deadlock Ref:1052.7	235 x 20 (forend size) 175 x 20 (keep size)
	Glutz mortice deadlock Ref:4525	230 x 25 (forend size) 92 x 25 (keep size)
Shoot bolts	Ironmongery Direct stainless steel shoot bolts Ref. 6399674	200 x 38 (footprint size)
Furniture	Aluminium lever type handles	Ø52 (rose size)

Note: [1] Laminesse Firesound 59mm only.

13.3 Additional & Alternative Hardware

13.3.1 Latches & Locks

Latches and locks must either be as tested, or alternatively components with the following specification are acceptable:

Element	Dimensions
Maximum forend and strike plate dimensions	235mm high by 25mm wide by 4mm thick
Maximum body dimensions	165mm high by 100mm wide by 18mm thick
Intumescent protection	See section 11
Materials	All parts essential to the locking/latching action (including the latch bolt, forend and strike) to be steel or stainless steel
Lock position	850-1200mm from the threshold of doors

13.3.2 Hinges

Leaves ≤2400mm high must be hung on a minimum of 3 hinges. Leaves >2400mm high must be hung on 4 hinges. Hinges with the following specification are acceptable:

Element		Specification	
Blade height		90-120mm	
Blade width (excluding knuckle)		30-35mm	
Blade thickness		2.5-4mm	
Fixings		Minimum of 4No. 30mm long No. 8 or No.10 steel wood screws per blade	
Materials		Steel or stainless steel	
Hinge positions	**If 3 hinges are required**	Top	100–180mm from the head to top of hinge
		2nd	Minimum 200mm from top hinge or centrally fitted between top and bottom hinge
		Bottom	150-250mm from the foot of leaf to bottom of hinge
	If 4 hinges are required	Top	100-180mm from the head to top of hinge
		2nd & 3rd	Equispaced between top and bottom or 2nd hinge 200mm from top hinge and 3rd hinge equally spaced between 2nd and bottom hinge
		Bottom	150-250mm from the foot of the leaf to bottom of the hinge
Intumescent protection		See section 11	

Note: Simonswerk Tectus TE527 3D concealed hinges may be used with Laminesse Firesound 59mm only for both 30 and 60 minutes performance; intumescent protection must be fitted as detailed in PF15073 doorset A.

13.3.3 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.

Notes:

1. The automatic closing device must be appropriate for the size and weight of the leaf required. (See appendix D for maximum leaf sizes and refer to the manufacturer's details for the maximum weight of leaf permitted with the automatic closing device.)
2. Concealed overhead closers are assessed for use with Laminesse Firesound 59mm doorset design only for both 30 and 60 minutes performance; intumescent protection must be fitted as detailed in PF15073 doorset A.

13.3.4 Pull Handles

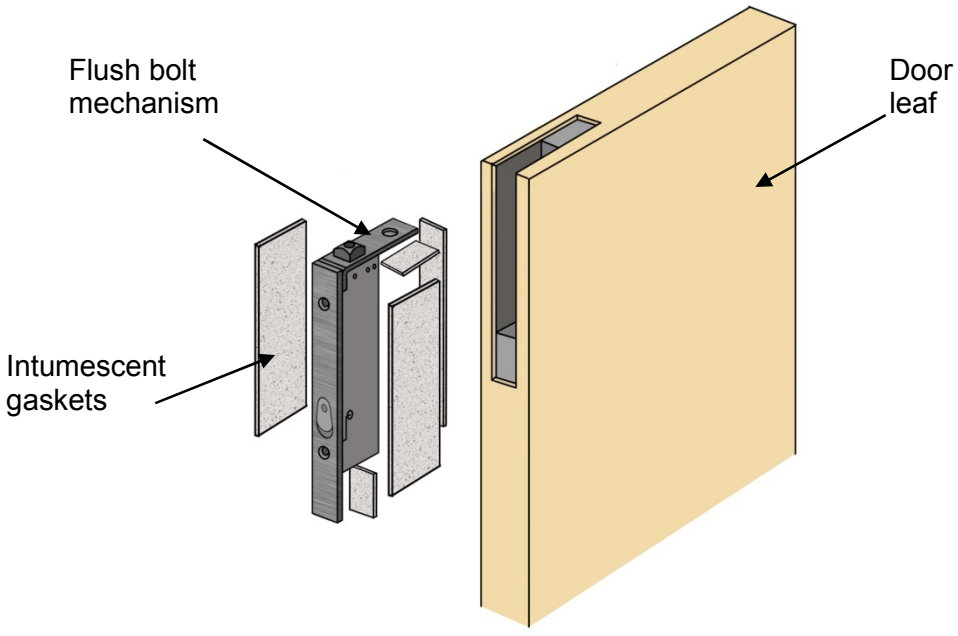
These may be surface-fixed or bolted through the door leaf provided that they are steel or brass and the length is limited to 1200mm between the fixing points. No additional intumescent protection is required provided that the hole for the bolt through the leaf is tight.

13.3.5 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 leaf edge fitted with intumescent strips.

- 250mm 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 mortice must be protected with intumescent gaskets as specified in section 11. Alternatively, the hardware manufacturers tested gaskets may be used.



13.3.6 Push Plates/Kick Plates

Face-fixed hardware such as push plates and kick plates may be fitted to the doorsets on both sides 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 contact or other thermally softening adhesive. Plates must not return around the door edges.

13.3.7 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 +1mm). Lenses must be glass and the item must be protected with a tested acrylic intumescent mastic.

13.3.8 Panic Hardware

Panic hardware may be fitted, provided that its installation does not require the removal of any timber from the leaf, stop or frame reveal and it in no way interferes with the self-closing action of the door leaf.

13.3.9 Environmental Seals

Silicon based flame retardant acoustic, weather and dust seals (e.g. Lorient IS1212, IS1511, IS7025, IS7060, Norsound 710 and 720, STS ST1009) may be fitted to this doorset design without compromising the performance, providing their fitting does not interfere with the activation of the intumescent seals or hinder the self-closing function of the leaves.

13.3.10 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 Ltd.	IS8010Si
Raven	RP8Si
Athmer	Schall-Ex Duo L-15
Norsound Ltd.	810dB+
STS	422

13.3.11 Letter Boxes/Plates

Letter boxes/plates may be fitted providing the product can demonstrate contribution to the required performance of this type of 30 or 60 minute doorset design (as appropriate), when tested to BS 476: Part 22: 1987 or BS EN 1634-1, when installed within a timber based doorset of comparable thickness. Margins to the leaf edges must remain as detailed for glazing. The position of the letter box/plate will be dictated by the pressure regime tested in the proving evidence (normally below mid-height).

14 Door Gaps

For fire resistance performance, door gaps and alignment tolerances must fall within the following range:

Location	Dimensions
Door edge gaps	A minimum of 2mm and a maximum of 4mm
Alignment tolerances	Leaves must not be proud of each other or from the door frame by more than 1mm
Threshold	10mm between bottom of leaf and top of floor covering

15 Structural Opening

The supporting construction must be capable of staying in place and intact for the full period of fire resistance required from the doorset.

16 Fixings

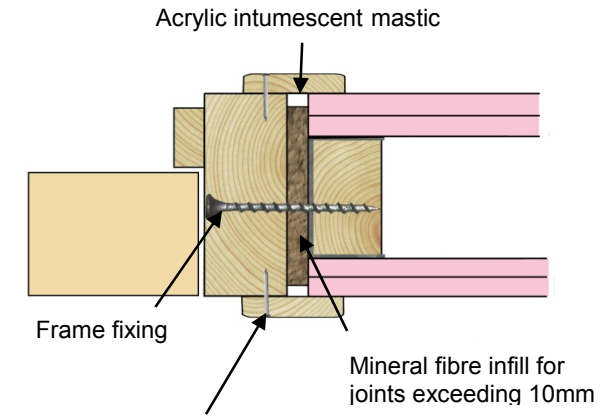
The frame jambs are to be fixed to the supporting construction using steel fixings at 600mm maximum centres. The fixings must be of the appropriate type for the supporting construction and must penetrate to a minimum depth of 50mm. It is not necessary to fix the frame head, although packers must be inserted.

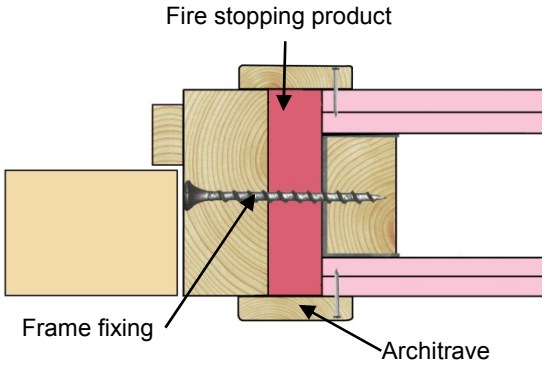
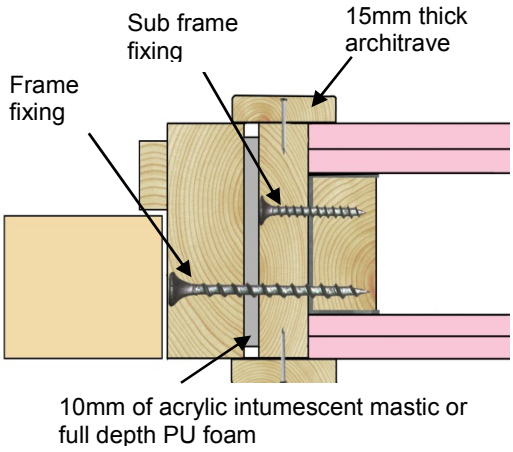
17 Sealing to Structural Opening

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

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.

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.



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.	
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.	

Guidance for various methods of sealing the frame to structural opening gap is also given in BS 8214: 2008, “Code of practice for fire door assemblies”, which may be referred to where appropriate.

Note: Drawings are representative of doorset installation only; actual installations must be as the text within this document specifies.

18 Insulation

Insulation performance may be claimed for a doorset to these designs meeting the following.

18.1 30 Minutes Performance

Type	Details
Partially insulating	Doorsets incorporating up to 20% of non-insulating or partially insulating glazing
Fully insulating	Unglazed doorsets or doors fitted with 30 minute fully insulating glass (see note in section 7.1.2)

18.2 60 Minutes Performance

Type	Details
Partially insulating	Doorsets incorporating up to 20% of non-insulating or partially insulating glazing
Fully insulating	Unglazed doorsets or doors fitted with 60 minute fully insulating glass (see note in section 7.2.2.2)

19 Smoke Control

19.1 General

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

(a) have a leakage rate not exceeding $3m^3/m$/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.

19.2 Further Considerations

Note that there is other guidance available, including BS EN 9999-2008 - *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.

It is the responsibility of the relevant parties to agree the precise smoke control specification, prior to commencing manufacture and/or installation.

20 Conclusion

20.1 Laminesse FireSound 54mm

It is our opinion that, if the Moralt AG Laminesse FireSound 54mm doorset design constructed in accordance with the specification documented in this global assessment, were to be tested in the appropriate configuration in accordance with BS 476: Part 22: 1987, it would provide a minimum of 30 or 60 minutes integrity and insulation (subject to section 18), as appropriate.

20.2 Laminesse FireSound 59mm

It is our opinion that, if the Moralt AG Laminesse FireSound 59mm doorset design constructed in accordance with the specification documented in this global assessment, were to be tested in the appropriate configuration in accordance with BS 476: Part 22: 1987, it would provide a minimum of 30 or 60 minutes integrity and insulation (subject to section 18), as appropriate.

21 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: **Moralt AG**

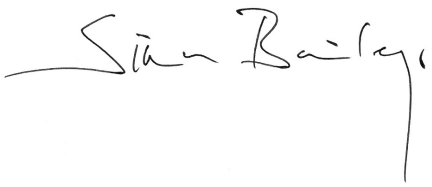
22 Limitations

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. It is beyond the scope of this assessment to consider the potential effects of alterations to the tested specification on the acoustic performance of the doorsets herein. 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, Exova 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.

23 Validity

1) The assessment is initially valid until the date shown on the front cover, after which time it must be submitted to Exova Warringtonfire for technical review.
2) This assessment report is not valid unless it incorporates the declaration given in Section 21, duly signed by the applicant.

Signatures:		
Name:	**A M Winning**	**S Bailey**
Title:	Senior Product Assessor	Senior Product Assessor

Appendix A

Performance Data

Primary Data – FireSound 54mm

Test Report No.	Configuration	Leaf Size (mm)	Test Standard	Performance (mins)
RF10007 (FireSound 54)	LSADD	2145 933/933 55	BS 476: Part22: 1987	Integrity: 56* Insulation: 56
P1009/14-530	B: LSASD** (FireSound 54)	2145 915 54	BS EN 1634-1: 2014 and BS EN 1363-1: 2012	Integrity: 64 Insulation: 64
PF15041***	A&B: ULSADD	A&B: 2250 820/260 54		A: Integrity: 77 Insulation: 77
				B: Integrity: 66 Insulation: 66

Notes:

* Failure was attributed to undermining of the beads at the glazing perimeter. Based on the performance of the remainder of the doorset, which did not achieve failure criteria until 60 minutes, it is our assessment that the FireSound 54mm may be assessed for 60 minutes performance. Test data is used in support of assessment for double doorsets, the tested glazing system is not assessed for use at 60 minutes performance.

** Doorset B in test P1009/14-530 contained a glazed aperture; no failures were recorded prior to termination of the test at 64 minutes. Assessment for glazed apertures is based on the performance and installation details tested in P1009/14-530.

The ISO834 time/temperature curve used in BS 476: Part 22: 1987 test is the same as within BS EN 1634-1, but due to the use of the Plate Thermometer device(s) for furnace control in the EN test, which test data has shown to make the EN test more onerous. This is due to the higher thermal inertia required for the plate thermocouple to read the same temperature as the probe thermocouple used for the BS 476: Part 20 test, particularly during the early stages of the test. It is therefore our assessment that the same 60 minutes integrity and insulation performance would be achieved in a test conducted utilizing the principles of BS 476: Part 22: 1987, subject to the glazing requirements within section 7.

*** Test PF15041 was designed to compare the performance of the two core types discussed in section 2; assessment of parity between the two core types is based on using distortion data and reference to the observations recorded up to the time of failure of doorset B.

Primary Data – FireSound 59mm

Test Report No.	Configuration	Leaf Size (mm)	Test Standard	Performance (mins)
Chilt/RF13181	Doorset A only LSADD**	2135 915/490 59	BS 476: Part 20/22: 1987	Integrity: 58* Insulation: 58
Chilt/RF13225	Doorset B only LSASD	2135 915 59	BS 476: Part 20/22: 1987	Integrity: 69 Insulation: 69
PF15073	A: ULSASD	2250 915 56	BS EN 1634-1: 2014 and BS EN 1363-1: 2012	A: Integrity: 92 Insulation: 92
	B: ULSADD	2250 915/490 56		B: Integrity: 79 Insulation: 70

* Failure was attributed to burn-through at the central core area of the leaf at 58 minutes. By utilising Geistlich Mirapur adhesive in the core as in fire test Chilt/RF13225, the leaf construction has demonstrated greater resistance to burn through and has been deemed acceptable for 30 or 60 minutes fire resistance performance.

** Doorset A contained a glazed aperture and glazing system, which has been deemed acceptable for use with this door design since no failures were attributable to the glass or glazing system prior to the test termination at 60 minutes.

Doorset A in test P1009/14-530 below utilised an alternative supplier for the two layer core (details of the suppliers and core make-ups are held, in confidence, at Exova Warringtonfire) compared to those in tests RF13181 and RF13225 above. Comparison of the distortion figures recorded at 60 minutes within the 3 tests above show no significant difference in the performance of the doorsets which could be attributed to the use of the different core suppliers. It is therefore our assessment that the two core types may be interchanged within the FireSound 59mm doorset design.

Supporting Data

Test Report No.	Configuration	Leaf Size (mm)	Test Standard	Performance (mins)
P1009/14-530	A: LSADD (FireSound 59)	2145 933/933 58	BS EN 1634-1: 2000 and BS EN 1363-1: 1999	Integrity: 82 Insulation: 78
BMT/FEP/F14102[1] (WoodEx Ash 60)	A - ULSADD	2040 826/303 54	BS 476: Pt 22: 1987	Integrity: 42 Insulation: 42
BMT/FEP/F14102[1] (WoodEx Redwood)	B - ULSADD	2040 826/303 54	BS 476: Pt 22: 1987	Integrity: 30 Insulation: 30
PF15288 revision A	A - ULSASD	2244 x 905 x 59	BS 476: Pt 22: 1987	Integrity: 43
	B - ULSADD	2250 x 905/478 x 59		Integrity: 83 Insulation: 83
BMT/CNA/F14191 Revision B	WoodEx engineered door frame assessment			30 & 60

Construction Specialities – Acrovyn facings & edge protectors supporting data

RF11059 (Construction Specialities – Acrovyn edge protectors)	A: ULSADD	2100 x 900/300 x 44	BS 476: Pt 20/22: 1987	Integrity:43 Insulation: 43
	B: ULSADD	2100 x 900/300 x 44		Integrity: 39 Insulation: 39
IF13094	ULSADD	1400 x 900/300 x 48[2]		Integrity: 45
IF13095 Revision A	ULSADD	1400 x 900/300 x 48[3]		Integrity: 60

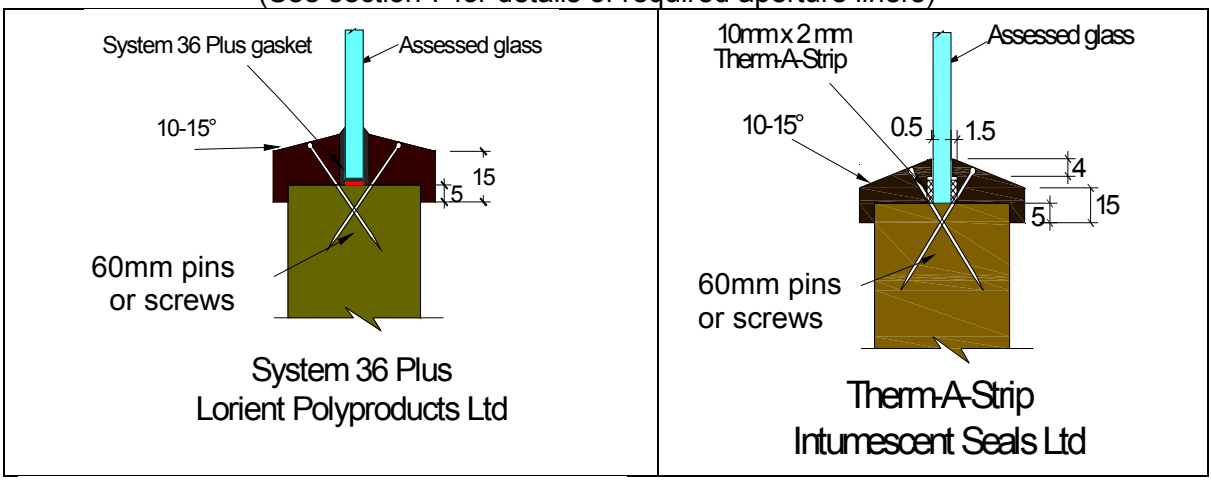
Notes:

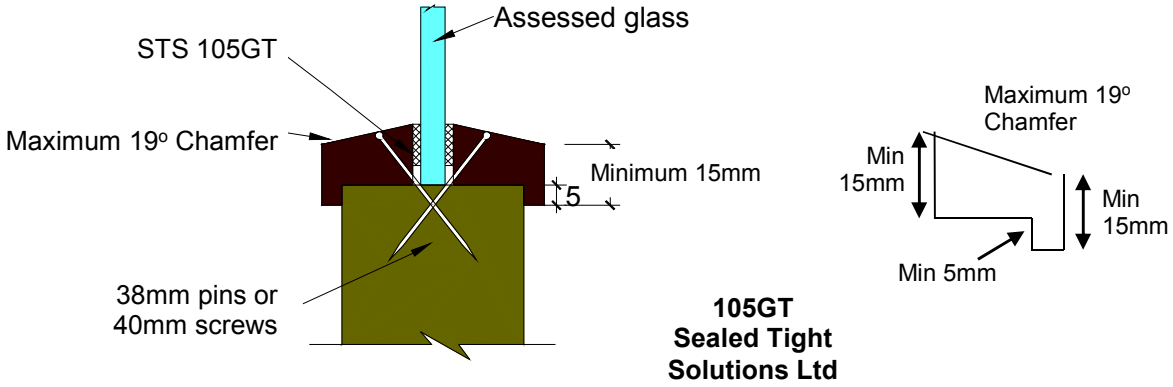
1. Test BMT/FEP/F14102 was devised to investigate the influence of the WoodEx engineered timber as a door frame material for use with previously tested and approved door designs. The failure of doorset A was attributable to the latch and has been deemed a result of inadequate intumescent protection. Had the doorset been tested with the approved intumescent specification it would have achieved a minimum of 60 minutes integrity, when tested to BS 476: Part 22: 1987. The failure is therefore completely remote from the door frame and was not influenced by the type of door frame material used. The test is therefore suitable as supporting data for the hardwood WoodEx products with the Laminesse Firesafe & Firesmoke 60 doorset designs
2. Door leaf thickness includes thickness of the Acrovyn facings
3. Door leaf thickness includes thickness of the Acrovyn facings.

Appendix B

Assessed 30 Minute Glazing Systems

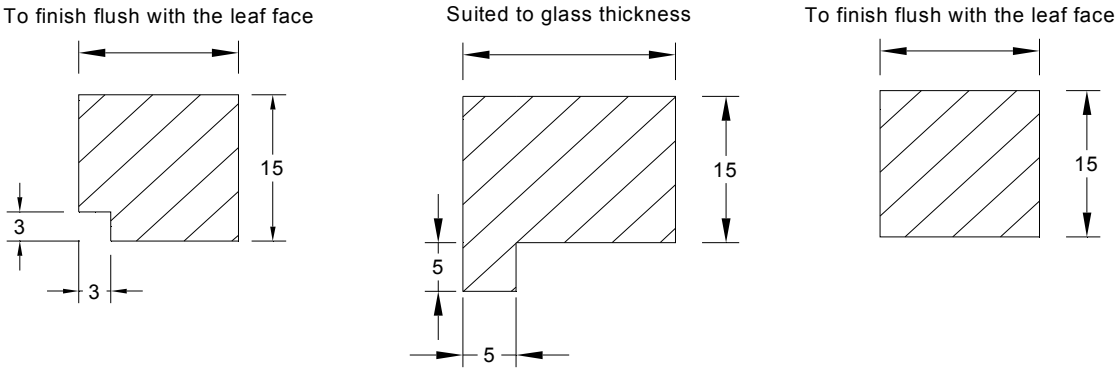
(See section 7 for details of required aperture liners)



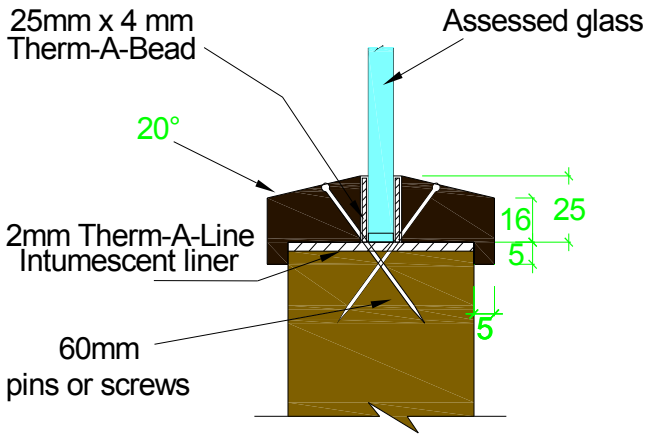


Square Beads

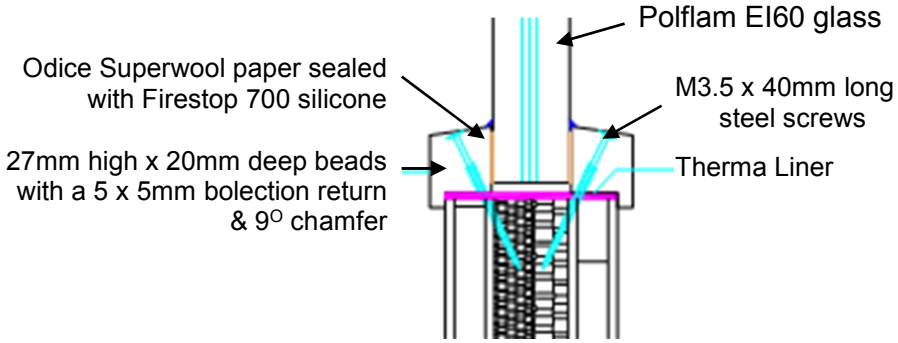
The STS 105GT glazing system has also been tested with a flush, square bead incorporating a 3 x 3mm quirk as shown below left. It is permitted to use any of the square bead profiles shown as an alternative to the tested beads detailed.



Assessed 60 Minute Glazing Systems

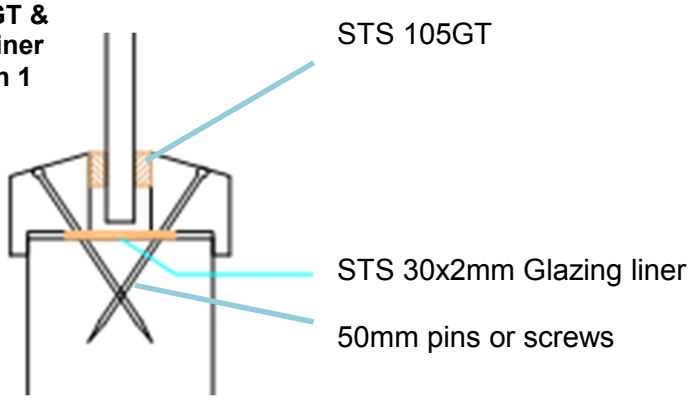


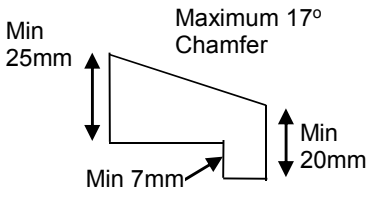
Therm-A-Glaze 60
Intumescent Seals Ltd



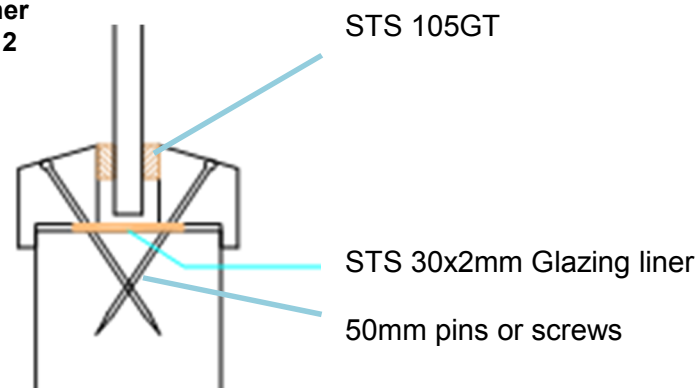
Superwool & Therma Liner
Odice S.A.S.

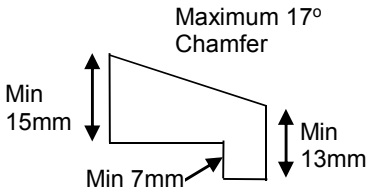
ST105GT &
30x2 Liner
Option 1





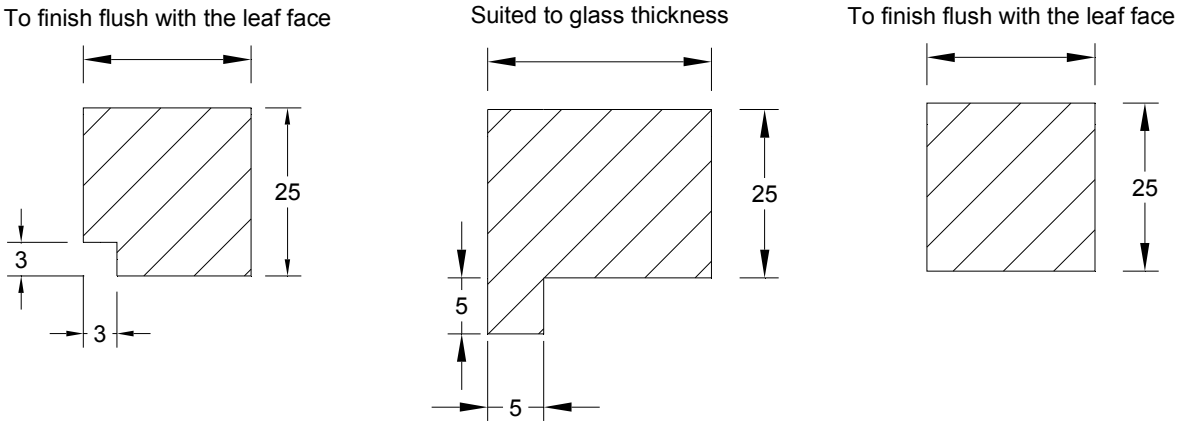
ST105GT & 30x2 Liner Option 2





Assessed Square Glazing Bead Profile

The following square bead profile may be used as an alternative to the splayed beads detailed above.



Bead shape may be altered from that shown above provided the minimum dimensions are maintained; but note that all glass types must be fitted fully in accordance with the manufacturers' tested details/installation requirements, particularly with respect to edge cover and expansion tolerances.

Splayed Flush Bead

A splayed flush bead may be used with either of the STS glazing systems only, subject to the following details.

1. The bead must be ≥ 25mm high, with a maximum 19^0 chamfer, the chamfered material must be in addition to the square bead material as shown in drawing above
2. The bead may incorporate a 3 x 3mm quirk as shown above left to accommodate door thickness tolerances
3. Provided any minimum and maximum dimensions are complied with, any bead shape is permitted; all glass types must be fitted fully in accordance with the glass manufacturers tested details/installation requirements, particularly with respect to edge cover and expansion tolerances.

Appendix C

Revisions & Amendments

Rev.	Exova Warringtonfire Ref.	Date	Description
A	Chilt/A13279	20/12/13	Revision and update of global assessment to include the additional scope for the Moralt Laminesse FireSound 59 door core for 30 and 60 minutes fire resistance performance, based on Chilt/RF13181 and Chilt/RF13225. Due to the supporting test evidence for the Laminesse 59 door core, conducted to BS 476: Part 22, the assessment is now written in terms of fire resistance performance judged against BS 476: Part 22 for 30 and 60 minutes performance
B	Chilt/A14003	8/01/14	Inclusion of FireSound 59 door core diagram with T-shaped lipping diagram
C	CNA/F14310	10/02/15	Addition of WoodEx 60 door frames, additional facing options, core details held on file and grooving options added
D	CNA/F15112	10/06/15	Addition of new data from tests PF15041 and PF15073
E	CNA/F16025	08/06/16	Addition of new data from tests PF15288 and PF14102 to allow assessment of STS glazing, hardware and leaf edge seals and Lathams WoodEx Redwood for 30 minute applications. Also, based on tests RF13095, RF11059, IF13094 and IF13095, addition of options for the use of CS Group. Acrovyn facings

Appendix D

Data Sheets for:

Moralt AG

Laminesse FireSound 54mm & 59mm Doorsets

30 & 60 Minutes Fire Resistance

Laminesse FireSound 54mm – 30 Minutes Integrity Performance

Latched & Unlatched, Single & Double Acting, Single Doorsets

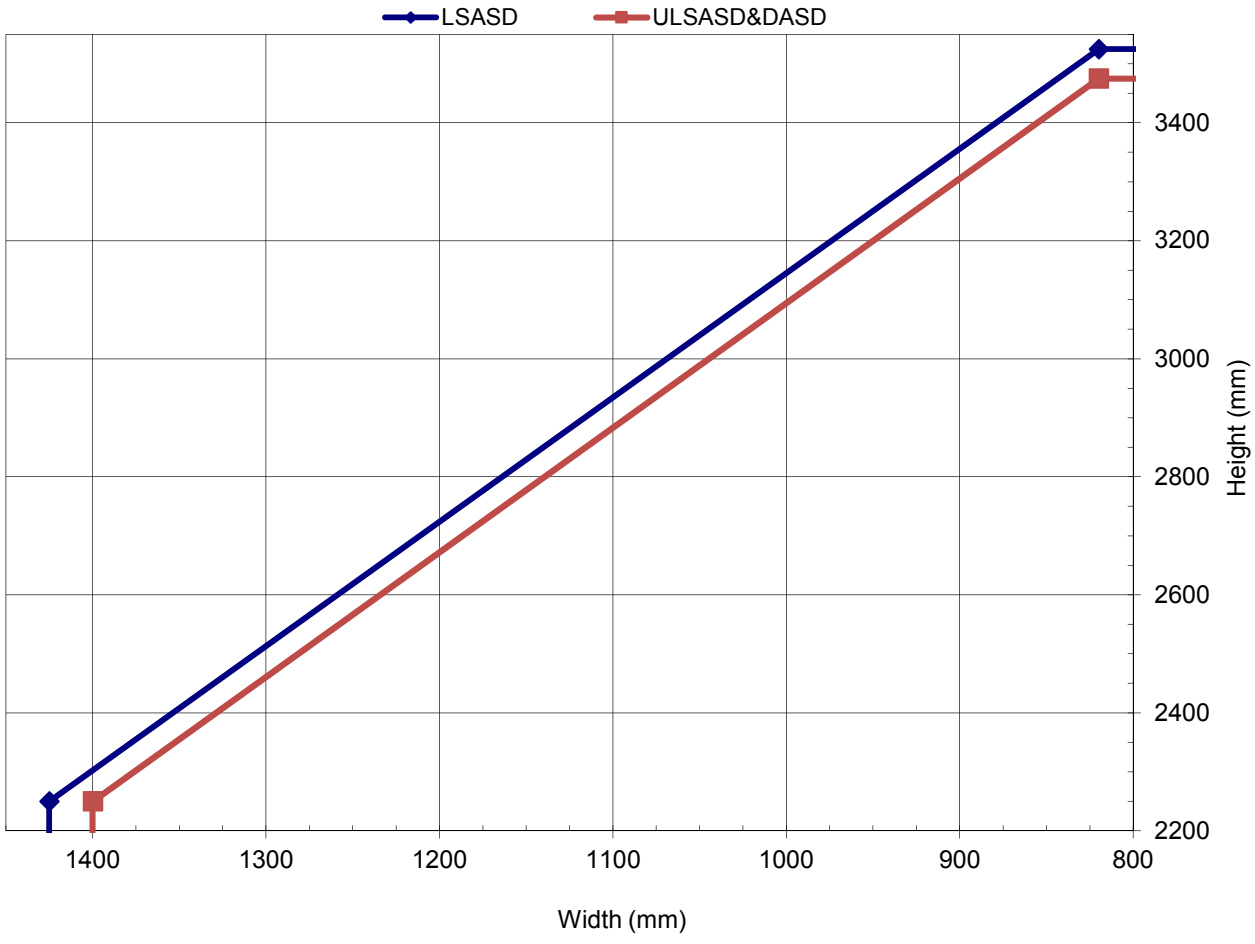
Leaf Sizes	Configuration		Height (mm)		Width (mm)
	LSASD	From:	2250	x	1425
		To:	3525	x	820
	ULSASD & DASD	From:	2250	x	1400
		To:	3475	x	820
Maximum Overpanel Height (mm)		Transomed	2000		
Glazing		0.51m² (see section 7)			

Intumescent Materials: PVC encased Pyroplex Rigid Box Seals or STS Fire (4mm thick) – Pyroplex Ltd. or Flexilodice (1.8mm thick) – Odice S.A.S.

Head, Jambs and Overpanel: 2No. 15mm wide seals exposed and fitted 10mm apart - 5mm either side of the centreline in the leaf edge or frame reveal. For leaves over 2900mm high and/or 1100mm wide increase to 2No. 20mm wide seals

Hardware Protection: See section 11.

Maximum Door Leaf Size



Laminesse FireSound 54mm – 30 Minutes Integrity Performance

Latched & Unlatched, Single & Double Acting, Double Doorsets

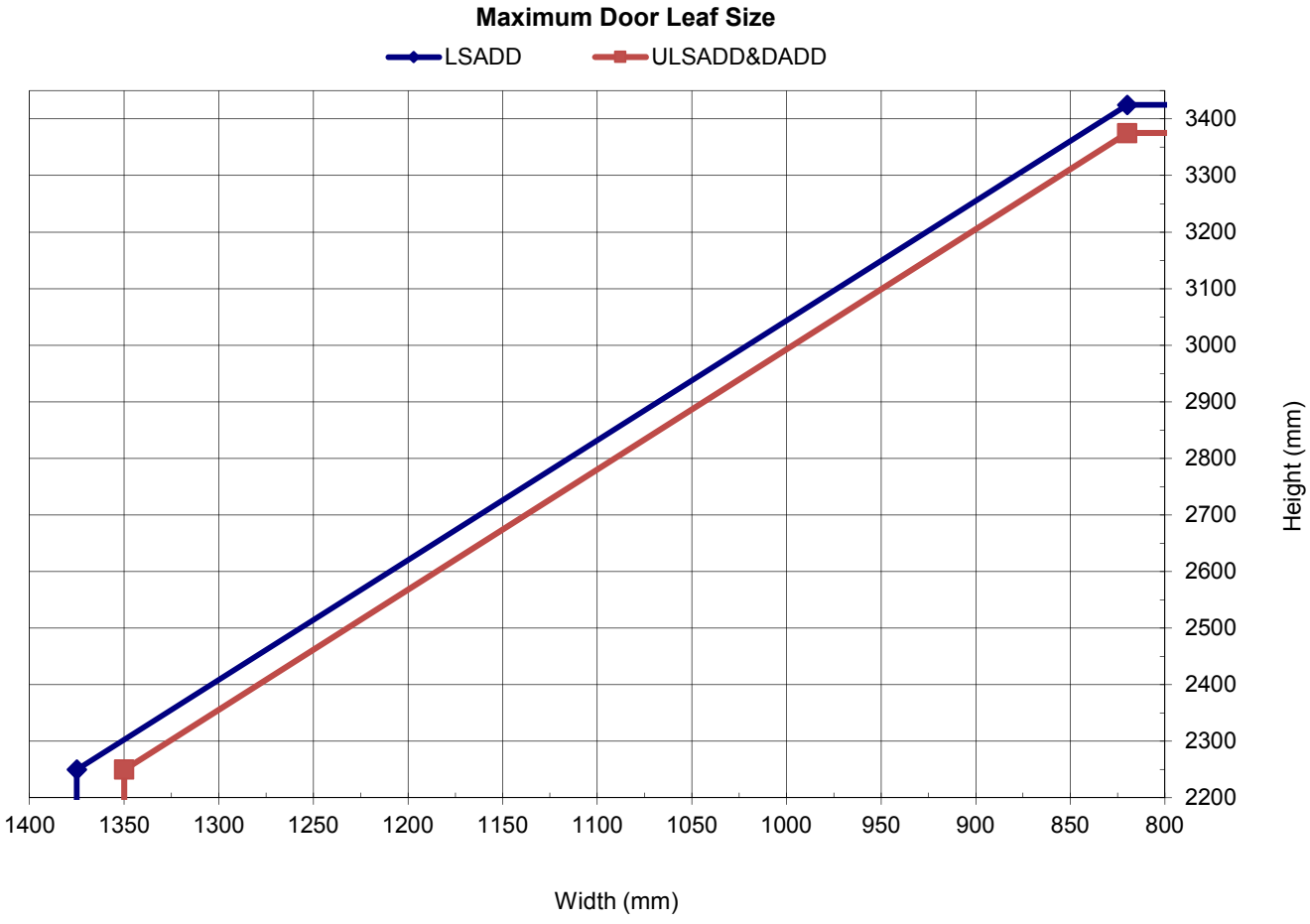
Leaf Sizes	Configuration		Height (mm)		Width (mm)
	LSADD	From:	2250	x	1375
		To:	3425	x	820
	ULSADD & DADD	From:	2250	x	1350
		To:	3375	x	820
Maximum Overpanel Height (mm)		Transomed	1500		
Glazing		0.51m² (see section 7)			

Intumescent Materials: PVC encased Pyroplex Rigid Box Seals or STS Fire (4mm thick) – Pyroplex Ltd. or Flexilodice (1.8mm thick) – Odice S.A.S.

Head, Jambs and Overpanel: 2No. 15mm wide seals exposed and fitted 10mm apart - 5mm either side of the centreline in the leaf edge or frame reveal. For leaves over 2900mm high and/or 1100mm wide increase to 2No. 20mm wide seals

Meeting Edges: 2No. 15mm wide seals exposed and fitted 10mm apart - 5mm either side of the centreline in one leaf edge only.

Hardware Protection: See section 11.



Laminesse FireSound 54mm – 60 Minutes Integrity Performance

Latched & Unlatched, Single Acting & Double Acting, Single Doorsets

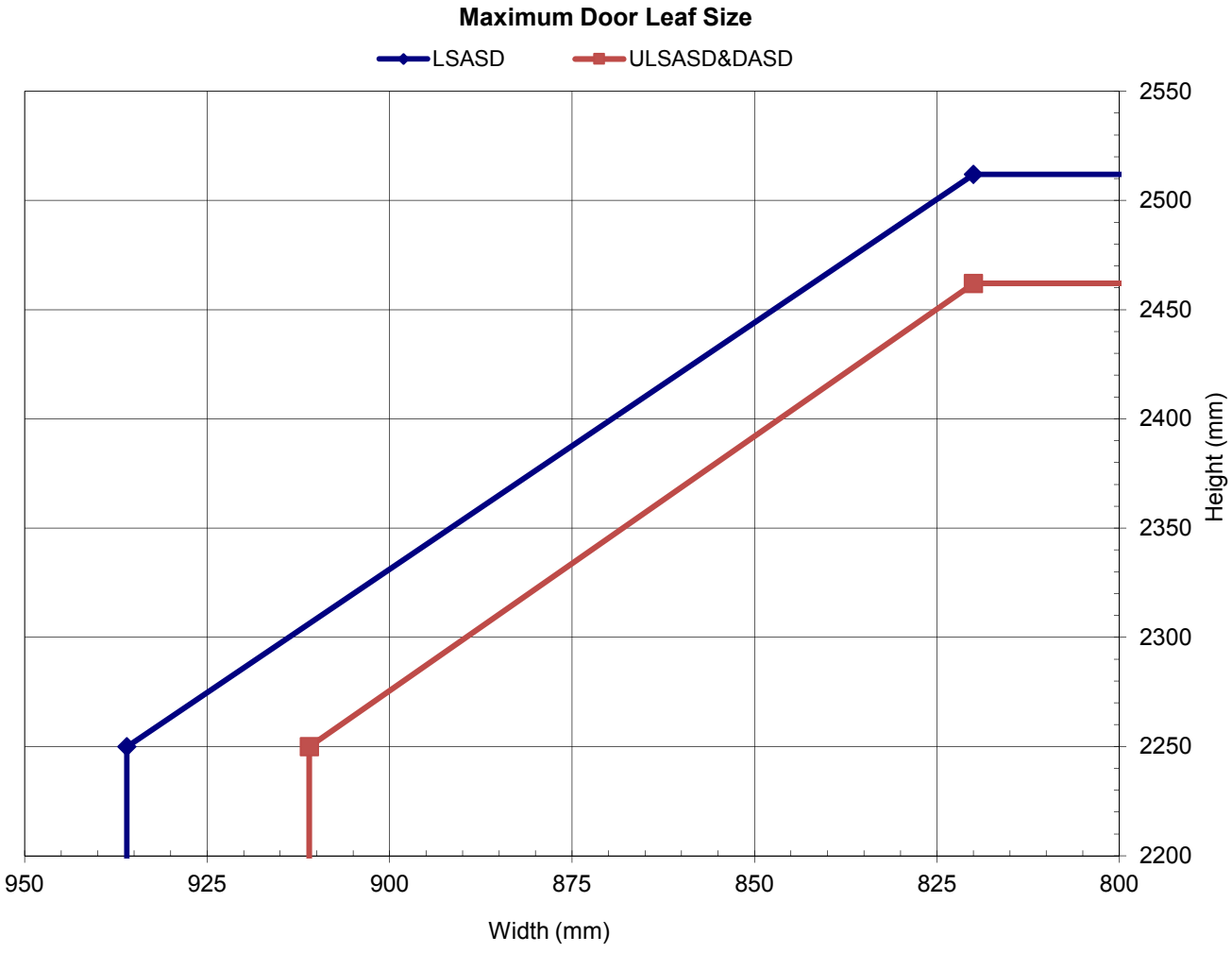
Leaf Sizes	Configuration		Height (mm)		Width (mm)
	LSASD	From:	2250	x	936
		To:	2512	x	820
	ULSASD & DASD	From:	2250	x	911
		To:	2462	x	820
Maximum Overpanel Height (mm)		Transomed	2000		
Glazing		0.51m² (see section 7)			

Intumescent Materials: PVC encased Pyroplex Rigid Box Seals or STS Fire (4mm thick) – Pyroplex Ltd. or Flexilodice (1.8mm thick) – Odice S.A.S.

Head: 2No. 15mm wide seals exposed and fitted 10mm apart - 5mm either side of the centreline in the leaf edge or frame reveal.

Jambs & Overpanel: 2No. 15mm wide seals exposed and fitted 10mm apart - 5mm either side of the centreline in the leaf edge or frame reveal.

Hardware Protection: See section 11.



Laminesse FireSound 54mm – 60 Minutes Integrity Performance

Latched & Unlatched, Single Acting & Double Acting, Double Doorsets

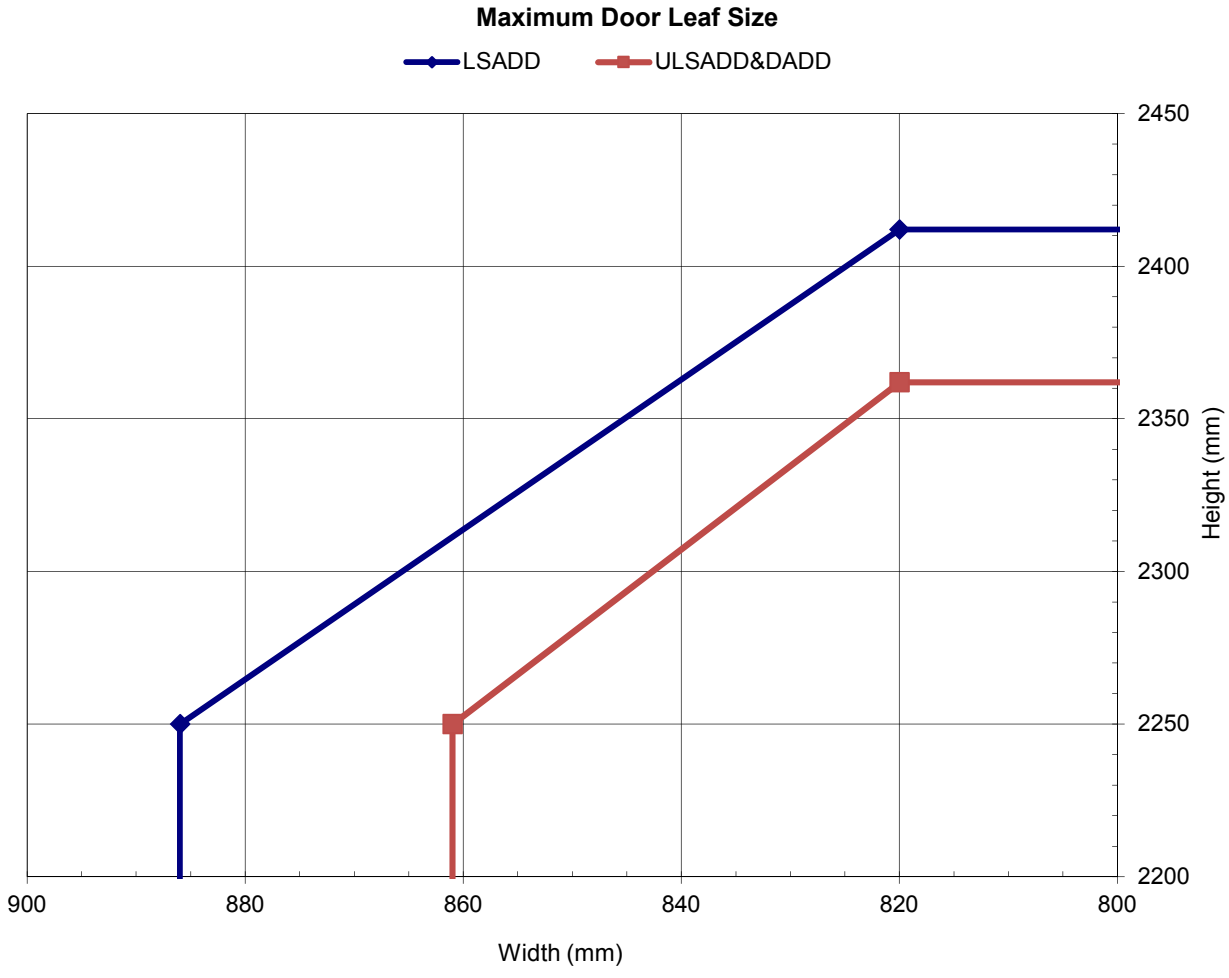
Leaf Sizes	Configuration		Height (mm)		Width (mm)
	LSADD	From:	2250	x	886
		To:	2412	x	820
	ULSADD & DADD	From:	2250	x	861
		To:	2362	x	820
Maximum Overpanel Height (mm)		Transomed	1500		
Glazing		0.51m² (see section 7)			

Intumescent Materials: PVC encased Pyroplex Rigid Box Seals or STS Fire (4mm thick) – Pyroplex Ltd. or Flexilodice (1.8mm thick) – Odice S.A.S.

Head, Jambs and Overpanel: 2No. 15mm wide seals exposed and fitted 10mm apart - 5mm either side of the centreline in the leaf edge or frame reveal.

Meeting Edges: 2No. 15mm wide seals exposed and fitted 10mm apart - 5mm either side of the centreline in one leaf edge only.

Hardware Protection: See section 11.



Moralt Laminesse FireSound 59mm Doorsets – 30 Minutes Fire Resistance

Latched & Unlatched, Single & Double Acting, Single Doorsets

	Configuration		Height (mm)		Width (mm)
Leaf Sizes	LSASD	From:	2250	x	1475
		To:	3575	x	915
	ULSASD & DASD	From:	2250	x	1450
		To:	3525	x	915
Maximum Overpanel Height (mm)		Transomed	2000		
Glazing		0.51m² (see section 7)			

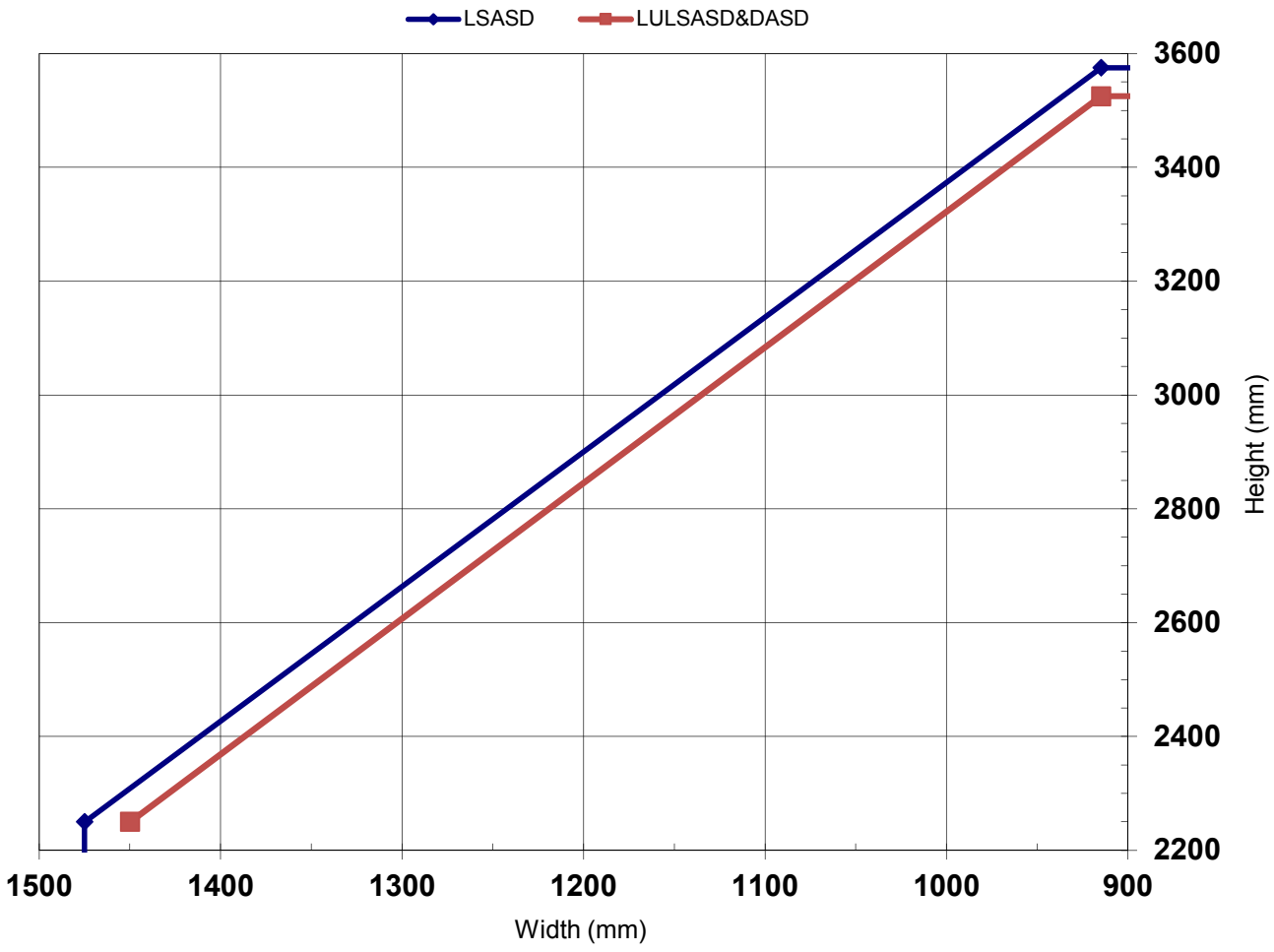
Intumescent Materials: PVC encased Pyroplex Rigid Box Seals or STS Fire (4mm thick) – Pyroplex Ltd. or Flexilodice (1.8mm thick) – Odice S.A.S.

Head: 2No. 15mm wide seals exposed and fitted 10mm apart with the 1st seal 10mm from the opening face in the frame reveal. For leaves over 2600mm high increase to 2No. 20mm wide seals

Jambs and Overpanel: 2No. 15mm wide seals exposed and fitted 10mm apart with the 1st seal 10mm from the opening face in the frame reveal.

Hardware Protection: See section 11.

Maximum Door Leaf Size



Moralt Laminesse FireSound 59mm Doorsets – 30 Minutes Fire Resistance

Latched & Unlatched, Single & Double Acting, Double Doorsets

	Configuration		Height (mm)		Width (mm)
Leaf Sizes	LSADD	From:	2250	x	1425
		To:	3475	x	915
	ULSADD & DADD	From:	2250	x	1400
		To:	3425	x	915
Maximum Overpanel Height (mm)		Transomed	1500		
Glazing		0.51m² (see section 7)			

Intumescent Materials: PVC encased Pyroplex Rigid Box Seals or STS Fire (4mm thick) – Pyroplex Ltd. or Flexilodice (1.8mm thick) – Odice S.A.S.

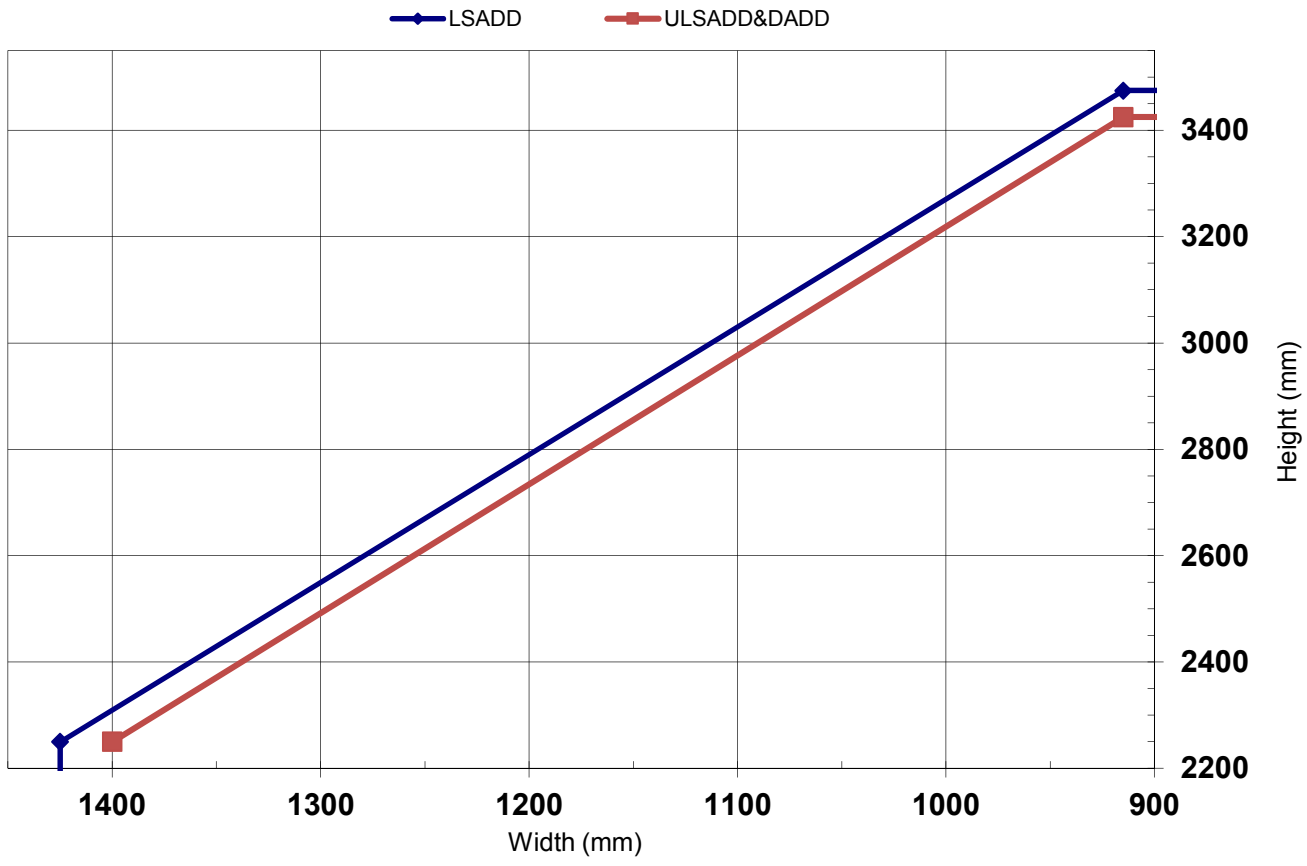
Head: 2No. 15mm wide seals exposed and fitted 10mm apart with the 1st seal 10mm from the opening face in the frame reveal. For leaves over 2600mm high increase to 2No. 20mm wide seals

Jambs and Overpanel: 2No. 15mm wide seals exposed and fitted 10mm apart with the 1st seal 10mm from the opening face in the frame reveal.

Meeting Edges: 1No. 15mm wide seal exposed and fitted 33mm from the opening face in the closing edge of the left leaf, and 1No. 15mm wide seal exposed and fitted 9mm from the opening face in the closing edge of the left leaf.

Hardware Protection: See section 11.

Maximum Door Leaf Size



Moralt Laminesse FireSound 59mm Doorsets – 60 Minutes Fire Resistance

Latched & Unlatched, Single & Double Acting, Single Doorsets

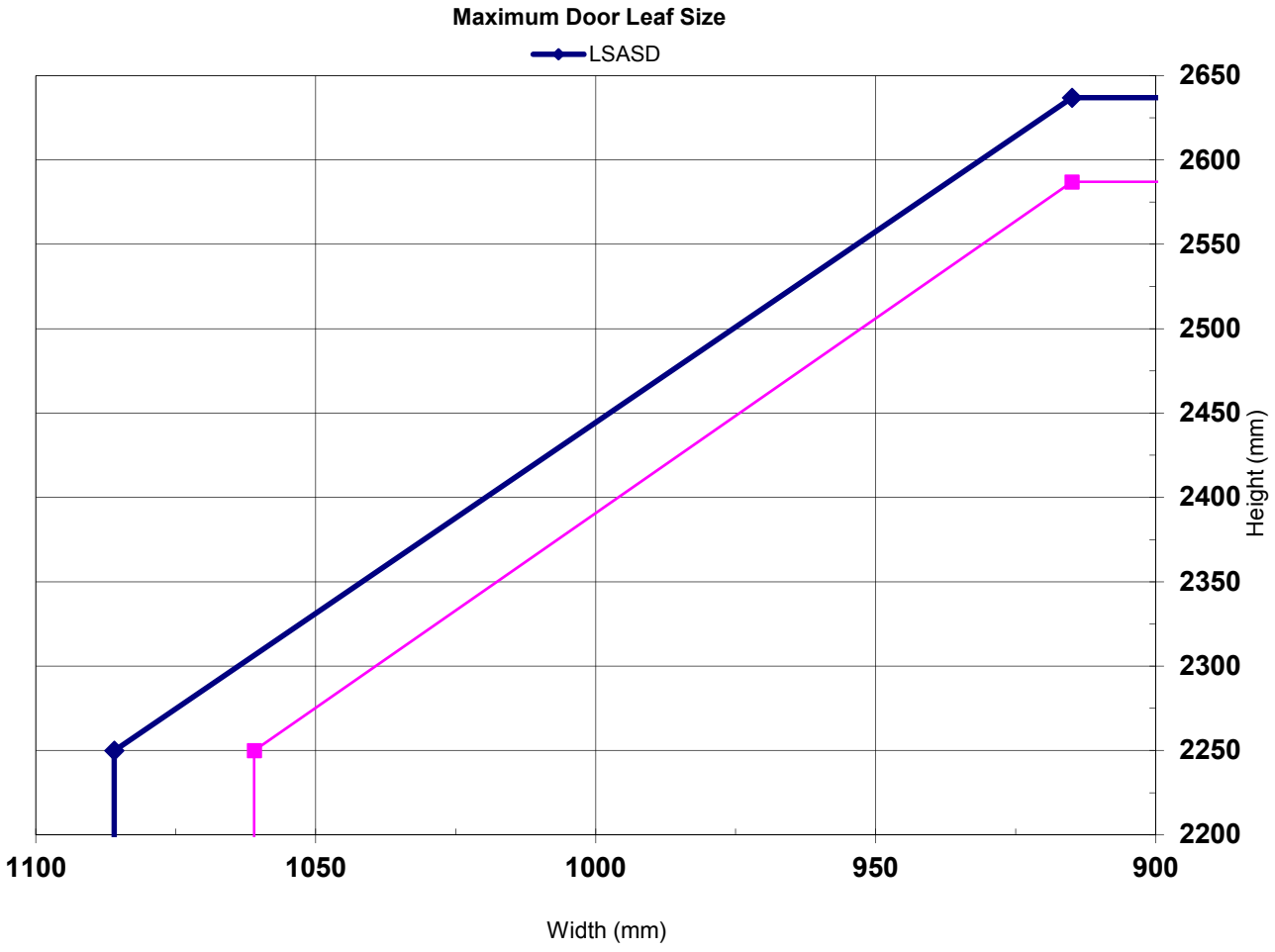
	Configuration		Height (mm)		Width (mm)
Leaf Sizes	LSASD	From:	2250	x	1086
		To:	2637	x	915
	ULSASD & DASD	From:	2250	x	1061
		To:	2587	x	915
Maximum Overpanel Height (mm)		Transomed	2000		
Glazing Details		0.51m² (see section 7)			

Intumescent Materials: PVC encased Pyroplex Rigid Box Seals or STS Fire (4mm thick) – Pyroplex Ltd. or Flexilodice (1.8mm thick) – Odice S.A.S.

Head: 2No. 15mm wide seals exposed and fitted 10mm apart 5mm either side of the centreline in the leaf edge or frame reveal.

Jambs & Overpanel: 2No. 15mm wide seals exposed and fitted 10mm apart 5mm either side of the centreline in the leaf edge or frame reveal.

Hardware Protection: See section 11.



Moralt Laminesse FireSound 59mm Doorsets – 60 Minutes Fire Resistance

Latched & Unlatched, Single & Double Acting, Double Doorsets

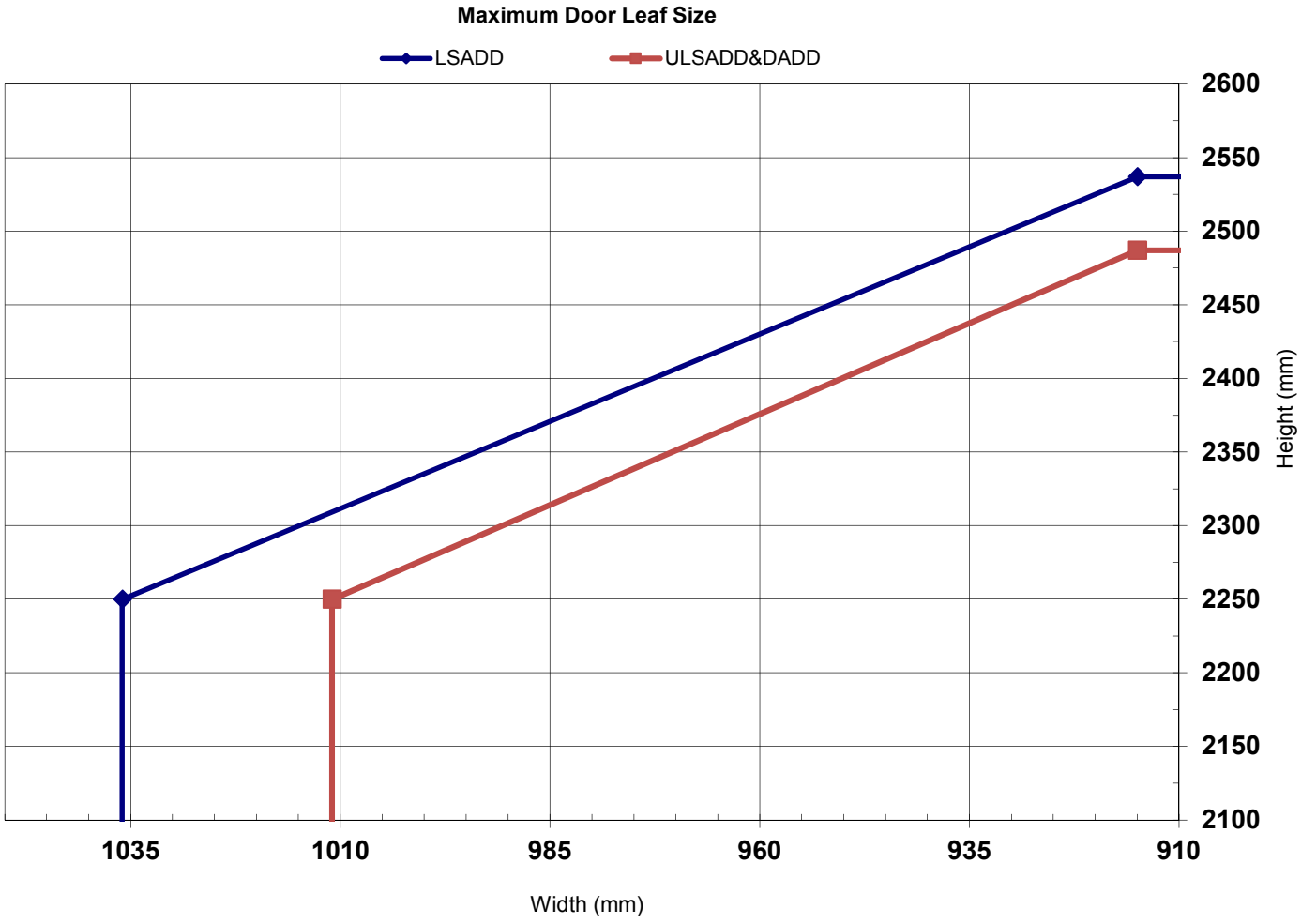
	Configuration		Height (mm)		Width (mm)
Leaf Sizes	LSADD	From:	2250	x	1036
		To:	2537	x	915
	ULSADD & DADD	From:	2250	x	1011
		To:	2487	x	915
Maximum Overpanel Height (mm)		Transomed	1500		
Glazing Details		0.51m² (see section 7)			

Intumescent Materials: PVC encased Pyroplex Rigid Box Seals or STS Fire (4mm thick) – Pyroplex Ltd. or Flexilodice (1.8mm thick) – Odice S.A.S.

Head, Jambs and Overpanel: 2No. 15mm wide seals exposed and fitted 10mm apart 5mm either side of the centreline in the leaf edge or frame reveal.

Meeting Edges: 2No. 15mm wide seals exposed and fitted 10mm apart 5mm either side of the centreline in one leaf edge only.

Hardware Protection: See section 11.



Moralt Laminesse FireSound 54mm & 59mm Doorsets – 30 Minutes Fire Resistance
CS Edge Protectors/Acrovyn Wrap

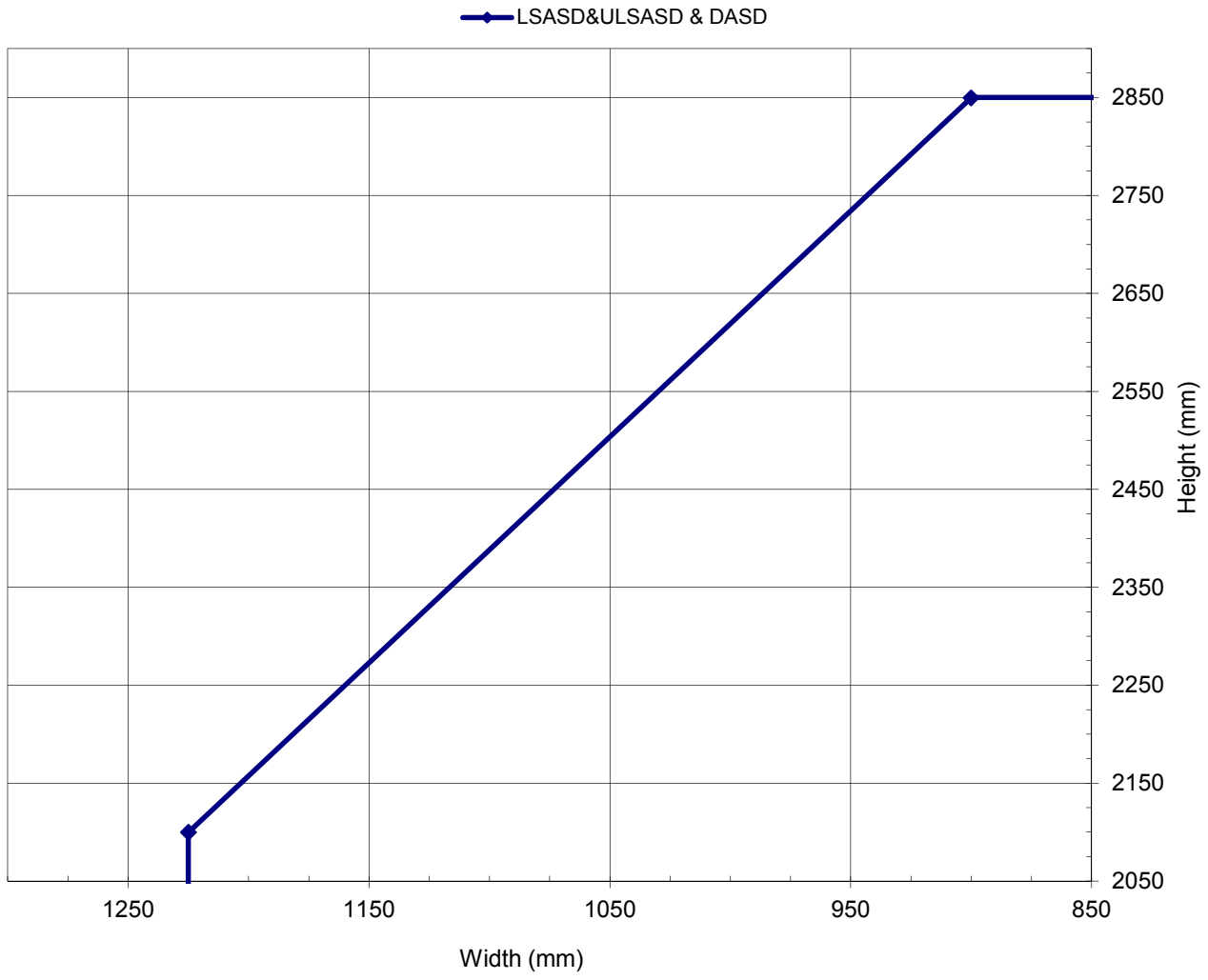
Latched & Unlatched, Single & Double Acting, Single Doorsets

	Configuration		Height (mm)		Width (mm)
Leaf Sizes	LSASD & ULSASD & DASD	From:	2100	x	1225
		To:	2850	x	900
Max. Overpanel Height (mm)		Transomed	2000		
Glazing		0.51m² (see section 7)			

INTUMESCENT MATERIALS: Type 617

HEAD:
Square: 1No. 15 x 4mm strips centrally fitted in the leaf head or frame reveal.
JAMBS & OVERPANEL: 1No. 15 x 4mm strips centrally fitted in the frame reveal.
HARDWARE PROTECTION: See section 11.

Maximum Door Leaf Size



Moralt Laminesse FireSound 54mm & 59mm Doorsets – 30 Minutes Fire Resistance CS Edge Protectors/Acrovyn Wrap

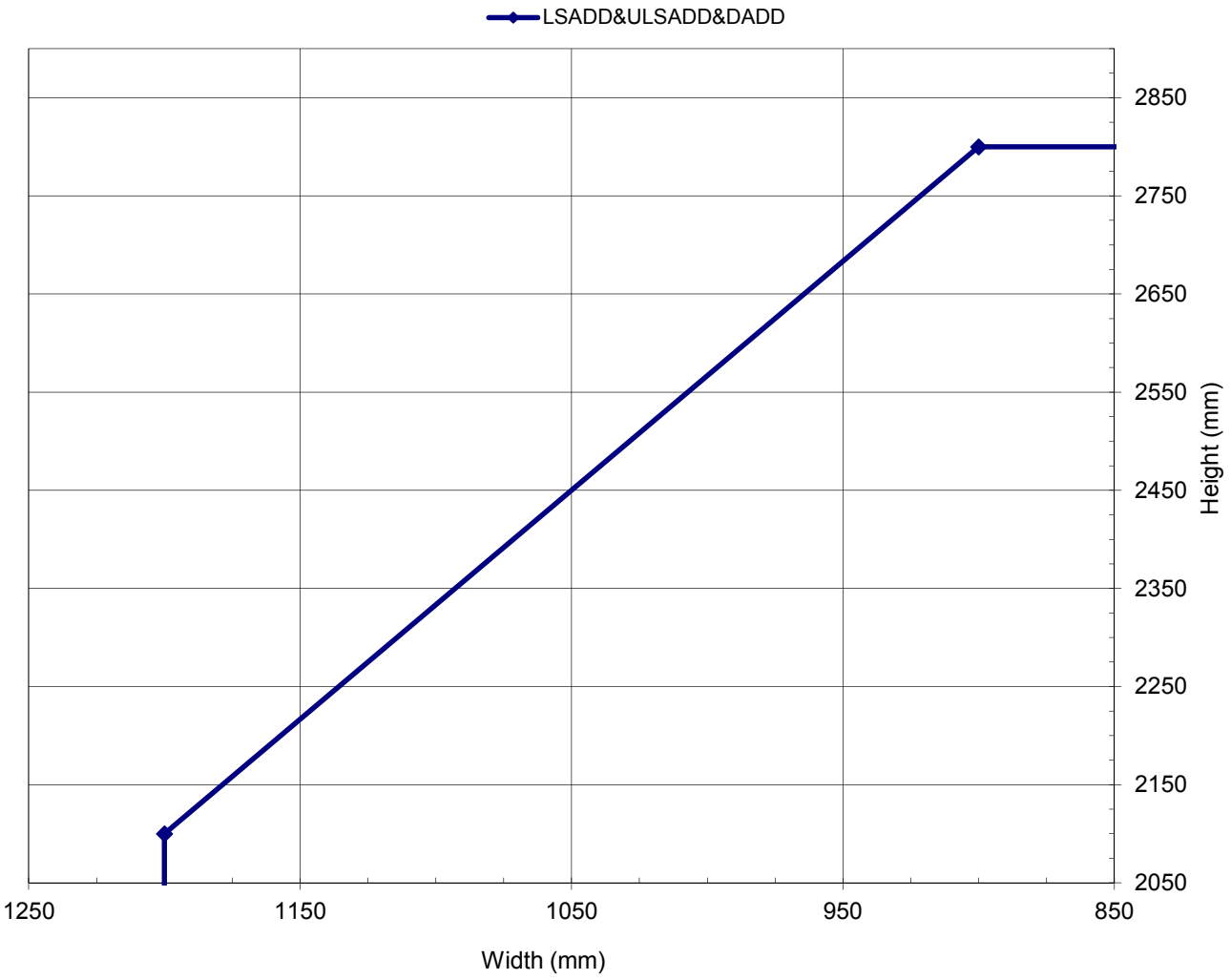
Latched & Unlatched, Single & Double Acting, Double Doorsets

	Configuration		Height (mm)		Width (mm)
Leaf Sizes	LSADD & ULSADD & DADD	From:	2100	x	1200
		To:	2800	x	900
Max. Overpanel Height (mm)		Transomed	1500		
Glazing		0.51m² (see section 7)			

INTUMESCENT MATERIALS: Type 617

HEAD:
Square: 1No. 15 x 4mm strips centrally fitted in the leaf heads or frame reveal.
JAMBS & OVERPANEL: 1No. 15 x 4mm strips centrally fitted in the frame reveal.
Meeting Edges: Square: 1No. 15 x 4mm strip centrally fitted in the meeting edge of both leaves.
HARDWARE PROTECTION: See section 11.

Maximum Door Leaf Size



Moralt Laminesse FireSound 54mm & 59mm Doorsets – 60 Minutes Fire Resistance CS Edge Protectors/Acrovyn Wrap

Latched & Unlatched, Single & Double Acting, Single Doorsets

	Configuration		Height (mm)		Width (mm)
Leaf Sizes	LSASD & ULSASD & DASD	From:	2100	x	970
		To:	2255	x	900
Max. Overpanel Height (mm)		Transomed	2000		
Glazing		0.51m² (see section 7)			

INTUMESCENT MATERIALS: Type 617

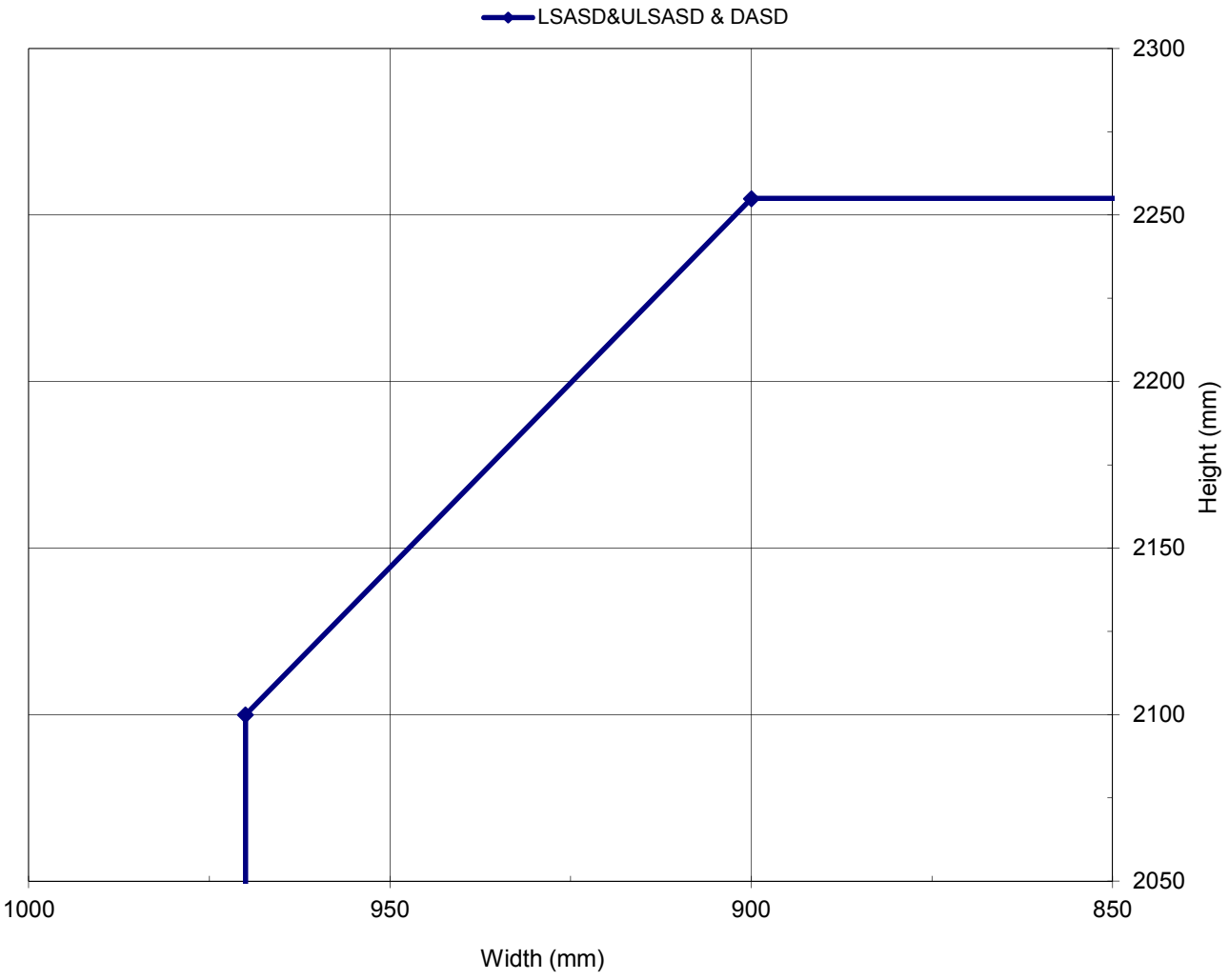
HEAD:

Square: 2No. 15 x 4mm strips centrally fitted 5mm either side of the centreline in the leaf head or frame reveal.

JAMBS & OVERPANEL: 2No. 15 x 4mm strips centrally fitted 5mm either side of the centreline in the frame reveal.

HARDWARE PROTECTION: See section 11.

Maximum Door Leaf Size



Moralt Laminesse FireSound 54mm & 59mm Doorsets – 60 Minutes Fire Resistance CS Edge Protectors/Acrovyn Wrap

Latched & Unlatched, Single & Double Acting, Double Doorsets

	Configuration		Height (mm)		Width (mm)
Leaf Sizes	LSADD & ULSADD & DADD	From:	2100	x	945
		To:	2205	x	900
Max. Overpanel Height (mm)		Transomed	1500		
Glazing		0.51m² (see section 7)			

INTUMESCENT MATERIALS: Type 617

HEAD:

Square: 2No. 15 x 4mm strips centrally fitted 5mm either side of the centreline in the leaf heads or frame reveal.

JAMBS & OVERPANEL: 2No. 15 x 4mm strips centrally fitted 5mm either side of the centreline in the frame reveal.

Meeting Edges: Square: 1No. 15 x 4mm strip centrally fitted in the meeting edge of both leaves.

HARDWARE PROTECTION: See section 11.

Maximum Door Leaf Size