



INTERNATIONAL FIRE
CONSULTANTS LIMITED

PRIVATE & CONFIDENTIAL

IFC FIELD OF APPLICATION REPORT

Field of Application for Moralt LAMINESSE FireSound Thickness 59mm FD90 Door Leaf Range Installed in Timber Frames

Fire Resistance Standard: BS476: Part 22: 1987

PAR/15143/01 REVISION B

Prepared on behalf of:

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NOTE: This report should not be manipulated, abridged or otherwise presented without the written consent of International Fire Consultants Ltd

#17364

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ISSUE AND AMMENDMENT RECORD

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PAR/15143/01	August 2015	DC	DJI	
Revision A	September 2015	DC	DJI	Clarification of glazing systems and details
Revision B	August 2017	WL/DC	DJI	Removal of confidential door construction details

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1. INTRODUCTION

This report has been prepared by International Fire Consultants Ltd (IFC), on the instruction of Moralt AG, to define the field of application for FD90 door assemblies, including Moralt LAMINESSE FireSound door leaves installed in timber frames, that are required to provide 90 minute fire resistance performance, when adjudged against BS476: Part 22: 1987.

The methodologies used in preparing this document are based upon the guidance in BS ISO/TR 12470; *'Fire resistance tests - Guidance on the application and extension of results'*.

It is proposed that variations to the tested specifications, as described in the following sections, may be accommodated into assemblies, without reducing their potential to achieve a 90 minute integrity rating, if tested in accordance with the method and criteria of BS476: Part 22: 1987. The omission of information on any components or manufacturing methods does not imply a lack of approval of those details but these would need to be the subject of a separate analysis. Only variations specifically mentioned are supported by this assessment document, and all other aspects must otherwise be as proven in tests summarised herein.

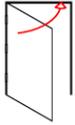
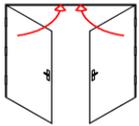
2. TEST EVIDENCE

The test evidence used to support this Field of Application Report is summarised in Appendix E of this report.

3. SCOPE OF APPROVAL

3.1 Door Assembly Configuration

The approved leaf sizes and configurations of door assemblies including Moralt LAMINESSE FireSound door leaves are outlined below:

Configuration	Envelope of Approved Leaf Size
 <ul style="list-style-type: none"> • Latched • Single Acting • Single Door • With or without Transomed Overpanel 	<p style="text-align: center;">Figure PAR/15143/01B:C01 in Appendix C</p>
 <ul style="list-style-type: none"> • Unlatched • Single Acting • Single Door • With or without Transomed Overpanel 	<p style="text-align: center;">Figure PAR/15143/01B:C02 in Appendix C</p>
 <ul style="list-style-type: none"> • Latched • Single Acting • Double Doors <i>Note 1</i> • With or without Transomed Overpanel 	<p style="text-align: center;">Figure PAR/15143/01B:C03 in Appendix C</p>

Note 1 Single acting double leaf door assemblies must have square edged meeting stiles.

3.2 Maximum Assessable Door Leaf Sizes

The calculated envelopes of assessed leaf dimensions for each door assembly configuration covered by this Field of Application report are given in Appendix C based upon use of the intumescent seal specifications shown in Appendix B.

Double door assemblies may each be of the same width, up to the maximum width indicated in Appendix C. For unequal pairs there is no limit on the ratio of leaf widths, (although the large leaf must still be within the limitations in Appendix C). The width of the small leaf shall not be less than 250mm, since this will affect its vertical stability relative to that of the larger leaf.

3.3 Overpanels

Only overpanels fitted above a transom member are permitted with this door assembly design. Intumescent seals at the panel/frame interface shall be as defined in Appendix B. Transom members shall be in accordance with Section 3.5. The installation shall be as defined in Section 3.8.

The size of overpanels is limited to the full width of the leaf/leaves contained within the doorset and the following maximum height:

Single leaves:	2000mm high
Double leaves:	1500mm high

In all cases, the overpanel must be a single piece panel across the frame width; i.e. a “double door” overpanel shall not be used above double door leaves. Approval of an overpanel size by IFC does not indicate that such a size can be fabricated, this should be checked with the manufacturer, and will be subject to the ability of the supporting construction providing adequate restraint/support.

3.4 Door Leaf Specification

The Moralt LAMINESSE FireSound door leaf and overpanel constructions comprise bespoke layered core and facing constructions. No stiles or rails are incorporated in the door leaf designs and all four edges are lipped with hardwood. Detailed constructional specifications are given below for the various leaf constructions included in this Field of Application Report.

The leaf construction, below, is based upon the test evidence detailed in Appendix E, and define variations and tolerances, where it is considered that these will not adversely affect overall fire resistance. The construction details are limited to the information available from the test reports.

The Moralt LAMINESSE FireSound leaf construction is described below and shown in **Figure PAR/15143/01B:A01** in Appendix A.

Component		Species/Material	Dimensions	Minimum Density
Moralt LAMINESSE Firesound 59mm		Held on confidential file by IFC	Minimum 58.5mm	–
Lippings		Hardwood <i>Note 2</i>	8–25mm thick <i>Note 3</i>	650kg/m ³ <i>Note 2</i>
			8–25mm thick plus 5–15mm thick inserted between the facings to cap the core <i>Note 5</i>	
Adhesives	Lippings	Polyurethane (PU) or cross linked PVA	–	–
Optional additional decorative finishes		Timber veneer, decorative plastic based laminate or PVC	Maximum 2mm thick	–
		Varnish or paint	Maximum 0.5mm thick	–

Note 2 Lippings to be straight grained hardwood, not Beech, with minimum measured density 650kg/m³ (measured at 12% moisture content) of appropriate quality in accordance with BS EN 942: 1996. Moisture content to be 10 ± 2% for UK market (or to suit internal joinery moisture content specification of export countries).

Note 3 To assist the application of the lippings a hardwood insert may be used as shown in option 2 on **Figure PAR/15143/01B:A01** in Appendix A.

3.5 Frames

Timber frames, to the specifications given below, may be used across the complete range of approved sizes and configurations outlined in Appendix C, utilising the intumescent seal specification outlined in Appendix B.

Material	Density	Minimum Face Width	Minimum Frame Depth	Minimum Stop Depth
Hardwood	640kg/m ³ <i>Note 4</i>	27mm, excluding stop <i>Note 5</i>	95mm	12mm <i>Note 6</i>

Note 4 Timber must have a minimum measured density at 12% moisture content. The timber must be straight grained hardwood, not Beech, and of appropriate quality in accordance with BS EN 942: 1996. The moisture content shall be 10 ± 2% for UK market, (or to suit internal joinery moisture content specification of export countries).

Note 5 These dimensions assume that the rear of the frame is protected by the adjacent wall (and gap-sealing), and that the frame does not project out from the wall. See Section 3.8 regarding projecting frames and shadow gaps.

Note 6 The doorstop is to comprise the same material as the door frame and may be either planted and pinned using 40mm steel pins, or integral with the main door frame, providing the minimum frame thickness remains as stated.

The overall frame depth may be increased by the use of extension linings.

In scenarios where the face of the frame, and the door, are flush with the face of the wall, architraves may be 'loose' (i.e. pin-fixed), but are optional, subject to adequate fire-stopping; (See Section 3.8 regarding wall/frame gaps). Where an integral architrave is used, the face of the door may project beyond the face of the wall, providing the thickness of the architrave is no greater than 10mm and it projects at least 15mm beyond the rear face of the door frame. This assumes that the face of the door leaf is flush with the face of the architrave.

Head/jamb joint : Mortice and tenon, or half-lapped joint, head twice screwed to each jamb **or** mitred joint which is glued with a non-thermally softening adhesive and the head twice screwed to each jamb.

Transom members : When a transom is used between a door and an overpanel, the member shall comprise of back to back frame members to give a minimum face width of 54mm with minimum 12mm thick door stops on both sides (i.e. making a minimum 78mm wide overall section).

At the interface between the two frame members 2no 10 x 4mm or 10 x 2mm graphite based intumescent seals should be recessed into the rear face of one of the frame sections. These seals should be positioned a maximum of 10mm from the face of the frames.

At the interface between the two frame sections a maximum 3 x 3mm quirk may be included for aesthetic purposes.

The transom detail is shown in **Figure PAR/15143/01B:A01** in Appendix A.

Architraves : Architraves are optional and have no fire performance requirements. (See Section 3.8 regarding wall/frame gaps).

3.6 Glazed Apertures

3.6.1 Glass types

The following glass types are approved for use in the doors considered, herein, which are compatible with the identified approved glazing systems given in Section 3.6.2, although some restrictions on size may be given in subsequent sections.

G90/1	25mm thick Polflam EI60 (by Polflam)
G90/2	23mm thick Pyrostop 60-101 (by Pilkington) <i>Note 7</i>
G90/3	10mm thick Pyrodur EW60-10 (by Pilkington) <i>Note 8</i>
G90/4	6mm thick Pyran S (by Schott) <i>Note 9</i>

Note 7 Glass type G90/2, 23mm thick Pyrostop 60-101, is restricted to a maximum vertical length of 1135mm due to limitations in fire resistance test evidence. Apart from this limitation the assessed sizes are all as given in Section 3.6.4.

Note 8 Glass type G90/3, 10mm thick Pyrodur EW60-10, is restricted to a maximum horizontal length of 330mm due to limitations in fire resistance test evidence. Apart from this limitation the assessed sizes are all as given in Section 3.6.4.

Note 9 Glass type G90/4, 6mm thick Pyran S, is restricted to a maximum horizontal length of 260mm due to limitations in fire resistance test evidence. Apart from this limitation the assessed sizes are all as given in Section 3.6.4.

The expansion allowance for this glass types shall be as recommended by the glass manufacturer.

3.6.2 Glazing materials and systems

The following glazing materials are approved for use in the doors considered, herein, which are compatible with the identified approved glass types listed above, although some restrictions on size may be given in subsequent sections.

S90/1	15 x 2mm Superwool paper sealed with Firestop 700 silicone and 59 x 2mm Therma Liner by Odice (use with G90/1)
S90/2	25 x 2mm Therm-A-Strip and 59 x 2mm Therm-A-Liner by Intumescent Seals (use with G90/2) <i>Note 10</i>
S90/3	25 x 5.8mm (compressed to 4mm thick) ISL60 Plus and 59 x 2mm Therm-A-Liner by Intumescent Seals (use with G90/3 and G90/4) <i>Notes 11 & 12</i>
S90/4	25 x 2.5mm FireGlaze Tape and 59 x 2.5mm FireGlaze Tape by Sealmaster (use with G90/3) <i>Note 11</i>

Note 10 Glass type G90/2, 23mm thick Pyrostop 60-101, is restricted to a maximum vertical length of 1135mm due to limitations in fire resistance test evidence. Apart from this limitation the assessed sizes are all as given in Section 3.6.4.

Note 11 Glass type G90/3, 10mm thick Pyrodur EW60-10, is restricted to a maximum horizontal length of 330mm due to limitations in fire resistance test evidence. Apart from this limitation the assessed sizes are all as given in Section 3.6.4.

Note 12 Glass type G90/4, 6mm thick Pyran S, is restricted to a maximum horizontal length of 260mm due to limitations in fire resistance test evidence. Apart from this limitation the assessed sizes are all as given in Section 3.6.4.

3.6.3 Bead profiles and installation

The approved bead sizes and profiles, and relevant fixing details, are shown on **Figure PAR/15143/01B:A02** in Appendix A, which also define any limitations upon options of interchangeability with glass types, glazing systems and bead profiles.

Glazing beads formed from hardwood, not Beech, with a minimum measured density of 640kg/m³ at 12% moisture content. The timber must be straight grained and of appropriate quality in accordance with BS EN 942: 1996. The moisture content shall be 10 ± 2% for UK market, (or to suit internal joinery moisture content specification of export countries).

3.6.4 Assessed aperture sizes

Apertures are created by cutting directly into the door slab, with beads fitted directly to the particleboard 'core'. Alternatively, an 8 – 12mm thick hardwood lipping may be applied to the aperture perimeter, using the specification for lippings defined in Section 3.4.

Based upon the size of apertures tested, it is the opinion of IFC that the following limitations apply to glazed apertures in the door leaves considered herein;

Maximum area of apertures	-	0.76m ²
Maximum vertical length of aperture	-	1620mm <i>Note 13</i>
Maximum horizontal length of aperture	-	480mm <i>Note 13</i>
Minimum distance from leaf edge (top)	-	200mm
Minimum distance from leaf edge (sides)	-	200mm
Minimum distance between apertures	-	150mm
Minimum distance from bottom of leaf	-	200mm

Note 13 Refer to Section 3.6.1 for restrictions in size of apertures with specific glass panes and Section 3.6.2 for restrictions in size of apertures with specific glazing systems.

More than one aperture may be included in each door leaf subject to the individual limitations above.

3.7 Hardware

Some of the various items of hardware to be used with the proposed door assemblies will have a positive contribution to the overall performance ('essential hardware') and others are classed as 'non-essential'. However, in all cases it must be ensured that choice of items, or their installation within the assemblies, does not have a detrimental effect upon their achievement of the required period of fire resistance.

General guidance for all items of hardware is outlined in Appendix D, based upon the range of items tested. All hardware beyond the scope of the general guidance must have been subjected to fire resistance testing, and/or assessed by a notified body to support its use in doors of a similar construction to that proposed.

3.8 Installation, Supporting Construction and Door Edge Gaps

Timber frames must be fixed back to the supporting construction with steel fixings at centres not exceeding 600mm on the vertical edges (minimum 200mm from the top and bottom), and a minimum of one fitted centrally across the width of the frame head of double doors. Screws shall be of sufficient length to penetrate the wall by at least 40mm, and shall be positioned such that they are not exploited by charring of the frame, irrespective of the direction of test exposure; (this may necessitate a twin line of screws). Packers shall be used at all fixing positions, although if combustible packers are employed, these must be protected by a layer of firestopping (see below) aligned near to each face of the door frame.

The supporting construction may be timber or steel stud plasterboard partition, blockwork, brickwork or concrete walls, but shall be of a type that has been tested or assessed to provide in excess of 90 minutes fire resistance, at the required size, when incorporating door openings. If fitted into timber or steel stud partitions, the method of forming the door assembly aperture must be as tested by the partition and/or door assembly manufacturer.

Note 14 Reference to steel stud partitions is in the context of permanent elements, such as those designed and proven by the plasterboard manufacturers – this report does not approve use of the proposed door assemblies in proprietary 'demountable' partitions, which must be subject to a full and independent appraisal of the particular system and door assemblies therein.

No part of the rear of the frame section shall be exposed once installed, (except for integral architraves) and leaves must not project beyond the exposed face of the door frame. There shall be no feature rebates or shadow gaps at the junction of the frame and wall with timber frames.

No part of the rear of the frame section shall be exposed once installed and leaves must not protrude beyond the exposed face of the door frame. There shall be no feature rebates or shadow gaps at the junction of the frame and wall.

The gap between the supporting construction and door frame should not exceed 15mm in width and should be filled with tightly packed mineral wool and capped off with acrylic intumescent mastic to a minimum depth of 20mm from both sides. The gap-sealing shall be positioned on the plane of the door leaf (unless combustible packers are employed).

The gap between the door and the frame or between meeting stiles, and between double doors, should be 1.5–4mm. Gaps under the door(s) should not exceed 6mm for fire performance, although, if smoke control is also required, these gaps should only be 3mm, or smoke seals should be included (see also Section 3.10 regarding suitability of smoke seals).

The door assembly design should be such that door leaves are fully flush within the frame when closed. The face of leaves in double door assemblies should be flush with each other at meeting stiles when closed.

Overpanels shall be secured into the frame using steel screws fixed through the rear of the frame members, passing at least 40mm into the centre line of the overpanel thickness. (Screws must not be fixed through the overpanel into the stops, or vice versa). Screws must be no more than 100mm from each corner of the overpanel, and at maximum 400mm centres, with a minimum of 2no screws per overpanel edge. The gap between overpanel and frame should not exceed 3mm.

3.9 Intumescent Seals

It is important that the type, size and fitting detail for the intumescent seals remains strictly as tested. Intumescent seals can often exhibit significantly different characteristics which could alter the performance obtained during test, and therefore they must not be considered interchangeable, irrespective of whether the product has been tested on an alternative design of door blank and the seal dimensions are maintained. The intumescent seal specifications, widths, and positions are shown in Appendix B, based upon tested details.

3.10 Ambient Temperature Smoke Seals

Smoke seals, or combined intumescent/smoke seals (using the specification approved in Section 3.9), that have been tested to BS476: Part 31: Section 31.1: 1983 and shown not to leak by more than 3m³/m/hr at 25Pa may be used in conjunction with the proposed door assemblies to provide smoke control.

The orientation of the seals, door edge gaps, degree of hardware interruption, and leaf configuration, will need to be as tested to BS476: Part 31: Section 31.1: 1983 to achieve the desired level of smoke control, unless these conflict with the intumescent seal widths and positions as shown in Appendix B, in which case, the latter shall take precedence. Test evidence to BS476: Part 22: 1987 shall be available to demonstrate that the smoke seals will not adversely affect the overall fire resistance of timber door assemblies, when fitted in the proposed arrangements.

4. CONCLUSION

It is the opinion of International Fire Consultants Ltd that, if the proposed Moralt LAMINESSE FireSound 59mm door leaves installed in timber frames were manufactured and installed in accordance with the requirements of this Field of Application Report, the leaf sizes are within the envelope of approved dimensions/sizes given for the configuration outlined in Appendix C, and the hardware, glazing details, and intumescent seal specification are in accordance with the recommendations of this report, then the assemblies, as described, would satisfy the integrity criteria for 90 minutes when tested for fire resistance to the conditions of BS476: Part 22: 1987.

5. DECLARATION BY THE APPLICANT

We the undersigned, confirm that, except for that information declared to International Fire Consultants Ltd previously during the original engineering evaluation process, the components, products, and/or assemblies evaluated within IFC Field of Application Report PAR/15143/01 Revision B have not been altered in any way; and have not subsequently, to our knowledge, been included in a fire test, to the methodology of BS 476: Part 22: 1987, in the form and/or configurations proposed.

We also confirm that we have supplied all information and assurances requested of us, for the purpose of writing this Field of Application Report, and are not aware of any other information that would adversely influence or affect the conclusions of this report.

We agree that if fire test evidence or other information subsequently becomes available, to supply this to IFC in full and seek immediate review of the continuing validity of the original report from IFC. If after review IFC conclude that the original evaluation and report is no longer appropriate, we agree to withdraw it and any references to it from circulation and advise clients and agents accordingly.

Signature:



Position:



Company:

Moralt AG

6. LIMITATIONS

This assessment addresses itself solely to the ability of the proposed assemblies described to satisfy the criteria of the fire resistance test and does not imply any suitability for use with respect to other unspecified criteria.

This document only considers the door assemblies described, herein, and assumes that the surrounding construction will provide no less restraint than the tested assembly and that it will remain in place and be substantially intact for the full fire resistance period.

This report is issued on the basis of test data and information to hand at the time of issue. If contradictory evidence becomes available, IFC reserves the right to withdraw the report unconditionally but not retrospectively.

Where the constructional information in this report is taken from details provided to International Fire Consultants Ltd (IFC) and/or from fire resistance test reports referenced herein, it is, therefore, limited to the information given in those documents. It is necessarily dependent upon the accuracy and completeness of that information. Where constructional or manufacturing details are not specified, or discussed, herein, it should not, therefore, be taken to infer approval of variation in such details from those tested or otherwise approved.

The analysis and conclusions within this report are based upon the likely fire resisting performance of a complete assembly that is manufactured and installed in accordance with this document, and offered for fire resistance testing in 'perfect' condition. In practice, management procedures must be in place in any building where the door assemblies are installed, to ensure that no parts of the assembly are damaged or faulty. Further, the doors must open and close without the use of undue force. The edge gaps/alignment of door leaves must be in accordance with the tolerances defined, herein, when the doors are closed. Any such shortfalls in respect to the condition of the assemblies will invalidate the approval by IFC, and may seriously affect the ability of the assemblies to provide the required level of fire resistance performance. Determination of what constitutes wear or damage, and any corrective actions in order to return assemblies to the required condition, should only be carried out following consultation with the manufacturer and IFC.

This report applies to fire door assemblies that are evaluated to BS476: Part 22: 1987; which is an applicable test method currently referenced within guidance to Building Regulations in the United Kingdom, and in building codes in some other countries. However, IFC have a duty of care to advise that introduction of CE Marking may become compulsory for fire resisting doorsets marketed in the EU, during the validity period of this report; in which case, users should contact IFC for further details/advice.

Where the assessed constructions have not been subject to an on-site audit by International Fire Consultants Ltd, it is the responsibility of anyone using this report to confirm that all aspects of the assemblies fully comply with the descriptions and limitations, herein.

Any materials specified in this report have been selected and judged primarily on their fire performance. IFC do not claim expertise in areas other than fire safety. Whilst observing all possible care in the specification of solutions, we would draw the reader's attention to the fact that during the construction and procurement process, the materials used should be subjected to more general examination regarding the wider Health and Safety, and CoSHH Regulations.

This assessment considers the fire resistance performance of the door assemblies when tested with the leaves in the closed position, within the frame reveal; either retained by the latch, or self-closing device, or locked shut, as applicable. The door assemblies will only provide the assessed fire performance when in a similar configuration; and it is the responsibility of the building occupants/owner to ensure that this is the case.

This Report is provided to the sponsor on the basis that it is a professional independent engineering opinion as to what the fire performance of the construction/system would be should it to be tested to the named standard. It is IFC's experience that such an opinion is normally acceptable in support of an application for building approvals, certainly throughout the UK and in many parts of Europe and the rest of the world.

However, unless IFC have been commissioned to liaise with the Authorities that have jurisdiction for the building in question for the purpose of obtaining the necessary approvals, IFC cannot assure that the document will satisfy the requirements of the particular building regulations for any building being constructed.

It is, therefore, the responsibility of the sponsor to establish whether this evidence is appropriate for the application for which it is being supplied and IFC cannot take responsibility for any costs incurred as a result of any rejection of the document for reasons outside of our control. Early submittal of the Report to the Authorities will minimise any risks in this respect.

7. VALIDITY

This Field of Application Report has been prepared based on International Fire Consultants Ltd's present knowledge of the products described, the stated testing regime and the submitted test evidence. For this reason, anyone using this document after September 2020 should confirm its ongoing validity.

Prepared by:



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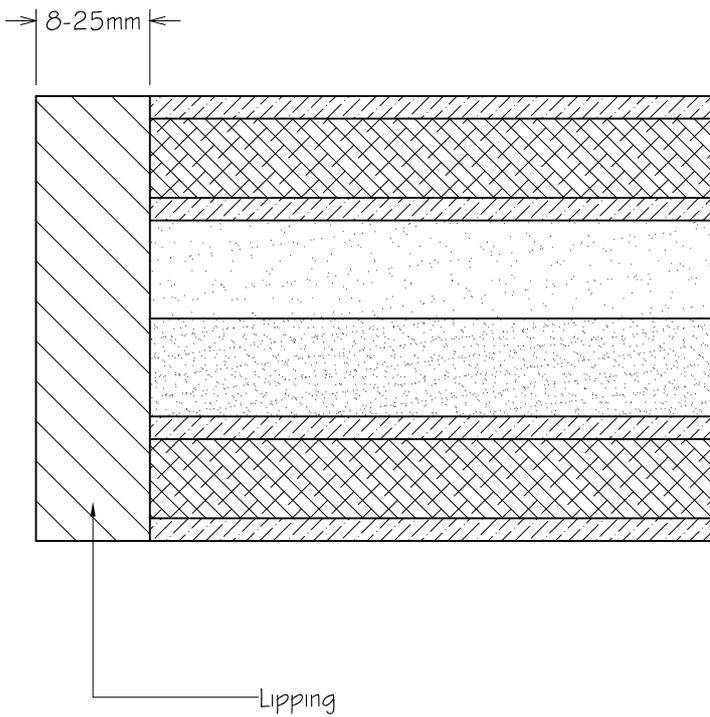
APPENDIX A

Figures PAR/15143/01B:A01 to A03

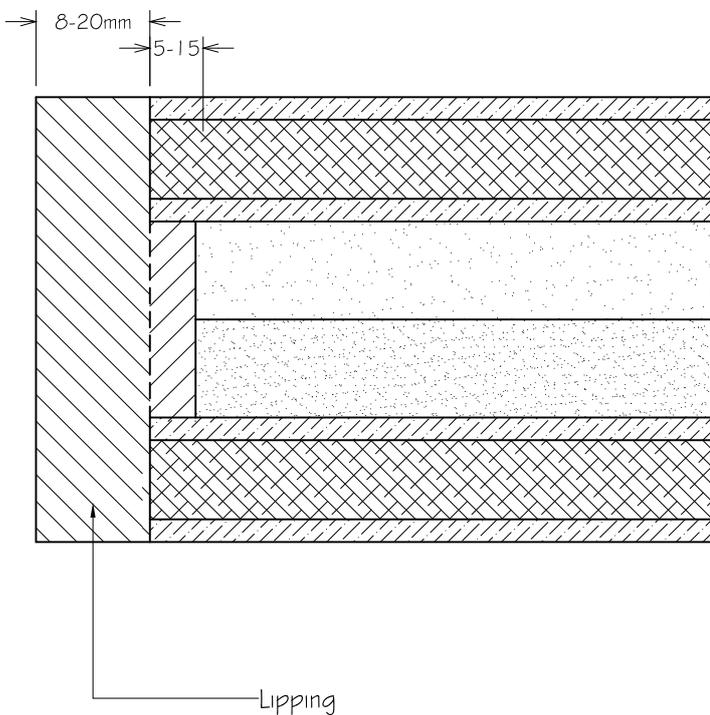
Lipping and Glazing Details

***The figures in this Appendix are not included
in the sequential page numbering of this report***

OPTION 1 (without insert - see Section 3.4)



OPTION 2 (with hardwood insert - see Section 3.4)



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Only work to dimensions stated on drawing.

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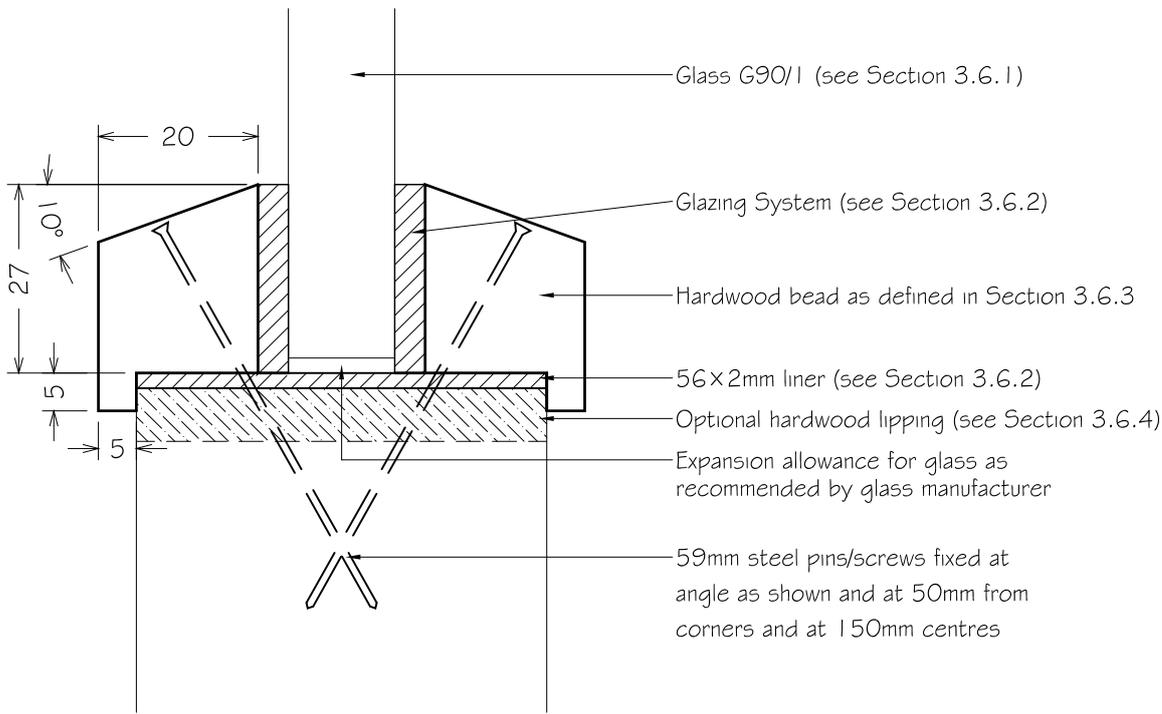
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PAR/15143/01 Revision B
Moralt AG
Moralt LAMINESSE FireSound
Thickness: 59mm FD90 Door Leaf
Range Installed in Timber Frames

Laminesse FireSound
Lipping Options

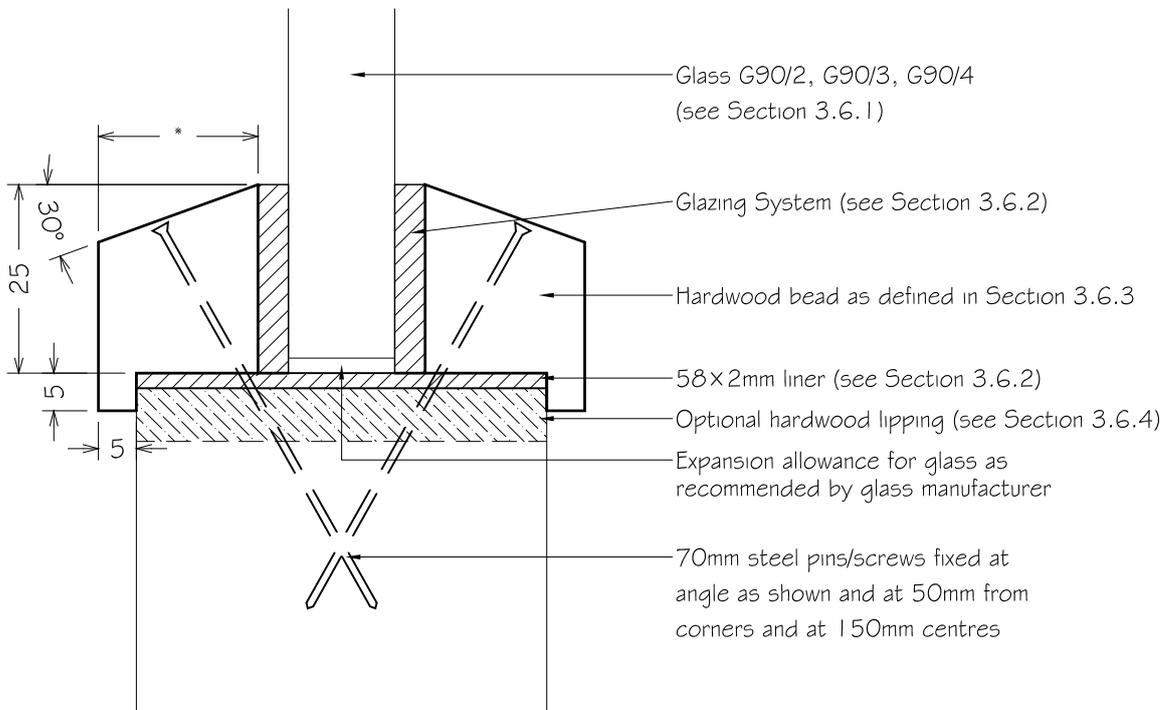
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PAR/15143/01B:A01



BEAD DETAIL - B1



BEAD DETAIL - B2

*Bead size is dependant upon door leaf thickness

Refer to text of Report for details of glass and seal types

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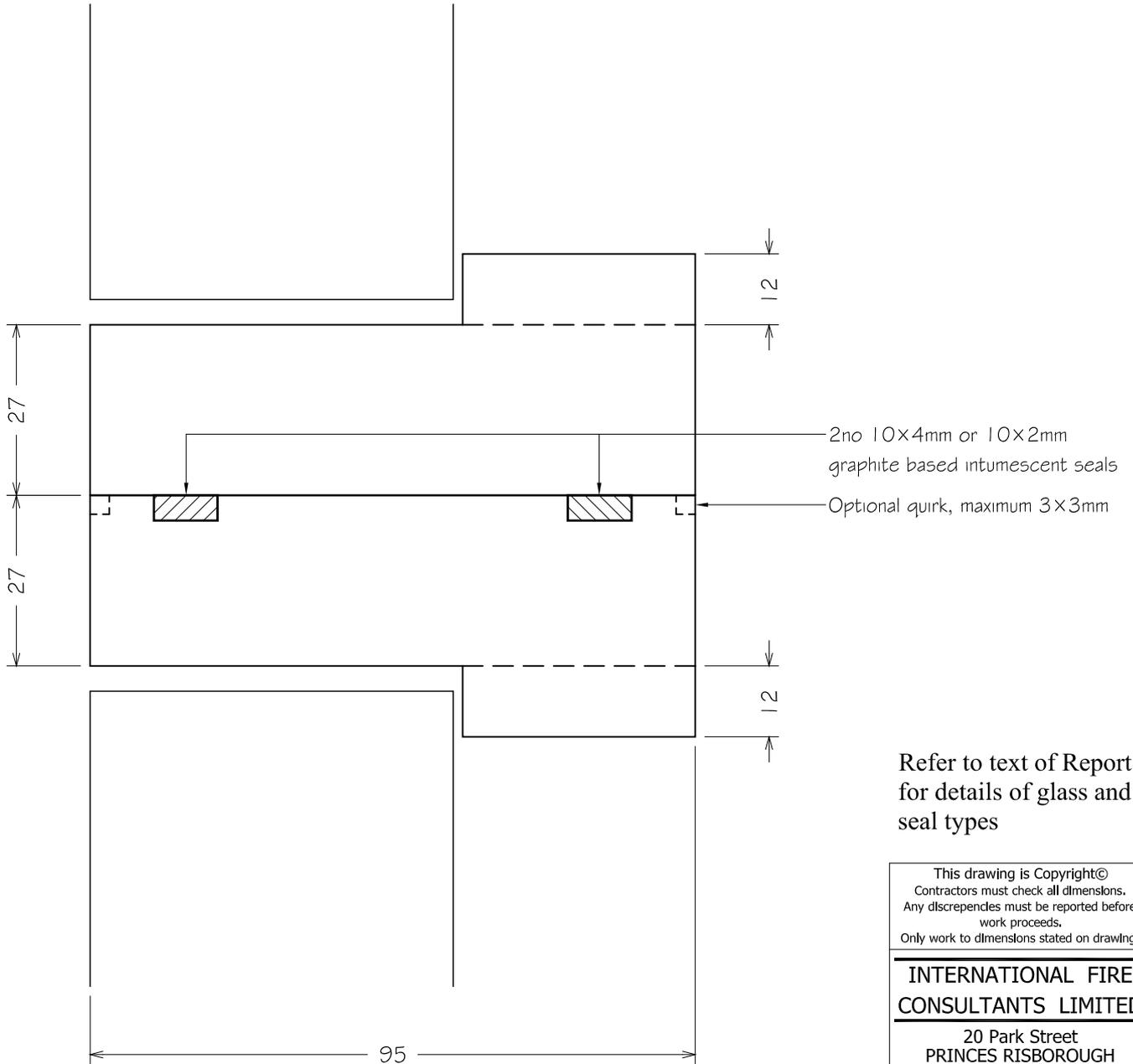
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PAR/15143/01 Revision B
Moralt AG
Moralt LAMINESSE FireSound
Thickness 59mm FD90 Door Leaf
Range Installed in Timber Frames

Glazing Detail

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PAR/15143/01B:A02



Refer to text of Report for details of glass and seal types

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<p>Field of Application Report PAR/15143/01 Revision B Moralt AG Moralt LAMINESSE FireSound Thickness: 59mm FD90 Door Leaf Range Installed in Timber Frames</p>	
<p>Transom Detail</p>	
<p>Job number: 17364</p>	
<p>Drawn by: CSP</p>	<p>Checked by: WL</p>
<p>Not To Scale</p>	<p>Drawn: Aug 2017</p>
<p>PAR/15143/01B:A03</p>	

APPENDIX B

Assessed Intumescent Seal Specifications for FD90 Moralt LAMINESSE FireSound Thickness 59mm Door Leaves Installed in Timber Frames

Location	Intumescent Seal Specification
Hanging and closing edge (stiles/jambes)	2no 15 x 4mm strips, centrally spaced 10mm apart, fitted in the leaf edge or frame reveal
Head	2no 15 x 4mm strips, centrally spaced 10mm apart, fitted in the leaf edge or frame reveal
Meeting stiles	2no 15 x 4mm strips, centrally spaced 10mm apart, fitted in the active leaf edge only
Overpanel perimeter	2no 15 x 4mm strips, centrally spaced 10mm apart, fitted in the overpanel edge or frame reveal

Note:

The 4mm thick seals are to be Pyroplex graphite based or Lorient Polyproducts Ltd Type 617 type pvc encased and may be employed across the complete range of door sizes and configurations approved herein. Alternatively these can be substituted for 1.8mm thick unencased Odice SAS flexible graphite based seals.

APPENDIX C

Figures PAR/15143/01B:C01 to C03

**Assessed Leaf Size Envelopes for FD90
Moralt LAMINESSE FireSound Thickness
59mm Door Leaves Installed in Timber
Frames**

***The figures in this Appendix are not included
in the sequential page numbering of this report***

A	B	
766	1045	Width
2650	2091	Height

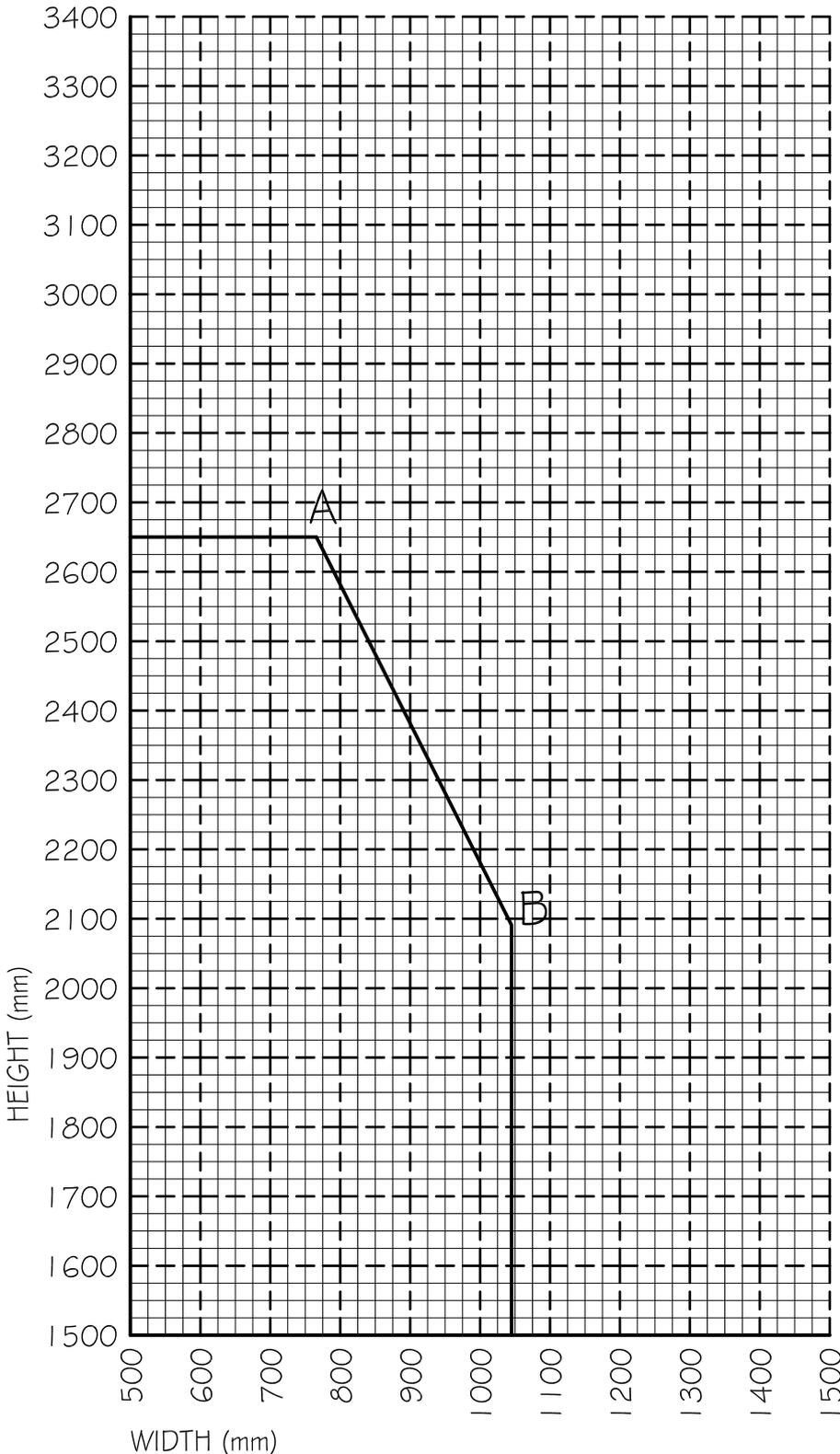
LEAF SIZE ENVELOPE POINTS

Note:
These sizes relate to
the door leaf.

PROPOSED CONFIGURATION:

FD90
LATCHED
SINGLE ACTING
SINGLE LEAF
WITH OR WITHOUT TRANSOMMED OVERPANEL

TIMBER FRAME



This figure must be read in conjunction with International Fire Consultants Ltd's Field of Application Report PAR/15143/01 Revision B which contains full details of the assessed door construction.

ENVELOPE OF APPROVED LEAF SIZES

The above graph represents the envelope of approved leaf sizes for the proposed door leaf configuration. Any combination of leaf width and height that falls within the graph axes and the solid line on the graph above are approved.

POINT A represents the maximum leaf height and its associated width.

POINT B represents the maximum leaf width and its associated height.

This drawing is Copyright©
Contractors must check all dimensions.
Any discrepancies must be reported before
work proceeds.
Only work to dimensions stated on drawing.

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Field of Application Report
PAR/15143/01 Revision B
Moralt AG
Moralt LAMINESSE FireSound
Thickness 59mm FD90 Door Leaf
Range Installed in Timber Frames

Envelope of Approved
Leaf Sizes
LSASD

Job number: 17364

Drawn by: CSP Checked by: WL
Not To Scale Drawn: Aug 2017

PAR/15143/01B:CO1

A	B	
751	1025	Width
2599	2051	Height

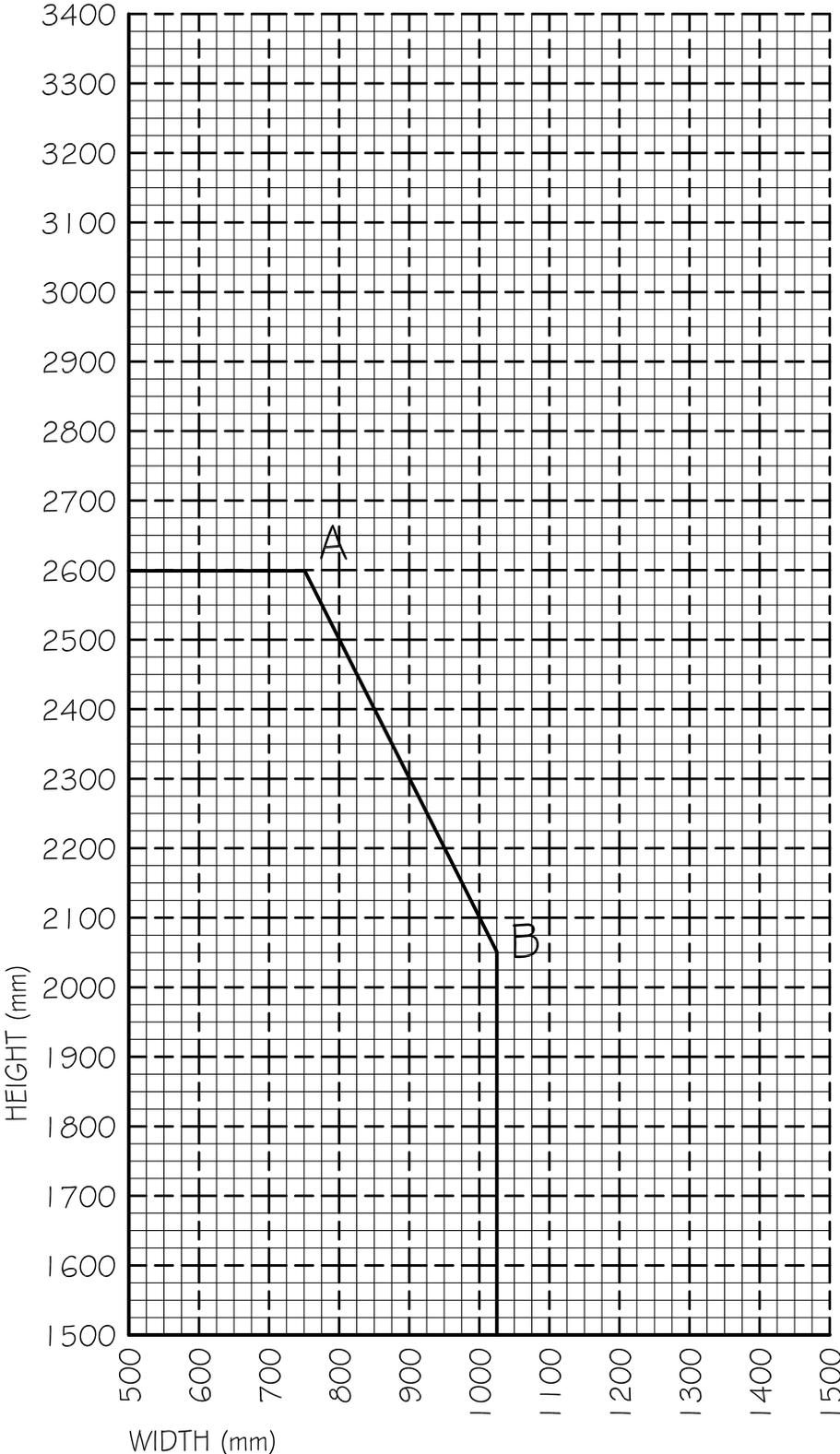
LEAF SIZE ENVELOPE POINTS

Note:
These sizes relate to
the door leaf.

PROPOSED CONFIGURATION:

FD90
UNLATCHED
SINGLE ACTING
SINGLE LEAF
WITH OR WITHOUT TRANSOMMED OVERPANEL

TIMBER FRAME



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ENVELOPE OF APPROVED LEAF SIZES

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Field of Application Report
PAR/15143/01 Revision B
Moralt AG
Moralt LAMINESSE FireSound
Thickness 59mm FD90 Door Leaf
Range Installed in Timber Frames

Envelope of Approved
Leaf Sizes
ULSASD

Job number: 17364

Drawn by: CSP Checked by: WL
Not To Scale Drawn: Aug 2017

PAR/15143/01B:CO2

A	
915	Width
2250	Height

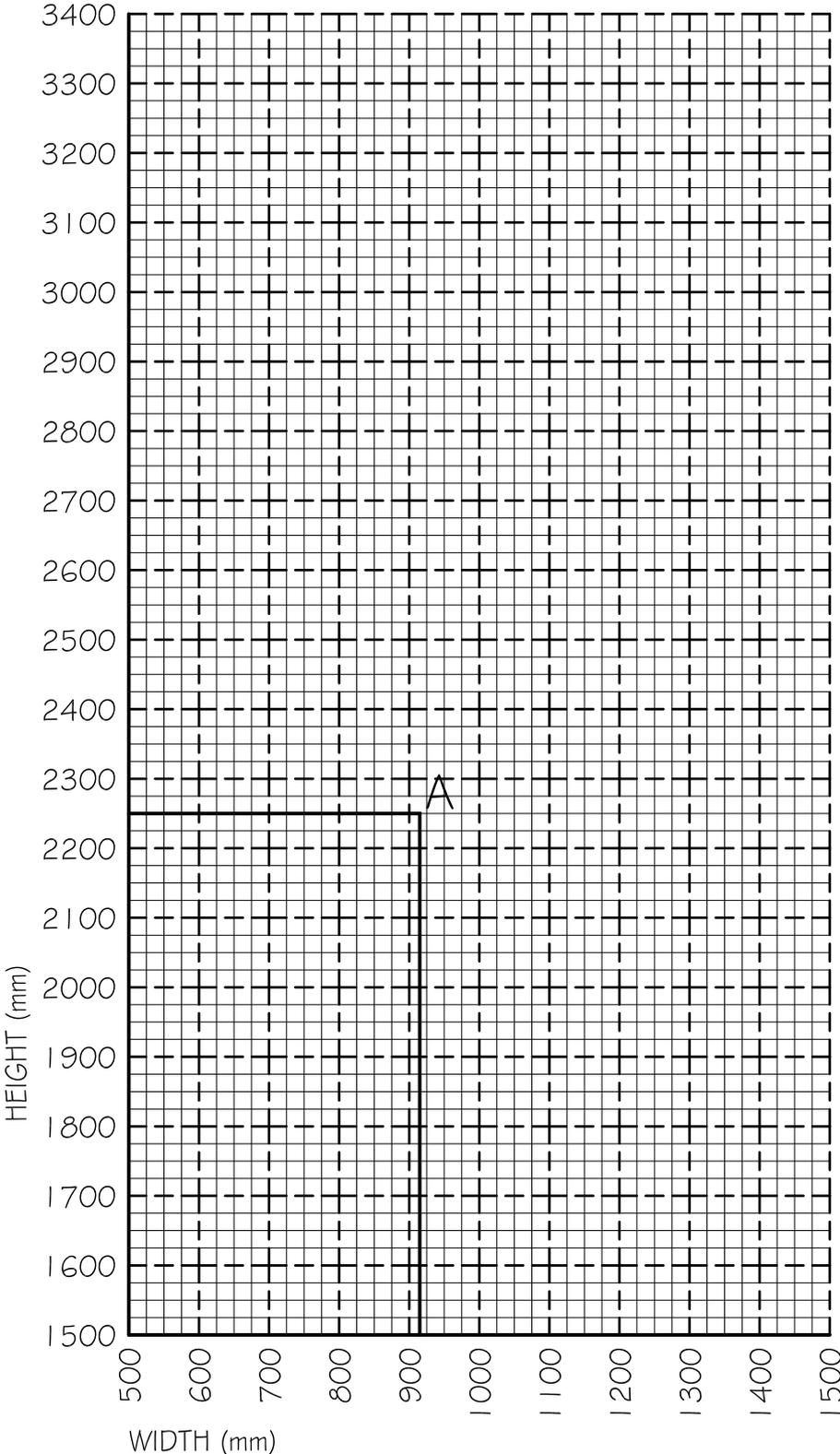
LEAF SIZE ENVELOPE POINTS

Note:
These sizes relate to
the door leaf.

PROPOSED CONFIGURATION:

FD90
LATCHED
SINGLE ACTING
DOUBLE LEAF
WITH OR WITHOUT TRANSOMMED OVERPANEL

TIMBER FRAME



This figure must be read in conjunction with International Fire Consultants Ltd's Field of Application Report PAR/15143/01 Revision B which contains full details of the assessed door construction.

ENVELOPE OF APPROVED LEAF SIZES

The above graph represents the envelope of approved leaf sizes for the proposed door leaf configuration. Any combination of leaf width and height that falls within the graph axes and the solid line on the graph above are approved.

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Field of Application Report
PAR/15143/01 Revision B
Moralt AG
Moralt LAMINESSE FireSound
Thickness: 59mm FD90 Door Leaf
Range Installed in Timber Frames

Envelope of Approved
Leaf Sizes
LSADD

Job number: 17364

Drawn by: CSP	Checked by: WL
Not To Scale	Drawn: Aug 2017

PAR/15143/01B:CO3

APPENDIX D

General Guidance on Installation of Hardware

D.1 Hinges

Butt hinges

Butt hinges may be used, subject to compliance with the specifications below.

Hinge types: Fixed pin, washered butt, ball bearing butt or journal supported hinges may be used.

Number of hinges: 3no (1½ pairs) per leaf. (4no should be used on leaves greater than 2200mm high).

Positions: Top hinge set 150mm from head of leaf and bottom hinge set 225mm up from the bottom of the leaf. The middle hinges must be equispaced between the top and bottom hinge or 200-250mm below the top hinge. (All positions ± 25 mm).

Fixings: Steel screws, as recommended by the hinge manufacturers, but in no case smaller than No 8 (3.8mm diameter) x 32mm long, and having thread for the full length. Position of screws (in relation to the door face) in blades of alternative hinge shall be similar to hinges tested with the proposed door type.

Hinge blade sizes: 2.5–3.5mm thick x 100–110mm high x 32–38mm wide. (These dimensions refer to the blade size, i.e. the part of the hinges that are recessed into the edge of the leaves/frame).

Hinge materials: Steel or Stainless Steel. (Aluminium, Nylon or 'Mazac' are not permitted). No combustible or thermally softening materials to be included.

Additional protection: All hinge blades must be bedded on 2mm thick graphite based or non-pressure forming intumescent material and a minimum 15mm width of intumescent seal shall be continuous alongside the hinge blades.

Rising butt, non-cranked butts and spring hinges are not suitable for use on doors approved within the scope of this generic assessment, although may be suitable to form the subject of an individual and specific evaluation.

Concealed or invisible hinges

Tectus Concealed Hinge Type TE527 3D hinges have been successfully included in fire resistance testing with LAMINESSE FireSound door assemblies. Other concealed or invisible hinges may be included within door assemblies subject to compliance with the specifications below.

- Alternative concealed or invisible hinges must not be larger in any dimension than the Tectus TE527 3D hinge and must have test evidence for their successful inclusion in a 90 minute fire resisting 54mm thick timber based door assembly.
- Prior to fixing of the concealed or invisible hinges, the 'cold-state' performance of the screws that fix the hinges into the core and frame must be evaluated; particularly since the screws are so near to the edge of the recess for the main body of the hinge.
- It must be ensured that the correct number of hinges are fitted, to ensure that the door leaf is supported for the full fire resistance period.
- The lipping at the hanging jamb of the door leaf must be minimum 15mm thick to the specification given in Sections 3.4.1 and 3.4.2.
- The slots for the hinges in the door leaf and frame must be cut tightly, such that there are no gaps around the hinge components/intumescent material when the hinges are installed.
- Hinge position to be set 200mm from top of door, 200mm from bottom, and third hinge set nominally 300mm below top hinge, with additional hinges as required.
- All hinge portions must be fitted with the intumescent gasket kits supplied by the hinge manufacturer (as per test evidence for the hinge type).
- At least 15mm width of intumescent strip must be continuous past the hinge locations; i.e. between the hinge and the stop.

D.2 Mortice Latches/Locks

Where mortice latches or locks are fitted, they should be centred at 1000mm (\pm 200mm), above the bottom of the door leaf, and should comply with the following specifications:

Latch/lock types: Mortice latches, tubular mortice latches, sashlocks, deadlocks

Maximum dimensions: Forend plate: 235mm long x 20mm wide x 3mm thick
Latch body: 18mm thick x 170mm high x 135mm wide
Strikeplate: 200mm long x 20mm wide x 3mm thick

Materials: Latches must have no essential part of their structure made from polymeric or other low melting point (<800°C) materials, and should not contain any flammable materials.

Additional protection: The latch body must be encased in 1mm thick non-pressure forming intumescent material.
The forend and strikeplate must be bedded on 2mm thick non-pressure forming intumescent material.

Over-morticing is to be avoided; mortices should be as tight as possible to the latch. If gaps around the case exceed 2mm, then these must be made good with intumescent mastic or sheet material. Holes for spindles or cylinders should be kept as small as is compatible with the operation of the hardware.

Where glazing apertures are also incorporated, and are positioned such that locks/latches are included in the margin between the aperture and door edge, care must be taken to ensure that the effective door 'stile' is not weakened by the mortice. It is a condition of this assessment that, except where tubular latches are employed, the margin must be at least 75mm wider than the lock/latch mortice. If the mortice latch/lock is fitted in line with a 'rail' between two apertures, no part of the lock mortice shall be closer than 50mm to the edge of any aperture.

D.3 Door Closers

Each hinged door leaf must be fitted with a self-closing device unless they are normally kept locked shut and labelled as such with an appropriate sign which complies with BS5499: Part 1: 1990. The closer used in the test was not specified but other closers may be used, subject to compliance with the specifications below.

It is essential that the closers are of the correct power rating for the width and weight of the doors (minimum power size 3). They must be fitted according to the manufacturer's instructions, and be adjusted so that they are capable of fully closing the door leaf, against any friction imposed by the latch, (and smoke seals, if fitted), from any position of opening.

Face fixed overhead closers

Face-fixed overhead door closer (and accessories such as soffit brackets) that have been tested, assessed or otherwise approved for use on unlatched FD90 cellulosic door leaves in timber frames may be used. Any accessory that is located within the door reveal must have appropriate test or assessment evidence. In addition, where areas of uninsulated glazing are adjacent to the closer, the selected closer type must have been tested on the unexposed face of an uninsulated steel door, or a fully glazed door fitted with uninsulating glass, to demonstrate that the closer does not emit flammable fluids onto the glass face that would otherwise cause integrity failure before the required period of fire resistance.

Concealed overhead closers

A concealed overhead closer has been successfully included in fire resistance testing with FireSound door assemblies. This is a 'slide-arm' type closer, with the closer morticed into the head of the leaf and a single arm and roller acting in a slide channel morticed into the frame head. The closer is installed in a relatively deep mortice in the door head, with the slide channel in a mortice in the frame head. The following concealed overhead closers can be included in the proposed doors subject to the limitations below.

- Dorma ITS96 (size 2-4 model)
- Geze Boxer (size 3-6 model)

The limitations are as follows:

- Minimum stop depth as stipulated by manufacturer's instructions and/or test evidence.
- Inclusion of 2mm thick graphite based intumescent gasket kit as tested encasing the closer body.
- Inclusion of 2mm thick non-pressure forming intumescent encasing the closer arm slide body in the frame head.
- A minimum of 8mm width of intumescent must be residual alongside the arm recess in the head of the frame.

This opinion does not support the substitution of other concealed closers, including door jamb types, no matter how similar, nor does it support the use of the closer body fitted in the frame head.

D.4 Bolts

Double leaf door assemblies have been tested with flush bolts fitted at the top and bottom of the closing edge of the passive leaf. Steel flush bolts may be utilised, subject to the following limitations:

- Maximum size of flush bolt is 250mm long x 14mm wide and 18mm deep.
- The body of the bolt should be bedded on minimum 1mm thick non-pressure forming intumescent material.
- Edge fixed bolts shall be positioned centrally in leaf thickness.
- Face fixed flush bolts shall be fixed so that there is a minimum of 50mm between the bolt and the door edge.

Surface mounted barrel bolts shall not exceed 400mm in length, but there is no limitation on their width. They shall be fixed so that there is a minimum of 50mm between the bolt and the door edge. Screws for fixing bolts must be at least 25mm long, and have thread for the full screw length.

D.5 Non-Essential Hardware Items

D.5.1 Push plates, kick plates, etc.

Plastic, pvc or metal plates may be surface-mounted to the doors, but, if more than 800mm in length by nominally 200mm wide, they must be attached in a way that would prevent them distorting the door leaf, e.g. glued with thermally softening adhesive or screwed with short aluminium screws and fitted in such a way so they will not be prevented from falling away by being trapped under door stops, glazing beads or handle escutcheons etc.

D.5.2 Pull handles

These may be fixed to the doors, provided that the fixing points are no greater than 800mm apart. Pull handles that are fixed through the leaf should use clearance holes as close fitting as possible to the bolt.

APPENDIX E

Summary of Fire Test Evidence

Test Report	Configuration Tested	Leaf Size Tested	Test Standard	Integrity
BMT/FEP/F15073	ULSASD	2250mm high x 915mm wide x 56mm thick	BS EN 1634-1: 2014	92 minutes
	LSADD	2250mm high x 915mm + 490mm wide x 56mm thick		79 minutes <i>Note 1</i>

ULSASD = Unlatched, Single Acting. Single leaf Door assembly
LSADD = Latched Single Acting Double leaf Door assembly

Note 1 Failure occurred in this test at 79 minutes due to an element of the door assembly construction that has been amended as part of the engineering analysis included within this report. No further failures occurred within the specimen until after 90 minutes.

Note 2 Where appropriate, fire test evidence from glass, hardware, and intumescent seal manufacturers has also been considered when preparing this Field of Application Report.