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Testing, calibrating, advising.

Title:

Global Fire Resistance Assessment
of Stredor Doorsets

30 Minutes Fire Resistance

Valid From: 16th December 2016

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Prepared for:

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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

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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

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1 Introduction

This document constitutes a fire resistance assessment relating to Falcon Panel Products Ltd. Stredor timber based door cores, for 30 minute fire resisting doorsets. The assessment uses established extrapolation and interpretation techniques in order to extend the scope of application by determining the limits for the designs, based on the tested constructions and performances obtained. The 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

The basic tested construction of the Stredor door design based comprises the following.

| Element | | Material | Dimensions (mm) | Minimum Density (kg/m ³) |
|----------------------|------------|---|--|--------------------------------------|
| Stiles & rails | | None fitted | - | - |
| Core | Inner core | Cross Grain Poplar | 2.1 (t) | 510 ¹ |
| | Outer core | Vertically orientated finger-jointed spruce lamels* | 18.8 (t) x 28 (w) (nominal individual lamel size) | 480 ¹ |
| Facings ³ | Inner | Cross grain Poplar | 1.4 (t) | 510 ¹ |
| | | MDF | 7 (t) | 720 ² |
| | Outer | Long grain Beech | 0.4 (t) | 600 ¹ |
| Adhesive | Lippings | PU | - | - |
| Lippings – all edges | | Sapele | 6 (t) | 640 ² |

Notes: ¹ Stated by client; not verified by laboratory. ² Stated nominal density. ³ See section 11 for options.

3 Leaf Sizes

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

Doorsets with reduced dimensions are deemed to be less onerous. Therefore, doors with dimensions that are less than those tested and stated in Appendix D may be manufactured.

4 Configuration

Based on the test evidence listed in Appendix A, this assessment covers the following doorset configurations.

| Abbreviation | Description |
|----------------|---|
| LSASD & ULSASD | Latched & unlatched, single acting, single doorsets |
| DASD | Double acting, single doorsets |
| LSADD & ULSADD | Latched & unlatched, single acting, double doorsets |
| DADD | Double acting, double doorsets |

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

5 Leaf Size Adjustment

The Stredor doorset design referred to in this assessment may be altered as follows.

| Element | Reduction |
|---------|--|
| Leaf | The manufactured size of the leaf may be reduced in height or width without restriction providing all edges are re-lipped in accordance with section 10. |
| Lipping | The lipping dimensions stated in section 10 may be reduced by 20% for fitting purposes. |

6 Overpanels

6.1 Solid

Overpanels of the same construction as the door leaves may only be used when separated by a transom. The overpanel must be fully contained within the door frame (see following diagram).

The transom required to separate the leaf heads from the overpanel must be to the same specification as the door frame (see the note under the table in section 9.1).

Door frame joints must utilise one of the following methods: mortice and tenon joints or butt joints (see section 9.2).

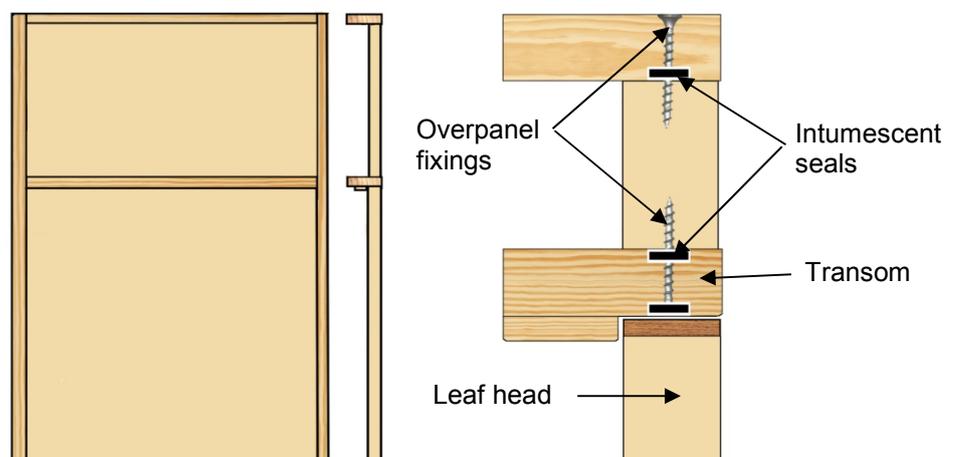
All methods require joints to be tight, with no gaps, and require mechanical fixing with the appropriate size ring shank nails or screws. Butt joints must be additionally bonded with urea formaldehyde.

The overpanels must be fixed by screwing through the rear of the frame with steel screws passing at least 40mm 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 must also be fitted to all concealed edges of the overpanel. The seals may be fitted in the overpanel edges or alternatively in the frame reveal. A maximum 2mm gap is permitted between the edge of the overpanel and the frame reveal.

Permitted overpanel heights are as follows.

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



7 Glazed Fanlights & Sidescreens

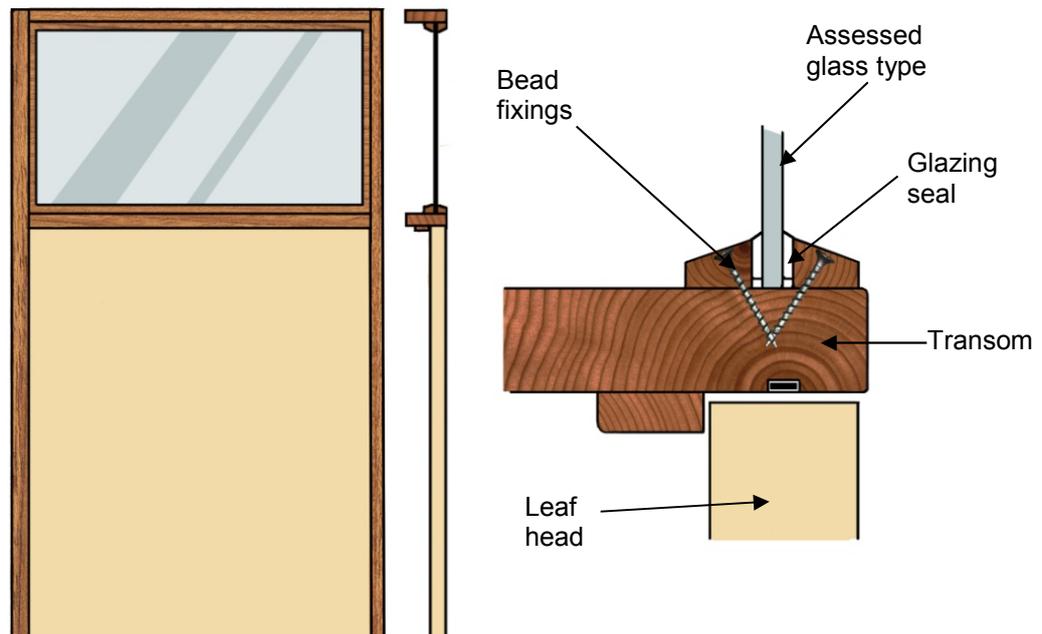
7.1 General

Doorsets with timber frames may include glazed fanlights or side screens. The timber frame and glazing beads must be hardwood with a minimum density of 640kg/m³, whilst the frame section for the transom must be a minimum of 70mm x 44mm. All other elements of the timber door frame and transom assembly must comply with the specifications contained in section 9.

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

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

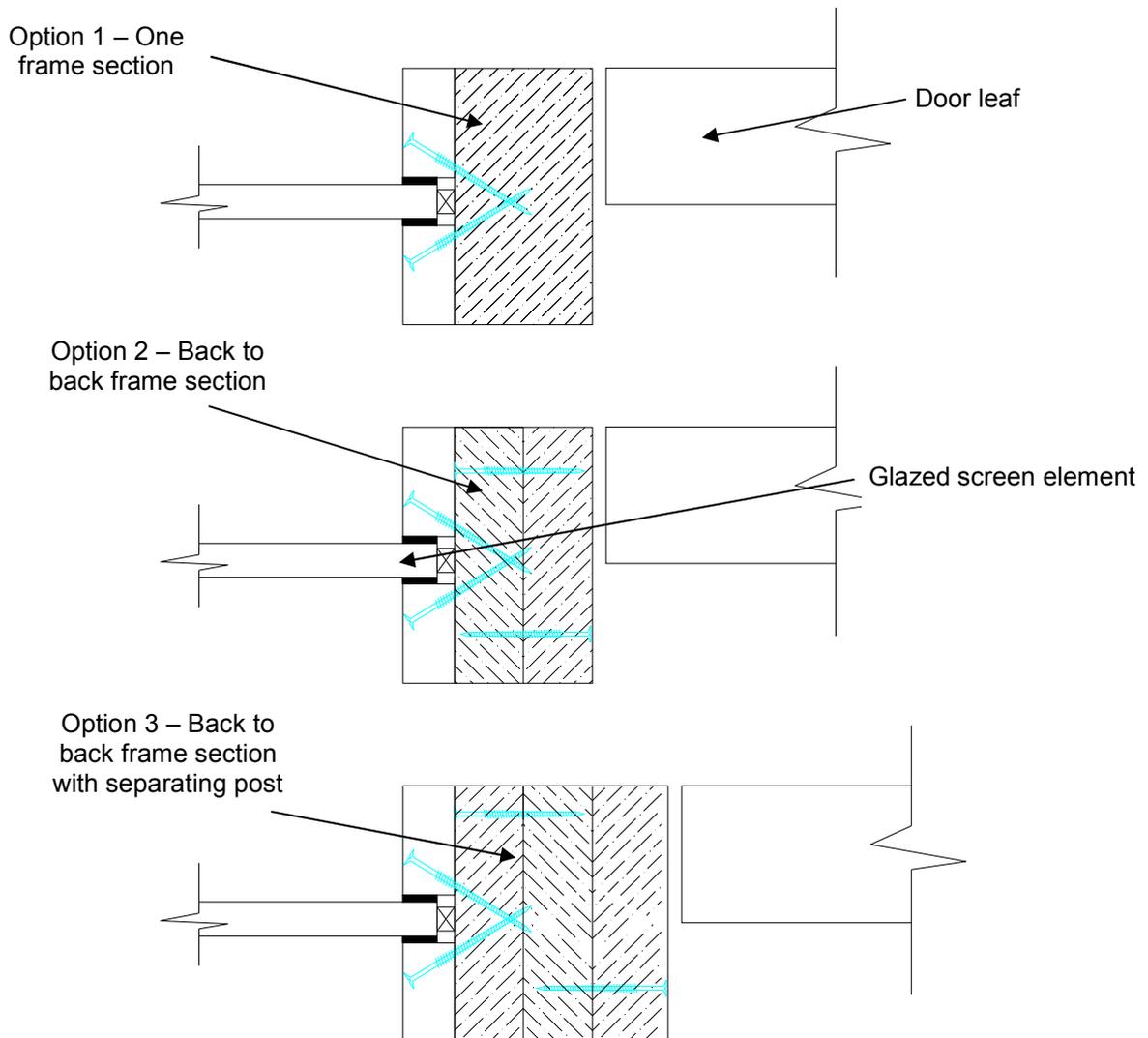
| Screen Element | Configuration | Height (mm) | Width (mm) |
|----------------|--------------------------|---------------------|--------------------|
| Fanlight | Single & double doorsets | ≤600 | Overall door width |
| Side Screen | Single & double doorsets | Overall door height | ≤600 |



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

7.2 Common Frame Sections

The following drawings depict possible constructions of common frame sections for the screens and door frame jambs.



When using separate sections of timber, as shown above (option 2 and 3), each section must be suitably fixed to one another using appropriate steel screw fixings and glued using one of the adhesives approved for the lipping in the adhesive section of this report. Screws must be fixed at 600mm centres and locate to approx 2/3 depth of the adjacent timber section. The overall frame section and material must match that given in this assessment for each glass type and glazing specification. Joints must be tight with no gaps.

It is permitted to include maximum 3mm (w) x 3mm (d) quirks at the junction of each timber section for option 2 and 3.

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

8 Glazing

8.1 General

The testing referenced FEP/F16012 Revision A & FEP/F16031, conducted on the Stredor doorset design has successfully demonstrated that the design is capable of tolerating glazed apertures, whilst providing a margin of over-performance. Glazing is therefore acceptable within the following parameters:

The maximum assessed glazed area for all configurations is 1.1m². The glazing system must be one of the following tested proprietary systems:

8.2 Assessed Glazing Systems

The glazing system must be one of the following proprietary tested systems.

| Glazing System | Manufacturer | Max. Area (m ²) |
|----------------------------|---------------------------|-----------------------------|
| 1. 30049 | Pyroplex Ltd. | 1.1 |
| 2. Therm-A-Strip 30 | Intumescent Seals Ltd. | 1.1 |
| 3. Fireglaze 30 | Sealmaster Ltd. | 1.1 |
| 4. Firestrip 30 | Hodgsons Sealants Ltd. | 1.1 |
| 5. System 36 Plus | Lorient Polyproducts Ltd. | 1.1 |
| 6. R8193 | Pyroplex Ltd. | 1.1 |
| 7. Flexible Figure 1 (FF1) | Lorient Polyproducts Ltd. | 1.1 |
| 8. Pyroglaze 30 | Mann McGowan Ltd. | 1.1 |
| 9. Therm-A-Glaze | Intumescent Seals Ltd. | 1.1 |

8.3 Assessed Glass Products

Assessed glass types are as follows.

| Glass Type | Manufacturer | Thickness (mm) | Max. Area (m ²) |
|----------------------|-----------------------|----------------|-----------------------------|
| 1. Pyroshield 2 | Pilkington Group Ltd. | 6 & 7 | 1.1 |
| 2. Pyran S | Schott Glass Ltd. | 6 | 1.1 |
| 3. Pyrostem | Pyroguard UK Ltd. | 6 | 1.1 |
| 4. Pyroguard EW 30 | Pyroguard UK Ltd. | 7 | 0.87 |
| 5. Pyrobelite 7 | AGC Flat Glass Europe | 7 | 1.1 |
| 6. Pyrodur 30-104 | Pilkington Group Ltd. | 7 | 1.1 |
| 7. Pyrodur 60-10 | Pilkington Group Ltd. | 10 | 1.1 |
| 8. Pyroguard EW MAXI | Pyroguard UK Ltd. | 11 | 0.58 |
| 9. Pyranova 15-S2.0 | Schott Glass Ltd. | 11 | 1.1 |
| 10. Pyrobelite 12 | AGC Flat Glass Europe | 12 | 1.1 |
| 11. Pyrodur 60-20 | Pilkington Group Ltd. | 13 | 1.1 |
| 12. Pyroguard EI 30 | Pyroguard UK Ltd. | 15 | 1.1 |
| 13. Pyrostop 30-10 | Pilkington Group Ltd. | 15 | 1.1 |
| 14. Pyrobel 16 | AGC Flat Glass Europe | 16 | 1.1 |

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.

8.4 Glazing Beads & Installation

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

| Material | Profile | Application | Min. Density (kg/m ³) |
|----------|---------|---|-----------------------------------|
| Hardwood | Splayed | All proprietary systems detailed in section 8.2 & shown in Appendix B & all glass types listed in section 8.3 | ≥640 |
| Hardwood | Square | Proprietary system 2 – 4 as specified in section 8.2 & glass types 5 – 14 listed in section 8.3 | ≥640 |

See Appendix B for square and splayed bead profile options. A 6 – 10mm thick square aperture liner is permitted for use with square beads providing it is constructed from hardwood of minimum density 640kg/m³ and glued in position using a UF, PVA or PU type adhesive.

Glazing beads must be retained in position with 60mm long steel pins or 60mm long No. 6 – 8 screws, inserted at 10° to the vertical, at no more than 50mm from each corner and at 150mm maximum centres. Pneumatically fired pins are acceptable providing they meet the specification given in section 8.5 below.

Glazed openings must not be less than 100mm from any door edge. Multiple apertures are acceptable within the permitted glazed area, with a minimum dimension of 80mm between apertures. Aperture shape is not restricted, providing the glazing system and beads are compatible with that shape.

Timber for glazing beads must be straight grained, joinery quality hardwood, free from knots, splits and checks.

Sectional drawings detailing the tested and approved proprietary glazing systems are contained in Appendix B.

False timber beads may be bonded to the glass face with an intumescent mastic/silicon, or a 0.5 – 2mm thick self-adhesive intumescent tape/strip of the types shown below; mechanical fixing of the false beads to the leaf framing is not permitted. Suitable glass for this application is restricted to types 5 – 14 in section 8.3.

| Glazing System | Manufacturer |
|--|------------------------|
| 1. Therm-A-Strip 30 | Intumescent Seals Ltd. |
| 2. Fireglaze 30 | Sealmaster Ltd. |
| 3. Firestrip 30 | Hodgsons Sealants Ltd. |
| 4. Envirograf Product 77 – G10/10 | Intumescent Seals Ltd. |
| 5. Intumescent mastic or silicone tested for glazing applications to BS 476: Part 22: 1987 or BS EN 1634-1 | Various |

Seals for glazing beads must be a minimum of 10mm wide x 0.5 – 3mm thick. Preformed strip systems 1 – 4 may be self-adhesive and grooved into the rear of the glazing bars.

8.5 Gun (Pneumatically) Fired Pins

The following pin specification is permitted and has been considered suitable for gun (pneumatically) fired applications:

8.5.1 Option 1 – Round, Oval & Rectangular Pins

The following dimension of pin has been approved for round, oval and rectangular shaped pins:

- Minimum Standard Wire Gauge (SWG) 16.
- Minimum cross section area of 2.03mm².
- Minimum linear dimension of 1.6mm in any direction.

Round pin diameter (mm) = minimum 1.6mm:



Oval/rectangular pin minimum diameter linear dimension = 1.6mm:



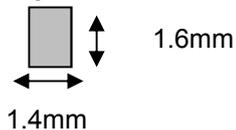
8.5.2 Option 2 – Rectangular Pins

Dimensions

The following dimension of rectangular pin has been deemed suitable for gun (pneumatically) fired applications:

- Minimum Standard Wire Gauge (SWG) 16.
- Minimum cross section area of 2.24mm².
- Minimum linear dimension of 1.4mm.

Rectangular pin minimum diameter linear dimension = 1.4mm:



8.5.3 Note of Caution

Pins with dimensions less than those stated above are not covered by this assessment.

9 Door Frames

9.1 Door Frame Construction

Door frames for Stredor doorsets must be constructed to meet the following specification.

| Material | Min. Section Size (mm) | Min. Density (kg/m ³) |
|----------------------|------------------------------|-----------------------------------|
| Softwood or hardwood | 70 x 32 (excluding the stop) | 510 |

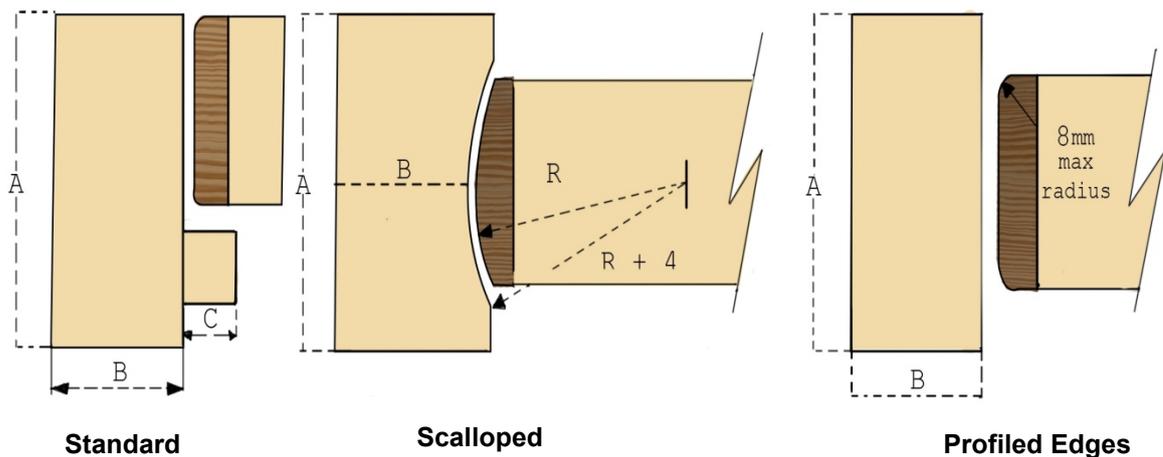
All door frame timber must be straight grained, joinery quality, free from knots, splits and checks.

A 12mm deep planted stop is adequate for single acting frames whilst double acting frames may be scalloped or square (see diagram below). If frames are square, the maximum radius to the corners of the leaf is 8mm.

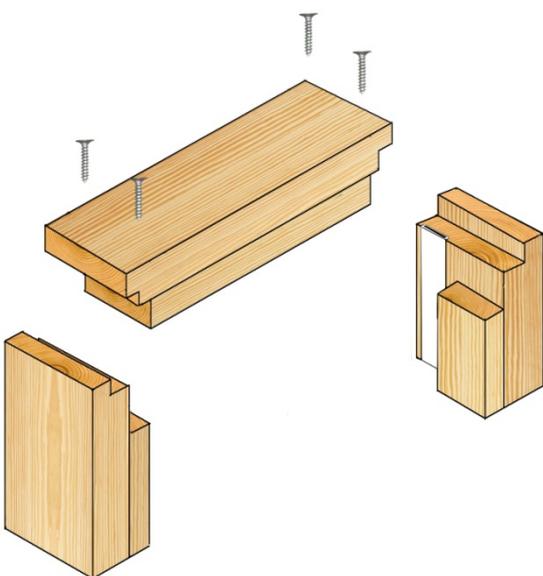
Frame joints may be mortice and tenoned, mitred, half lapped or butted and with no gaps (see section 9.2). All jointing methods require mechanical fixing with the appropriate size ring shank nails or screws.

The following diagram depicts the assessed frame profiles and dimensions:

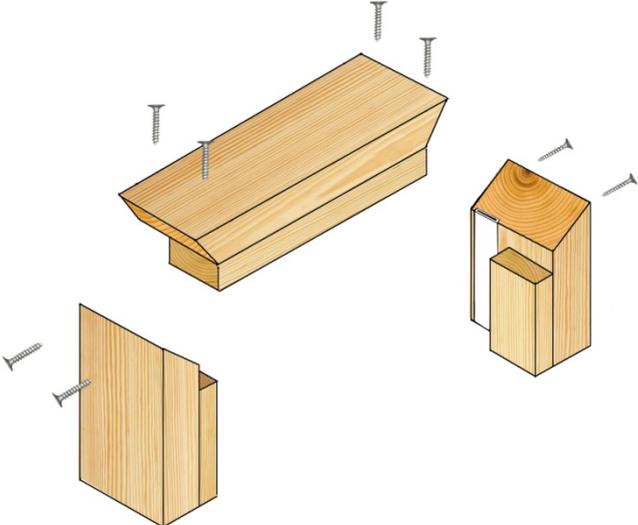
A = Min. 70mm B = Min. 32mm (see table above) C = Min. 12mm
 R = Radius from floor spring 8mm radius to create maximum 2mm edge profiling



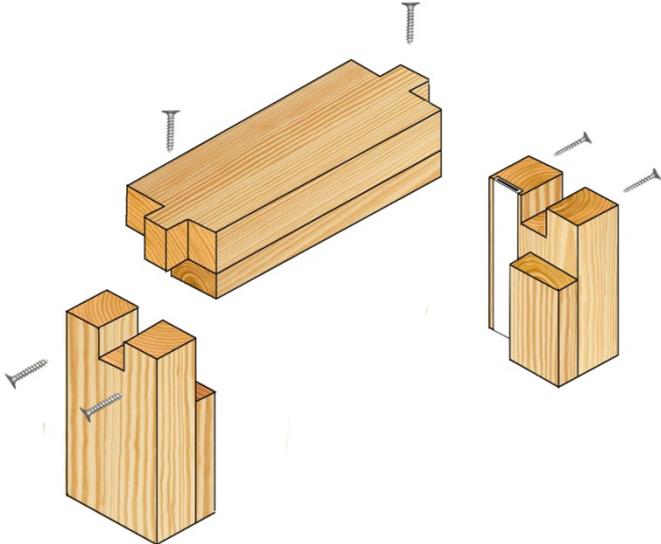
9.2 Door Frame Joints



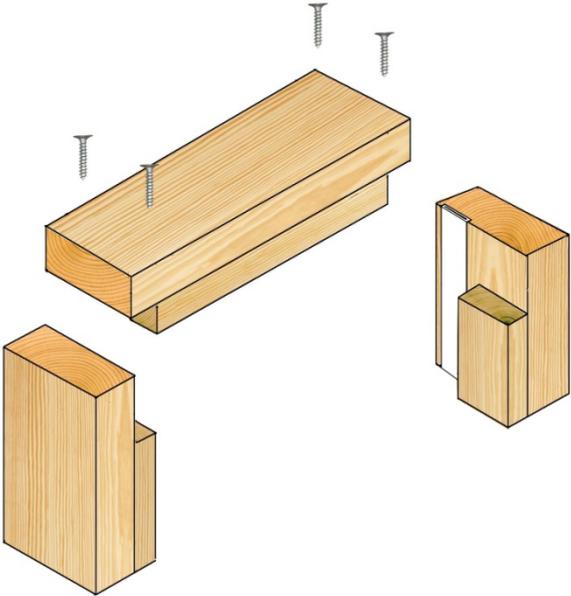
Half Lapped Joint



Mitre Joint



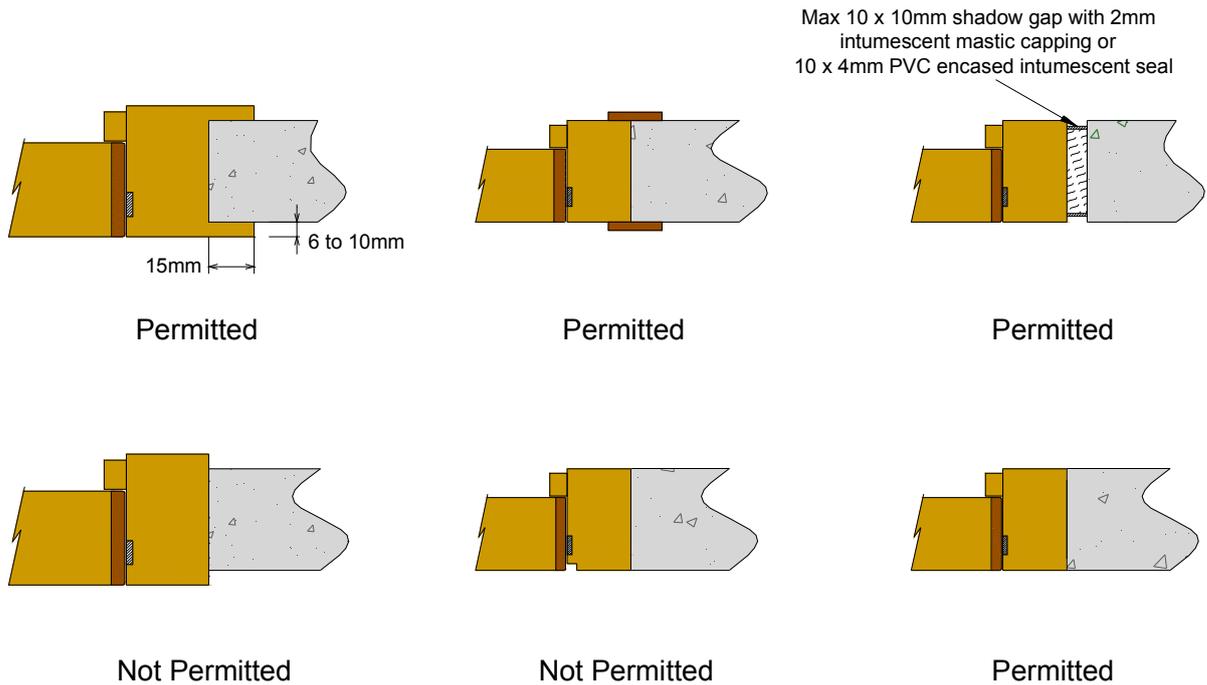
Mortice & Tenon Joint



Butt Joint

9.3 Door Frame Installation

The following diagrams indicate acceptable and unacceptable door frame installations:



Notes:

1. Drawing is representative of door frame installation; actual installation must be as the text within this document specifies. See section 19 for specification on sealing to structural opening.
2. For the shadow detail depicted above (top right), the sub-frame material must be manufactured from one of the following materials, tightly fitted and with no gaps between the sub-frame and door frame with the junction between the sub-frame and supporting construction fire-stopped in compliance with the requirements in section 19:
 - Timber with a density $\geq 450\text{kg/m}^3$;
 - Plywood with a density $\geq 600\text{kg/m}^3$;
 - MDF with a density $\geq 700\text{kg/m}^3$;
 - Particleboard with a density $\geq 600\text{kg/m}^3$;
 - Non-combustible board.

10 Lippings

10.1 General

Stredor doorsets must be lipped in accordance with the following specification.

| Material | Size (mm) | Min. Density (kg/m ³) |
|---|---|-----------------------------------|
| Hardwood must be straight grained, joinery quality, free from knots, splits and checks. | 1. Flat = 6 – 11 thick with a maximum of 2 profiling permitted at corners of lipping (see section 9.1) | 640 |
| | 2. Rounded = 8 – 11 thick with a radius matching the distance between leaf edge and floor pivot (see section 9.1) | |

- Doorsets to this design must be lipped on all leaf edges
- Lippings must not conceal intumescent materials
- A 2.5° chamfer is permitted to the lipping at the leading edge of leaves providing the door gaps meet the requirements of section 18
- Rounded lippings must only be fitted to the hanging edges of door leaves.

11 Leaf Facing Materials

11.1 Tested Facings

The primary tested facing materials based on FEP/F15066 & FEP/F16031 for the Stredor 30 doorset design are an inner facing of 1.4mm thick cross grain Poplar and an outer timber veneered facing 0.4- 0.6mm thick.

The testing conducted in test FEP/F16012 Revision A on the Stredor doorset design has successfully evaluated the use of 2mm thick MDF facings, replacing both the 1.4mm thick cross grain Poplar inner and outer veneer facings as above. Door leaves may therefore be produced with either the 2 layer facings above or 2m thick MDF.

In either case the minimum finished leaf thickness must be 44mm, irrespective of facing thickness.

11.2 Alternative Facing Materials

The testing conducted in test FEP/F16174 on the Stredor doorset design has successfully evaluated the use of 7mm thick MDF as an alternative inner facing material to the 1.4mm thick cross grain Poplar detailed in section 11.1 (see discussion in appendix A).

Where the 7mm MDF is used the minimum finished leaf thickness must be a minimum of 44mm (i.e. the outer core thickness as detailed in section 2 may be reduced to a minimum mm 13mm thick). Maximum leaf size permitted where the 7mm facings are used is 2140mm (h) x 926mm (w) in any configuration permitted in section 4, see data sheets in appendix D.

11.3 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 |
| PVC/plastic laminates | 2 |
| Decorative paper/non-metallic foil | 0.5 |

1. Metallic facings are not permitted except for push plates and kick plates
2. The door leaf thickness may be reduced by a total maximum of 0.6mm to each face (a maximum of 1.2mm in total) for calibration purposes, only in order to accommodate one of the additional facings shown in the table above
3. Materials must not conceal intumescent strips
4. PVC/plastic laminates must not be applied to the edges of leaves.

12 Adhesives

The following adhesives must be used in construction based on FEP/F15066 & FEP/F16012 Revision A & FEP/16031.

| Element | Product |
|-----------------------------|---------------------------|
| Lippings | PVAC or PU |
| Core & outer veneer facings | PVAC or exterior melamine |
| Primary facings | Melamine formaldehyde |

13 Intumescent Materials

13.1 General

Based on FEP/F15066, FEP/F16012 Revision A & FEP/F16031, the intumescent materials tested and assessed for the Stredor doorset design are as follows.

| Application | Location | Product/Manufacturer |
|-------------------------------------|--|--|
| Edge seals | Fitted in the frame jambs or leaf edges | 1. Pyroplex; Ref: 8512 – Pyroplex Ltd. |
| | | 2. Pyroplex; Ref: 8500 – Pyroplex Ltd. |
| | | 3. Pyroplex; Ref: 8712 – Pyroplex Ltd. |
| | | 4. Type 617 – Lorient Polyproducts Ltd. |
| Hinges | Under all hinge blades | 1. 1mm Interdens – Dufaylite Developments |
| | | 2. 1mm Pyroplex graphite – Pyroplex Ltd. |
| | | 3. 1mm MAP – Lorient Polyproducts Ltd. |
| Lock/latches | Under latch forend & keep only | 1. 2mm NOR910 – Norsound Ltd. |
| | Under latch forend & keep & encasing latch body | 1. 1mm Pyroplex graphite – Pyroplex Ltd. 2. 1mm MAP – Lorient Polyproducts Ltd. |
| Top pivots & flush bolts | Lining all sides of the mortices & under flush bolt keep in frame head | 1. 2mm NOR910 – Norsound Ltd. |
| | | 2. 1mm Pyroplex graphite – Pyroplex Ltd. |
| | | 3. 1mm MAP – Lorient Polyproducts Ltd. |

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

Intumescent seals may be provided with or without pile or elastomeric fins in order to provide additional performance i.e. smoke or acoustic control. Seals may be installed with the additional features, it is beyond the remit of this assessment to discuss likely acoustic or cold smoke control performance. See table below for a selection of available Pyroplex seal types. Other variations are available and are considered acceptable as per the above.

| | | | | |
|-----------------------|---|---|---|--|
| Pyroplex Seal Details |  |  Pile only |  Twin flipper |  Triple flipper |
| Description | Fire Only | Fire and Smoke | Twin Flipper | Triple Flipper |
| 10 mm x 4mm Ref: | 8500 | 8512 | 30170 | Not Available |
| 15mm x 4mm Ref: | 8700 | 8712 | 30175 | 30141 |
| 20mm x 4mm Ref: | 8600 | 8612 | 30176 | 30148 |

Lorient Polyproducts Ltd similarly supply a range of seal construction variations.

14 Tested Hardware

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

| Element | Manufacturer & Product Reference |
|----------------------|--|
| Hinges | 1. Hafele SUS – 304 bearing butt type hinges |
| Closers | 1. Arrone AR1500 overhead face-fixed type closer 2. Rutland TS3204 overhead face-fixed type closer |
| Latches/locks | 1. ERA steel mortice lock; Ref: ERA 226 2. Hafele steel mortice latch; Ref: 911.23.465 |
| Furniture | 1. Aluminium lever type handle 2. Hoppe flush bolts; Ref: AR326 3. Hafele shoot bolts; Ref: 900.17.984 |

15 Additional & Alternative Hardware

15.1 General

The following section details the permitted scope and constraints for fitting hardware to this door design.

The following items of hardware must also bear the CE Mark:

- Latches & Locks: Standard EN 12209;
- Single Axis Hinges: Standard EN 1935;
- Controlled Door Closing Devices: Standard EN 1154;
- Panic Exit Hardware: Standard EN 1125.

15.2 Latches & Locks

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

| Element | Specification |
|--|--|
| Maximum forend & strike plate dimensions | 235mm high by 25mm wide by 4mm thick |
| Maximum body dimensions | 180mm high by 100mm wide by 18mm thick |
| Intumescent protection | See section 13 |
| Materials | All parts essential to the locking/latching action (including the latch bolt, forend & strike) to be steel or brass (with a melting point $\geq 800^{\circ}\text{C}$) |
| Location | Between 750 – 1200mm from the threshold |

15.3 Hinges

Stredor door leaves must be hung on a minimum of 3 hinges. Leaves over 2400mm high must fit 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. 30 long No. 8 or No. 10 steel wood screws per blade | |
| Materials | | Steel or stainless steel or brass (melting point $\geq 800^{\circ}\text{C}$) | |
| Hinge positions | Leaf dimensions <2400mm | Top | 150–200mm from head of leaf to top of hinge |
| | | 2 nd | Minimum 200mm from top hinge OR equally spaced between top & bottom hinges |
| | | Bottom | 200–300mm from foot of leaf to bottom of hinge |
| | Leaf dimensions >2400mm | Top | 150–200mm from head of leaf to top of hinge |
| | | 2 nd & 3 rd | Minimum 200mm from top hinge to equispaced between top & bottom hinges |
| | | Bottom | 200–300mm from foot of leaf to bottom of hinge |
| Intumescent protection | | See section 13 | |

15.4 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 30 minute doorset design, when tested to BS 476: Part 22: 1987 or BS EN 1634-1.

Note: It is not permitted to fit concealed closers to this door design.

15.5 Pull Handles

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

15.6 Push Plates/Kick Plates

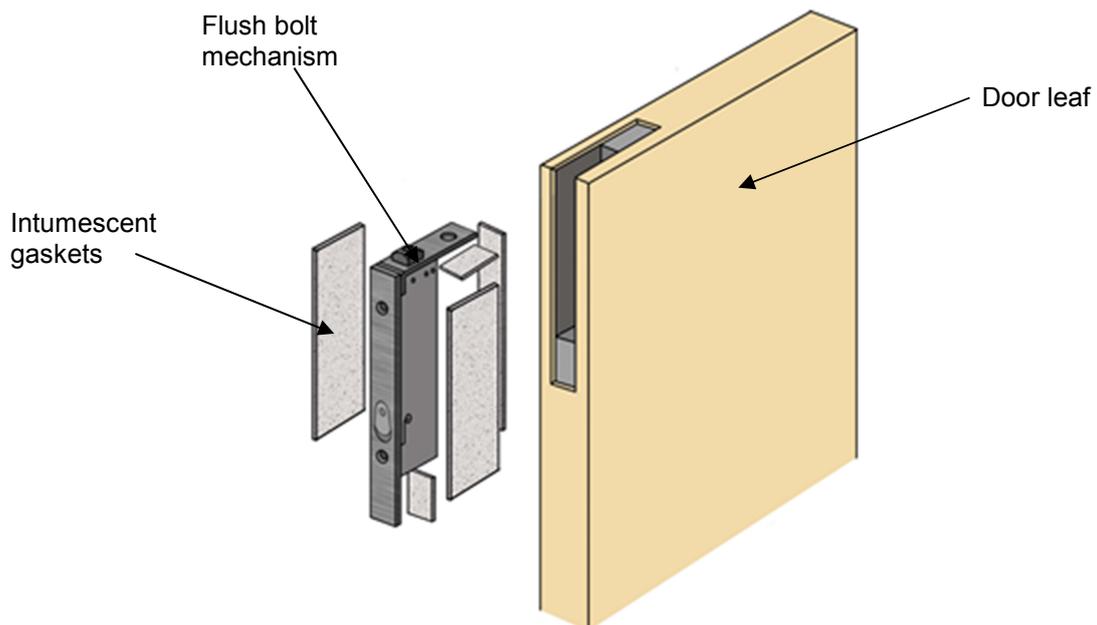
Face-fixed hardware such as push plates and kick plates may be fitted to the doorsets provided that their fitting requires the removal of no part of the door leaf. These items of hardware are permitted up to a maximum of 20% of the door leaf area if mechanically fixed and a maximum of 30% if bonded with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

15.7 Flush Bolts

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

- 203mm long x 20mm deep x 22mm wide

Flush bolts must be steel or brass 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 13. Alternatively the hardware manufacturers tested gaskets may be used. See diagram below for example of intumescent protection to flush bolt:



15.8 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.

15.9 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 bedded in to a tested intumescent mastic.

15.10 Environmental Seals

Silicon based flame retardant acoustic, weather and dust seals (e.g. Norsound 710, Lorient IS1212, IS1511, IS7025, IS7060, Reddiplex Ltd 10623, 9946, 9927, 9945) 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.

15.11 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. | LAS8001Si |
| Pemko | 411 – AR |
| Raven | RP8Si |
| Athmer | Schall-Ex Duo L-15 |
| Norsound Ltd. | NOR810, NOR810S, NOR810dB+ |
| Reddiplex Ltd | Reddiplex IDD Threshold |

15.12 Letter Boxes/Plates

Letter boxes/plates may be fitted providing the product can demonstrate contribution to the required performance of this type of 30 minute doorset design, when tested to BS 476: Part 22: 1987 or BS EN 1634-1, when installed within a timber based doorset of comparable thickness. Products may be fitted up to 1200mm from floor level and not closer than 100mm to any leaf edge.

15.13 Air Transfer Grilles

Air transfer grilles may be fitted providing the product has suitable test evidence to BS 476: Part 22: 1987 or BS EN 1634-1, that demonstrates a minimum 30 minutes integrity performance when installed within a timber based doorset of comparable thickness. Margins to the leaf edges will remain as detailed for glazing and the position of the unit will be dictated by the pressure regime tested in the proving evidence (normally below mid-height). The area occupied by the air transfer grille must not exceed 0.2m² and must be deducted from the area of glazing, if both elements are fitted.

16 Structural Opening

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

17 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 40mm. It is not necessary to fix the frame head, although packers must be inserted. Craylon Ltd Craylon Blue 60 packers have been successfully tested for this application

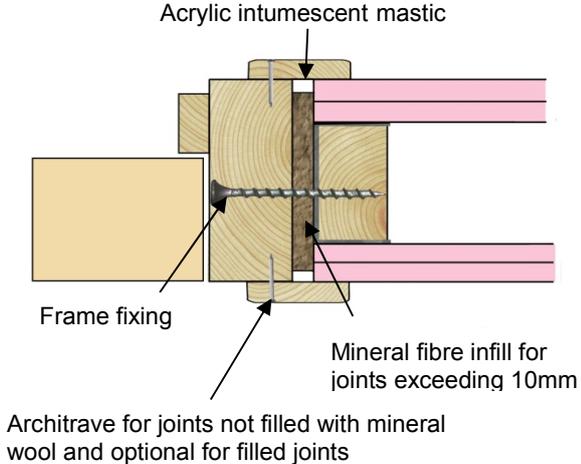
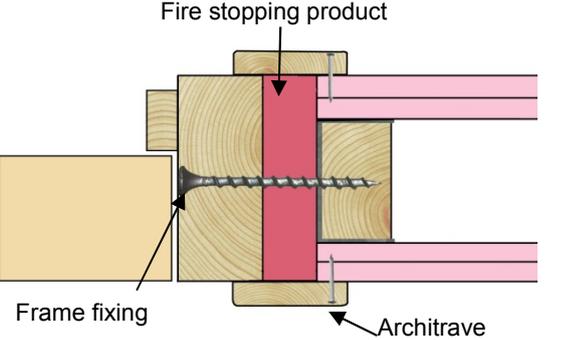
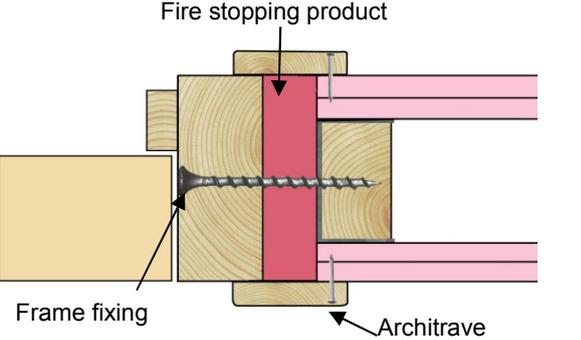
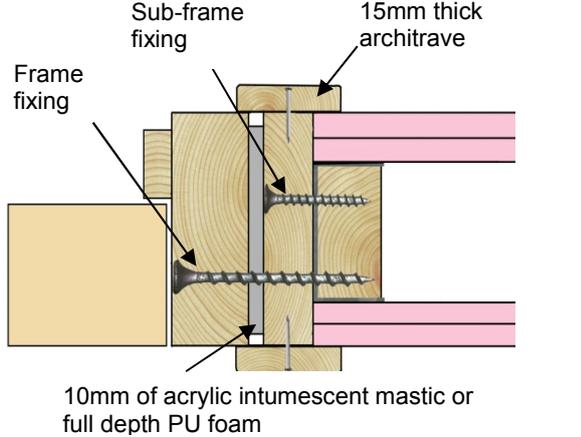
18 Door Gaps

For fire resistance performance, door edge gaps, threshold gaps, and alignment tolerances must fall within the range shown in the following table.

| 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 |

19 Sealing to Structural Opening

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

| | |
|--|--|
| <p>1. Gaps up to 10mm must be sealed on both sides with a 10mm depth of acrylic intumescent mastic, fire tested for this application to BS 476: Part 22: 1987 or BS EN 1634-1. Joint must be fitted with 15mm thick architraves overlapping at least 15mm each side.</p> |  |
| <p>2. Gaps between 10mm and 20mm must be tightly packed with mineral fibre capped on both sides with a 10mm depth of acrylic intumescent mastic, fire tested for this application to BS 476: Part 22: 1987 or BS EN 1634-1. Architraves are optional.</p> |  |
| <p>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. Craylon Ltd Blue60 expanding foam has been successfully tested for this application.</p> |  |
| <p>4. Timber based or non-combustible sub-frame up to 50mm thick, with gaps up to 10mm between the components filled on both sides with 10mm depth of acrylic intumescent mastic or full depth expanding PU foam, fire tested for this application to BS 476: Part 22: 1987 or BS EN 1634-1. Joint must be fitted with 15mm thick architraves overlapping at least 15mm each side.</p> |  |

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.

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

20 Insulation

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

| Type | Details |
|----------------------|--|
| Partially insulating | Doorsets incorporating up to 20% of non-insulating glazing |
| Fully insulating | Unglazed doorsets or doorsets including 30 minute insulating glazing (e.g. Pyrostop 30-10 or Pyrobel 16) |

21 Smoke Control

21.1 General

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

- (a) have a leakage rate not exceeding $3\text{m}^3/\text{m}/\text{hour}$ (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.

21.2 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.

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

22 Conclusion

If the Falcon Panel Products Ltd. Stredor doorset design, constructed in accordance with the specifications documented in this Global Assessment, were to be tested in the appropriate configuration in accordance with BS 476: Part 22: 1987, it is our opinion that it would provide a minimum of 30 minutes integrity and insulation (subject to section 20).

23 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: FALCON PANEL PRODUCTS LTD.

24 Limitations

The following limitations apply to this assessment:

1. This assessment addresses itself solely to the elements and subjects discussed and does not cover any other criteria. All other details not specifically referred to should remain as tested or assessed.
2. This assessment is issued on the basis of test data and information to hand at the time of issue. If contradictory evidence becomes available, 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.

25 Validity

1. The assessment is valid until the expiry date shown on the front cover, i.e. 31st July 2020, after which time it must be submitted to Exova Warringtonfire for re-appraisal.
2. This assessment report is not valid unless it incorporates the declaration given in Section 23 duly signed by the applicant.

| | | |
|-------------------|---|---|
| Signature: |  |  |
| Name: | A M Winning | M A Cummings |
| Title: | Lead Product Assessor | Deputy Technical Manager |

Appendix A Performance Data

Primary Data

| Report No. | Configuration | Leaf Size (mm) | Test Standard | Performance (mins) | |
|--|---------------|-------------------------|--------------------------|--------------------|-----------------|
| FEP/F15066 | ULSADD | 2448 1000/1000 44 | BS 476: Part 22: 1987 | Integrity | 34 ¹ |
| | | | | Insulation | 34 |
| FEP/F16012 Rev. A (MDF facing & PU lipping adhesive) | ULSADD | 2450 1000/1000 44 | | Integrity: 42 | |
| | | | | Integrity: 40 | |
| FEP/F16031 (Plywood facing & Type 617 seals) | ULSADD | 2447 1000/1000 44 | | | |

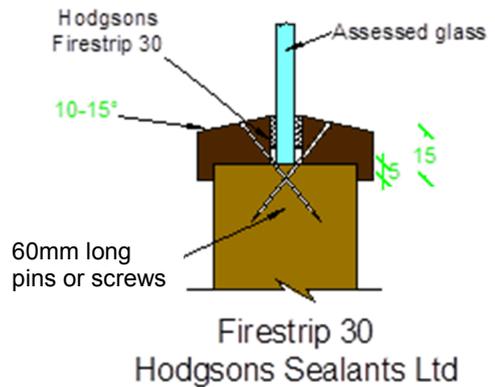
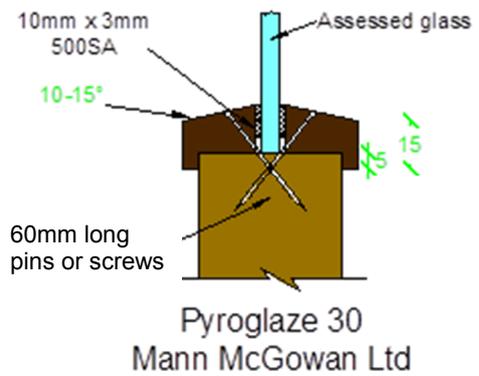
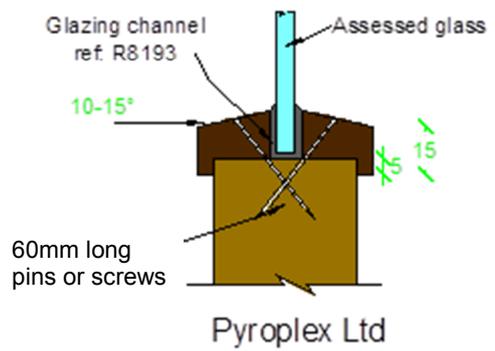
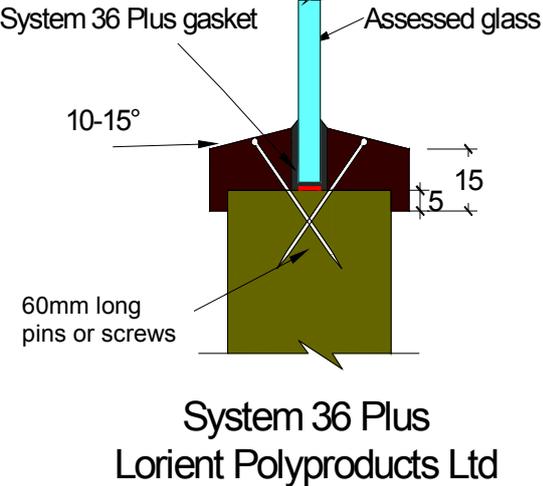
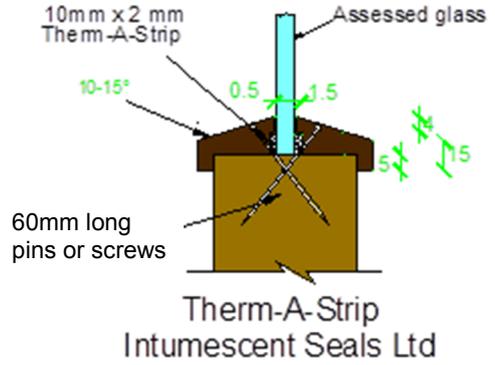
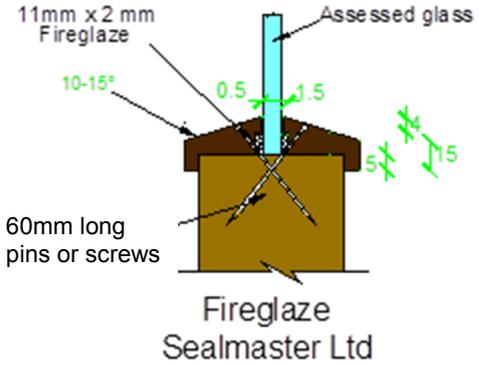
Supporting Data

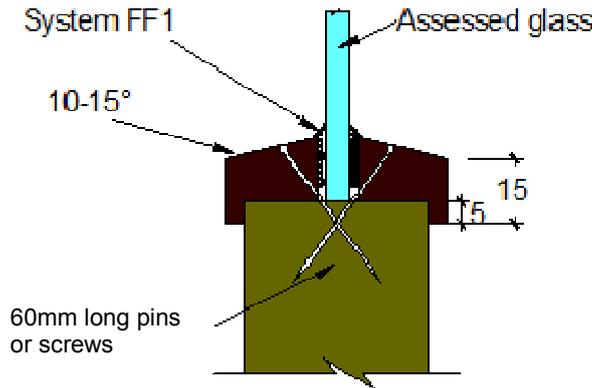
| | | | | | |
|--|---|-------------------------|--------------------------|----------------------------|----|
| FEP/F16174 | ULSADD | 2140 926/926 54 | BS 476: Part 22: 1987 | Integrity: 68 ² | |
| WF178457 | Softwood framed, Glazed Screen | 3000 3000 O/All | | Integrity: 37 | |
| CFR1603041 (Blue60 fire-stopping foam and packers) | LSADD | 2400 1000/1000 44 | BS EN 1634-1 | Integrity | 34 |

¹ The initial integrity failure witnessed at 34 minutes was attributed to the glazed aperture. The first perimeter integrity failure witnessed at 41 minutes was used for the purposes of calculating the assessed leaf size increase.

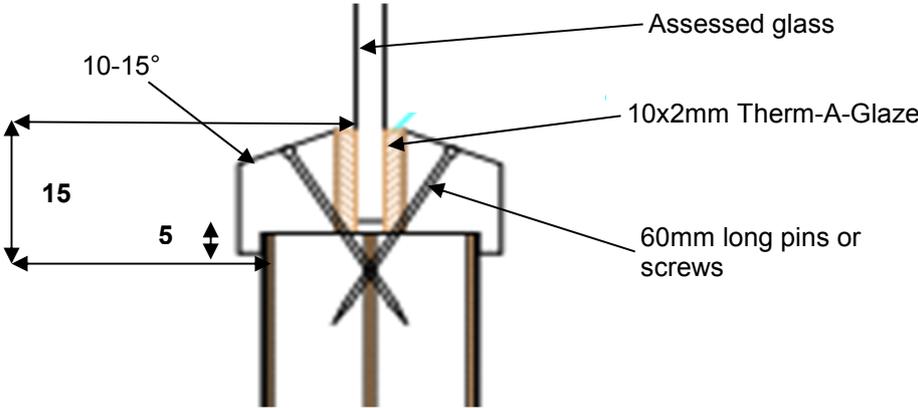
² The 7mm thick MDF facings used in the construction of the specimen tested in test FEP/F16174 are recorded as detaching from the core at 23 minutes, integrity failure of the doorset was not recorded prior to 68 minutes. The 44mm thick specimens in tests F15066, F16012 & F16031 all utilised the same core materials as in F16174 combined with 1.4mm thick inner facings adhered to the core with the same glueline as used in F16174 for the 7mm thick MDF. It is the opinion of Exova Warringtonfire that the Stredor 30 doorset design may be constructed with 7mm thick MDF inner facings as an alternative to the previously tested 1.4mm inner facings, subject to the requirements within this document (see section 11.2), since the thicker facing would be expected to remain in place for at least 23 minutes as previously proven, preventing erosion of the core.

Appendix B 30 Minute Proprietary Glazing Systems

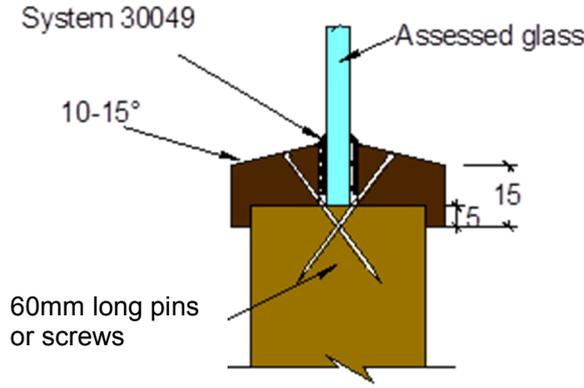




System FF1
Lorient Polyproducts Ltd



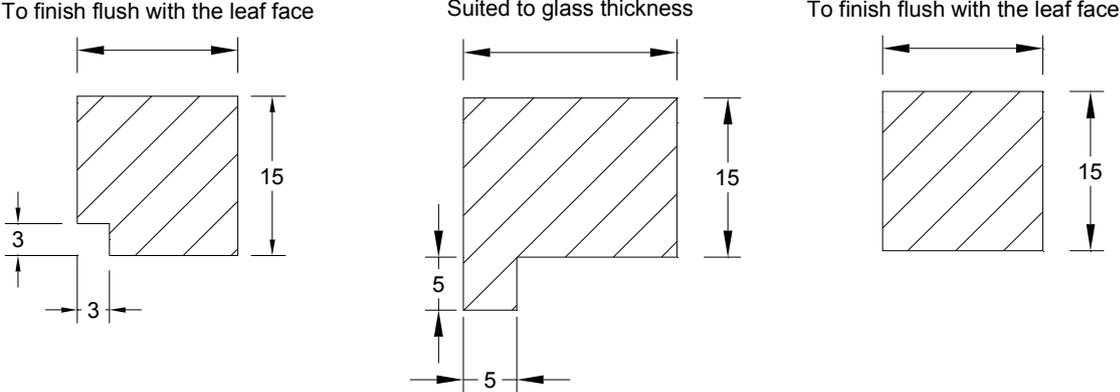
Therm-A-Glaze
Intumescent Seals Ltd.



Pyroplex Ltd

Assessed Square Glazing Bead Profiles

(The following square bead profiled may be used as an alternative to the splayed beads detailed above – refer to section 8 for glazing system and glass restrictions).



Appendix C
Revisions

| Rev. | Ref. | Date | Description |
|-------------|-------------|-------------|--|
| A | CNA/F15193 | 05.08.15 | Clarification of glazing bead pin fixings. |
| B | CNA/F16188 | 15.12.16 | Technical review & update to new document format. Inclusion of FEP/F16012 Rev. A covering MDF facings, PU adhesive for lippings, tested hardware (Rutland TS3204 closer, Hafele shoot bolts & Hafele steel mortice latch), tested Pyroplex graphite hardware protection, tested Pyroplex 30049 glazing system, assessed leaf size & maximum glazed area aperture increases. Inclusion of FEP/F16031 covering Plywood facings, Type 617 perimeter seals with supporting data sheets, tested MAP hardware protection, assessed leaf size & maximum glazed area aperture increases. Addition of 7mm inner facings based on test FEP/F16174. |
| | | | |
| | | | |
| | | | |
| | | | |

Appendix D

Date Sheets for:

**Falcon Panel Products Ltd.
Stredor Doorsets**

30 Minutes Fire Resistance

Falcon Panel Products Ltd. Stredor Doorsets – 30 Minutes Fire Resistance
Latched & Unlatched, Single & Double Acting, Single Doorsets

| Leaf Sizes | Configuration | | Height (mm) | | Width (mm) |
|------------|------------------|-------------------------------|--------------|--------|--------------|
| | LSASD | From: To: | 2450 3090 | x x | 1275 1000 |
| | ULSASD & DASD | From: To: | 2450 3040 | x x | 1250 1000 |
| | | Maximum Overpanel Height (mm) | Transomed | 2000 | |

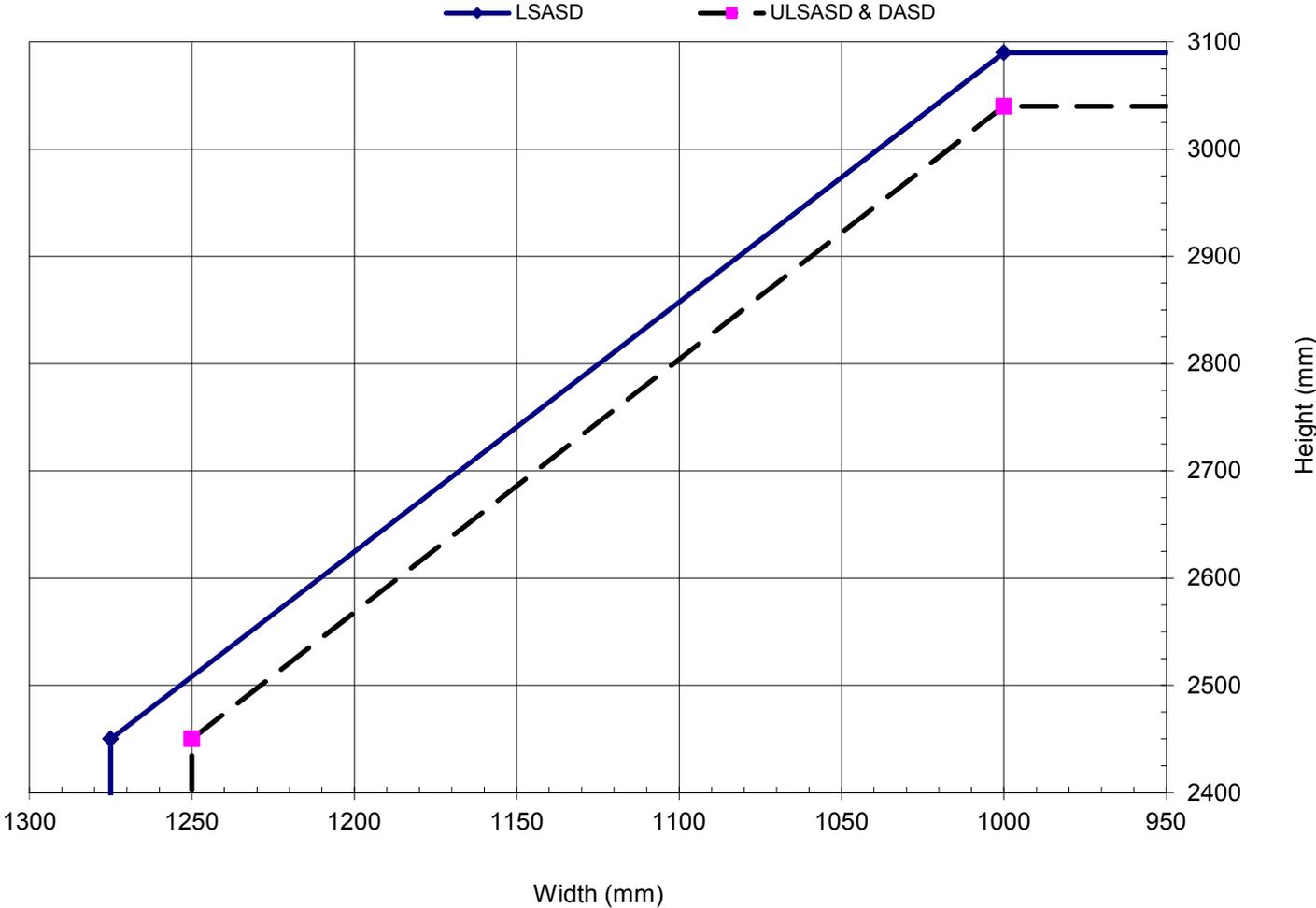
INTUMESCENT MATERIALS: PVC encased Pyroplex Rigid Box Seals – Pyroplex Ltd., or Type 617 Seals – Lorient Polyproducts Ltd.

HEAD: 1No. 15 x 4mm seal fitted centrally in the leaf or frame head. For leaves over 2800mm high, increase to 1No. 20 x 4mm seal.

JAMBS: 1No. 15 x 4mm seal fitted centrally in the leaf edge or frame reveal. For leaves over 2800mm high, increase to 1No. 20 x 4mm seal.

HARDWARE PROTECTION: See section 13.

Maximum Door Leaf Size



Falcon Panel Products Ltd. Stredor Doorsets – 30 Minutes Fire Resistance
Latched & Unlatched, Single & Double Acting, Double Doorsets

| Leaf Sizes | Configuration | | Height (mm) | | Width (mm) |
|------------------|-------------------------------|--------------|--------------|--------------|--------------|
| | LSADD | From: To: | 2450 2990 | x x | 1225 1000 |
| ULSADD & DADD | From: To: | 2450 2940 | x x | 1200 1000 | |
| | Maximum Overpanel Height (mm) | Transomed | 1500 | | |

INTUMESCENT MATERIALS: PVC encased Pyroplex Rigid Box Seals – Pyroplex Ltd., or Type 617 Seals – Lorient Polyproducts Ltd.

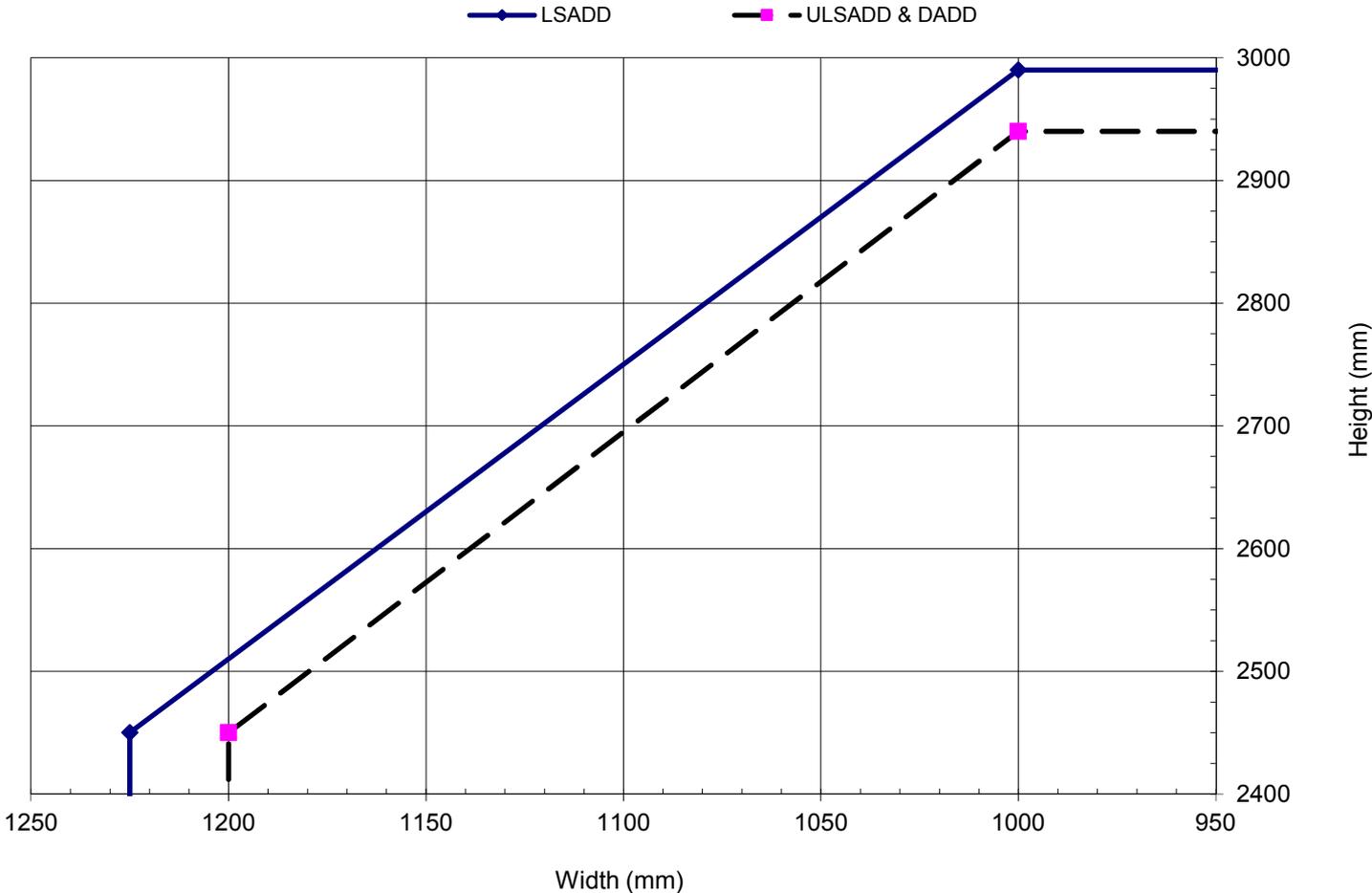
HEAD:
Square: 1No. 15 x 4mm seal fitted centrally in the leaf or frame head. For leaves over 2800mm high, increase to 1No. 20 x 4mm seal.

JAMBS: 1No. 15 x 4mm seal fitted centrally in the leaf edge or frame reveal. For leaves over 2800mm high, increase to 1No. 20 x 4mm seal.

MEETING EDGES:
Square: 2No. 10 x 4mm seals fitted centrally 5mm either side of the centreline in one meeting edge only.

HARDWARE PROTECTION: See section 13.

Maximum Door Leaf Size



Falcon Panel Products Ltd. Stredor Doorsets – 30 Minutes Fire Resistance
Latched & Unlatched, Single & Double Acting, Single & Double Doorsets
7mm Inner MDF Facing

| | | | | | |
|---|----------------------|-------------------|-------------|------------|-----|
| Leaf Sizes | Configuration | | Height (mm) | Width (mm) | |
| | LSASD, ULSASD & DASD | Maximum Leaf Size | 2140 | X | 926 |
| | LSADD, ULSADD & DADD | | | | |
| Maximum Overpanel Height (mm) | | Transomed | 2000 | | |
| <p>INTUMESCENT MATERIALS: PVC encased Pyroplex Rigid Box Seals – Pyroplex Ltd., or Type 617 Seals – Lorient Polyproducts Ltd.</p> <p>HEAD: 1No. 15 x 4mm seal fitted centrally in the leaf or frame head.</p> <p>JAMBS: 1No. 15 x 4mm seal fitted centrally in the leaf edge or frame reveal.</p> <p>HARDWARE PROTECTION: See section 13.</p> | | | | | |

Maximum Door Leaf Size

—◆— LSASD, ULSASD, DASD, LSADD, ULSADD & DADD

