INTERNATIONAL FIRE CONSULTANTS LIMITED

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IFC FIELD OF APPLICATION REPORT

Field of Application of the fire resistance of 50mm thick flaxboard core FD60 door leaves hung in steel or hardwood frames

Fire Resistance Standard: BS476: Part 22: 1987

IFC Report IFCA/06214 Revision D

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1. INTRODUCTION

This report has been prepared by International Fire Consultants Ltd (IFC) to define the Field of Application for timber based door assemblies, comprising 50mm thick flaxboard core door leaves in steel or hardwood frames, that are required to provide 60 minutes 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:

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 60 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

Test evidence used to support this Field of Application Report is summarised in Appendix E.

3. SCOPE OF APPROVAL

3.1 Doorset Configurations

The following single acting door configurations are only covered for door assemblies which are installed to open away from the fire risk side, apart from double acting door assemblies which are covered for the risk occurring from either side of the door leaf.

Note: Reference, above, to the 'fire-risk' face implies that the direction of fire exposure will be predicted in practice, and it is recommended that the 'uni-directional' fire exposure is agreed with the Approving Authority.

The following door configurations are approved within the scope of this report:-

Latched, single acting, single leaf door	LSASD
Latched, single acting, single leaf door with overpanel *Note 1*	LSASDOP
Double acting single leaf door *Note 2*	DASD
Latched, single acting, double leaf door	LSADD
Latched, single acting, double leaf door with overpanel *Note 1*	LSADDOP
Double acting, double leaf door *Note 2*	DADD

Note 1 *Overpanels above single acting door assemblies must be 'flush' with either rebated or square junctions. Where included, the rebate in the overpanel shall be 26-29mm wide x 19mm deep and the rebate in the leaf head shall be 22-25mm wide x 19mm deep.*

Note 2 *Double acting door assemblies are only approved with steel frames.*

3.2 Maximum Assessable Door Leaf Sizes

The calculated envelopes of assessed leaf dimensions for each mode and configuration covered by this Field of Application Report are given in Appendices C and D, based upon use of the intumescent specification shown in Appendix B.

Leaves in double door assemblies may each be of the same width, up to the maximum width indicated in Appendices C and D.

For unequal width leaves (assuming the smaller leaf is secured using flush bolts) there is no limit on the ratio of leaf widths (although the large leaf must still be within limitations in Appendices C and D), since the bolts will restrict deflection irrespective of the leaf width.

However, the width of the small leaf shall not be less than 300mm, since this will affect its vertical stability relative to that of the larger leaf.

Note 3 *Although this report approves a range of door sizes, door leaves must be made to the required size, by the manufacturer. Doors must <u>not</u> be reduced in size after manufacture, since this will reduce the width of framing members, and interfere with intumescent strips; adversely affecting the fire resistance of the assembly.*

3.3 Overpanels

Intumescent seals at the panel/frame interface shall be as defined in Appendix B, and installation shall be as defined in Section 3.8.3.

The size of overpanel is limited to the full width of the leaves contained within the door assembly and the following maximum heights:

Single leaf door assemblies:	2000mm high
Double leaf door assemblies:	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.

Note 4 *Approval of a door or overpanel size by IFC does not indicate that such a size can be fabricated, (check with manufacturer), and will be subject to the ability of the supporting construction to provide adequate restraint/support.*

3.4 Door Leaf and Overpanel Specification

The basic door and overpanel construction comprises a flaxboard core, surrounded by softwood stiles and rails (or hardwood top rail where flush overpanels are incorporated) and subsequently faced with hardboard. A detailed constructional specification is given below.

This is based upon the test evidence referenced in Appendix E, (and is therefore limited to the information available from those test reports), but also defines variations and tolerances*Note 5* where it is considered that these will not adversely affect overall fire resistance. See **Figure 06214D/01** in Appendix A. The machining and assembly of all components, and the bonding processes, shall be such to ensure that no gaps occur within the construction.

Note 5 *Although variations and options may be approved herein, both doors (and overpanel where applicable) of each assembly shall use the same specification.*

Component	Species/ Type	Dimensions	Density
Core	Flaxboard	44mm thick	440kg/m³ *Note 6*
Stiles	Softwood	35mm wide x 44mm thick	510kg/m³ *Note 7*
Top and bottom rails	Softwood	35mm wide x 44mm thick	510kg/m³ *Note 7*
Top rail (when flush overpanels are incorporated)	Hardwood	67mm wide *Note 8* x 44mm thick	640kg/m³ *Note 6*
Bottom rail of overpanel (when fitted flush with door leaf)	Hardwood	67mm wide *Note 8* x 44mm thick	640kg/m³ *Note 6*
Optional lippings	Hardwood	Maximum 12mm thick *Note 9*	640kg/m³ *Note 6*
Facings	Hardboard	3mm thick	900kg/m³ *Note 6*
Adhesive	Urea Formaldehyde	–	–

Table 1. Approved Door/Overpanel construction

Note 6 *This is the stated minimum density of the component.*

Note 7 *This is the nominal minimum density of the component.*

Note 8 *In assemblies containing an equal or unequal rebated junction between leaf head and overpanel, the hardwood top rail of leaf or leaves, and the bottom rail of the overpanel, are machined to create a 19mm deep rebate, of equal width or 29/22mm split width. (67mm deep hardwood rails must always be included at overpanel junctions, even if the junction is not rebated).*

Note 9 *Optional 12mm thick lippings may be included on all edges, or just vertical edges; but may NOT be included at the head of the leaf and base of the overpanel where rebated overpanels are included.*

Minimum overall leaf thickness:	50mm (excluding any decorative facings)
Decorative finishes:	The leaves and overpanels may have timber veneers, or decorative plastic based laminates (maximum thickness 2mm) applied to the facings only. Plastic based laminates must not extend over the door leaf edge. The leaf must not be reduced in thickness to accommodate the finishes. Paint or varnish may be applied to faces and edges.
Leaf framing:	Door leaf and overpanel framing timber must be good quality, straight grained, timber, with minimum measured density as defined in Table 1, above (measured at 12% moisture content). Optional 400mm high x 38mm wide x 44mm thick softwood lock block may be included, as required. Minimum measured density 510kg/m³ (measured at 12% moisture content). Timber must be free of splits, shakes and checks and have a slope of grain better then 1:15. Moisture content 10 ±2% for UK market (or to suit internal joinery moisture content specification of export countries).
Leaf edge details:	Door leaves must have square edges, however, a slight rounding, of minimum radius 50mm, is permissible. The radius formed on the leading edge of double acting doors, or single acting double doors, shall not remove more than 2mm thickness of framing on the door face. The radius of pivot stiles (double-acting doors) shall suit the pivot/floor spring employed but a maximum 4mm gap must not be exceeded at the interface with the opposing door frame reveal.

Meeting stile details: The meeting stiles in double leaf door assemblies must have square edges, however, a slight rounding of minimum 50mm radius is permissible, or a splayed leading edge on one or both leaves may be machined, providing the resulting gap between the leaves does not exceed 4mm.

Rebated meeting stiles are not permitted.

Hardwood astragals shall be included on single-acting doors (as tested) and must include a 26 x 2mm intumescent strip concealed within a 26 x 6mm groove, concealed under a 4mm thick hardwood lipping. (Minimum density 640kg/m³). See **Figure 06214D/02** in Appendix A.

Astragals are not used on double-acting doors; which must not include locks or flush bolts.

Overpanel junction details: Overpanels above single acting door assemblies must be 'flush', with either rebated or square junctions. Where approved, the rebate in the overpanel shall be 25-29mm wide x 19mm deep and the rebate in the leaf head shall be 22-25mm wide x 19mm deep, see **Figure 06214D/03** in Appendix A.

Where flush bolts are used in door assemblies with rebated overpanels, the rebates shall be offset, and bolts shall be installed so that they will be centrally aligned (or abutting the upstand) with the rebate in the leaf.

Overpanels above double acting door assemblies are not permitted.

3.5 Door Frames

3.5.1 Steel frame for single acting door assemblies

Material: 1.5mm thick rolled mild steel or stainless steel of grade 304 or 316.

Frames to be backfilled with mortar or concrete. Gypsum slurry may also be utilised when fitted within a blockwork, brickwork or concrete wall. Mineral fibre, glass fibre or ceramic wool must not be used.

Minimum dimensions: 35mm wide (excluding stop) x 110mm deep, with minimum 90mm thick supporting construction as detailed in **Figure 06214D/04** in Appendix A.

Stop:	25mm deep.
Architraves:	The architraves are 10mm thick and are integral to the frame section as shown in **Figure 06214D/04** in Appendix A.
Head/jamb joint:	Formed with welded joints or bolted tabs **or** mitred joint with interconnecting plates on the inside of the frame.
Approved leaf sizes:	The approved leaf sizes and configurations are outlined in Appendix C, utilising the intumescent seal specification outlined in Appendix B.

3.5.2 Steel frame for double acting door assemblies

Material:	1.5mm thick rolled mild steel or stainless steel of grade 304 or 316. Frames to be backfilled with mortar or concrete. Gypsum slurry may also be utilised when fitted within a blockwork, brickwork or concrete wall. Mineral fibre, glass fibre or ceramic wool must not be used.
Minimum dimensions:	35mm wide by 110mm deep, with minimum 90mm thick supporting construction as detailed in **Figure 06214D/05** in Appendix A. Frame profile for double acting doorsets to have a stepped profile as tested but must maintain a maximum 4mm gap between leaf and frame.
Architraves:	The architraves are 15mm thick and are integral to the frame section as shown in **Figure 06214D/05** in Appendix A.
Head/jamb joint:	Formed with welded joints or bolted tabs **or** mitred joint with interconnecting plates on the inside of the frame.
Approved leaf sizes:	The approved leaf sizes and configurations are outlined in Appendix C, utilising the intumescent seal specification outlined in Appendix B.

3.5.3 Hardwood frame for single acting door assemblies

Material:	Hardwood of minimum density 640kg/m³ (measured at 12% moisture content), straight grained and of appropriate quality in accordance with BS EN 942: 2007. Moisture content 10 ± 2% for UK market (or to suit internal joinery moisture content specification of export countries).
Minimum dimensions:	21mm face width (excluding stop) x 75mm deep. These dimensions assume that the rear of the frame is protected by the adjacent wall, (and includes firestopping), and that the frame does not project out from the face of the wall. If this is not the case, a special assessment will need to be sought. See also Section 3.8 regarding installation.

The overall frame depth may be increased by use of sub-frames/extension linings, but the joint between the main frame and sub-frame must not intrude in the plane of the door thickness.

Architraves: The architraves are shown in **Figure 06214D/06** in Appendix A and shall be in addition to the 75mm depth of frame defined above. (See Section 3.8 regarding wall/frame gaps.)

Stop: 20mm thick minimum, as shown in **Figure 06214D/06** in Appendix A.

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

Approved leaf sizes: The approved leaf sizes and configurations are outlined in Appendix D, utilising the intumescent seal specification outlined in Appendix B.

3.6 Glazing Apertures

3.6.1 Glass types

The following glass types are approved for use in the door leaves 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.

The codes used, below, for the glass types, glazing materials, and bead types, (e.g. G60/1, S60/1 and B60/1), are not those used by the respective manufacturers, and are attributed solely by IFC for the purpose of identification and cross-referencing within this assessment.

For door assemblies that are to satisfy a 60 minutes integrity requirement, the following glass types are approved;

G60/1	5mm thick Firelite (Southern Ceramics) *Note 10*
G60/2	6mm thick Pyroshield 2 (Pilkington) *Note 11*
G60/3	7mm thick Pyran S (Schott Glass)
G60/4	10mm thick Pyrodur (Pilkington)
G60/5	12mm thick Pyrobelite (AGC Flat Glass)

Note 10 *Limitations apply to the pane size of glass type G60/1 - 5mm thick Firelite, as it does not satisfy the requirements of BS6206. Panes are restricted to a smaller dimension not exceeding 250mm and an area not exceeding 0.5m², each measured between glazing beads, in accordance with the requirements of Approved Document N.*

Note 11 *Pyroshield 2 glass has not been proven at larger sizes in all glazing systems considered here, and due to its potential to soften and slump in the later stages of a 60 minute fire test, the approval for this glass is restricted to apertures with an area not exceeding 0.3m² and/or no longer than 1200mm, and is restricted to use with seal types S60/3 and S60/8.*

For door assemblies that are to satisfy a 60 minute integrity and 30 minute insulation requirement, the following glass types are also approved;

G60/6	15mm thick Pyrostop (Pilkington)
G60/7	16mm thick Pyrobel (AGC Flat Glass)
G60/8	18mm thick Pyrobel (AGC Flat Glass)

Expansion allowance for all 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 door leaves and overpanels considered herein, which are compatible with the identified approved glass types listed above, although some restrictions on size may be given in subsequent sections. (See also **Figure 06214D/07** in Appendix A.)

S60/1	25 x 3mm Pyroglaze 60 and Pyroglaze 300 liner *Note 12* (use with glass G60/1, G60/3-5)
S60/2	25 x 3mm Therm-A-Glaze 60 and Therm-A-Line liner *Note 12* (use with G60/1, G60/3-5)
S60/3	25 x 4mm Fireglaze and Therm-A-Line liner (use with G60/1–G60/5)
S60/4	25 x 4mm Fireglaze 2000 and Therm-A-Line liner (use with G60/1, G60/3-5)
S60/5	18 x 4mm Ceramic fibre tape and Therm-A-Line liner between beads (use with G60/6–G60/8) *Note 13*
S60/6	18 x 5mm Closed cell foam and Therm-A-Line liner between beads (use with G60/6–G60/8) *Note 13*
S60/7	Lorient System 36 variant to suit glass thickness, including Palusol or Therm-A-Line liner between beads (use with G60/6–G60/8) *Note 14*
S60/8	Lorient System 90 Plus including Palusol liner (use with G60/1–G60/3) *Note 14*

Note 12 *Pyroglaze 60 and Therm-A-Glaze 60 have not been tested in long apertures, and their ability to contribute to successful performance is not proven. The use of these systems is thus restricted to panes no longer than 1000mm, irrespective of the glass type.*

Note 13 *If required, silicone sealant may be installed to cover the top/visible edge of the glazing system, at the bead/glass interface.*

Note 14 *The use of these systems may necessitate a different beading profile/size from the standard profile referenced in Section 3.6.3; refer to glazing system manufacturer for correct profile.*

3.6.3 Bead profiles and installation

The approved bead size and profile, and relevant fixing details, are shown on the **Figure 06214D/07** in Appendix A.

Note 15 *If non-insulating glass types G60/1, G60/2 and G60/3 are employed, the face of the glazing bead that is adjacent to the glass must be splayed by at least 20°.*

Glazing beads must comprise hardwood (excluding Ash and Beech) with a minimum measured density of 640kg/m^3 at 12% moisture content. The timber must be straight grained and of appropriate quality in accordance with BS EN 942: 2007. 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

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 single aperture	-	1.1m²
Maximum vertical length of aperture	-	1560mm
Maximum horizontal width of aperture	-	740mm
Minimum distance from leaf edge (top)	-	140mm
Minimum distance from leaf edge (sides)	-	140mm
Minimum distance from bottom of leaf	-	140mm
Minimum distance between apertures	-	140mm

More than one aperture may be included in each leaf subject to the individual limitations above. The maximum total area of apertures allowed is outlined below:-

All assemblies	-	1.2m² *Note 16*

Note 16 *Any aperture(s) for intumescent air transfer grilles, (see Section 3.7.6), must also be included in the total area permitted for apertures given above. Margins between apertures apply whether for glazing or grilles.*

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.

All hardware beyond the scope of the general guidance given below 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, or third party certification shall be available to support its use on door assemblies of the proposed type.

General guidance for all items of hardware is outlined below, based upon the range of items tested.

3.7.1 Hinges

The hinges used in the tests were 140 x 80 x 3mm steel hinges, but other hinges may be used, subject to compliance with the specifications below.

Hinge types:	Fixed pin, washered butt, or journal supported hinges may be used. Ball bearing butt hinges must have fire test evidence on timber doors of similar construction.
Number of hinges:	3no. (1½ pairs) per leaf for leaf sizes up to 2040mm height. 4no. (2 pairs) per leaf for leaf sizes over 2040mm height.
Positions:	Top hinge set 150mm from the head to the top of the hinge and the bottom hinge set 220mm up from the foot of the leaf to the bottom of the hinge. Middle hinge either equispaced between the top and bottom hinges or 2nd hinge positioned 200 – 250mm below the top hinge and the 3rd hinge equi-spaced between the 2nd and bottom hinge. (All positions ±50mm).
Fixings:	Screw-fixed or welded to steel frames; as tested. Screw-fixed to door leaves, and to timber frames. Steel screws, as recommended by the hinge manufacturers, in no case smaller than No. 8 (3.8mm diameter) x 32mm long in the door leaf. The method of fixing hinges to timber frames shall be as tested with the proposed frames, irrespective of hinge type, and without adversely affecting the fire resistance. Position of screws (in relation to the face of door and frame) in blades of alternative hinge types shall be similar to hinges tested with the proposed door type.
Hinge blade sizes:	2.5–3.5mm thick x 80–140mm high x 32–36mm width. (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.

Rising butt, cranked butts and spring hinges (single or double action) are not suitable for use on doors approved within the scope of this generic report, although may be suitable to form the subject of an individual and specific evaluation.

3.7.2 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 the BS5499 series of standards. Closers may be used, subject to compliance with the specifications below.

a) Face-fixed overhead door closer (and accessories such as soffit brackets) that have been tested, assessed or otherwise approved for use on unlatched FD60 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.

Provision must be made to secure the closer arm to the door frame, irrespective of the closer type, and without adversely affecting the fire resistance of the door assembly.

b) Concealed jamb mounted closers (e.g. Perko/Perkomatic) may be used in single leaf door assemblies, subject to there being sufficient force to close the door against the action of the latch bolt, and smoke seals where fitted. The mortice in the door must be cut carefully to prevent voids within the construction. (Provision must be made to accept the anchor plate in the frame, without adversely affecting the fire resistance of the door assembly).

It is essential that the closers are of the correct power rating for the width and weight of the door assemblies (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.

3.7.3 Floor springs and accessories (steel framed door assemblies only)

Floor springs and accessories (straps and top pivots) are necessary for double acting assemblies. The floor spring and accessories used in test 6302 were Dorma type BTS.

The tested floor springs and accessories may be used, and others may also be used, subject to having appropriate test or assessment evidence for use on timber door assemblies of similar construction to that proposed, when fitted in steel frames, and the following limitations;

i) Incorporation of any intumescent gasketry used in the test.
ii) A 40 x 2mm Palusol based intumescent strip should be bonded to the frame head, central to the leaf thickness, such that 7mm remains continuous either side of the top pivot.
iii) No removal of the timber or intumescent strip at the leaf stile.
iv) Provision must be made to accept the top centre in the frame, as in testing, without adversely affecting the fire resistance.

3.7.4 Mortice latches/locks

Mortice cylinder latch/lock used in the tests, but other mortice latches/locks may be used, subject to compliance with the specifications below.

Where mortice latches or locks are fitted, they should be centred at 1000mm (± 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 25mm wide
	Latch body	- 20mm wide (thick)
	Strikeplate	- 235mm long x 25mm wide

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.

The body of the lock/latch should be wrapped in 1mm thick non-pressure forming intumescent sheet. The intumescent strip details (see Appendix B) will ensure that at least 10mm width of seals will be maintained at the meeting stiles. (Astragals MUST also be used with ALL single acting double doors).

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. Holes for spindles should be kept as small as is compatible with the operation of the hardware.

Where glazing apertures are permitted/specified, and are positioned such that locks/latches are included in the margin between 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 between the back of the lock mortice and the aperture must be at least 135mm.

3.7.5 Flush bolts

DYLA bolts were used in the tests, but other bolts may be used, subject to compliance with the specifications below.

Unless specific fire test evidence is available, all bolts shall be steel. The following limitations and protection apply;

- Maximum size of flush bolt is 250mm long x 20mm wide x 18mm deep.
- Flush bolts in door assemblies with rebated overpanels, shall be installed so that bolts will be centrally aligned with the rebate in the leaf; which must be offset. Surface mounted bolts may be used; see below.

- 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.

3.7.6 Non-essential hardware items

Hinge bolts:	Steel bolts may be included fixed into the frame reveal with maximum size 8 x 8mm, and projecting 8mm from the frame. If they interrupt the intumescent seal in the leaf edge they must be bedded on 2mm thick low pressure forming intumescent material.
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 door assemblies.
Pull handles:	These may be fixed to the door assemblies, 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 door assemblies. Any components that pass through the door, to connect back-to-back handles, shall be steel.
Intumescent air transfer grilles:	These must be tested, assessed or otherwise approved for with 50mm thick (or less) timber/cellulosic FD60 doors. They must be fitted fully in accordance with the manufacturer's instructions, including all intumescent liners and cloaking grilles/beads. They must be no larger than that for which test or assessment evidence exists. See Section 3.6.4, for restrictions on maximum size and placement of any apertures; these apply to those for grilles, which must also be included in the <u>total</u> area permitted for apertures given in Section 3.6.4.
Note 17	*The installation of such items in a door leaf may compromise its performance as a smoke control door.*

Security viewers: These may be fixed into the proposed doors, subject to the following limitations, unless specific fire test evidence exists to the contrary;

- Viewers must not exceed 15mm outer diameter, and be made from brass or steel;
- Holes bored through the door must be no greater than 1mm larger than the bore of the viewer, which must be bedded in a non-pressure forming intumescent mastic/sheet material;
- The viewer must include an effective shutter/cover plate.

Door selectors: These are used on double leaf door assemblies with astragals to ensure that the leaves close in sequence. Face fixed items are preferred. Door selectors must not be recessed into the leaf or frame to the extent that they interrupt any intumescent strips. Recesses cut to accommodate these items must be as small/accurately cut as possible.

Drop seal: Planet KT drop seals may be included in the bottom edges of doors. They must be wrapped in minimum 1mm thick non-pressure forming intumescent material and must be positioned centrally within the thickness of the door leaf.

3.8 Installation, Supporting Construction and Edge Gaps

3.8.1 Installation with steel frames

The frames must be fixed back to the supporting construction with the proprietary two-part adjustable clamping system fixed within the frame section; as utilised in the tests outlined in Appendix E with steel frames. The clamping system should be employed at maximum 250mm from the top and bottom of the jambs and at maximum 800mm centres. At the head of door assemblies no clamping system fixing is required.

Where the hinges are fixed into the perimeter framing, the hinge is fixed back to the clamping system, within the frame, as utilised in tests 5645 and 5644 outlined in Appendix E.

The steel frames should be backfilled as outlined in Sections 3.5.1 or 3.5.2, as appropriate. It is assumed that the back-fill material will be applied to fill any minor gaps between the rear of the frame and the edge of the opening in the wall, or that frames will be installed such that the back-fill material forms a close fit against the edge of the opening in the wall. If this is not the case, then fire-stopping materials should be included between the supporting construction and frames, following the recommendations of Table 4 or 5 in BS8214: 2016, *"Code of practice for fire door assemblies"*, and using a product proven in such steel applications, and with reference to the correct depth of seal to suit the width of gap between wall and frame.

No part of the rear of the frame section shall be exposed once installed, except for integral architraves. This assessment assumes that there are no feature rebates or shadow gaps at the junction of the frame and wall. This report only applies to scenarios where the frame is fully aligned with the fire-resisting wall/partition. The approval in this report does not apply where the wall/partition includes decorative 'cladding' on the face of the fire-resisting construction, (e.g. timber panelling on battens, or plasterboard on dabs/studs), such that any part of the frame is aligned within the plane of this decorative cladding. This detail is likely to adversely affect the fire resistance of the door assembly, and IFC should be consulted for specific advice, to determine upgrading measures that will be required in such cases.

The door design should be such that single acting leaves are fully flush within the frame when closed. Double acting doors should be centred on the frame depth. The face of leaves in double leaf door assemblies should be flush with each other at meeting stiles.

3.8.2 Installation with hardwood frames

The frames must be fixed back to the supporting construction with steel fixings at centres not exceeding 600mm; this applies to jambs and head. 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 direct of test exposure; (this may necessitate a twin line of screws in timber based door frames). Packers shall be used at all fixing positions.

The gaps between the supporting construction and frames should be sealed following the recommendations of Table 4 or 5 in BS8214: 2016, *"Code of practice for fire door assemblies"*, using a product proven in such timber applications, and with reference to the correct depth of seal to suit the width of gap between wall and frame. This assessment assumes that there are no feature rebates or shadow gaps at the junction of the frame and wall, and that the face of the frame does not project beyond the face of the wall. This report only applies to scenarios where the frame is fully aligned within the plane of the fire-resisting wall/partition. The approval in this report does not apply where the wall/partition includes decorative 'cladding' on the face of the fire-resisting construction, (e.g. timber panelling on battens, or plasterboard on dabs/studs), such that any part of the frame is aligned within the plane of this decorative cladding. This detail is likely to adversely affect the fire resistance of the door assembly, and IFC should be consulted for specific advice, to determine upgrading measures that will be required in such cases.

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

3.8.3 Installation of overpanels

Overpanels shall be installed utilising one of two distinct options, as outlined below.

The first option for installation of overpanels (in steel frames) uses the proprietary hinge bolt and carrier system utilised in tests 5645 and 5644 outlined in Appendix E. The fixing and installation details are outlined in **Figure 06214D/08** in Appendix A. This is applicable for flush and over-rebated overpanels.

The second option (when using timber frames) is for the overpanel to 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 2 screw fixings per overpanel edge. This option is only applicable for flush overpanels.

3.8.4 Supporting construction

The supporting construction may be timber or steel stud plasterboard partition (with or without Rockwool infill, as required) *Note 18*, or blockwork, brickwork or concrete walls, but shall be of a type that has been tested or assessed to provide in excess of 60 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 aperture must be as tested by the partition and/or door manufacturer. Refer to Section 3.5 herein, regarding minimum thickness of wall to suit frames.

Note 18 *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.*

The size of opening, the condition of the material forming the opening, and the alignment of frame within the opening, shall all be such that they will allow positive engagement of the proprietary clamping system for steel frames, to ensure secure fixing and retention.

3.8.5 Edge gaps

The gap between the door/overpanel and the frame, and the gap at the meeting stiles, and between door(s) and overpanel, should be 2–4mm. The gap between overpanel and frame should be 0–4mm.

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 in accordance with BS8214 (see also Section 3.10 regarding suitability of smoke seals).

3.9 Intumescent Seals

The intumescent seal specifications, widths, and positions are shown in Appendix B, based upon tested details.

3.10 Ambient Temperature Smoke Seals

Separate smoke seals that have been tested to BS476: Part 31: Section 31.1: 1983 and shown not to leak by more than $3m^3/m/hr$ 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 in accordance with BS EN 1634-3: 2004 (ambient temperature) or 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 described 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 steel or timber frames, as appropriate.

4. CONCLUSION

It is the opinion of International Fire Consultants Ltd that if the proposed door assemblies utilising 50mm thick flaxboard core door leaves hung in steel or hardwood frames were manufactured and installed within the limitations of this report and tested for fire resistance, they would satisfy the integrity criteria of BS476: Part 22: 1987 for 60 minutes.

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 IFCA/06214 Revision D have not been altered in any way; and have not subsequently, to our knowledge, been included in a fire test to BS476: 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: **Theuma NV**

6. LIMITATIONS

This Field of Application Report, addresses itself solely to the ability of the assemblies described to satisfy the criteria of the fire resistance test. It 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.

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.

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.

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 door assemblies 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 door assemblies will invalidate the approval by IFC, and may seriously affect the ability of the assembly to provide the required level of fire resistance performance. Determination of what constitutes wear or damage, and any corrective actions in order to return door assemblies to the required condition, should only be carried out following consultation with the manufacturer and IFC.

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 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 assessment 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 October 2023 should confirm its ongoing validity.

This Field of Application Report is not valid unless it incorporates the declaration by the applicant given in Section 5 duly signed by the applicant.

Prepared by:

Chris Houchen BSc. AIFireE
Senior Technical Manager
International Fire Consultants Ltd. (IFC)

Checked by:

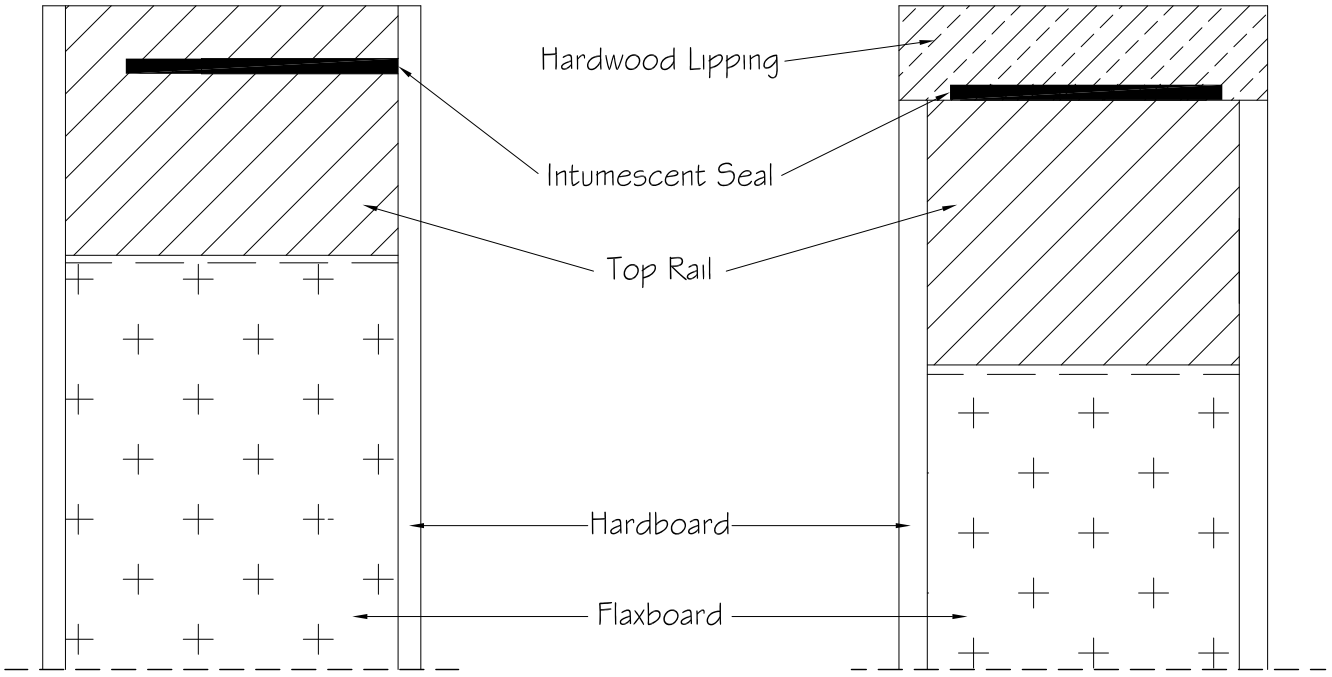
Mark Billingham
Senior Fire Safety Engineer
International Fire Consultants Ltd. (IFC)

APPENDIX A

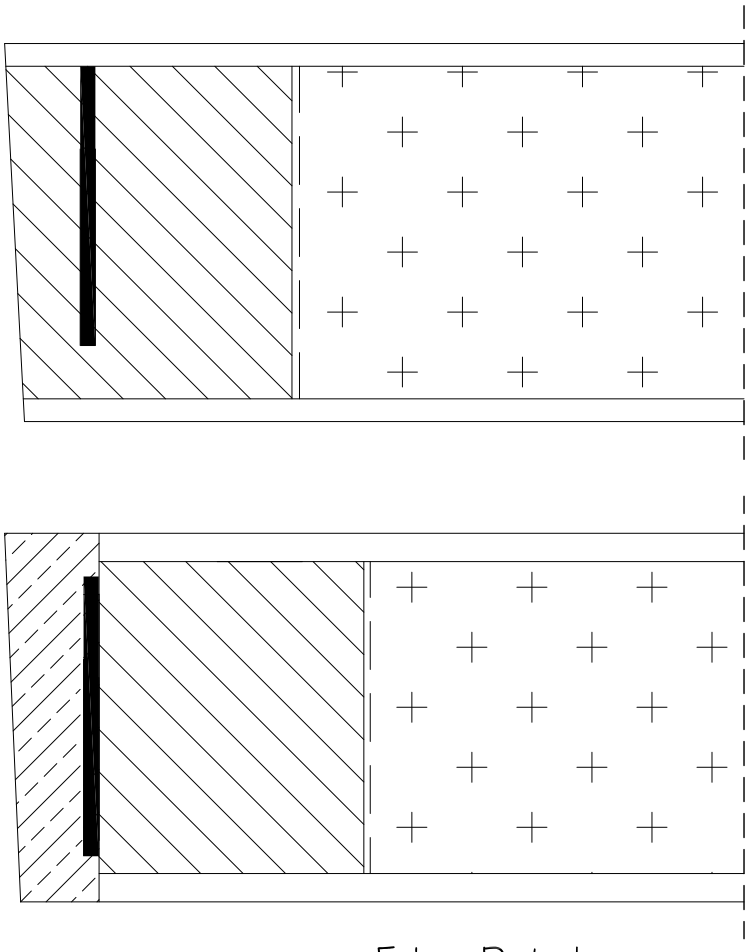
Figures 06214D/01 to 08

Construction Details

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



Flush Head Details



Edge Detail

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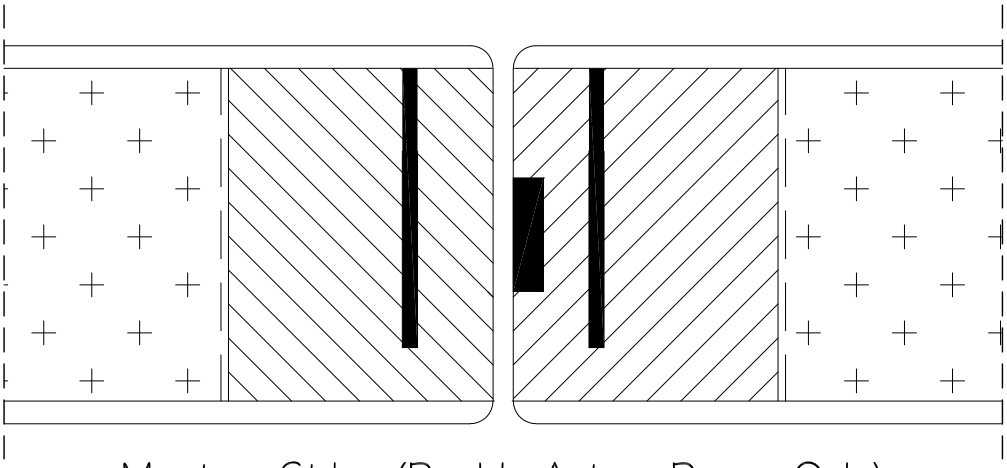
Field of Application Report
IFCA/06214 Revision D
Theuma NV

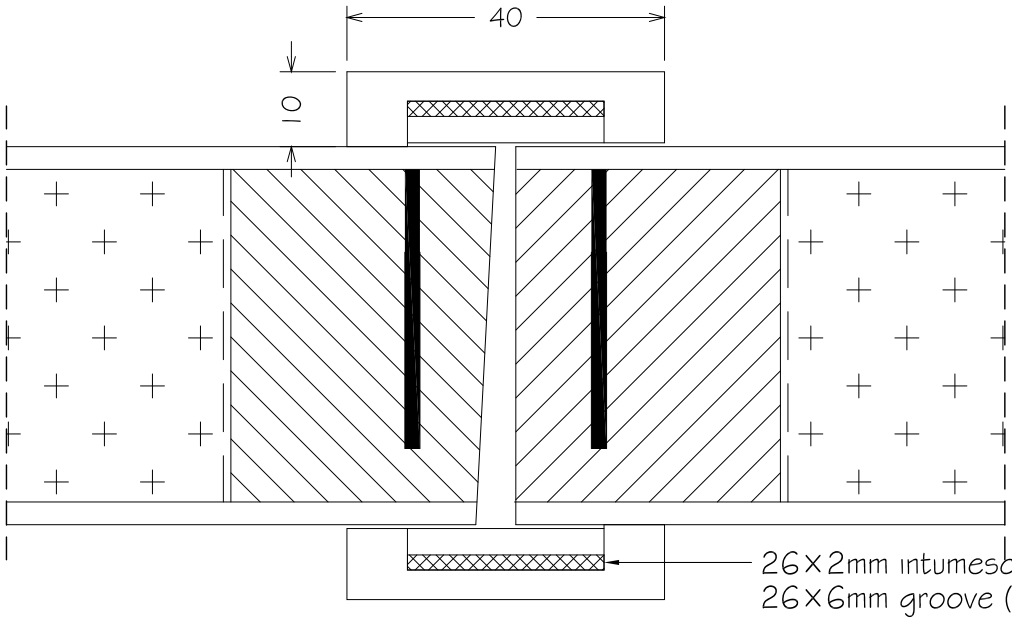
Leaf Construction
& Edge Detail

Job number: 17720	
Drawn by: CSP	Checked by: CH
Not To Scale	Drawn: Mar 2018

06214D/01



Meeting Stiles (Double Acting Doors Only)



Meeting Stiles (with lock, latch and/or flush bolts)

Refer to Appendix B for other options of intumescent seals

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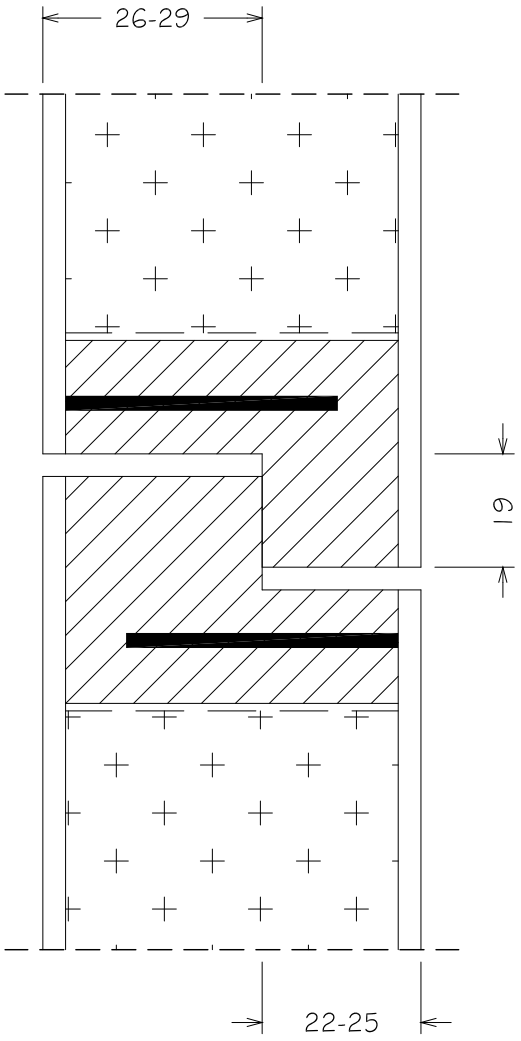
Meeting Stile Details

Job number: 17720	
Drawn by: CSP	Checked by: CH
Not To Scale	Drawn: Mar 2018

06214D/02



Refer to Appendix B for other options of intumescent seals

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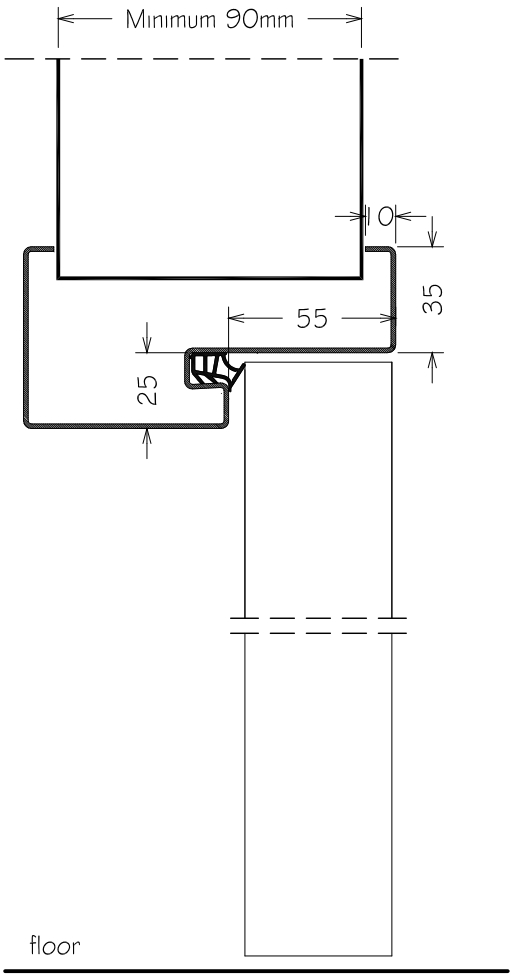
IFCA/06214 Revision D
Theuma NV

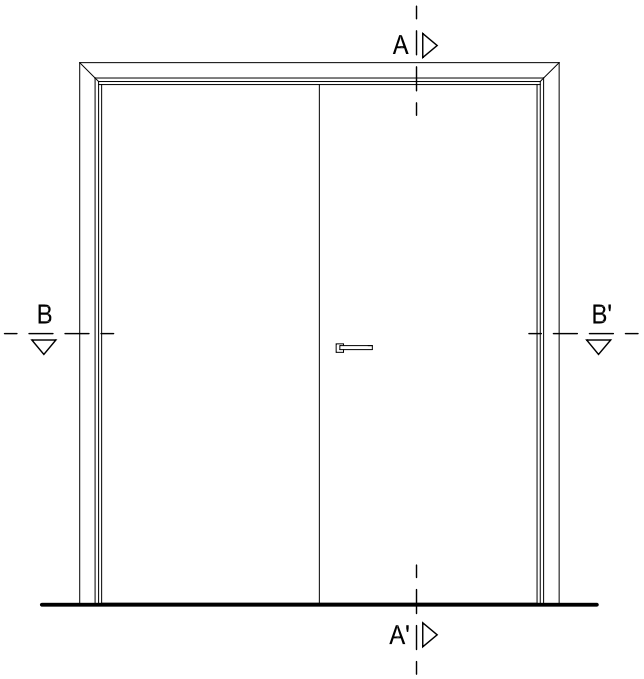
Rebated Overpanel Detail
(With One Option of Intumescent Seals Only)

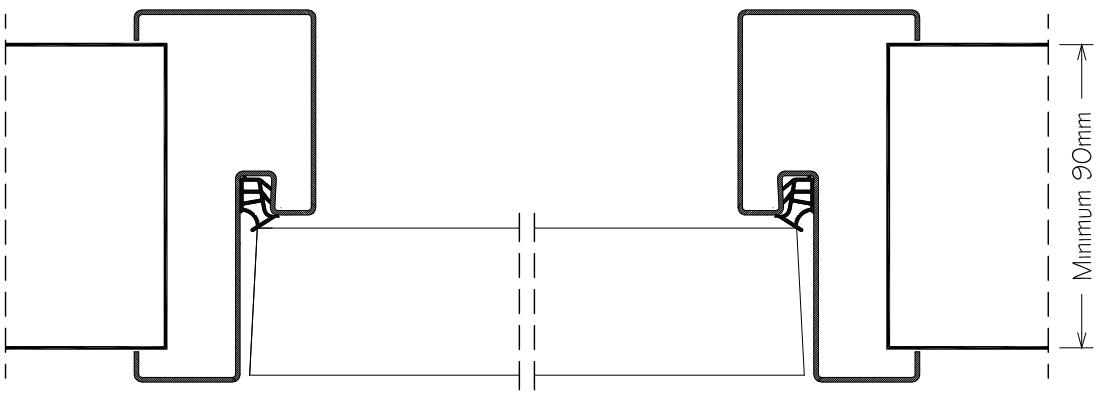
Job number: 17720	
Drawn by: CSP	Checked by: CH
Not To Scale	Drawn: Mar 2018

06214D/03



Section A-A





Section B-B

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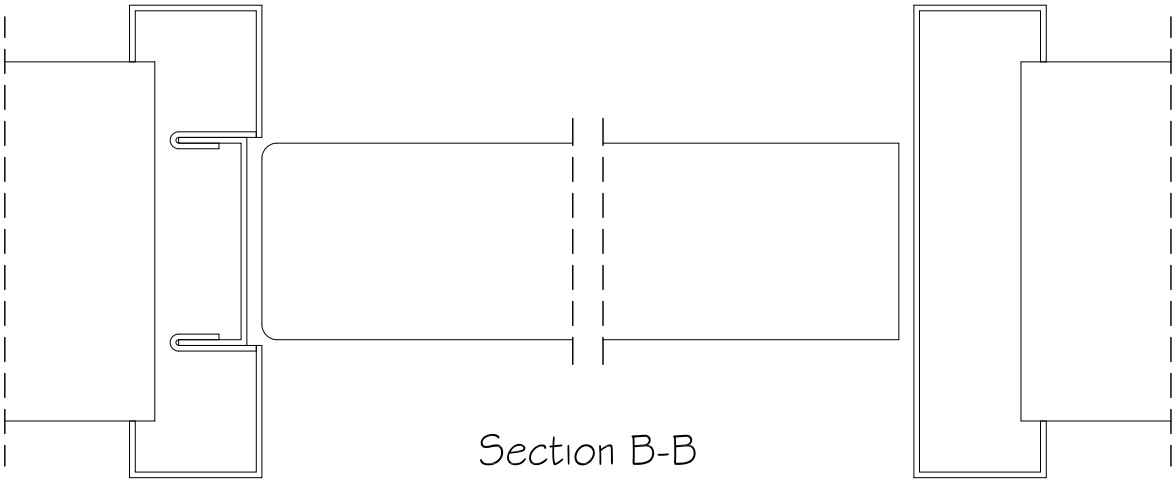
Theuma NV

Steel Frame for
Single Acting Doorsets

Job number: 17720	
Drawn by: CSP	Checked by: CH
Not To Scale	Drawn: Mar 2018

06214D/04



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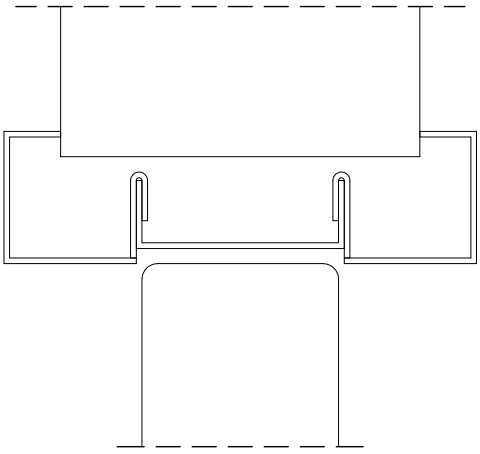
Curved

Flush



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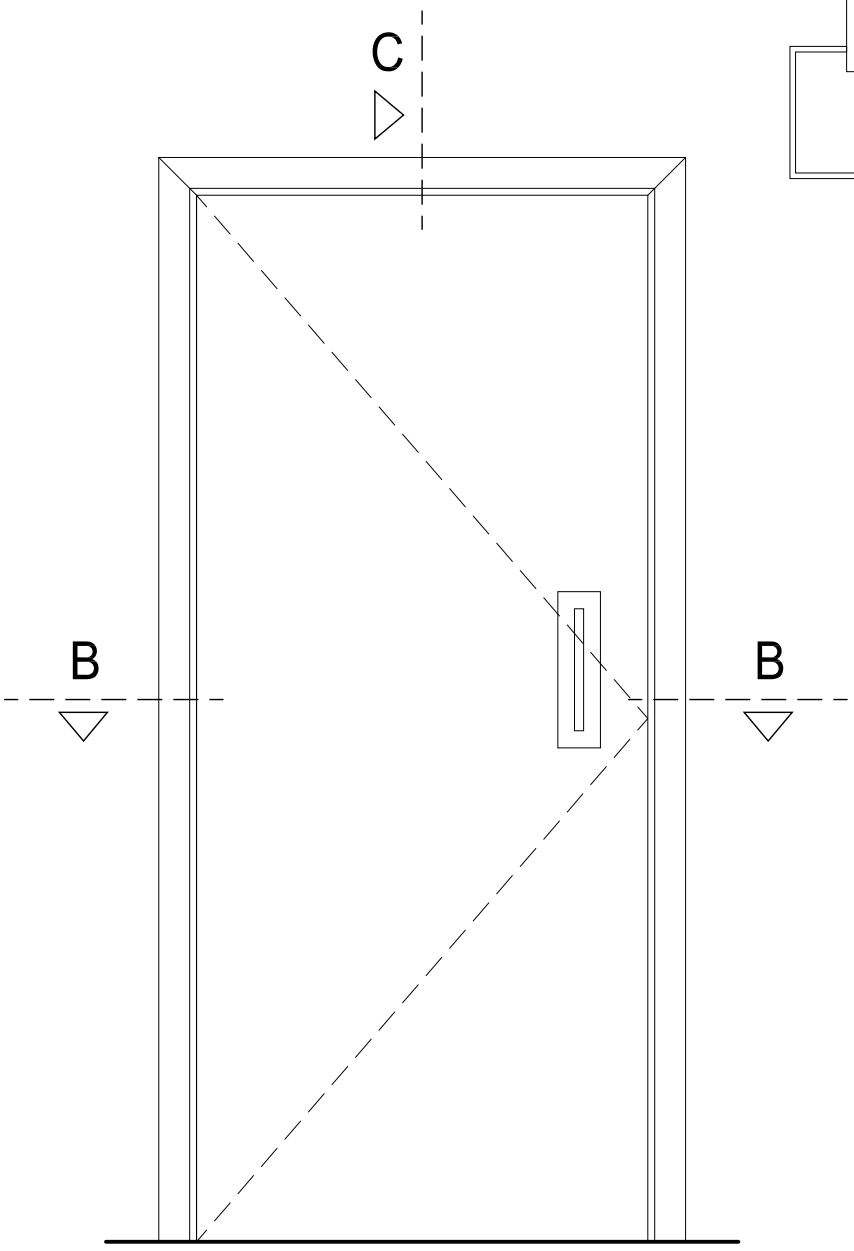

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Field of Application Report
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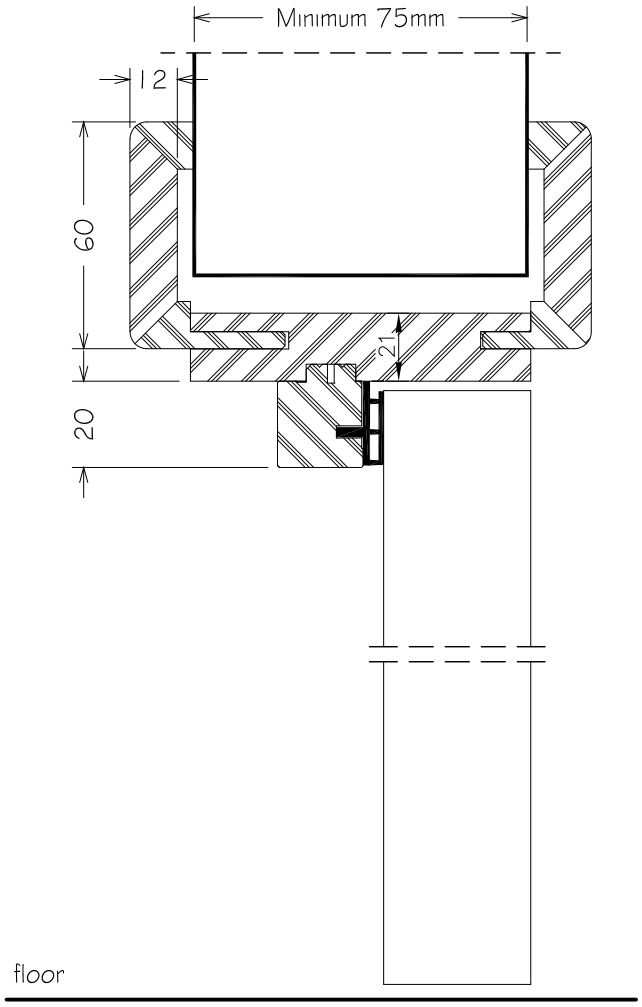
Steel Frame for
Double Acting Doorsets

Job number: 17720	
Drawn by: CSP	Checked by: CH
Not To Scale	Drawn: Mar 2018

06214D/05



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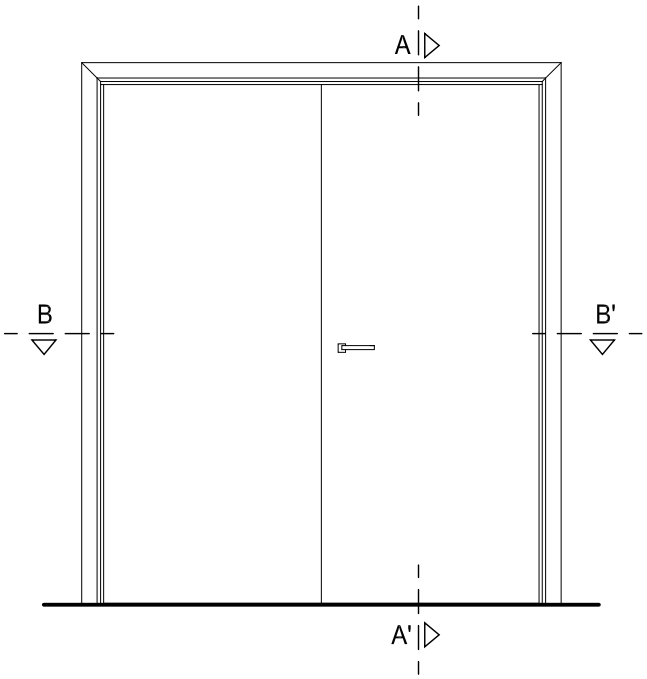

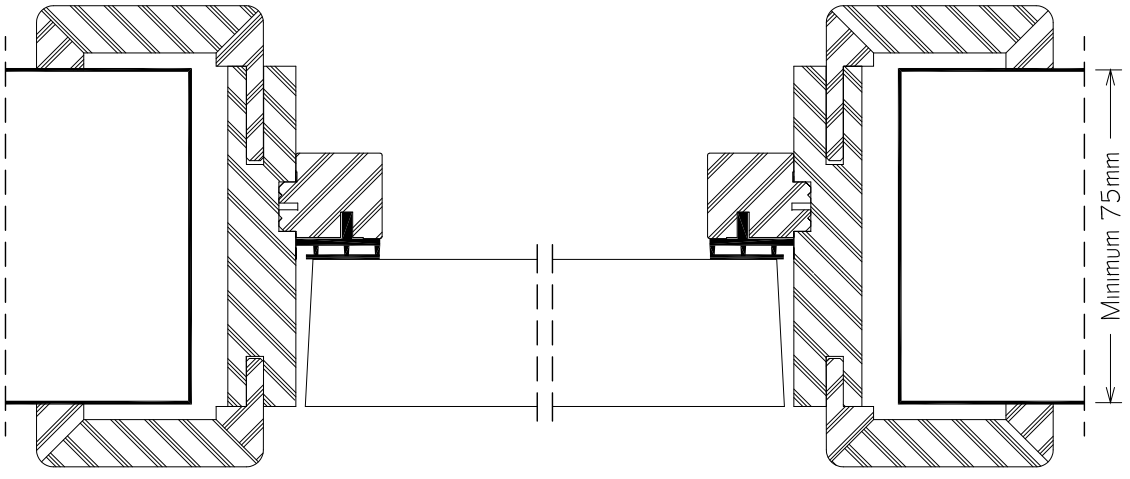

Section B-B

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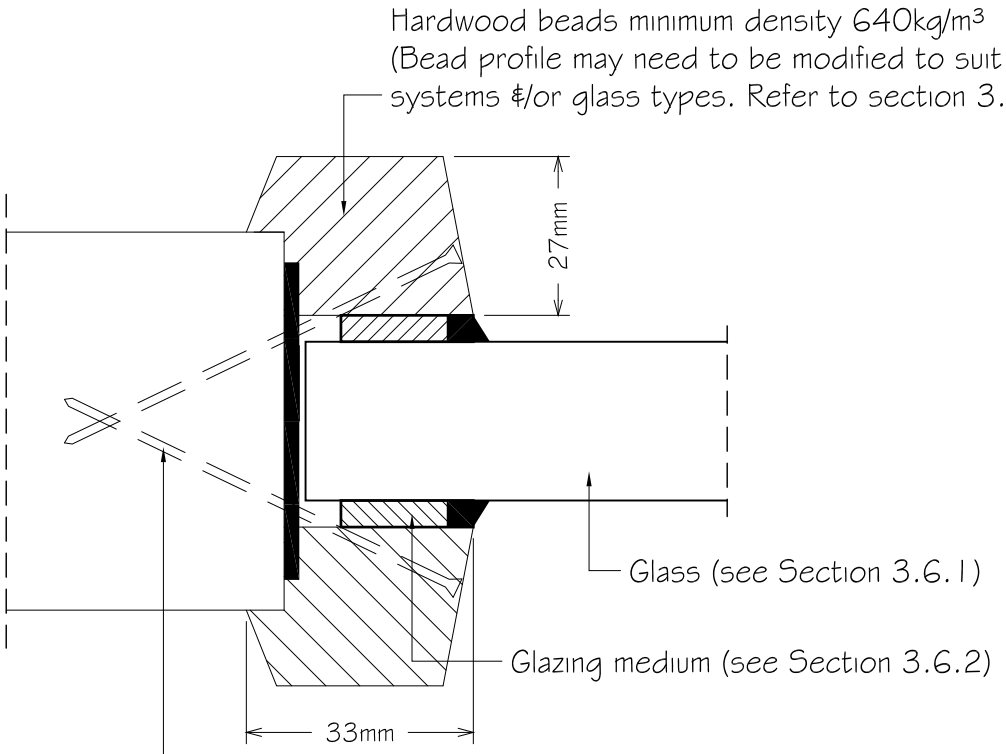
Hardwood Frame for Single Acting Dootsets

Job number: 17720	
Drawn by: CSP	Checked by: CH
Not To Scale	Drawn: Mar 2018

06214D/06



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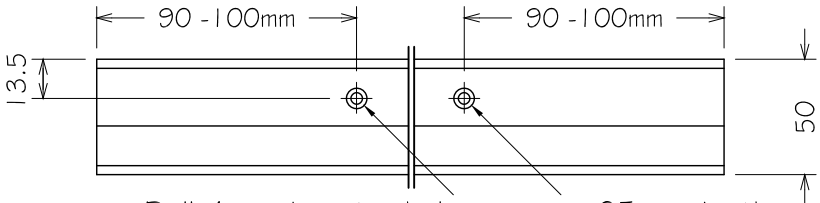
Glazing Detail

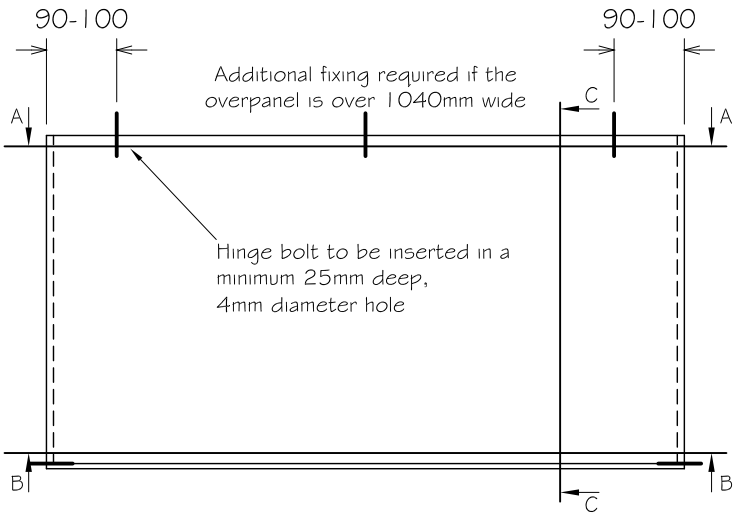
Job number: 17720	
Drawn by: CSP	Checked by: CH
Not To Scale	Drawn: Mar 2018

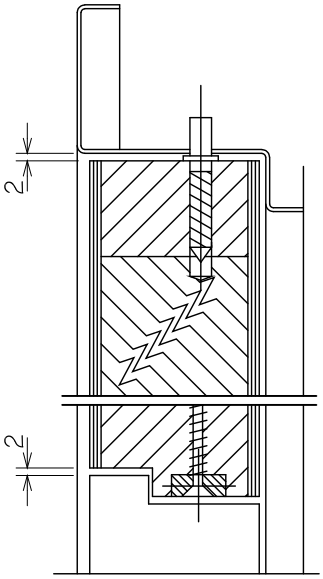
06214D/07



Drill 4mm diameter hole, minimum 25mm depth

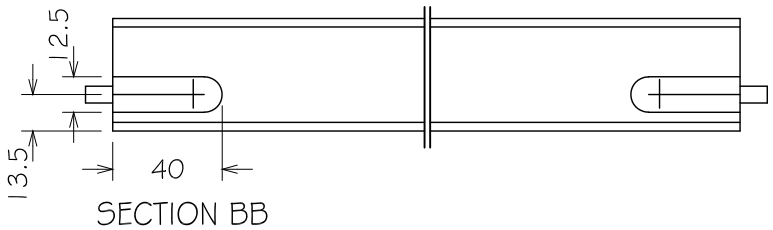
SECTION AA





SECTION CC

Typical Section for overpanel fitted flush in frame



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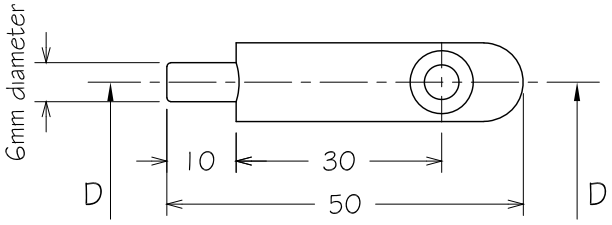
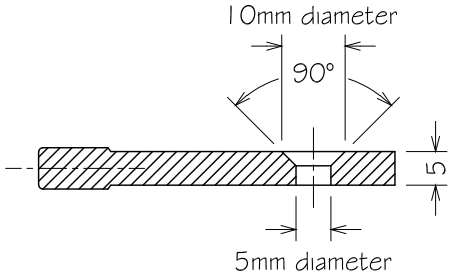


Overpanel Carrier



SECTION DD

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Typical Overpanel Fixings
Option 2

Job number: 17720	
Drawn by: CSP	Checked by: CH
Not To Scale	Drawn: Mar 2018

06214D/08

APPENDIX B

Assessed Intumescent Seal Specifications

Intumescent Seal Specifications

Location	Seal Specification
Stiles/jambs (not meeting stiles)	1no. 36 x 2mm Palusol seal, concealed 8mm below the surface of the leaf framing, or recessed into the back of the lipping, if applied.
Head of single acting leaves without overpanel	1no. 36 x 2mm Palusol based seal, concealed 8mm below the surface of the leaf framing, or recessed into the back of the lipping, if applied
Head of double acting leaves (only approved without overpanels)	1no. 36 x 2mm Palusol based seal, concealed 8mm below the surface of the leaf framing, or recessed into the back of the lipping, if applied, **and** 1no. 40 x 2mm Palusol based seal bonded to the underside of the frame head, fitted centrally relative to the leaf edge.
Head of single acting leaves and bottom of overpanels (Square overpanel junction)	1no. 36 x 2mm Palusol seal, concealed 8mm below the surface of the leaf framing, or recessed into the back of the lipping, if applied, **and** 1no. 36 x 2mm Palusol seal, concealed 8mm below the surface of the overpanel framing, or recessed into the back of the lipping, if applied.
Head of single acting leaves and bottom of overpanels (Rebated overpanel junction)	1no. 12 x 2mm Palusol seal concealed 8mm below the surface of the leaf framing in the rebate in the leaf edge **and** 1no. 26 x 2mm Palusol seal concealed 8mm below the surface of the overpanel framing in the rebate in the overpanel base. **OR** 1no. 36 x 2mm Palusol seal concealed 8mm below the surface of the rebate in the leaf edge **and** 1no. 36 x 2mm Palusol seal concealed 8mm below the surface of the rebate in the overpanel base. **OR** 2no. 15 x 2.8mm Palusol seals; 1no. centrally grooved into the surface of the nib of the door leaf and 1no. grooved into the corner of the surface of the rebate of the door leaf.

Location	Seal Specification
Meeting Stiles of Single Acting Double Leaves	1no. 36 x 2mm Palusol seal in the leaf edge, concealed 8mm below the surface of the leaf framing, or recessed into the back of the lipping, if applied, in each opposing leaf edge **and** 1no. 26 x 2mm Palusol seal recessed 4mm below the surface of the astragal on each face of the meeting stiles.
Meeting Stiles of Double Acting Double Leaves	1no. 36 x 2mm Palusol seal in the leaf edge, concealed 8mm below the surface of the leaf framing, or recessed into the back of the lipping, if applied, in each opposing leaf edge **and** 1no. 20 x 4mm pvc encased Palusol based seal centrally grooved into one leaf edge.
Interface between overpanel and frame	1no. 36 x 2mm Palusol seal in the leaf edge, concealed 8mm below the surface of the overpanel framing, or recessed into the back of the lipping, if applied; at head and sides of overpanel.

Note:

It is the recommendation of IFC that all seals should be obtained from a member of the Intumescent Fire Seals Association (IFSA) to ensure product quality and consistency.

APPENDIX C

Figure 06214D/09

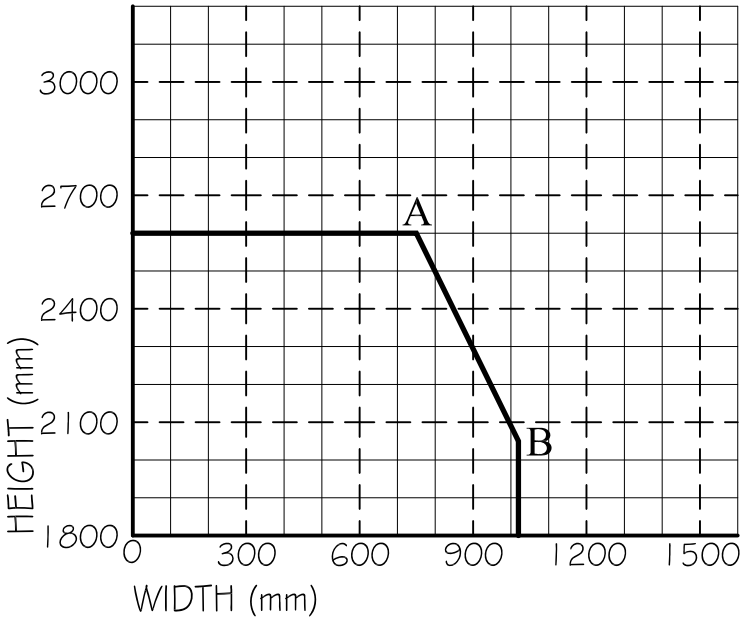
Assessed Leaf Size Envelopes for Door Leaves in Steel Frames

The figure in this Appendix is not included in the sequential page numbering of this report

Leaf Size Envelope

	Steel Frame	
	A	B
Width	750	1020
Height	2600	2050

PROPOSED CONFIGURATION
LATCHED
SINGLE or DOUBLE ACTING
SINGLE LEAF
WITH or WITHOUT OVERPANELS
REQUIRED INTEGRITY: 60 minutes



ENVELOPE OF APPROVED LEAF SIZES

These graphs represent the envelope of approved leaf sizes for the proposed door leaf configurations. Any combination of leaf width and height that falls within the graph axes and the solid/dotted line on the graphs are approved.

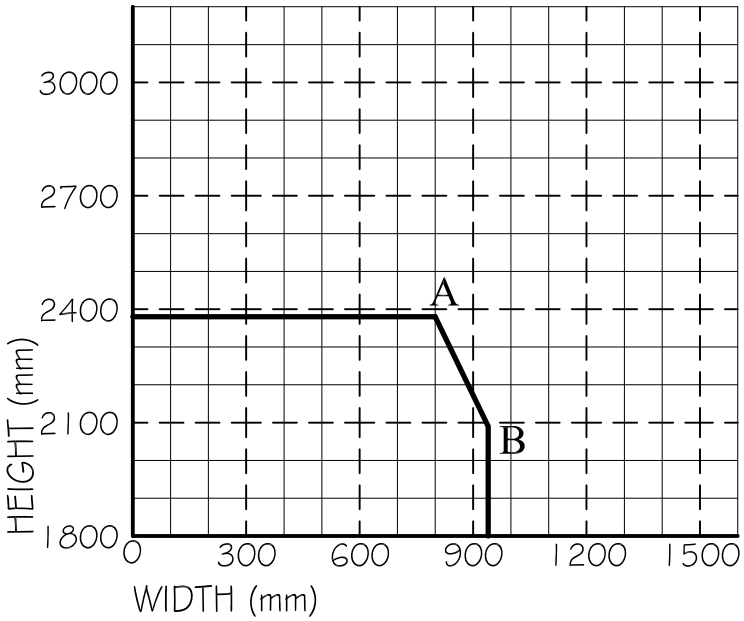
POINT A represents the maximum leaf height and its associated width.
POINT B represents the maximum leaf width and its associated height.

This figure forms part of International Fire Consultants Ltd's Field of Application Report IFCA/06214 Revision D, which contains full details of the assessed doorset construction.

Leaf Size Envelope

	Steel Frame	
	A	B
Width	800	940
Height	2380	2090

PROPOSED CONFIGURATION
LATCHED
SINGLE or DOUBLE ACTING
DOUBLE LEAF
WITH or WITHOUT OVERPANELS
REQUIRED INTEGRITY: 60 minutes



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Field of Application Report
IFCA/06214 Revision D
Theuma NV

Envelope of Approved Door Leaf Sizes In Steel Frames

Drawn: Mar 2018
Job number: 17720
Drawn by: CSP | Checked by: CH

06214D/09

APPENDIX D

Figure 06214D/10

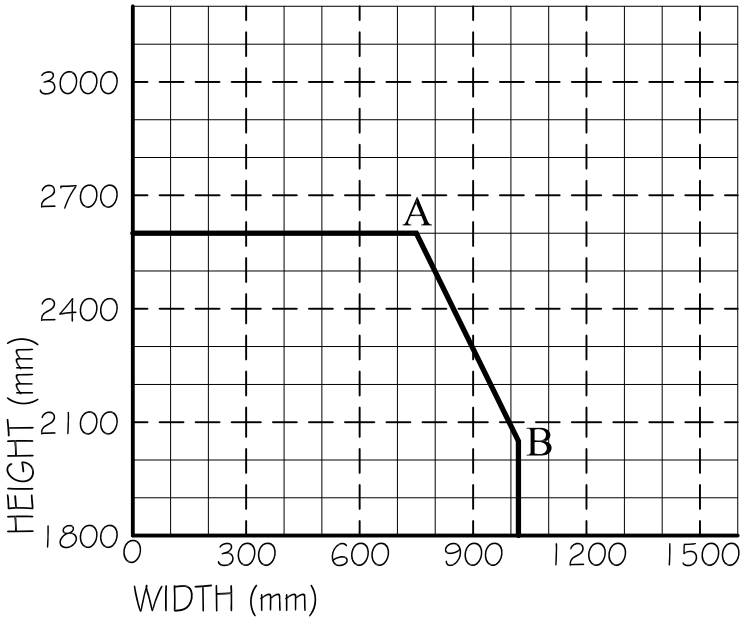
Assessed Leaf Size Envelopes for Door Leaves in Hardwood Frames

The figure in this Appendix is not included in the sequential page numbering of this report

Leaf Size Envelope

	Timber Frame	
	A	B
Width	750	1020
Height	2600	2050

PROPOSED CONFIGURATION
LATCHED
SINGLE ACTING
SINGLE LEAF
WITH or WITHOUT OVERPANELS
REQUIRED INTEGRITY: 60 minutes



ENVELOPE OF APPROVED LEAF SIZES

These graphs represent the envelope of approved leaf sizes for the proposed door leaf configurations. Any combination of leaf width and height that falls within the graph axes and the solid/dotted line on the graphs are approved.

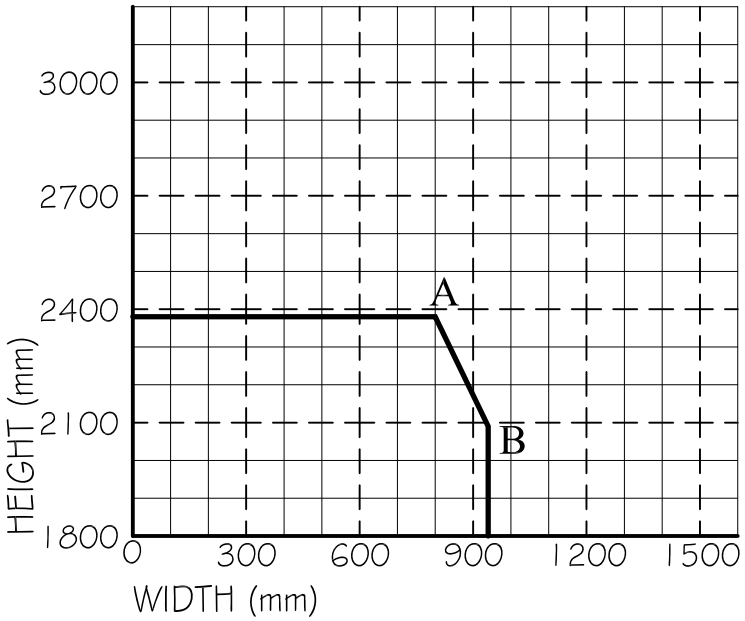
POINT A represents the maximum leaf height and its associated width.
POINT B represents the maximum leaf width and its associated height.

This figure forms part of International Fire Consultants Ltd's Field of Application Report IFCA/06214 Revision D, which contains full details of the assessed doorset construction.

Leaf Size Envelope

	Timber Frame	
	A	B
Width	800	940
Height	2380	2090

PROPOSED CONFIGURATION
LATCHED
SINGLE ACTING
DOUBLE LEAF
WITH or WITHOUT OVERPANELS
REQUIRED INTEGRITY: 60 minutes



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Envelope of Approved Door Leaf Sizes In Hardwood Frames

Drawn: Mar 2018
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06214D/10

APPENDIX E

Summary of Fire Test Evidence

Summary of Fire Test Evidence

Primary Test Evidence

Test Report	Configurations Tested	Tested Leaf Size (Overpanel Size)	Integrity (and Insulation) Performance
6302	Double acting, double leaf doors fitted in steel frame filled with concrete	2300 x 930/930mm	58 minutes *Note iii* (46 minutes)
5645	Latched, single acting, double leaf doors, with rebated overpanel, fitted in steel frames filled with concrete	1950 x 930/930mm (567 x 1863mm)	69 minutes (67 minutes)
5644	Latched, single acting, single leaf door, with rebated overpanel, fitted in steel frame filled with concrete	1950 x 975mm (567 x 977mm)	62 minutes (62 minutes)
5213	Latched, single acting, double leaf doors, with rebated overpanel, fitted in hardwood frame	2015 x 955/955mm (560 x 1916mm)	70 minutes (63 minutes)
5204	Latched, single acting, single leaf door, with rebated overpanel, fitted in hardwood frame	2015 x 980mm (560 x 984mm)	67 minutes (62 minutes)

Secondary Test Evidence

Test Report	Configurations Tested	Tested Leaf Size (Overpanel Size)	Integrity (and Insulation) Performance
EF/GF/844A	Latched, single acting, single leaf door, with rebated overpanel fitted in steel frame fitted with concrete	2010 x 1060mm (565 x 1060mm)	70 minutes (62 minutes)
9159	Latched, single acting, single leaf door fitted in hardwood frame	2015 x 980mm	73 minutes (64 minutes)
	Latched, single acting, single leaf door fitted in hardwood frame	2015 x 980mm	74 minutes (60 minutes)
9485	Latched, single acting, double leaf doors fitted in steel frame filled with concrete	2310 x 1080 + 428mm	65 minutes (63 minutes)
8724	Latched, single acting, single leaf door fitted in steel frame fitted with concrete	2015 x 826mm	64 minutes (64 minutes)
8870	Latched, single acting, single leaf door fitted in steel frame fitted with concrete	2015 x 890mm	66 minutes (57 minutes)

Notes:

Note i *The tests referenced above were carried out to the Belgium test procedure as described in NBN 713.020 Addendum 1 (1982). Test method NBN 713.020 Addendum 1 (1982) is similar to International Standards Organisation (ISO) method 3008: 1976 which is based upon ISO 834 and incorporates the requirements needed for evaluating the fire resistance of door assemblies. The ISO 834 procedure is also the basis of the British Standard test BS476: Part 20: 1987, as it uses identical temperature/time exposure conditions. The major difference between the British and Belgium test methods is to do with the positioning of the neutral pressure axis. In the British method this is set at approximately 1 metre from the bottom of the specimen, in Belgium it is set at the bottom of the specimen. As a consequence the overpressure at the head of the specimen is greater in the Belgium method, which could make tests carried out to this method more onerous. As a consequence, tests to NBN 713.020 Addendum 1 (1982) can be used as a basis for assessments to BS476: Parts 20 & 22 due to the use of similar furnace conditions, criteria and instrumentation.*

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

Note iii *The result in test 6302 has been utilised, along with the other test results, in calculating the maximum leaf size that can be achieved utilising the door construction outlined herein. It should be noted that the approved leaf sizes, outlined in Appendices C and D would not include the leaf sizes included in test 6302.*