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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
14/5090
Product Sheet 1

EPWIN CAVITY CLOSER SYSTEMS

SPECTUS FORMER CAVITY CLOSER SYSTEM

This Agrément Certificate Product Sheet[1] relates to the Spectus Former Cavity Closer System, for use as a cavity closer and to form an opening in masonry cavity walls. It can also provide ventilation via the vented head section.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigation
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Hygrothermal behaviour — the cavity closers meet and exceed the minimum thermal resistance path of 0.45 $m^2 \cdot K \cdot W^{-1}$ as required by the Accredited Construction Details (version 1.0). Default ψ-values (psi) in BRE Information Paper IP 1/06 may, therefore, be used for jamb and sill junctions in SAP or SBEM calculations (see section 6).

Water resistance — the system is effective as a damp-proof barrier and, when used in a suitable wall construction, will resist the passage of water into the interior of the building in flush and check reveal installations (see section 7).

Structural stability — in terms of wind-loading resistance, the system can be used in all areas of the UK. The system must not be used to support loads from masonry (see section 8).

Properties in relation to fire — the installed system will not contribute significantly to the growth of a fire. The system does not constitute a cavity barrier (see section 9).

Durability — the system, protected within the cavity, will continue to function for the normal expected life of a building; visible components will have an expected life in excess of 35 years (see section 12).

The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 9 May 2014

John Albon — Head of Approvals
Energy and Ventilation

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, the Spectus Former Cavity Closer System, if installed, used and maintained in accordance with this Certificate, will satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	C2(b)	**Resistance to moisture**
Comment:		The system has adequate resistance to the ingress of rain and wind-driven spray and so can contribute towards the wall satisfying this Requirement. See section 7 of this Certificate.
Requirement:	C2(c)	**Resistance to moisture**
Comment:		The system will not constitute a significant condensation risk and so can contribute towards the wall satisfying this Requirement. See sections 6.2 and 6.3 of this Certificate.
Requirement:	L1(a)(i)	**Conservation of fuel and power**
Comment:		The system can contribute to minimising heat loss at jambs and sills. See sections 6.1 and 6.2 of this Certificate.
Regulation:	7	**Materials and workmanship**
Comment:		The system is acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	26	**CO_2 emission rates for new buildings**
Regulation:	26A	**Fabric energy efficiency rates for new dwellings (applicable to England only)**
Comment:		The system can contribute to minimising heat loss at jambs and sills. See sections 6.1 and 6.2 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	**Durability, workmanship and fitness of materials**
Comment:		The system can contribute to a construction satisfying this Regulation. See section 12 and the *Installation* part of this Certificate.
Regulation:	9	**Building standards applicable to construction**
Standard:	3.10	Precipitation
Comment:		The system has adequate resistance to the ingress of rain and wind-driven spray and so can contribute towards the wall satisfying this Standard, with reference to clauses 3.10.1[1][2] and 3.10.3[1][2]. See section 7 of this Certificate.
Standard:	3.15	Condensation
Comment:		The system will not constitute a significant condensation risk and so can contribute towards the wall satisfying this Standard, with reference to clauses 3.15.1[1], 3.15.4[1][2] and 3.15.5[1][2]. See sections 6.2 and 6.3 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The system can contribute to minimising heat loss at jambs and sills, with reference to clauses 6.2.3[1], 6.2.4[1][2] and 6.2.5[2]. See section 6.1 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. In addition the system can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4[1][2] [Aspects 1[1][2] and 2[1]], 7.1.6[1][2] [Aspects 1[1][2] and 2[1]] and 7.1.7[1][2] [Aspect 1[1][2]]. See section 6.1 of this Certificate.
Regulation:	12	**Building standards applicable to conversions**
Comment:		All comments given for this system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1[1][2] and Schedule 6[1][2].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012

Regulation:	23	**Fitness of materials and workmanship**
Comment:		The system is acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	28	**Resistance to moisture and weather**
Comment:		The system has adequate resistance to the ingress of rain and wind-driven spray and so can contribute towards the wall satisfying this Regulation. See section 7 of this Certificate.
Regulation:	29	**Condensation**
Comment:		The system will not constitute a significant condensation risk and so can contribute towards the wall satisfying this Regulation. See section 6.3 of this Certificate.
Regulation:	39(a)(i)	**Conservation measures**
Regulation:	40(2)	**Target carbon dioxide emission rate**
Comment:		The system can contribute to minimising heat loss at jambs and sills. See sections 6.1 and 6.3 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

In the opinion of the BBA, there is no information in this Certificate which relates to the obligations of the client, CDM co-ordinator, designer and contractors under these Regulations.

Additional Information

NHBC Standards 2014

NHBC accepts the use of the Spectus Former Cavity Closer System, provided it is installed, used and maintained in accordance with this Certificate in relation to *NHBC Standards*, Chapter 6.1 *External masonry walls*, subject to the requirements of these Standards.

Technical Specification

1 Description

1.1 The Spectus Former Cavity Closer System is an insulated brown unplasticised polyvinyl chloride (PVC-U) cavity closer and window or door sub-frame, used to form an opening in masonry cavity walls during construction. It is made from extruded profiles fitted with insulation (EPS, declared thermal conductivity λ_D 0.038 $W \cdot m^{-1} \cdot K^{-1}$). The profiles are formed into a U-shape template, with welded or mechanically joined (using corner joints) corners at the sill or threshold and a temporary bracing tube fixed at the head (approximately 200 mm from the top) and corner bracings at the sill/threshold. The head and corner bracings must be removed prior to the installation of the window/door frames. Alternatively, a vented head profile is mechanically joined to form the head section (see Figure 2). For closer sub-frames over 1500 mm, an additional horizontal brace is fixed to prevent distortion in accordance with the rules described in the *Spectus Former Manual*.

1.2 The cavity frame components and accessories are listed in Table 1 and shown in Figure 1.

1.3 Insulation blocks made from EPS (declared thermal conductivity λ_D 0.038 $W \cdot m^{-1} \cdot K^{-1}$) can be bonded to cavity closer profiles to extend the range of cavity widths using double-sided adhesive tape or hot melt process as detailed in the *Spectus Former Manual* (see Figure 3).

1.4 The jamb, sill and vented head (if used) profiles are cut to size. Slots are routed in the vented head to suit the proprietary ventilator to be used. The sill and jamb sections are welded or, if mechanically joined, the corner joints are fixed to the sill and the jamb sections (using 3.9 mm by 19 mm self-drilling self-tapping screws) and silicone sealant is applied to the corner joint. The vented head is located between the jambs, and the jamb sections are screw-fixed onto it using 5 mm by 30 mm screws (if fixed through the wing) or 5 mm by 75 mm screws (if fixed through the body). (See Figure 2.)

1.5 The main PVC-U profile incorporates a box section to fit into the recess of the wall cavity.

1.6 The cavity closer profiles are produced from reground PVC-U material.

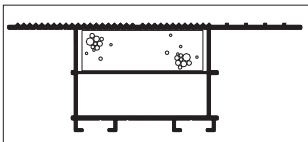
1.7 Polypropylene ties, manufactured by standard injection moulding techniques, are used to build the cavity closer frame into the surrounding mortar joints (see Figures 1 and 5).

Table 1 Spectus Former — list of components

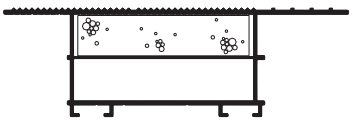
Manufacturer's designation	Components	Application
F751F	cavity closer/sub-frame	75 mm flush reveal
F101F	cavity closer/sub-frame	100 mm flush reveal
F752F	cavity closer/sub-frame	75 mm flush reveal (outside window fit)
F102F	cavity closer/sub-frame	100 mm flush reveal (outside window fit)
F753F	cavity closer/sub-frame	75 mm flush reveal (inside window fit)
F103F	cavity closer/sub-frame	100 mm flush reveal (inside window fit)
F754F	cavity closer/sub-frame	75 mm check reveal
F104F	cavity closer/sub-frame	100 mm check reveal
F031	vented head	head for flush reveal
F032	vented head	head for outside fit
F033	vented head	head for inside fit
–	insulation block	20 mm x 63.5 mm EPS insulation for 75 mm box
–	insulation block	20 mm x 88.5 mm EPS insulation for 100 mm box
–	insulation block	19 mm x 19 mm EPS[1] insulation for extending cavity closer width
—	insulation block	34 mm x 19 mm EPS[1] insulation for extending cavity closer width
F050	bracing tube	head
FM050	connector	for securing head bracing tube
FM751	corner joint	for mechanically joining cavity closer/sub-frame (75 mm box)
FM101	corner joint	for mechanically joining cavity closer/sub-frame (100 mm box)
900340	fixing clip	fitted to windows for securing window outer frame to cavity closer sub-frame
FM005	corner bracing	for strengthening sub-frame corners
FM001	tie	sub-frame tie
3.9 x 19 mm	stainless steel, self-drilling, self-tapping screws[1]	for fixing corner cleats, bracing connector and corner bracing
5 x 30 mm	stainless steel screws[1]	for fixing vented head to cavity closer jambs (through the wing)
5 x 75 mm	stainless steel screws[1]	for fixing vented head to cavity closer jambs (through the body)
3.9 x 19 mm	stainless steel screws[1]	fixing clip fixing screws
3M 9098	double-sided tape[1]	for attaching insulation outside the cavity closer box
Techbond 232	hot melt adhesive[1]	for attaching insulation outside the cavity closer box

(1) Not shown in Figure 1.

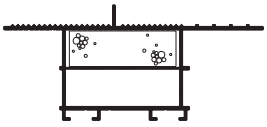
Figure 1 Components



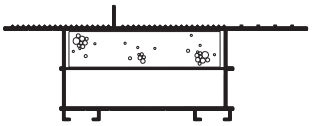
F751F
75 mm flush reveal



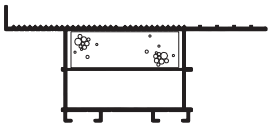
F101F
100 mm flush reveal



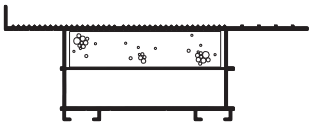
F752F
75 mm flush reveal
(outside window fit)



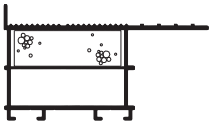
F102F
100 mm flush reveal
(outside window fit)



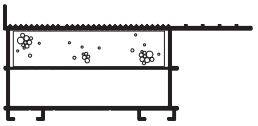
F753F
75 mm flush reveal
(inside window fit)



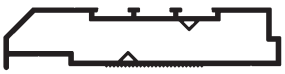
F103F
100 mm flush reveal
(inside window fit)



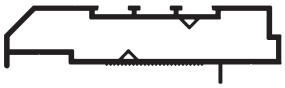
F754F
75 mm check reveal



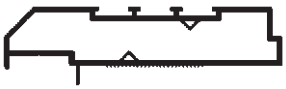
F104F
100 mm check reveal



F031
vented head

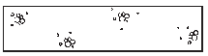


F032
vented head

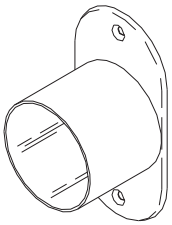


F033
vented head

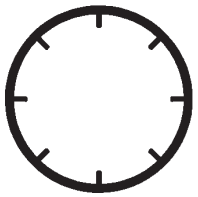
EPS for 75 mm closer



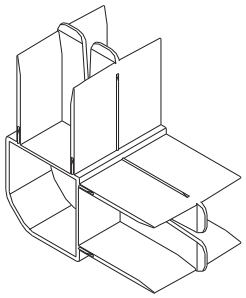
EPS for 100 mm closer



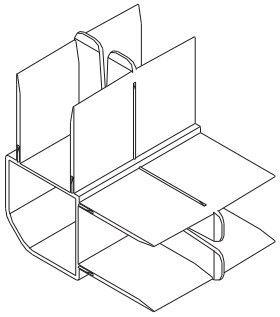
FM050
connector



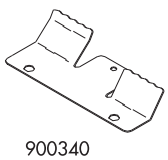
F050
bracing tube



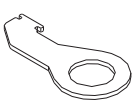
FM751
corner joint



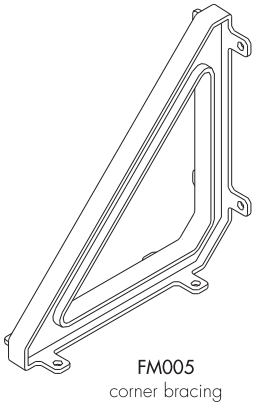
FM101
corner joint



900340
fixing clip



FM001
tie



FM005
corner bracing

Figure 2 Spectus Former sub-frame fabrication

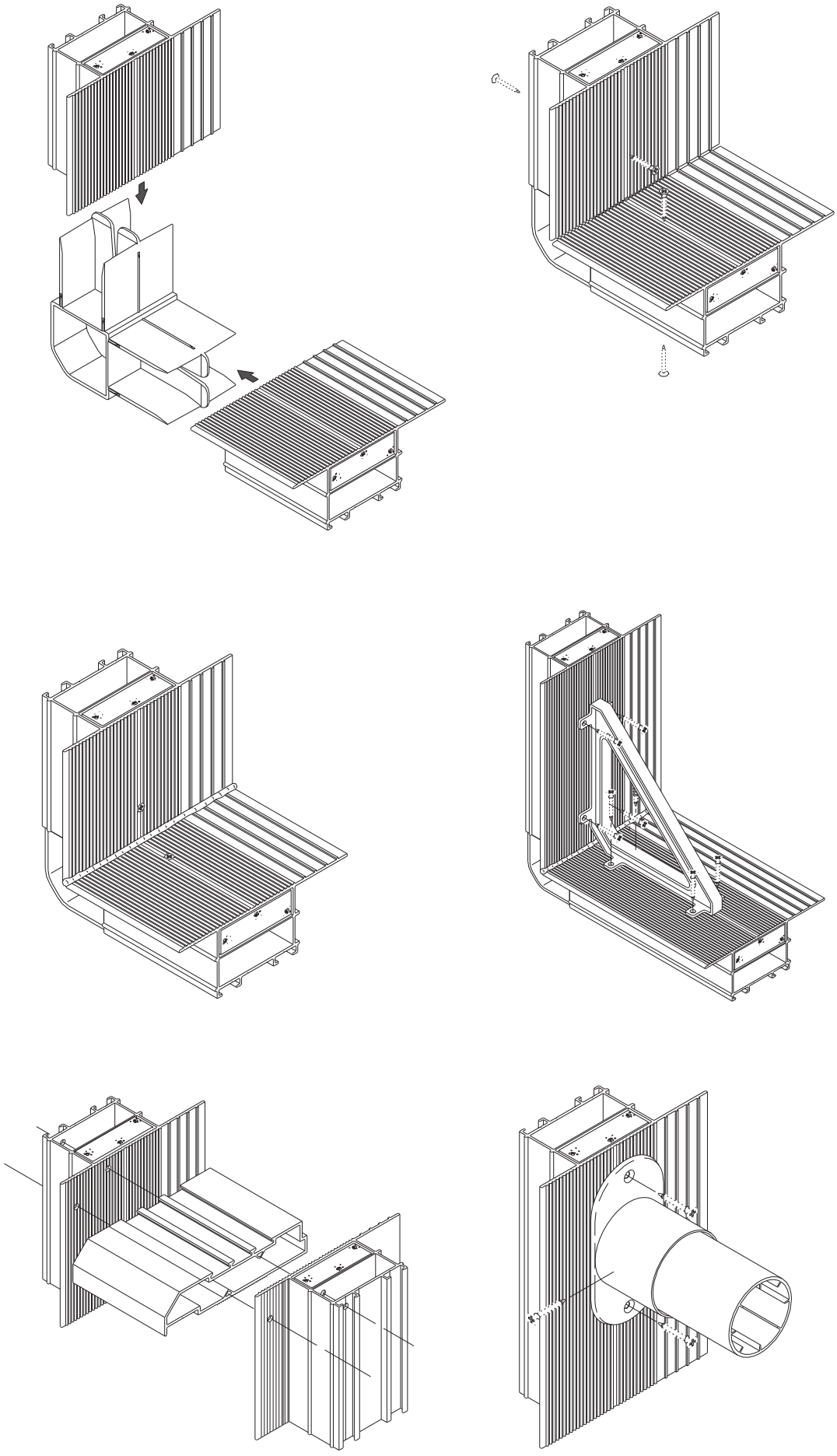


Figure 3 Typical examples of extended cavity closer profiles

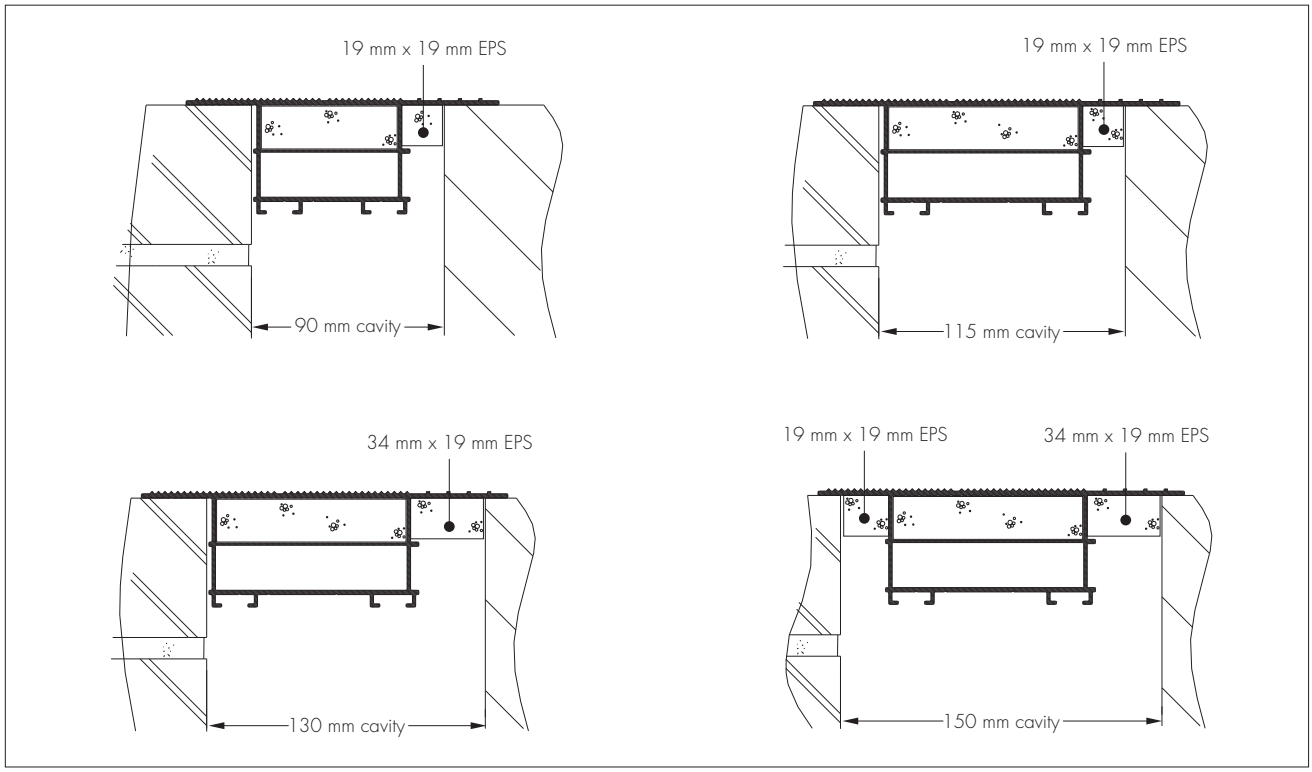


Figure 4 Typical head with window detail

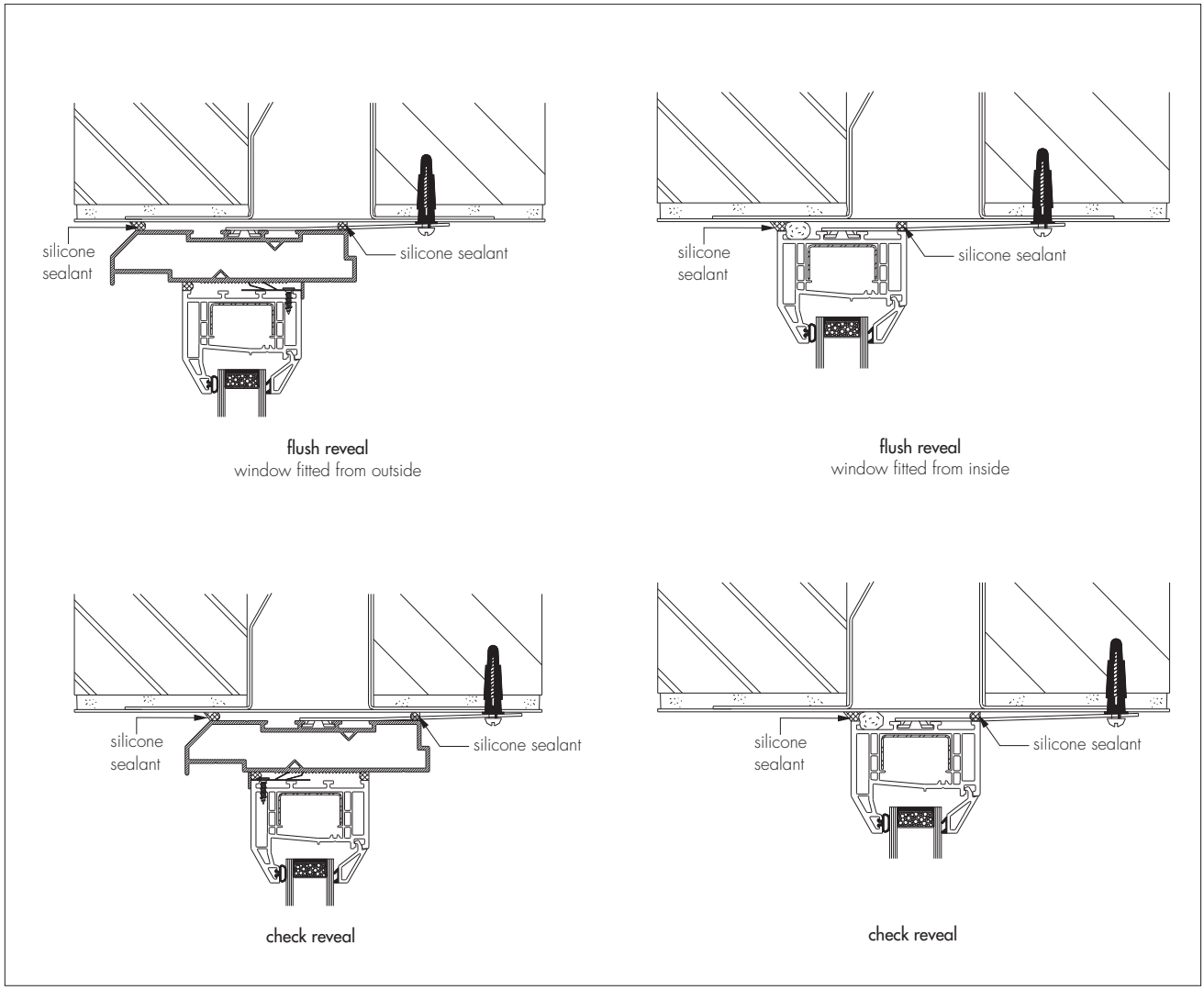
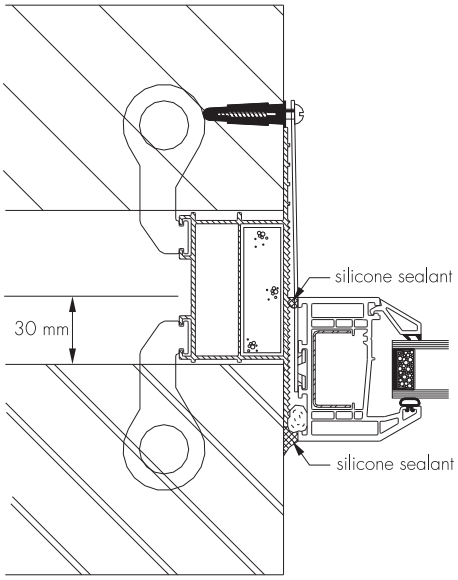
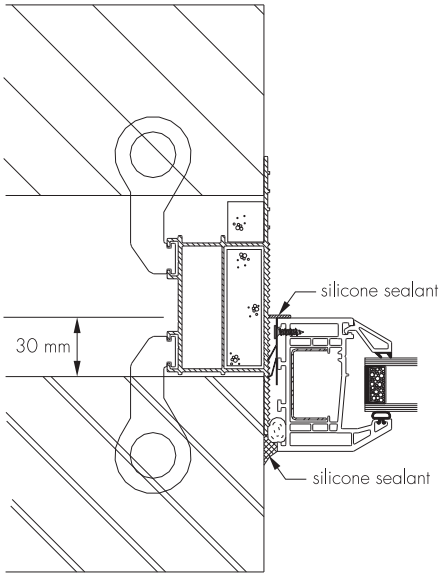


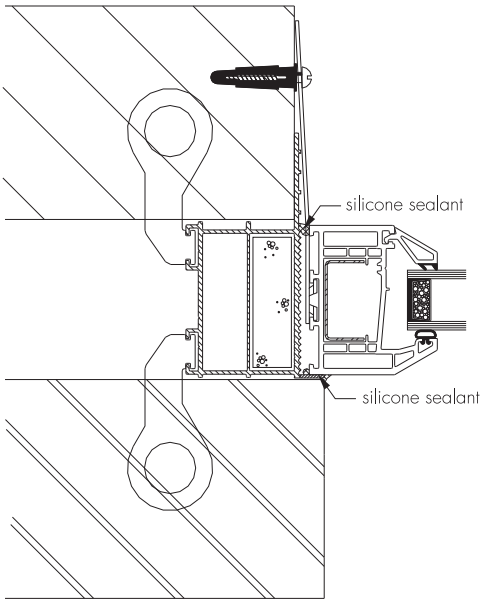
Figure 5 Typical jamb with window detail



flush reveal
window fitted from inside



flush reveal
window fitted from outside



check reveal

Note: An additional cavity barrier is required in Scotland and Northern Ireland

2 Manufacture

2.1 The cavity closer unplasticised polyvinyl chloride (PVC-U) profiles are produced by conventional extrusion techniques. The insulation is fitted in the factory.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by BSI (Certificate FM 01034).

3 Delivery and site handling

3.1 Assembled sub-frames are labelled with system identification. They are despatched along with the requisite number of ties, any additional ancillary items and installation instructions.

3.2 Assembled sub-frames are stacked vertically and delivered as individual items, taking care to avoid distortion in transit. The sub-frames or profiles should be stored under cover in a clean area, on edge in the case of sub-frames, and suitably supported to avoid distortion or damage. The sub-frames and profiles should be protected from vehicular and pedestrian traffic. Particular attention must be paid to sub-frames with bonded insulation onto the flanges of the profiles.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Spectus Former Cavity Closer System.

Design Considerations

4 Use

4.1 The Spectus Former Cavity Closer System is suitable for use in masonry walls with nominal cavity widths in the range of 75 mm to 150 mm and with window and door frames made from PVC-U, timber, aluminium or steel. The Certificate holder can advise on the suitability of outer frame profiles.

4.2 The system can be used as a template, to form an opening around which a wall can be constructed, and to establish the cavity width during construction.

4.3 The system provides a damp-proof barrier, acts as a cavity closer without forming a thermal bridge, and avoids the need for cutting bricks and blocks. The window/door is fitted after completion of the masonry. It can also be used to form a checked reveal where required and to fit the window after completion of the masonry, as is conventional practice in Scotland and Northern Ireland.

4.4 Masonry walls into which cavity closers are incorporated must be constructed in accordance with one or more of the following technical specifications:

- BS EN 1996-1-1 : 2005, BS EN 1996-1-2 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006 and their respective National Annexes
- the National Building Regulations:

England and Wales — Approved Document A1/2, section 1C

Scotland — Mandatory Standard 1.1[(1)(2)], *Small Buildings Guide*

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet D.

4.5 Windows and doors are fitted into the sub-frame from the outside or inside of the building.

4.6 Sub-frames are manufactured to suit the exact brickwork opening. A 5 mm clearance per side is allowed between the sub-frame and window or door, in accordance with the *Spectus Former Manual*.

4.7 The maximum sub-frame cavity closer size is 2420 mm wide by 2420 mm high, maximum perimeter 8060 mm for windows and for doors. Doors require additional proprietary fixings, which are outside the scope of this Certificate.

5 Practicability of installation

The system is designed to be installed by a competent general builder, or a contractor, experienced with this type of system.

6 Hygrothermal behaviour

6.1 The cavity closer can contribute to maintaining continuity of thermal insulation at jambs and sills in wall openings. The path of minimum thermal resistance through the product calculated to BRE Information Paper IP 8/08 is at least 0.45 $m^2 \cdot K \cdot W^{-1}$ when used in jambs and sills with the window/door frame set back 30 mm. Example junction details shown in Figures 4 and 5 are acceptable. For Accredited Construction Details, the corresponding ψ-values (psi) in BRE Information Paper IP 1/06, Table 3, may be used in carbon emission calculations in Scotland and Northern Ireland. Attention must be given to the correct setback in order to ensure compliance with these requirements. Detailed guidance on limiting heat loss and air infiltration can be found in:

England and Wales — Approved Documents to Part L and, for new thermal elements to existing buildings, Accredited Construction Details (version 1.0) See also SAP 2009 Appendix K and the *iSBEM User Manual* for new-build

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0).

6.2 Jambs and sills incorporating the system, in accordance with section 6.1, will adequately limit the risk of local surface condensation.

6.3 Under normal domestic conditions the level of interstitial condensation associated with the system will be low and the risk of any resultant damage minimal.

6.4 Door frames installed with proprietary fixings which cannot be set back into the wall cavity by 30 mm may require additional thermal insulation, for example dry lining, to minimise excessive heat loss and the risk of excessive surface condensation.

6.5 The junctions between the wall and the front and back of the window/door frame must be effectively sealed.

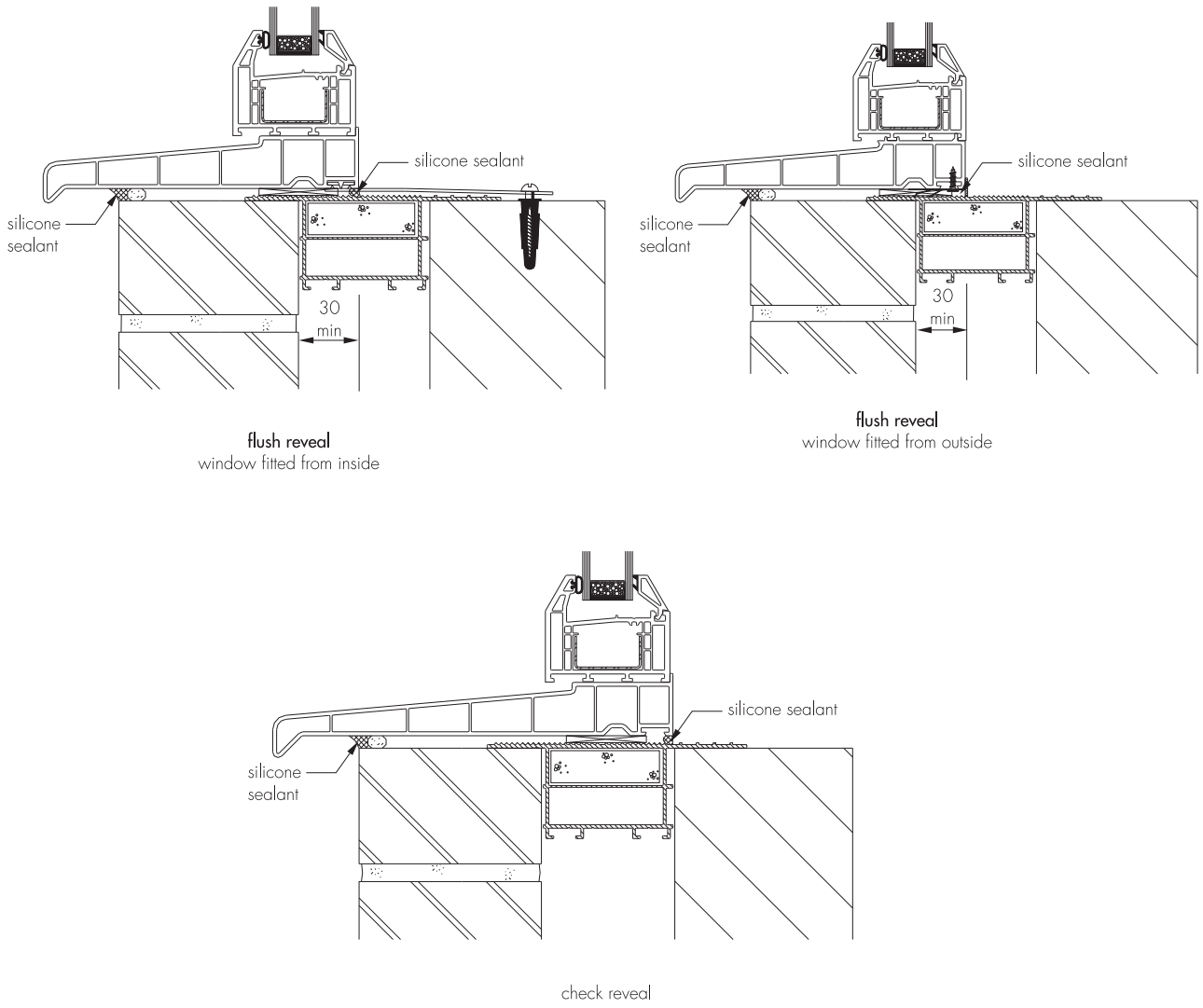
7 Water resistance

7.1 The system is effective as a vertical damp-proof barrier at jambs of window and door openings in masonry constructions where a brick/block closer and damp-proof course (dpc) detail would normally be used. The system is also effective as a horizontal damp-proof barrier at the sill or threshold.

7.2 Installations with a flush (in-line) wall opening and a minimum setback of 30 mm (see section 6.1 and Figures 4, 5 and 6) are suitable for use in exposure zones 1 ('sheltered') and 2 ('moderate'), as depicted in the map contained in Section 3.1 of BRE Report BR 262 : 2002. The sub-frame may also be considered for use in other areas where a conventional return brick/block closer detail with dpc has been found to provide adequate resistance to the penetration of wind-driven rain.

7.3 The system may also be used to construct a check reveal (see Figures 4, 5 and 6). In this construction, in which the frame is positioned in a rebate behind the outer leaf of the jamb, the system is suitable for use in exposure zones up to and including zone 4 (very severe) as depicted in the map contained in section 3.1 of BRE Report BR 262 : 2002 which covers all exposure zones in the United Kingdom.

Figure 6 Typical sill with window detail



8 Structural stability

8.1 The system is non-loadbearing and must not be used to support loads from the masonry. Lintels are required above window or door openings.

8.2 The system will not have an adverse effect on the structural stability of brickwork or blockwork walls constructed in the conventional manner in accordance with normal good practice, as defined in the Standards listed in section 4.4 of this Certificate. Use of the system does not obviate the need for conventional wall ties around the openings.

8.3 A window fitted correctly into a cavity frame using fixing lugs at the jambs, sill and head (or fixing screws if a vented head is used for flush reveal installations) or fixing clips at the jambs and sill and conventional fixing lugs at the head (or fixing clips if a vented head is used for check reveal installations), will satisfactorily transfer to the structure wind loads likely to be encountered in the UK. In terms of wind loading resistance, the cavity frame can be used in all areas of the UK.

8.4 Door frames for use with the cavity frame require additional proprietary fixings at the jambs and sill/threshold to ensure that the frame remains firmly fixed when the door is slammed. Head fixings may be required for larger doorsets. Relevant installation procedures are described in the *Spectus Former Manual*.

9 Properties in relation to fire

9.1 The installed system will not contribute significantly to the growth of a fire.

9.2 The system does not constitute a cavity barrier against the penetration of smoke and flame in the context of the Building Regulations.

9.3 The use of the system is not prevented in England and Wales, where generally, cavity barriers are not required around openings in masonry wall construction.

9.4 In Scotland and Northern Ireland, the system is only suitable for use in conjunction with a cavity barrier meeting the performance requirements defined in:

Scotland — Mandatory Standard 2.4, clause 2.4.1[1][2] and Annex 2.B[1] or 2.D[2]

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet E, paragraph 3.37.

9.5 The use of the system does not preclude the need to provide suitable fire protection to steel lintels where this is necessary to satisfy the Building Regulations.

10 Security against intrusion

Removal of a window from the cavity frame from outside is extremely difficult as the shape of the outer frame prevents access to the locating clips. If required, supplementary through fixing of the window frame is possible. Door frames secured by lugs or through-fixings around the perimeter are outside the scope of this Certificate.

11 Maintenance

To ensure the maximum weathertightness, the silicone seal between window or door frames and masonry must be checked regularly and repairs or renewal carried out promptly.

12 Durability

The system is durable when installed in accordance with this Certificate and will not suffer significant degradation when protected within the cavity. The system will continue to function for the normal expected life of a building. Visible components will have an expected life in excess of 35 years.

Installation

13 General

13.1 Installation of the Spectus Former Cavity Closer System must be carried out in accordance with the *Spectus Former Manual*.

13.2 A cavity barrier may be required (see section 9.2 of this Certificate).

13.3 Reference should be made to the typical installation details shown in Figures 4, 5 and 6 when reading the installation details given in section 14 of this Certificate. The windows in these Figures are shown for information only and do not form part of this assessment.

13.4 At the build-in stage, it must be ensured that the sub-frame remains plumb, level, square, and with parallel sides.

14 Procedure

14.1 The assembled sub-frame, including bracing tube or vented head, is ready for building into the construction of cavity walls using traditional building methods.

14.2 The cavity wall is built to the sill level, ensuring that the course work is level and flat, and that all excess mortar is removed.

14.3 The sub-frame is positioned in the cavity, ensuring that it is facing the correct way, so that the inner surface of the window frame is set in at least 30 mm from the inner surface of the outer leaf, and temporary timber supports are attached to the closer, if required. The closer frame is aligned with a spirit level and the timber supports are secured so that they are rigid and keep the frame square and plumb. The course work is built up by one course and butted to one side of the sub-frame.

14.4 The position of the sub-frame is checked and the course work on the opposite side of the sub-frame is built up by one level.

14.5 Ties are inserted into the channel of the sub-frame jambs, rotated through 90° and built into the mortar bed joints. These ties should be fitted after the first brick course and then at every three brick intervals (225 mm centres). The ties should be inserted alternately, tying the sub-frame into both inner and outer courses ensuring that the sub-frame is tight against the outer brick (see Figure 5). A minimum of three ties per vertical member is required.

14.6 When additional insulation is fitted to achieve extended cavity widths, an overlap of at least 10 mm per side with the brickwork/blockwork must be ensured.

14.7 When the masonry reaches head level, the bracing tube and any bracing support, if used, are removed and a lintel, with associated dpc, is fitted across the masonry just clear of the top of subframe. Where the vented head is used, the sub-frame is tied to the building structure with fixing lugs. The number of fixing lugs required depends on the width of the opening. The wall construction is continued to complete the aperture.

14.8 In all installations, the top brick course should be arranged to ensure that, when bedded in, the lintel does not exert a load on the window or door frame/sub-frame.

14.9 The sub-frame is cleaned to ensure that it is free from mortar. The brickwork must be allowed to set before attempting to fit the window/door.

14.10 The fitting of windows or doors to the sub-frame must be carried out in accordance with the *Spectus Former Manual*.

Window preparation and fitting

14.11 The correct window is selected to suit the sub-frame. All protective wrapping is removed.

Window installation from inside or outside using fixing lugs

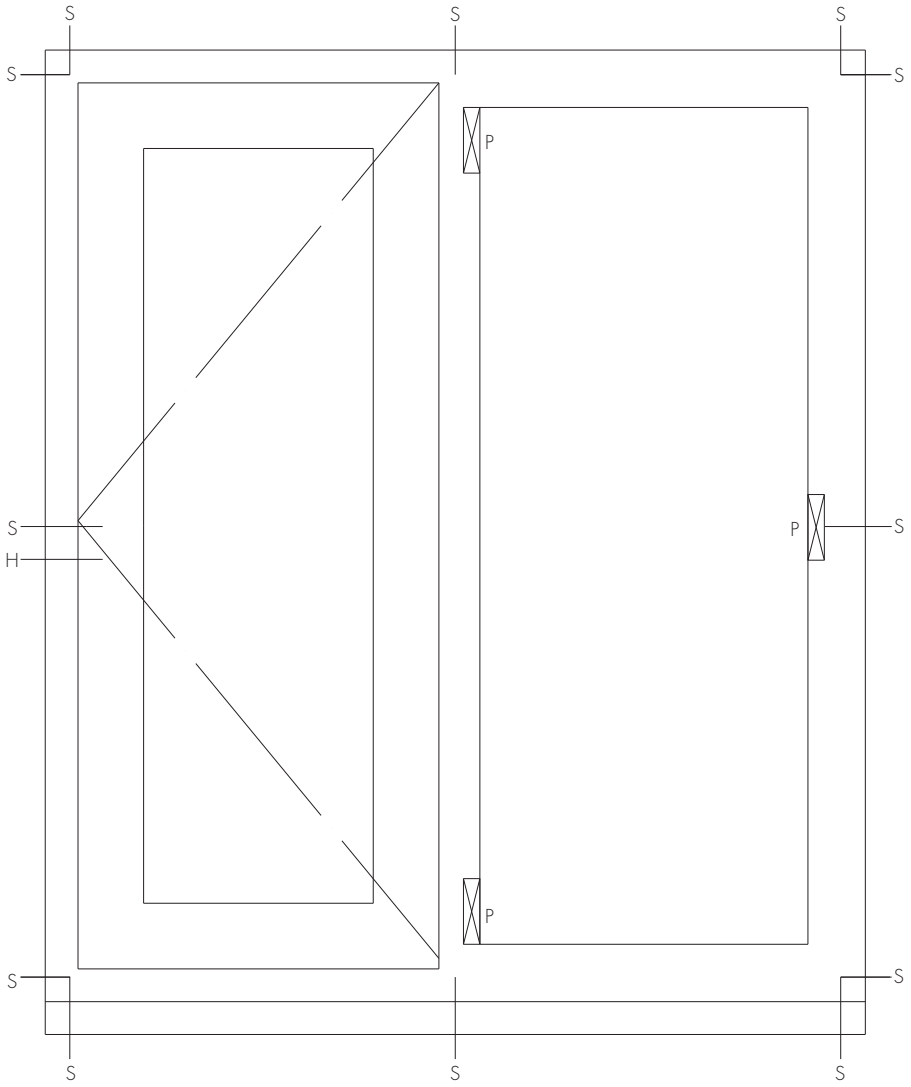
14.12 Fixing lugs are twisted into the outer frame jambs, sill and head section (see Figure 5) 150 mm to 250 mm from each corner and at centres not exceeding 600 mm. No fixing should be closer than 150 mm or further than 250 mm to the centre line of mullions or transoms. A minimum of two fixings per member is required.

14.13 The windows are offered up to the sub-frame from the inside or outside of the building and the fixing lugs are fixed onto the building structure.

Window installation from inside or outside, using fixing clips

14.14 Fixing clips are screw-fixed to the inside (for windows installed from outside) or the outside (for windows installed from inside) of the outer frame jambs, sill and head section (if sub-frame includes a vented head section) using stainless steel screws (3.9 mm by 19 mm self-drilling, self-tapping) (see Figures 4, 5 and 6) 25 mm from each corner and at centres not exceeding 600 mm. Fixing clips should also be fitted adjacent to mullions or transoms. For fixing clips fitted centrally on fixed light outer frames, glass packers should be positioned adjacent to the fixing clip and opposite, as shown in Figure 7. A minimum of two fixings per member is required.

Figure 7 Typical position of fixing clip and glass packers



14.15 The window is offered up to the sub-frame from the inside or outside, positioning it squarely in the aperture and clipping into place by applying even pressure to position the window back against the sub-frame stop (when using F102 or F752 profiles for windows installed from outside and F103, F753, F104 or F754 profiles for windows installed from inside) or ensuring that the outer frame overlaps the cavity by a minimum of 30 mm (when using F101 or F751). A screw-fixing should be used adjacent to the position of the fixing clip at opening lights in accordance with the *Spectus Former Manual*. Where a vented head section is not fitted, the head member of the window is secured using lugs or screw fixings positioned not less than 150 mm from the corners and at centres not exceeding 600 mm.

Finishing

14.16 For windows installed from the outside, a foam backing strip is applied all around the window/door externally and an effective sealant is applied all around the perimeter of the window/door internally, prior to applying internal finishes.

14.17 For windows installed from the inside, an effective sealant is applied all around the window/door all around the perimeter of the window/door internally prior to applying internal finishes.

14.18 In locations where the plaster may be subject to repeated impact (eg at door reveals from door slamming), it is recommended that wet plaster be reinforced by hessian scrim or, preferably, replaced by dry lining.

14.19 Finishing trims are fitted after completion of the window installation, where required.

14.20 The window is weather-proofed externally, using a suitable low modulus silicone sealant.

Technical Investigations

15 Tests

15.1 Tests were carried out on PVC-U extrusions to determine:

- resistance to impact at low temperature
- shrinkage on heating
- gelation on heating
- induction time of dehydrochlorination.

15.2 Tests were carried out on a combined sub-frame and PVC-U window, installed in a test rig, to determine:

- air permeability
- watertightness
- effect of cyclic wind loads to ±1250 Pa
- effect of temperature variation (–5°C to 55°C)
- safety test, wind loading using increased pressure of 2000 Pa and reduced pressure of 3000 Pa[1].

(1) The test was performed at reduced temperature to ensure that the contraction of the window under such conditions would not render the system unsafe.

15.3 Tests were carried out on the profiles fitted with stuck-on insulation to assess bond strength.

16 Investigations

16.1 An assessment was made of:

- heat loss and condensation risk in accordance with the Accredited Construction Details (version 1.0) and the Accredited Construction Details (Scotland)
- weather resistance of the system
- the practicability of the installation
- fire resistance and structural stability of walls incorporating the frame acceptor
- durability of the components used in the construction of the system.

16.2 The manufacturing process was evaluated, including methods for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS EN 1996-1-1 : 2005 *Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
NA to BS EN 1996-1-1 : 2005 *UK National Annex to Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
BS EN 1996-1-2 : 2005 *Eurocode 6 : Design of masonry structures — General rules — Structural fire design*
NA to BS EN 1996-1-2 : 2005 *UK National Annex to Eurocode 6 : Design of masonry structures — General rules — Structural fire design*
BS EN 1996-2 : 2006 *Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*
NA to BS EN 1996-2 : 2006 *UK National Annex to Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*
BS EN 1996-3 : 2006 *Eurocode 6 : Design of masonry structures : Simplified calculation methods for unreinforced masonry structures*
NA to BS EN 1996-3 : 2006 *UK National Annex to Eurocode 6 : Design of masonry structures : Simplified calculation methods for unreinforced masonry structures*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around opening*

BRE Information Paper IP 8/08 *Determining the minimum thermal resistance of cavity closers*

BRE Report BR 262 : 2002 *Thermal insulation: avoiding risks*

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

17.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

17.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

17.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

17.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

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- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

17.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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