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Windows and doors –

Part 4: Code of practice for the survey and installation of windows and external doorsets

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This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 40, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 8213 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 December 2015. It was prepared by Subcommittee B/538/1, *Windows and doors*, under the authority of Technical Committee B/538, *Doors, windows, shutters, hardware and curtain walling*. A list of organizations represented on these committees can be obtained on request to their secretary.

Supersession

This part of BS 8213 supersedes BS 8213-4:2007, which is withdrawn.

Relationship with other publications

BS 8213 is published in two parts:

- Part 1: *Design for safety in use and during cleaning of windows, including door-height windows and roof windows – Code of practice*;
- Part 4: *Code of practice for the survey and installation of windows and external doorsets*.

This part of BS 8213 is intended to supplement British and European product standards for windows and doorsets.

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

- updating of recommendations to reflect changes to legislation made since 2007;
- updating of recommendations to reflect changes in glazing, sealant and construction techniques;
- introduction of guidance on hazardous materials.

Due to the wide variety of installation conditions, it is not possible to cover all applications completely. This part of BS 8213 gives guidance on those good building practices that are expected to ensure satisfactory installation.

Windows and external doorsets are available in a range of materials, each material having a unique performance characteristic. The surveyor and installer need to be aware of the material being used, and any additional manufacturer's recommendations for survey and installation.

Use of this document

As a code of practice, this part of BS 8213 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this part of BS 8213 is expected to be able to justify any course of action that deviates from its recommendations.

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Attention is drawn to the Building Regulations 2010 [1], the Building (Amendment) (Wales) Regulations 2014 [2], the Building (Scotland) Regulations 2004 [3] and the Building Regulations (Northern Ireland) 2012 [4], and to the need for Building Regulations approval for the majority of window and external doorset installations.

1 Scope

This part of BS 8213 gives recommendations for the surveying and installation of non-load-bearing windows and external doorsets of any material, to be installed vertically (within 15°) into the external face of buildings. It gives recommendations for the good practices necessary for the successful surveying and installation of windows and external doorsets in both new build and replacement situations. It is primarily aimed at installations in dwellings but its provisions might also be relevant to other similar types of installation.

The recommendations contained in this part of BS 8213 may also be applied to door assemblies, but do not cover the site assembly of individual components.

This part of BS 8213 does not apply to load-bearing windows (other than bay poles), load-bearing doorsets, roof windows or rooflights, or to fire doorsets and assemblies. It does not cover curtain or ribbon walling, but might apply to separate window and door elements within those particular types of assemblies. It does not cover good business practice issues such as warranties and complaints.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 6262 (all parts), *Glazing for buildings*

BS 7619, *Extruded cellular unplasticized white PVC (PVC-UE) profiles – Specification*

BS 8000-0, *Workmanship on construction sites – Part 0: Introduction and general principles* [1)]

BS 8000-7, *Workmanship on building sites – Part 7: Code of practice for glazing*

BS EN 1670:2007, *Building hardware – Corrosion resistance – Requirements and test methods*

BS EN ISO 11600, *Building construction – Jointing products – Classification and requirements for sealants*

BS ISO 6707-1, *Buildings and civil engineering works – Vocabulary – Part 1: General terms* [2)]

3 Terms and definitions

For the purposes of this part of BS 8213, the terms and definitions given in BS ISO 6707-1 and the following apply.

3.1 bow window
type of bay window, usually carrying only light loads, which does not form an extension to the floor area of the room

3.2 check reveal
opening formed in the building structure with an external reveal size less than that of the internal reveal size

1) This part of BS 8213-4 also gives an informative reference to all parts of the BS 8000 series.
2) This part of BS 8213-4 also gives an informative reference to BS ISO 6707-1:2014.

3.3 door assembly
complete assembly as installed, including door frame and one or more leaves together with its essential hardware supplied from separate sources

[SOURCE: BS EN 12519:2004, **2.3.2**]

3.4 doorset
complete unit consisting of a door frame and a door leaf or leaves, supplied with all essential parts from a single source

[SOURCE: BS EN 12519:2004, **2.3.5**]

NOTE 1 For the purposes of this part of BS 8213, the word "doorset" refers to external doorsets only.

NOTE 2 For the purposes of this part of BS 8213, the terms "doorset" and "door assembly" are considered synonymous and the term "doorset" is used to refer to both types of product.

3.5 dormer window
vertical, or near-vertical (within 15°), window built into and projecting from a pitched roof structure

3.6 damp-proof course (DPC)
layer or coat of material covering the bedding surface of a wall to resist the passage of moisture

NOTE This can be used horizontally or vertically.

[SOURCE: BS ISO 6707-1:2014, **5.5.8**, modified – note added]

3.7 finishing
final covering and treatment of surfaces and their intersections

3.8 fixing
component that is used to secure separate parts of a window or doorset to each other, to secure an item of hardware to a window or door part, or to secure a completed window or doorset into the structure of a building

3.9 frame
part of a window or doorset that is fixed to the building structure

3.10 installation packer
packing piece used in gaps at fixing points to obtain rigid fixing and prevent distortion

NOTE This is also known as a fixing packer.

3.11 installer
company and/or individual carrying out the works

3.12 lintel
beam supporting loads over an opening

3.13 manufacturing size
overall dimensions, which result from making the appropriate deductions from the structural opening size excluding any add-ons

NOTE This is also known as "work size".

3.14 oriel window
multi-sided window projecting from an upper storey, and generally supported by brackets

3.15 structural opening
aperture in a wall into which a window or doorset is to be installed

3.16 structural opening size
size of the maximum rectangular shape that can be fitted within a structural opening

3.17 surveyor
competent person who is capable of surveying for window and doorset installation, advising on suitable design, carrying out the risk assessment as necessary, and assessing the quality of the finished installation

3.18 system supplier
original source of the design and/or supply of components used in the fabrication of a window or doorset

NOTE This is also known as "system house" or "system company".

4 Safety

*COMMENTARY ON CLAUSE **4***

Windows and doorset removal can be a dangerous operation. The replacement of existing windows and doorsets mainly involves working within occupied premises, including elderly residents' dwellings and residential homes such as sheltered accommodation, or schools and colleges occupied during term time by children and young people. Installers therefore need to be sympathetic to any possible impaired mobility of residents and lack of awareness of children, and not present any hazards during work.

4.1 Use of equipment

NOTE 1 Attention is drawn to current health and safety at work legislation in respect of site practices. For more information, see the Health and Safety Executive website www.hse.gov.uk [3)]*. Attention is particularly drawn to legal requirements in respect of risk assessments. A risk assessment might identify a need for increased levels of protection to those recommended in this subclause.*

NOTE 2 Attention is drawn to the Health and Safety at Work, etc. Act 1974 [5] and to the Control of Asbestos at Work Regulations 2012 [6].

Safety precautions should be observed at all times. All new operatives should be trained in the safe use of all tools, and installation companies should ensure that their operatives have the correct equipment including personal protective equipment. Full training and assessment records of operatives should be kept. At least the following safety precautions should be taken.

a) When handling glass, all operatives should wear eye protection, safety footwear and appropriate hand and wrist protection.

b) All electrically powered tools should either:

- work on 110 V mains power; or
- be battery operated (see BS 7671:2008+A3, Section 604); or
- work on 240 V with a residual current detector of 30 MA maximum rating, especially where moisture is present.

[3)] Last accessed 17 November 2015.

c) A safe working platform should be provided to give safe access to the structural openings.

NOTE 3 Attention is drawn to the Work at Height Regulations 2005 [7]. Guidance is given in GGF publication Code of practice – Working at heights in the domestic replacement window industry *[8].*

d) Old windows and doorsets and other debris should always be stored and disposed of safely. The components of old windows and doorsets should be recycled wherever possible.

NOTE 4 Additional guidance on removing existing windows and doorsets is given in Annex A.

4.2 Hazardous materials

The possible presence of hazardous materials should be assessed at survey stage.

NOTE 1 This is more relevant to replacement windows and doorsets in older buildings.

If any such materials are identified (e.g. in old putty; see Annex A), appropriate action for their safe removal and disposal should be taken according to the nature of the material identified.

NOTE 2 Many hazardous materials (e.g. asbestos) are covered by legislation.

NOTE 3 Guidance on asbestos is given in GGF publication The good practice guide for the installation of replacement windows and doors *[9].*

5 Materials for installation

5.1 Fixings

Fixings should be at least as corrosion-resistant as BS EN 1670:2007, Grade 3.

If lug fixings are used they should be of a suitable material to resist corrosion and, if used externally, they should be secured to the substrate using one-way or other suitable security screws.

The choice and size of through-frame fixing screw types should take account of the condition and nature of the receiving substrate together with the likely severity of operating loads to be imposed, e.g. door slamming.

A selection of proprietary sleeved or direct mechanical through-frame fixing products and methods is available, and an assessment should be made as to suitability and size within the given application. This assessment should preferably be made at survey stage or, if this is not possible, when the type and condition of substrate can be fully assessed. Additional guidance should be sought from the fixings manufacturer.

5.2 Perimeter sealants

*COMMENTARY ON **5.2***

The purpose of perimeter sealants is to resist water penetration and prevent air leakage in the face of differential movement between the aperture and the window or doorset. Suitable sealants exhibit and retain flexibility and adhesion over the intended service life of the product and it is vital that the correct sealant is selected to suit the construction and frame materials involved.

The movement class for the sealant depends on the substrate material, the frame material and the dimensions of the joint between the frame and the opening.

Wet sealants, e.g. silicones, should be tested and classified in accordance with BS EN ISO 11600. Unless an unusual and specific known requirement determines otherwise, they should be of low modulus, with adequate adhesion, movement capability of at least 20%, and neutral curing. The movement and modulus characteristics should be identified on their packaging as class 20LM or 25LM.

NOTE 1 A guide to the use of BS EN ISO 11600 [10] is given on The British Adhesives and Sealants Association website at www.basaonline.co.uk [4)].

If a situation arises where the anticipated movement exceeds the performance criteria of a class 25 sealant, then the sealant manufacturer should be contacted for specific advice on sealant selection.

NOTE 2 If in doubt, sealant manufacturers can be consulted on sealant adhesion to specific substrates and materials and on whether primers are required. They can also propose sealant/primer systems, which minimize the potential for staining. A comprehensive list of UK sealant manufacturers can be found at www.basaonline.co.uk[4)].

Impregnated foam tapes can also be used for sealing, and should remain permanently flexible and accommodate joint movement of at least the same as a wet sealant as classified above.

NOTE 3 The use of impregnated foam tapes or gun-applied polyurethane (PU) foam might enhance the thermal performance of the installation due to the location within the perimeter joint, although application of gun-applied PU foam might be impractical if the perimeter joint is below 5 mm wide. For joints below 10 mm, it is advisable to use a special tapered nozzle on the gun to facilitate adequate application depth.

NOTE 4 Impregnated foam tapes conforming to DIN 18542:2009 with an exposure category of BG1 are suitable.

NOTE 5 Such products do not rely on chemical adhesion to the contact surfaces, being held under compression within the joint, and do not therefore require primers.

5.3 Finishing trims

All trims should be compatible with the material of the frame and should be colour matched where specified. Finishing trims, where used externally, should be good exterior quality materials used in accordance with the manufacturer's instructions.

Cellular extruded PVC-U trims should conform to BS 7619.

6 Surveying for replacement windows and doorsets

6.1 General

The following factors should be taken into account:

- the need to provide a weather-resistant solution;
- the need to provide natural light and ventilation;
- the need for safety in use;
- the need to provide means of escape in case of fire;
- the need to provide security against unauthorized entry;
- the need for safety when cleaning;
- the need for maintenance.

[4)] Last accessed 17 November 2015.

The type of occupancy, and the age range of both occupants and visitors to the building, should also be taken into account where known.

NOTE BS 8213-1:2004 advises that a risk assessment be conducted by the designer (in the case of domestic replacement windows this is the person or organization taking the order from the client), taking account of the relative priority needs established in each situation.

6.2 Suitability of the aperture

The surveyor should check for any apparent defects and deficiencies around the structural opening. If any defects are found, then the purchaser should be notified, and agreement reached as to who is responsible for rectifying these defects prior to the new windows or doorsets being installed.

NOTE For large replacement contracts, it can be advisable to remove one window or doorset to check the condition of the structural opening.

6.3 Fire barriers

*COMMENTARY ON **6.3***

In all methods of construction it is important to ensure that the cavities between internal and external skins are protected at openings for windows and doors from the spread of fire. If these openings are not protected, in the event of a fire, smoke and fire can spread through the cavity, causing danger to occupants in other parts of the building not immediately affected by the fire. This issue is of particular concern in timber and metal framed buildings. Attention is drawn to the Building Regulations 2010 [1] in respect of the requirement for suitable fire barriers to be present in such buildings. Guidance is given in BS 9991, BS 9999, the Building Regulations 2010, Approved Document B for use in England [11], [12] and Wales [13], [14], and its equivalents in Scotland [15] and Northern Ireland [16].

The method of construction should be identified, and where the building is of timber or metal frame construction, the type of cavity barrier should be established. Where the barrier is a cavity sock or similar, and is likely to become dislodged or damaged by the removal of the existing frames, this should be noted on the survey sheet, and instruction given to the installation team to ensure that the cavity barrier is either repaired or replaced to maintain the original level of fire protection for the building.

NOTE Timber and metal frame constructions usually have a moisture barrier included in the area around openings, to resist moisture ingress into the cavity that could affect the timber sheathing or metal studwork.

6.4 Services in the aperture

The presence of any electrical or specialist items such as television aerials and telephone wires in the aperture should be noted. Wherever possible such services should be routed around, and not through, the outer frame of the window or doorset. When this is not possible, a solution should be agreed with the purchaser which does not compromise the performance of the product.

The presence of any curtain tracks in the aperture should be noted.

NOTE This is particularly important for inward opening or pivoting windows and net curtains. These could either cause problems during installation, or interfere with the function of the window or doorset after installation.

Action to prevent any problems should be agreed with the purchaser prior to the installation.

6.5 Weathertightness

The surveyor should determine the design wind load for the application, determine whether the windows and doorsets specified are suitable for the exposure conditions, and amend the specification if necessary.

NOTE BS 6375-1 gives guidance on selection and specification of windows and doorsets.

Where any doubts exist, the manufacturer should be consulted.

6.6 Structural support

The surveyor should take reasonable steps to check that there is a lintel or other means of supporting the structure above the window or doorset. Where no such support exists and the load is carried on the existing window or doorset, then alternative means of structural support should be specified.

6.7 Bow, oriel and dormer windows

Where bow, oriel or dormer windows have low applied loads, no special structural calculations are necessary. Where any doubts exist, the structure should be assumed to be load-bearing and the system supplier's instructions should be followed.

6.8 Coupled/combination frames

Where windows and/or doorsets are to be coupled, the surveyor should determine the method to be used, taking into account wind and dead loads, thermal performance, visual appearance and position of the coupling, in accordance with the system supplier's instructions.

6.9 Opening type and direction

The surveyor should confirm with the purchaser the type of opening (e.g. inward, outward, pivot) and the handing.

On outward opening doors, a restriction device should be fitted to help avoid damage caused by sudden wind gusts.

The protrusion of outward opening windows into the path of pedestrians should be taken into account.

NOTE Guidance on design for safety is given in BS 8213-1:2004.

6.10 Doorsets

The following factors should be taken into account when surveying for replacement doorsets.

a) It is good practice to take into account the requirements of the occupants and improve access into the dwelling if necessary, e.g. by reducing the threshold height. Weathering should be taken into account when lowering the threshold.

b) The requirement for additional hardware, such as trickle vents, cat flaps and spy holes, should be clearly specified.

c) On doorsets with side panels, the mullion should have sufficient stiffness to ensure rigidity when the door is closed against it.

6.11 Structural change

Where the structural opening is modified to install a window and/or doorset, the structural integrity of the formed opening should be ensured.

The method of any cavity closing should be specified, taking into account water penetration, fire protection, etc.

NOTE This work is not covered by the scope of a Competent Person's Scheme and it is therefore necessary to consult an appropriate building control body.

The method of making good should be agreed with the purchaser.

6.12 Drainage

The surveyor should specify and/or confirm any method of drainage of frame and/or glazing to be used.

6.13 Glazing

6.13.1 Safety glazing

The surveyor should specify and/or confirm the position and orientation of safety glazing.

NOTE 1 Attention is drawn to legal requirements in respect of safety glazing in critical locations. These include situations in which people are likely to come into contact whilst moving in or about the building, and glazing that acts as a barrier offering protection from falling.

NOTE 2 Recommendations for safety glazing are given in BS 6262-4.

NOTE 3 In certain circumstances and in consultation with the customer, it might be advantageous to supply and install safety glazing material in other situations which the surveyor considers hazardous following the risk assessment. Care is needed when determining the type of safety glazing material used. In certain environments the containment of broken safety glass is crucial.

NOTE 4 Guidance on design of barriers and infill panels is given in BS 6180 and GGF Datasheet 7.2 [17].

6.13.2 Decorative glass

The surveyor should specify and/or confirm the position, style and orientation of any glass pattern or decoration, including leading or Georgian Bar inserts, and the need for any alignment.

6.14 Measurement

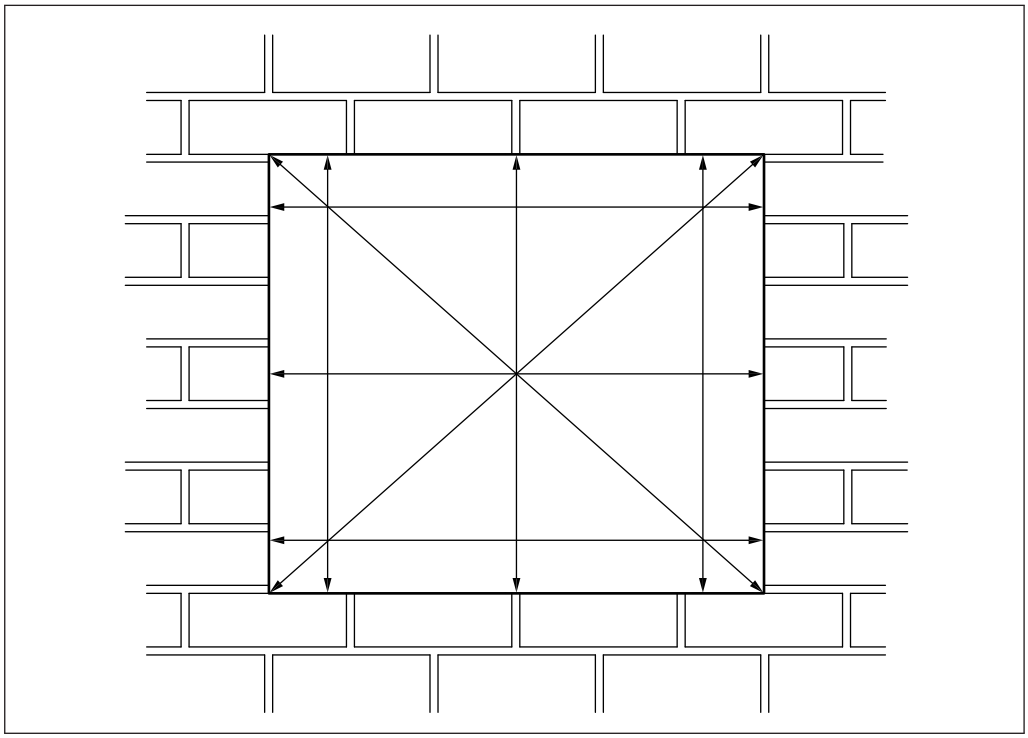
Three measurements of width and height should be taken and the squareness of the aperture determined by taking diagonal measurements (see Figure 1). The largest size frame that will fit into the opening and remain square, with an adequate gap to form an effective perimeter seal, should be used for determining the manufacturing sizes (see **6.16**, Table 1).

The need for any sill should be determined. The size of the sill should be such that there is a minimum overhang of at least 25 mm from the face of the building.

The surveyor should determine how the sill is to be fitted, taking into account features such as horns, and how any making good is to be carried out.

The difference between internal and external reveal sizes should be determined and checks made to ensure that the operation of any opening light will not be impeded by plaster, render or tiles, etc.

Figure 1 **Measurement of flat windows and doorsets**



6.15 Surveying a window or doorset in a check reveal

*COMMENTARY ON **6.15***

Check reveal may be used for reasons of weathering, aesthetics or a combination of both. The use of check reveal for weathering is common in areas of severe or very severe exposure, usually associated with the South West, West and North West of England and most of Wales, Scotland and Northern Ireland. Where weathering is the reason for building in check reveal, the rebate created is usually approximately 25 mm and incorporates a vertical DPC to the rear face of the external leaf and between the external leaf and the cavity closing material (return blockwork or insulated cavity closer). If the check is formed for aesthetic reasons, it is usually used to reduce the external visual effect of the width of the jambs of vertical sliding sash windows that incorporate a weight box. Where the check is used for this purpose, the rebate created is larger than the weathering check and is usually 75 mm or greater. Check reveals used to reduce the visual impact of sliding sash boxes are commonly found in older buildings of solid wall construction and a vertical DPC is not usually present.

The difference between widths is divided equally to both sides and, if present in the opening height, is located at the head only. Frames are installed with the front face of the frame positioned tight to the rear of the external leaf in the rebate created by the difference between external and internal sizes.

When surveying for replacement windows where a check reveal is present for weathering purposes, the window manufacturing sizes should be based on achieving a minimum frame overlap of 12 mm on the external leaf. A hole may be drilled thorough the existing frame jamb rebate to establish the check reveal size. A frame may also be built into the check reveal at the head by use of a rebated lintel, and again a minimum frame overlap of 12 mm should be provided where practicable. If an overlap of 12 mm cannot be achieved, this should be discussed with the purchaser and an agreement reached regarding the size of the overlap.

NOTE 1 The size of the head check reveal can be checked by drilling a hole through the head of the frame rebate. When surveying for replacement windows where the check reveal is present for aesthetic purposes, the size of the check may be established by either removing internal architraves around the window, cutting into the internal reveal plaster or drilling through the jambs and head.

Where the replacement windows are to be fitted with opening sashes, the window outer frame should be sufficient in size to allow the edge of the sash to clear the external reveal. Where there is insufficient width to the outer frame, a wider outer frame should be specified or purpose-designed frame extensions should be used.

NOTE 2 This is of particular importance when using narrow outer frames or when the external reveal is rendered.

6.16 Manufacturing sizes

Expansion and contraction of frames is to be expected due to temperature fluctuations, and this should be taken into account.

The deductions for windows and doorsets should be in accordance with Table 1.

When calculating height deductions, due allowance should also be made for the thickness of any silicone or mortar bed at the sill.

Table 1 **Recommended deductions from structural opening sizes**

Dimensions in millimetres

Material	Recommended deduction for width or height of structural opening			
	Up to 1.5 m	From 1.5 m to 3.0 m	From 3.0 m to 4.5 m [A)]	Over 4.5 m [A)]
PVC-U – white	10	10	15	20
PVC-U – non-white	15	15	22	28
Timber	10	10	10	15
Steel	8	10	12	15
Aluminium	10	10	15	20
Glass-reinforced plastic (GRP)	5	10	15	15

NOTE 1 These deductions are from the total width or height, and are not "per side".

NOTE 2 The gap required for effective PU foam fixing at the head is 10 mm to 15 mm.

NOTE 3 When fitting aluminium or steel frames into existing timber sub-frames, deduct 4 mm.

[A)] Intermediate expansion joints might be needed when the width or height exceeds 3 m.

6.17 Installation techniques

Wherever possible the survey should identify any necessary variations to standard installation techniques.

*NOTE See Clause **9** for standard installation techniques.*

7 Surveying and programming for new build

*COMMENTARY ON CLAUSE **7***

The manufacturing sizes and details of installation in new build are normally decided by the house designer in conjunction with the window and doorset supplier in accordance with current building regulations.

The use of proprietary cavity closers/sub-frame systems can enable accurate construction of the opening and simple installation of the window and doorsets. Given the dynamic forces that doors are often subjected to, caution is needed in adopting this method for the installation of doorsets. If in doubt, advice can be sought from the system supplier/manufacturer.

For new build, the appropriate recommendations given in Clause **6** should be met, together with the following.

The surveyor should ensure that the manufacturing sizes and details of installation are suitable for the products to be used and are clearly defined.

When measuring openings with cavity closers, the measurements taken should be between the faces of the cavity closers, not the brickwork reveals.

It should be brought to the house builder's attention that factory-finished windows and doorsets need to be programmed for installation as late as possible in the building process to minimize the risk of damage.

8 Removal of existing windows and doorsets

The installation team should ensure that all relevant documentation, e.g. drawings, survey sheets and special instructions, is available and understood, and that the relevant products and equipment are available. Prior to the commencement of work the sizes, type, and condition of all windows and doorsets should be checked both against the survey sizes and types and against the actual aperture sizes.

At the request of the installer, prior to the commencement of work, the purchaser should be given adequate notice to remove any furniture, fixings or fittings that might otherwise be damaged during the installation.

The installer is responsible for both internal and external protection of the property during the installation work. Care should be taken to avoid debris becoming embedded in soft garden areas (lawns, etc.).

Care should be taken to avoid soiling of or damage to floor coverings and to decorations. Damage is inevitably caused to the reveals adjacent to the installation, and care should be taken to keep this to a minimum.

The installer should plan to install and seal the new windows and doorsets on the same day that the existing windows or doorsets are removed, to maintain security and the weathertightness of the structure. When this is not practicable, e.g. on large contracts, an alternative arrangement for security and weathertightness should be agreed in advance between installer and purchaser.

The existing windows and doorsets should be removed with care to avoid unnecessary damage to the building structure and its finishings, and without permitting any subsidence of the superstructure during or after the installation procedure.

Any damaged or deteriorating DPC should be replaced.

Wherever practicable, any electrical or specialist items, such as television aerials or telephone wires, should be routed around, and not through, the frame of the window or doorset. Where this is not feasible, then the routing should be carried out in accordance with the alternative solution agreed between the purchaser and the surveyor (see **6.4**).

NOTE This might require the services of the appropriate service provider.

9 Installation

9.1 General

For correct fixing, each frame member should be fixed to the substrate or to an adjacent window or doorset to resist all likely imposed loads that could cause the frame to deflect.

NOTE 1 These loads might be due to:

a) wind loads;

b) operating loads;

c) gravity;

d) accidental impact;

e) attempted burglary.

NOTE 2 Fixing methods are affected by:

a) the presence or absence of a wall cavity;

b) the nature and condition of any cavity;

c) the relative position of the frame and cavity;

d) the type and position of the substrate receiving the fixings;

e) the position of the plaster line and the need to minimize disturbance and damage to interior decorations;

f) the design of the reveal;

g) maintenance loads;

h) any requirements for fire resistance.

Windows and doors should be installed plumb and square within the aperture in accordance with the manufacturer's instructions. The completed installation should be without twist, racking or distortion of any member so that they operate correctly and in accordance with the surveyor's instructions.

9.2 Methods of fixing

There are two principal methods of fixing available, which may be used separately or in combination: namely, through-frame fixings and lug fixings. The manufacturer's instructions should always be followed.

The type and selection of fixings should be in accordance with **5.1**.

Fixings should be sized to securely penetrate at least 40 mm for windows and 50 mm for doors into brick, block, concrete or masonry, or 25 mm into timber framing unless equivalent demonstrable provision can be made by other means.

Connections to steelwork up to 2 mm thick, such as folded sheet lintels, should be made with power-driven hardened self-drilling screws or self-tapping screws. If self-tapping screws are used, a pilot hole with an appropriate diameter for both the gauge of steel and screw size should be drilled prior to fixing. Connections to steelwork greater than 2 mm thick should be made either into pre-tapped holes with machine screws of minimum 5 mm diameter, or with power-driven hardened self-drilling screws. All such fixings should have the appropriate corrosion resistance and strength for their purpose.

Where appropriate, fixings into lintels should not be put into the weathered side, to avoid water ingress.

The fixings manufacturer should be consulted to determine the most appropriate products.

Installation packers should always be used, as recommended in **9.8.5**.

9.3 Fixing distances

9.3.1 General

Wherever practicable, the sides of the frame should be secured in accordance with the recommendations in **9.3.2** to **9.3.5**. If it is impossible to follow these recommendations, then, on large contracts, alternative positions should be agreed with the purchaser, and on domestic installations, the closest possible fixing positions should be used.

The presence of precast concrete or steel lintels can make it impracticable to achieve the recommended fixing distances using through-frame fixings or fixing lugs, or can pose severe difficulties in doing so. In these instances the use of PU foam may be used as a supplement to mechanical fixings but should not, under any circumstances, be used as the sole method of securing the entire frame into the reveal.

*NOTE Application of PU foam using a proprietary gun gives greater control (but see Note 3 to **5.2**).*

9.3.2 PVC-U windows and doorsets

Wherever practicable all four sides of the frame should be secured as follows.

a) Corner fixings should be between 150 mm and 250 mm from the external corner.

b) Fixings should be a minimum of 150 mm from the centre line of a mullion or transom.

c) There should be a minimum of two fixings on each jamb and sill, with intermediate fixings at centres no greater than 600 mm.

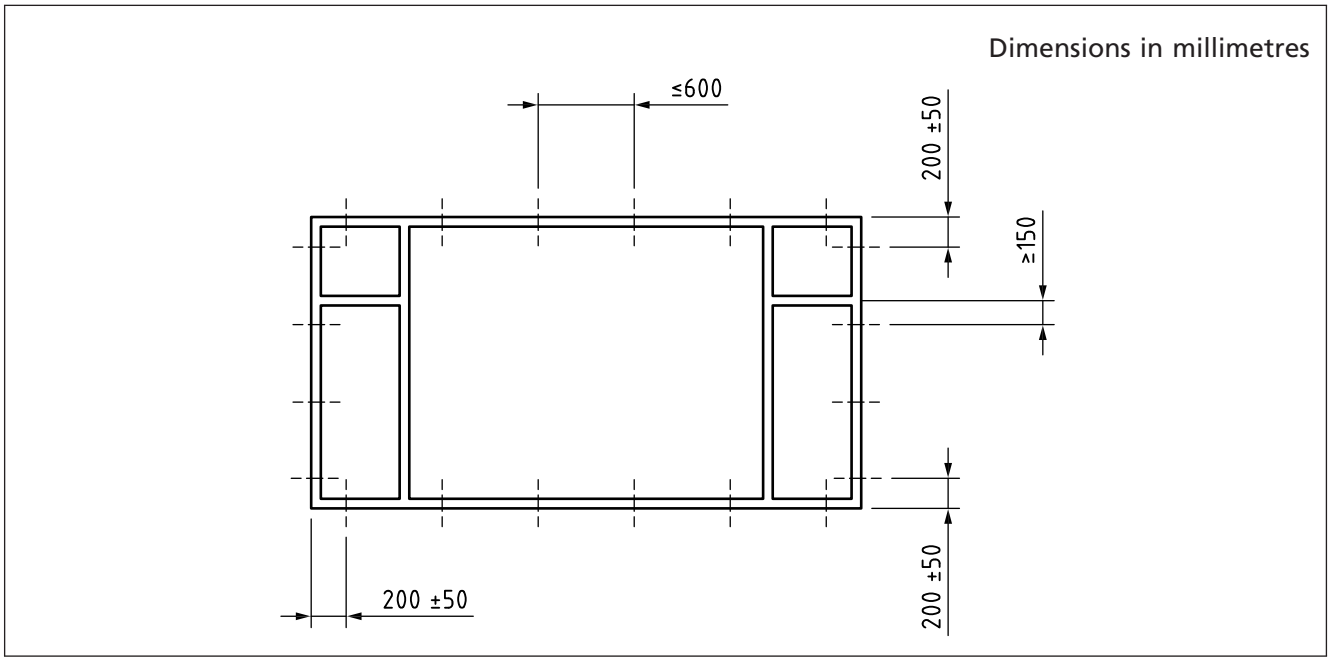
d) If the head is fixed with PU foam, then the fixings at the head may be as follows:

- frame width up to 1 200 mm – no fixings;
- frame width 1 201 mm to 2 400 mm – one central fixing;
- frame width 2 401 mm to 3 600 mm – two equally spaced fixings.

NOTE 1 The fixings in d) do not apply to French doors, patio doors or bi-fold doors.

NOTE 2 Figure 2 shows the recommended fixing positions for PVC-U windows and doorsets.

Figure 2 **Fixing positions for PVC-U windows and doorsets**



9.3.3 Timber windows and doorsets

Wherever practicable all four sides of the frame should be secured as follows.

a) Corner jamb fixings should be between 150 mm and 250 mm from the external corner.

b) Intermediate fixings should be at centres no greater than 600 mm.

c) There should be a minimum of two fixings on each jamb.

d) On windows and doorsets over 1 800 mm wide, central head and sill fixings should be provided.

NOTE Figure 3 shows the recommended fixing positions for timber windows and doorsets.

9.3.4 Aluminium windows and doorsets

Wherever practicable all four sides of the frame should be secured as follows.

a) Corner jamb fixings should be between 100 mm and 150 mm from the external corner.

b) Fixings should be a minimum of 100 mm from the centre line of a mullion or transom.

c) Intermediate fixings should be at centres no greater than 600 mm.

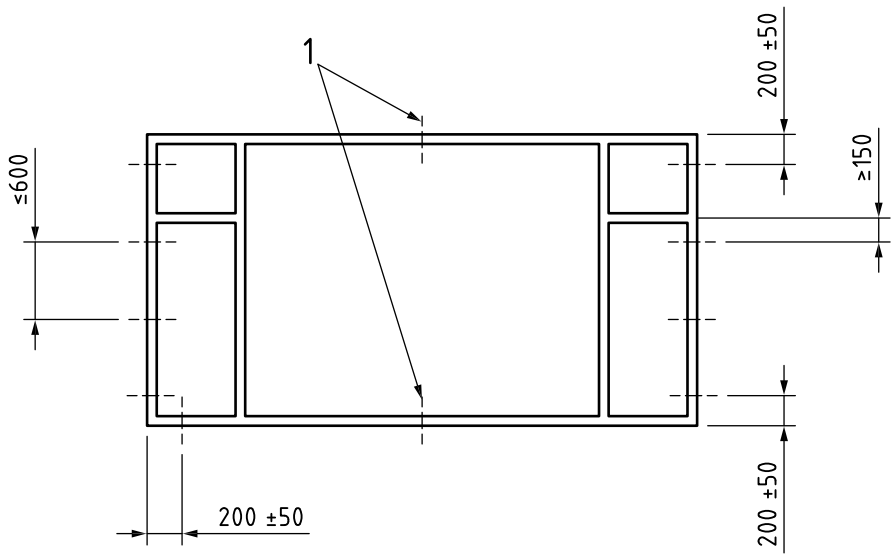
d) There should be a minimum of two fixings on each jamb.

e) On windows and doorsets over 1 800 mm wide, central head and sill fixings should be provided 100 mm or more distant from any mullion that might coincide.

NOTE Figure 4 shows the recommended fixing positions for aluminium windows and doorsets.

Figure 3 **Fixing distances for timber windows and doorsets**

Dimensions in millimetres

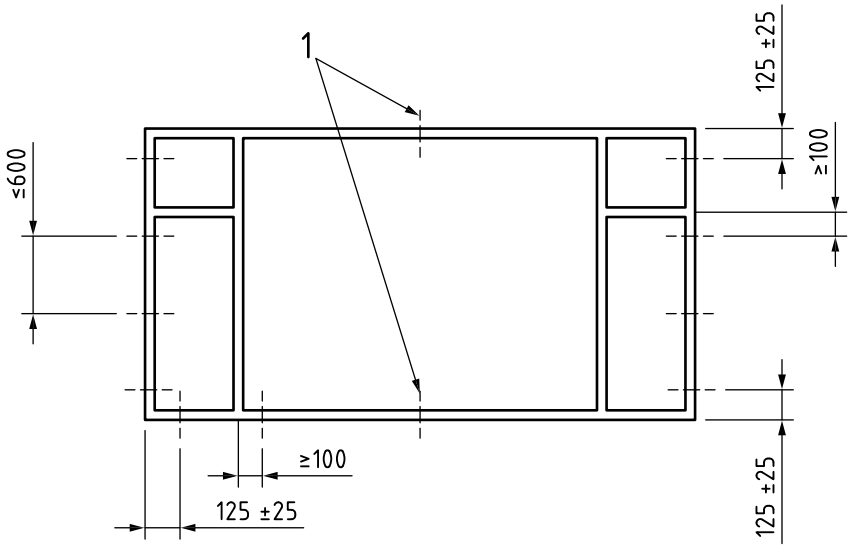


Key

1 Additional fixing for windows over 1 800 mm wide

Figure 4 **Fixing distances for aluminium windows and doorsets**

Dimensions in millimetres



Key

1 Additional fixing for windows over 1 800 mm wide

9.3.5 Steel windows and doorsets

Wherever practicable all four sides of the frame should be secured as follows.

a) For steel frames of hot rolled solid section:

   1) fixings should be a maximum of 175 mm from corners;

   2) intermediate fixings should be at centres no greater than 750 mm.

b) For steel frames of cold formed hollow section:

   1) fixings should be a maximum of 200 mm from corners;

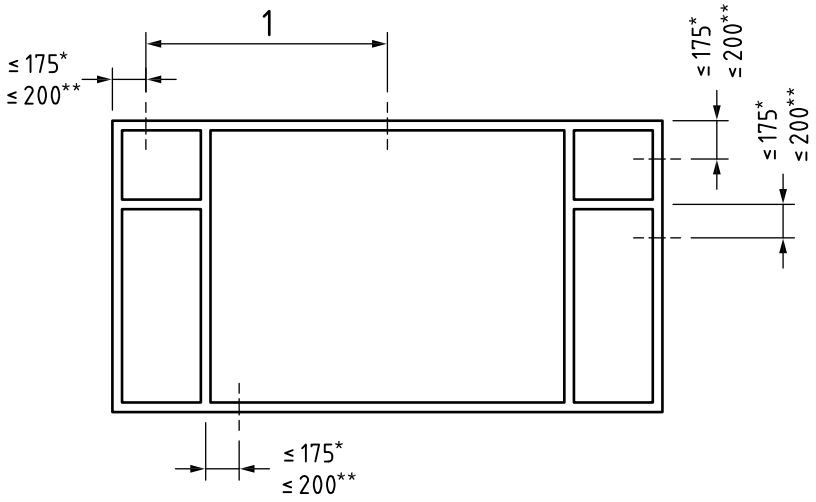
   2) intermediate fixings should be at centres no greater than 900 mm.

NOTE 1 Not all holes pierced around the frame perimeter for fabrication and assembly purposes necessarily require a fixing screw.

NOTE 2 Figure 5 shows the recommended fixing positions for steel windows and doorsets.

Figure 5 **Fixing distances for steel windows and doorsets**

Dimensions in millimetres



Key

1 Max. intermediate fixing distances (750 mm for hot rolled; 900 mm for cold rolled)

* Dimension for hot rolled sections

** Dimension for cold rolled sections

9.4 Fixing lugs

Where lugs are used externally they should be secured to the wall using one-way or other suitable security screws.

9.5 Finishings

Finishings, such as trims, are generally used to neaten the interface between frames and substrate. They should not be used to provide or enhance the weathertightness of the window or doorset or the perimeter joints.

The materials to be used in finishing trims should be as recommended in **5.3**.

9.6 Coupled assemblies

NOTE Coupled assemblies are usually delivered to site as separate units, to ease handling and minimize damage.

When building up components into the required assembly, care should be taken to keep coupling joints equal, and frames both aligned and plumb. When coupling joints are also to be used as expansion joints, they should have seals, such as wet sealants, impregnated foam tapes or flexible polymer gaskets, placed within the joint during the assembly operation. It is not sufficient to rely solely on external pointing sealant.

Coupled assemblies should be fastened together in accordance with the system supplier's instructions. Particular attention should be paid to weather-proofing.

9.7 Bay poles

Where loads are being transferred (e.g. several storeys or just a roof) the bay poles should be carried through the sill to the bearing plate. Competent structural advice should be obtained as necessary.

Bay poles may be positioned directly on to proprietary sill reinforcements. In this case:

a) the reinforcing system should be designed to perform this task; and

b) the system manufacturer's guidelines should be followed.

NOTE 1 It is desirable for bay poles to have similar thermal performance as the frames they are being fixed to.

NOTE 2 Figure 6 shows a bay pole jacking system. A load-bearing pole using shims is also acceptable.

9.8 Replacement windows and doorsets

9.8.1 Frame position in aperture

9.8.1.1 Flush reveal

Replacement windows and doorsets should be positioned to minimize the amount of making good, taking into account the following points.

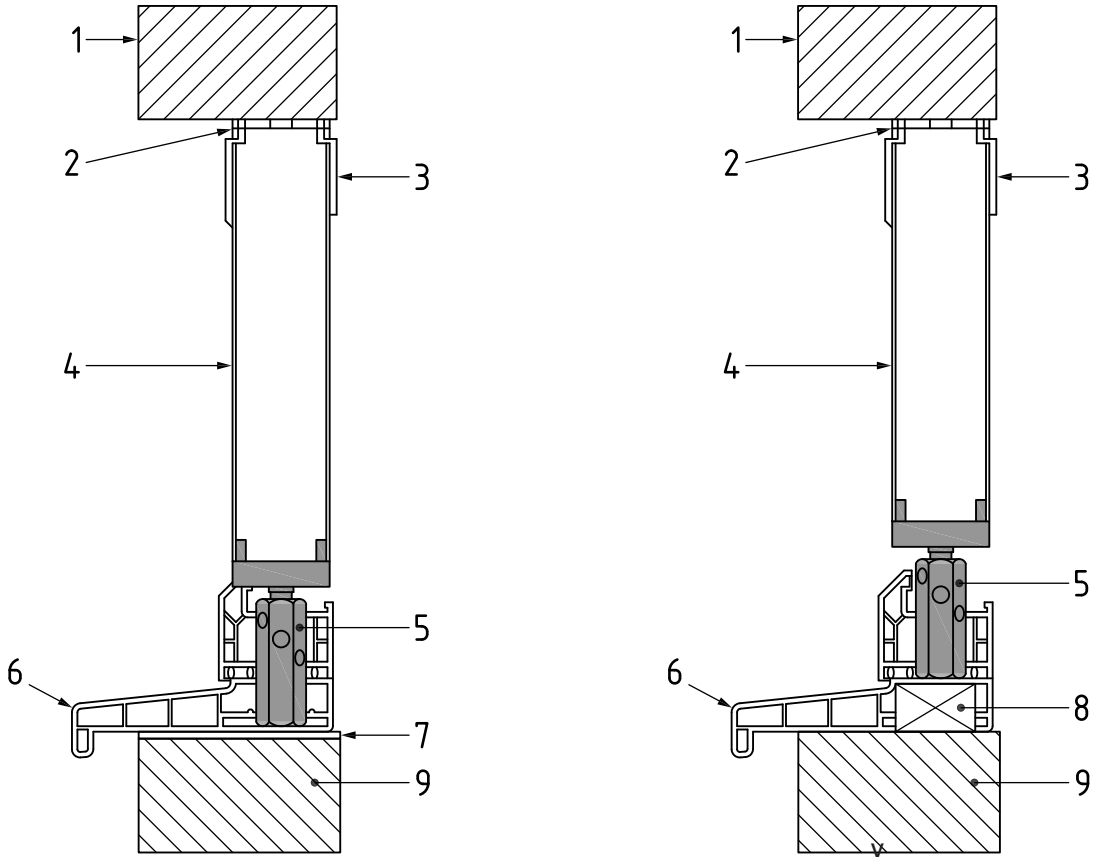
a) The new frame should bridge the DPC. Any damaged DPC should be repaired.

b) Wherever possible to reduce the effects of thermal bridging, the replacement frame should be set in such a position that the rear face of the replacement frame is behind the rear face of the external skin by 25 mm or more.

c) The frame should be set as far back in the reveal as is feasible for better weather performance. If a sill is included, the projection should be not less than 25 mm from the face of the building to allow the shedding of water.

d) The correct movement gap should be provided.

Figure 6 **Bay pole options**



a) Bay pole passes through sill

b) Bay pole positioned on reinforced sill

Key

1 Head plate (timber)
2 Top end cap
3 Window profile
4 Bay pole (load-bearing)
5 Bay pole jacking device
6 Sill
7 Bearing (spreader) plate
8 Reinforcement (solid)
9 Brickwork

9.8.1.2 Check reveal

When installing in a check reveal aperture and the check is being used to improve weathering performance, the frame should be positioned taking into account the following points.

a) The frame should be positioned behind the external skin and positioned centrally with a minimum overlap of the frame behind the external skin of 12 mm on both sides. Where applicable, the frame should be positioned vertically with the head positioned behind the external skin at the head.

b) If a vertical DPC is installed in the check reveal, the frame should be positioned as far forward as possible with the vertical DPC between the rear of the external skin and the external face of the frame.

When installing in a check reveal aperture and the check is being used to hide the width of the frame jambs (i.e. box sash windows) to provide more visually acceptable aesthetics, the frame should be positioned taking into account the following points.

1) The frame should be positioned behind the external skin and positioned such that the external visible dimensions of the frame jambs are equal.
2) The frame should be positioned, where applicable, behind the head check with the frame weight suitably supported.
3) Box sash windows are often installed in solid wall construction where a vertical DPC is not present. In these circumstances it can be beneficial to incorporate a suitable bead of sealant or impregnated foam tape between the external face of the frame and the external skin to provide additional protection against weather ingress.

NOTE 1 In some instances the reason for check reveal may be for both weathering and aesthetics.

*NOTE 2 Recommendations for fixing distances are given in **9.3**.*

NOTE 3 Annex B shows examples of the most commonly found reveal details.

For all situations, as with flush reveal, the sill projection beyond the effective external face of the wall below the aperture should be not less than 25 mm.

NOTE 4 The external skin sill detail may incorporate shaped stone sills or plinth bricks to bring this effective external face closer to the frame and therefore reduce the depth of sill needed.

9.8.2 Bedding of frames and/or their sills

Bedding materials should comprise one or a combination of the following:

a) mortar (usually used for levelling);
b) levelling packers and foam, with a silicone bead at the outer edge;
c) levelling packers and silicone;
d) levelling packers and impregnated foam tapes.

9.8.3 Open cavities and cavity protection

If open cavities are present between the external and internal skins of the wall, they should be closed using a suitable insulated cavity closing material which incorporates a vertical DPC. If the open cavity already has a vertical DPC present, the inclusion of a cavity closer should not compromise the integrity of the existing vertical DPC.

Where the frame design is such that it is not possible to provide a secure screw-fixing position into solid structure, fixing lugs should be used to enable the frame to be securely fixed to the building structure.

Many types of building construction also incorporate cavity barriers around the perimeter of window and doorset apertures. If the cavity barrier is damaged during removal of the existing frame or is found to be damaged following removal of the existing frame, the cavity barrier should be repaired or replaced before installation of the replacement frame.

NOTE 1 Ensuring that cavity barriers are intact and effective is of particular importance in buildings that are vulnerable to smoke and fire spread through the cavity, such as timber frame construction.

NOTE 2 In certain types of building it might be necessary to include weather-proofing around apertures. This is particularly relevant in system build dwellings such as timber or steel-framed buildings to prevent premature failure of the building structure.

9.8.4 Replacement of box sash windows

*COMMENTARY ON **9.8.4***

Traditional box sash with cords and weights may be replaced with windows with vertical sliding sashes using cords and weights, or windows with vertical sliding sashes hung on spiral balances or similar mechanisms. If the replacement windows are manufactured with cords and weights, the design and sizing of the frame components are similar to the existing frames and the weight box is positioned within the check reveal to reduce the visual impact of the frames. If the replacement windows use spiral balances, the new window jambs are considerably narrower as there is no weight box.

9.8.4.1 General

When box sash windows are replaced, the structural integrity of the aperture should be not less than that of the original installation, and the thermal performance of the junction between the window and the wall should be improved as much as possible.

9.8.4.2 Replacement of box sash windows with vertical sliding sash windows

When replacing a box sash window with a vertical sliding sash window, the recommendations for a normal casement window (see **9.1** to **9.5**) should be met, together with the following.

a) When replacing a window into the original check reveal, the window should be fitted from the inside, with the weight box hidden behind the brickwork when viewed externally.

NOTE 1 It is usually necessary to remove one or more of the internal reveals to achieve this.

NOTE 2 Replacement box sash windows are usually installed into an existing check reveal aperture. It is unusual to fit box sash windows in a flush reveal.

b) The windows should be installed in accordance with **9.8.1.2**.

c) Packing should be placed beneath the window jambs and any mullions to transfer the weight of the replacement sash window onto the structure, to avoid distortion of the sill member.

NOTE 3 A distorted sill can result in the hardware not engaging.

d) The window should be fitted level, without twist and with jambs packed behind fixing positions to ensure that they are straight and parallel.

NOTE 4 Jambs bowing outward make the sash window draughty, and jambs bowing inwards mean that the sashes will be excessively tight to slide and will probably not tilt inwards for cleaning if the option is present on the window design.

e) Expanding foam can be used as an aid to the mechanical fixings, but great care should be taken not to bow the outer frame jambs. If expanding foam is used then packing pieces should be placed between the frame and the sashes, or a brace put across the frame in order to prevent this bowing.

9.8.4.3 Replacement of box sash windows with spiral balance vertical sliding sash windows

When replacing a box sash window with a vertical sliding sash window using spiral balances rather than windows with cord and weights, the recommendations for a normal casement window given in **9.1** to **9.5** should be met, together with the following.

a) The check reveals should be packed to allow for the narrower window jambs. This can be achieved in a number of ways, but if timber packing pieces are used, the timber should be sized correctly and treated with preservative. The sides of the packing timber located against the reveal brickwork should have a vertical DPC attached to prevent water migration into the timber from the check reveal brickwork, blockwork or stonework.

b) Expanding foam can be used as an aid to the mechanical fixings, but great care should be taken not to bow the outer frame jambs. If expanding foam is used then packing pieces should be placed between the frame and the sashes, or a brace put across the frame in order to prevent this bowing.

NOTE The position of the new window within the reveal is normally the same as the existing window, with the external face of the new window being positioned level with the original check reveal internal face.

9.8.5 Frame installation packers

Frame installation packers should be used adjacent to fixing positions to:

a) prevent outer frame distortion during installation and use;

b) ensure that the frame remains centralized, level and square;

c) allow for thermal movement of the frame;

d) assist in withstanding wind loadings.

Packers should normally be left in situ and concealed as part of the completed installation. However, in some instances they may be removed to facilitate perimeter detailing or for reasons of compatibility with the type of frame fixing used. In these cases, the objectives listed in a) to d) above should be satisfied and the fixings manufacturer's guidance followed.

NOTE 1 Due to the dynamic forces experienced when doors are opened and closed, it is good practice on doorsets to use additional packers adjacent to hinge and locking points to provide additional support and security.

NOTE 2 Some lugs need to be packed off the substrate to prevent distortion.

Frame installation packers should be resistant to compression, rot and corrosion. If the packers are left in place, the fixings should be tightened so that the frame is held securely against them.

Over-tightening of fixings can lead to distortion and should be avoided.

9.8.6 Finishing off and making good

Debris or contaminants should be removed and any drainage paths should be cleared.

Internal reveals should be made good as agreed, ready for the purchaser to redecorate if necessary.

Any materials such as trims or sealant should not be applied on top of loose material or materials likely to be adversely affected by the sealant.

Protective tapes should be removed as soon as practicable, as ageing of tapes can cause difficulties in removal. The manufacturer's guidance should be followed.

Sand and cement should not be used to fill the vertical gap between the window jambs and the reveal, except for backfill for steel windows, usually limited to windows in stone surrounds or interior fair-faced brick and concrete.

Where a sand and cement mix has been used to bed and level the window sill, this should be finished by pointing the sand and cement bed, or the joint may be raked out and pointed using a suitable flexible external sealant.

Where the replacement product has a smaller front to back dimension than the original, then there might be a mastic and/or paint line visible on the substrate which should be removed as much as practicable or covered with a trim.

The method of, and responsibility for, repair to any finishing should be as previously agreed with the customer.

9.9 New build

NOTE 1 Attention is drawn to the Building Regulations 2010 [1], the Building (Amendment) (Wales) Regulations 2014 [2], the Building (Scotland) Regulations 2004 [3] and the Building Regulations (Northern Ireland) 2014 [4] in respect of windows and doorsets in new build installations.

When installing windows into new building works (new buildings or extensions), the original specification of the windows and installation should be reviewed, and the installation should conform to those specifications to ensure that the installed performance of the windows is as designed.

Many new build window and doorset installations are based on systems that control the position and fixing method of the window or doorset into the building. If this is the case, the manufacturer's installation instructions should be followed.

Where a building-in system is not being used, the installation method should, as far as practicable, meet the recommendations for replacement windows and doorsets given in **9.8**, taking the following points into account.

a) All cavities around the aperture should be closed with a suitable cavity closer.

b) The installer should, where specified, fit any cavity barriers and moisture barriers around the aperture.

c) In cavity wall construction, it is expected that the position of the internal face of the frames will have been agreed at the design stage, but as a general principle the frames should be set across the cavity by a minimum of 25 mm to reduce cold bridging at the junction between the window and the wall.

d) In other forms of construction such as timber frame, the position of the frame in the aperture should be as determined by the designer.

e) Account should be taken of potential differential settlement between the inner and outer skins of the wall, particularly in timber frame buildings. The frame should be fixed to the inner timber frame and an allowance left between the bottom of the sill and the external skin.

   NOTE 2 This is to allow the inner skins to settle and the frame to move with the inner skin relative to the outer skin, and to prevent this movement resulting in the sill being distorted by the external skin below the frame.

f) Sealing of frames to the building structure should be completed taking into account possible differential movement between the frame and external structure as detailed in item e).

9.10 Glazing

9.10.1 General

All glazing should conform to the recommendations given in the relevant part of BS 6262, in BS 8000-0 and in BS 8000-7. In addition, any glass or insulating glass unit manufacturer's instructions should be followed.

NOTE 1 Figure 7 shows the setting and location block positions.

All insulating glass units should be examined for damage prior to installation. Defective units should not be used.

A gap of at least 5 mm should be included around the insulating glass unit. Drainage and ventilation to external air should be provided by slots or holes.

NOTE 2 Suitable configurations are described in BS 8000 and BS 6262.

Insulating glass units incorporating safety glass should be oriented with the safety glass on the appropriate side.

NOTE 3 It is a legal requirement that the marking on the safety glass remains visible after installation.

The orientation of coated glass and laminated glass affects the thermal performance of the window or doorset, and these products should be installed in accordance with the window or doorset manufacturer's instructions.

9.10.2 Site glazing methods

*COMMENTARY ON **9.10.2***

Some windows and doorsets are delivered ready glazed; others are supplied with glass units and pre-formed glazing gaskets to be applied on site in accordance with the manufacturer's instructions.

A range of tapes, compounds and gaskets for glazing purposes might have been specified, and the installer should correctly use the appropriate products. In all cases the manufacturer's instructions should be followed.

Insulating glass units should wherever possible be installed by the drained and ventilated method.

NOTE 1 This method allows any moisture entering the glazing rebate to drain or evaporate. The purpose is to avoid wetting the insulating glass unit edge seal, which can ultimately lead to interstitial condensation (internal fogging/misting) failure.

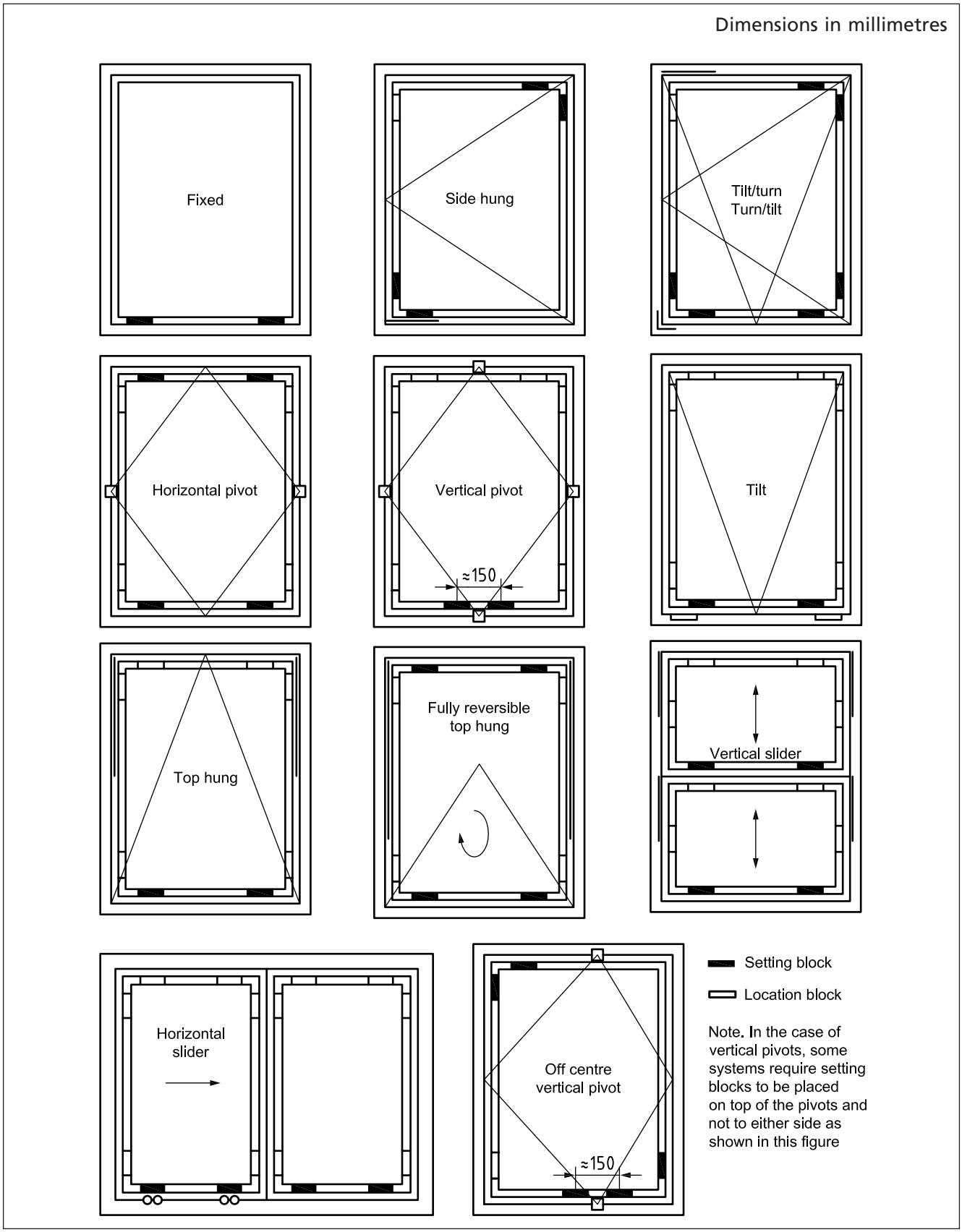
NOTE 2 Fully-bedded glazing methods may only be used if carried out in factory conditions, incorporating a drained bottom bead unless the window design prevents this configuration.

When used externally, windows installed with butyl-based, polyethylene, PVC or acrylic glazing tapes should be capped with sealant where appropriate.

Insulating glass units, setting and location blocks (see Figure 7), distance pieces, frame to glass and bead to glass gaskets, bead to frame airseals, corner sealing blocks, beads and bead end caps, bedding and capping sealants should be installed in accordance with BS 8000-7.

The glazing materials should be compatible with the insulating glass unit edge seal, to prevent premature failure or contamination of the insulating glass unit.

Figure 7 **Setting and location block position**



9.11 Sealing

A thermally insulating filling material should be applied into the perimeter gap around the frame, e.g. PU foam or impregnated foam tapes.

The presence of old oil-based mastics and bituminous DPCs can adversely affect the behaviour or appearance of otherwise correctly specified and applied wet sealants, through the migration of hydrocarbons to the surface of the new sealants. Consequent photo-oxidation of the migrant products can affect sealant performance and produce discoloration. This risk should be avoided by removal of unwanted mastic and by keeping sealant away from DPCs.

Perimeter joints should be continuously sealed on both the outside and the inside with a sealant appropriate to:

a) the frame surface;

b) the substrate material;

c) joint size and configuration;

d) anticipated joint movement;

e) anticipated exposure to weather.

When using impregnated foam tapes, over-capping with a wet sealant is generally not required. The manufacturer's instructions should be followed.

NOTE 1 Annex B gives examples of joint construction.

In situations where sealants rely upon atmospheric moisture to initiate curing, deep filling should be avoided.

The sealant should be applied against a firm backing so that it is forced against the sides of the joint during application. To avoid failure in service, the sealant should not adhere to the backing because this would restrict the lateral movement of the joint.

NOTE 2 For gaps greater than 6 mm these recommendations can be achieved through the use of a closed-cell over-sized polyethylene (PE) foam backer rod.

When applying sealant into a parallel joint, a width to depth ratio of between 1:1 and 2:1 should be observed. When applying a fillet joint, a minimum 6 mm contact to non-porous and 10 mm to porous substrates should be achieved.

For steel and aluminium framed windows and doorsets, an insulating fill should be inserted or injected wherever practicable around their full perimeter behind the external seal between frame and structural opening (see Annex B).

An adequate seal should be provided between any sill and frame, and a barrier should be created at the ends of the sill.

NOTE 3 This is to stop water bypassing the perimeter seal and entering the building or cavity. This seal/barrier can be made using appropriate sealants or proprietary end caps/sill sections designed for the purpose.

9.12 Final inspection

After installation a final inspection should be carried out, preferably accompanied by the purchaser, to ensure that the installation is fully in accordance with the surveyor's and manufacturer's instructions.

NOTE 1 An example of a final checklist is given in Annex C.

The purchaser should be made aware of the method(s) of operation, locking and unlocking and fire egress, including a practical demonstration where possible. This should be accompanied by written operating and maintenance instructions such as those published by trade federations.

NOTE 2 Ideally, all occupants of a household will be shown how to operate the windows and doorsets, particularly the operation of safety restrictors and their release for egress, in order to identify any difficulties any occupant might have and to agree remedies. Where it is not possible to pass the instructions directly to the occupant, e.g. in the case of housing association refurbishment, then it is the responsibility of the purchaser to ensure that the instructions are communicated.

Information on the ordering of spare keys should be provided.

NOTE 3 It is good practice to have the purchaser or purchaser's designated representative sign off the installation after the inspection has been passed.

Annex A (informative) Window and doorset removal techniques

A.1 Removal of putty-glazed fixed light glazing

Safe removal of putty-glazed fixed light glazing is preferably carried out by removing the putty, sprigs, beads or fixing nails and removing the glazing intact in its entirety. Alternatively, the glass can be carefully broken, so that the fragments are on the outside of the structure.

NOTE Old putty might contain asbestos and attention is therefore drawn to the Control of Asbestos Regulations 2012 [6].

A.2 Removal of frame

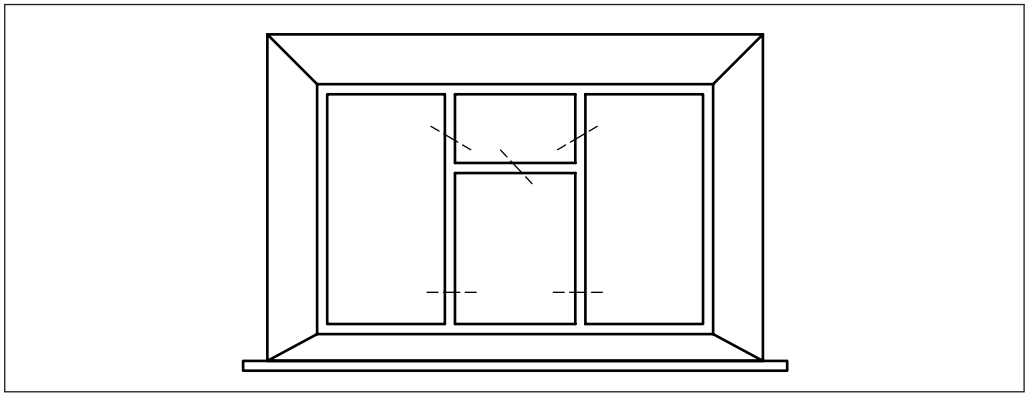
A.2.1 General

It is good practice to run a sharp knife between the inside face of the frame and the plaster adjoining the frame, to minimize the damage to the plaster when the frame is removed.

A.2.2 Timber windows and doorsets

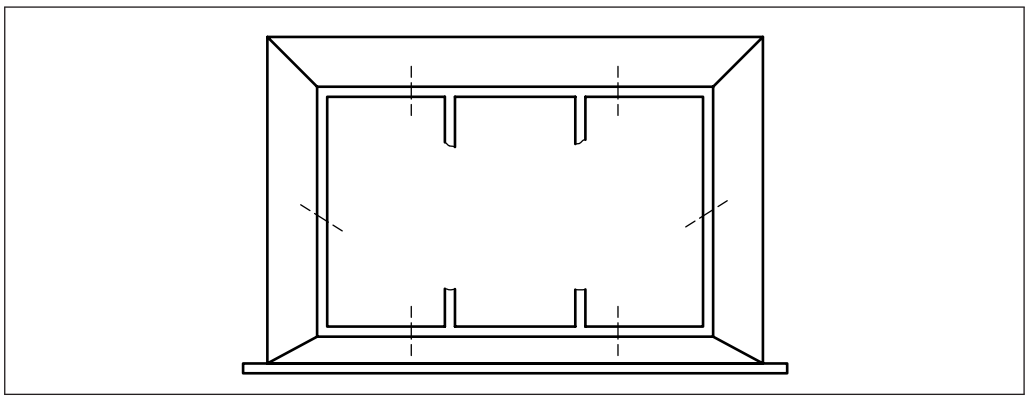
It is easiest for opening lights to be removed first, complete with their glass, by levering the screws from the frames, or unscrewing the hinges, or by cutting through the hinges (see Figure A.1). This provides working space, and reduces the weight.

Figure A.1 **Cutting through transoms and mullions**



After removal of the opening lights and fixed light glazing, any mullions and transoms can be cut through to remove them from the outer frame of the window or doorset, as shown in Figure A.2.

Figure A.2 **Cutting through the outer frame**



If the original fixing nails or screws cannot be found and removed, the outer frame can be cut through twice to remove a small central piece of the outer frame, then the frame carefully levered from the surrounding aperture – in the plane of the window or doorset – so as to cause the minimum of damage to the aperture.

There are often problems with windows and doorsets under the roof eaves. There might be a brick course resting on the frame between the top of the existing frame and the soffit board. This course is often purely decorative, not load-bearing, and can be wedged into position until the frame has been removed. Also the soffit board – plywood, timber or asbestos/cement – is frequently nailed to the existing frame. This joint can be severed by carefully locating and removing or cutting the nails.

A.2.3 Box sash windows

Most box sash windows pre-date cavity walls, and are built into the internal reveals of solid brickwork. The sashes can be removed fully glazed, in the following order.

a) Remove the mitred beading from around the frame.

b) Carefully cut the sash cords to release and lower the weights.

c) Remove the bottom sash, then take off the parting bead and take out the top sash.

d) Cut the outer frame from the aperture, leaving the horns in the structure.

e) Remove the counterweight from the sash box.

f) Remove the sill, if this is not part of the outer frame.

A.2.4 Metal windows and doorsets

Metal windows and doorsets can be removed in one of the two following orders, according to the type of window or doorset.

a) For metal windows and doorsets fixed through the frame into timber sub-frames or direct into the aperture:

   1) remove all glazing from fixed lights, and separate and remove all opening lights from the frames;

   2) locate the screws holding the metal frame in place and remove them;

   3) remove any timber sub-frame as described for timber windows and doorsets (**A.2.2**).

b) For metal windows and doorsets set directly into the brickwork or concrete held in place by lugs attached to the outer frame:

   1) remove any opening lights with an angle grinder or hacksaw;

   2) cut through any transoms and mullions and remove them;

   3) remove the screws from the frame by drilling out the heads or by driving them through the frame using a suitable punch;

   4) cut through each side of the frame with an angle grinder and lever away from the wall, taking care not to damage the fabric of the aperture.

A.2.5 PVC-U windows and doorsets

All of the glazing is normally removed first by removing the glazing beads. A sharp knife might be required to free the glass where glazing tapes have been used.

Opening lights can be separated from the frame and removed.

It is advisable to remove any trim profiles around the windows and doorsets to allow easier access and to determine the presence of fixing brackets.

PVC-U windows and doorsets are usually fixed by through-frame fixings, brackets or proprietary means.

a) Through-frame fixings can usually be unscrewed to allow the frame to be removed from the aperture. Care needs to be taken to avoid excessive damage to the fabric of the building.

b) Where fixing brackets have been used to secure the window or doorset, it is preferable to unscrew the fixings in the fixing brackets. Where this is not possible, the brackets can be cut with an angle grinder. Extra care is needed to reduce the inevitable damage to the window or doorset surround.

c) Proprietary fixings might require special instruction from the manufacturer.

A.2.6 Sills

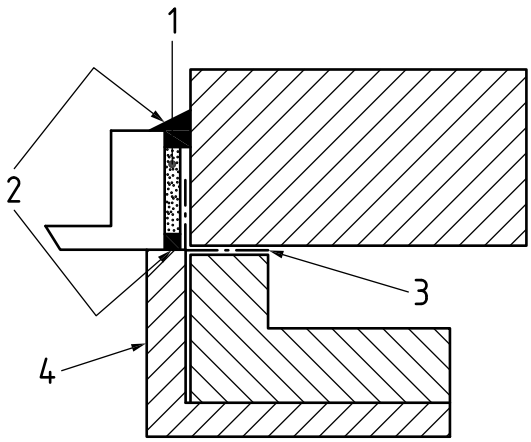
Sills, and sometimes heads, windowboards and mullions, are often horned into the fabric of the aperture. This can conceal DPCs and lead to difficulties in removal. Great care has to be taken when cutting and levering these items to reduce damage to plaster, renders and brickwork to a minimum. If the DPC is damaged, then it needs to be replaced. Repair might be possible in certain materials.

Annex B (informative) Examples of replacement frame position and joint construction

Figure B.1 to Figure B.13 show indicative examples of replacement frame positions and joint constructions. The examples apply to both internally and externally beaded/opening windows.

NOTE The contents of all of these figures are only indicative and are not to scale.

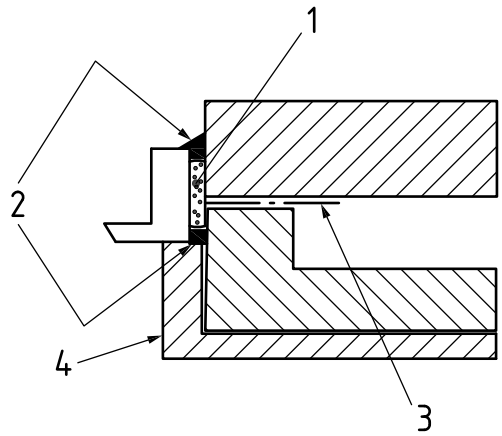
Figure B.1 **Flush reveal with joint width less than 6 mm and frame forward of DPC**



Key

1 Insulation
2 Sealant
3 DPC
4 Finishing trims/plaster

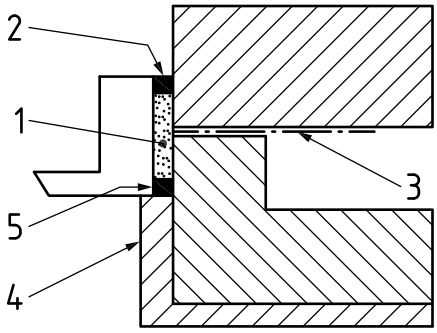
Figure B.2 **Flush reveal with joint width less than 6 mm and frame bridging DPC**



Key

1 Insulation
2 Sealant
3 DPC
4 Finishing trims/plaster

Figure B.3 **Flush reveal and frame bridging DPC – Alternative details using impregnated foam tapes**

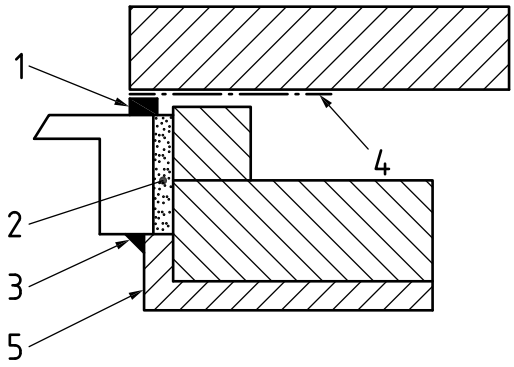


Key

1 Insulation
2 Impregnated foam tape
3 DPC
4 Finishing trims/plaster
5 Sealant

NOTE Alternatively, the impregnated foam tape can be installed to the full depth of the joint to provide insulation.

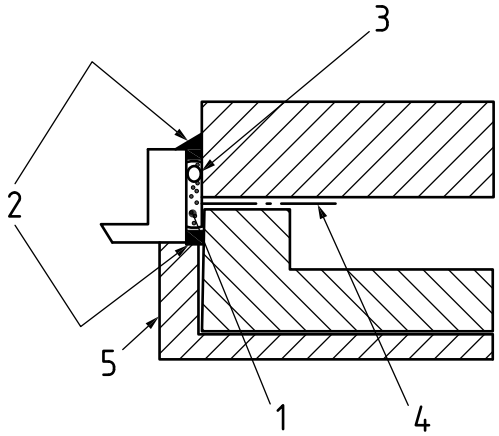
Figure B.4 **Check reveal and frame bridging DPC using impregnated foam tape**



Key

1 Impregnated foam tape
2 Insulation
3 Sealant
4 DPC
5 Finishing trims/plaster

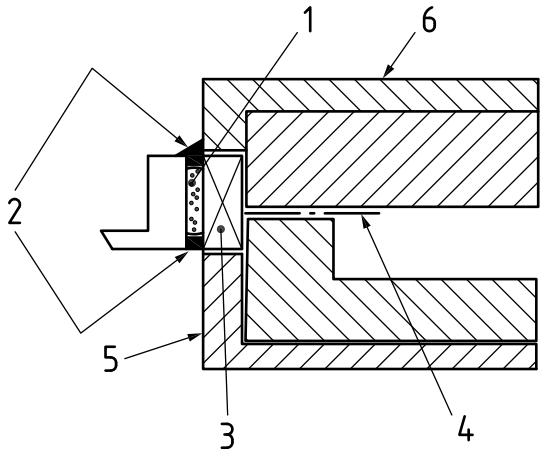
Figure B.5 **Flush reveal with joint width from 6 mm to 15 mm and frame bridging DPC**



Key

1 Insulation
2 Sealant
3 PE backer rod
4 DPC
5 Finishing trims/plaster

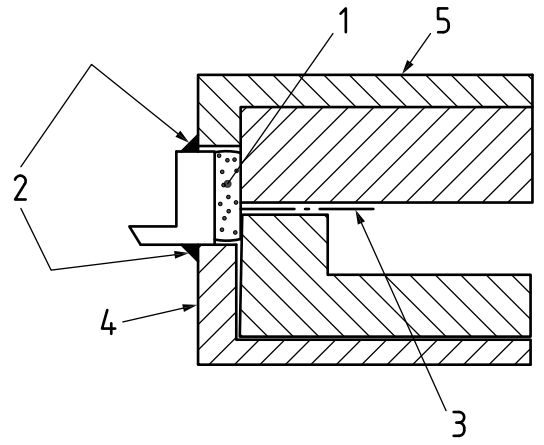
Figure B.6 **Flush reveal with external render, for replacement frames**



Key

1 Insulation
2 Sealant
3 Packing piece
4 DPC
5 Finishing trims/plaster
6 External render

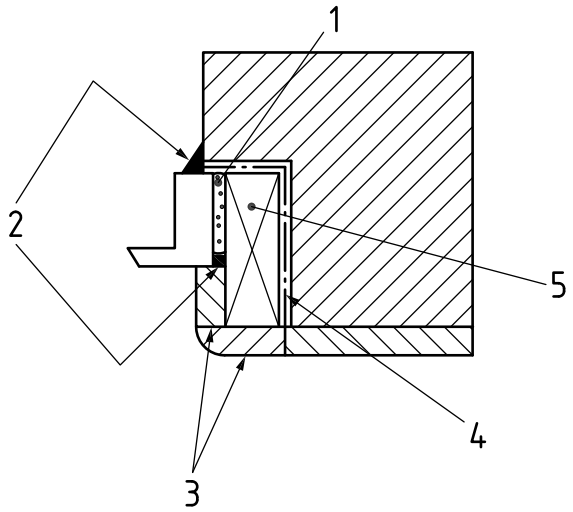
Figure B.7 **Flush reveal with external render, for replacement windows/doorsets with frame shuffled into position**



Key

1 Insulation
2 Sealant
3 DPC
4 Finishing trims/plaster
5 External render

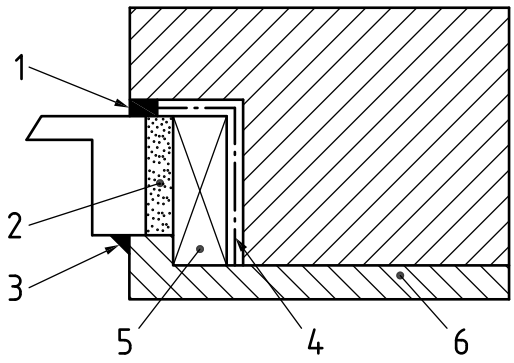
Figure B.8 **Box sash replacement**



Key

1 Insulation
2 Sealant
3 Finishing trims
4 DPC
5 Packing piece

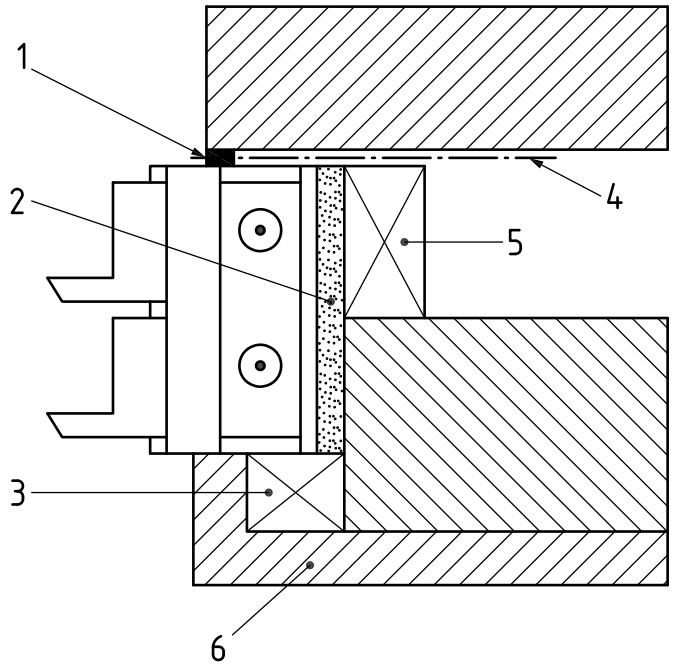
Figure B.9 **Box sash replacement – Alternative details using impregnated foam tapes**



Key

1 Impregnated foam tape
2 Insulation
3 Sealant
4 DPC
5 Packing piece
6 Finishing trims/plaster

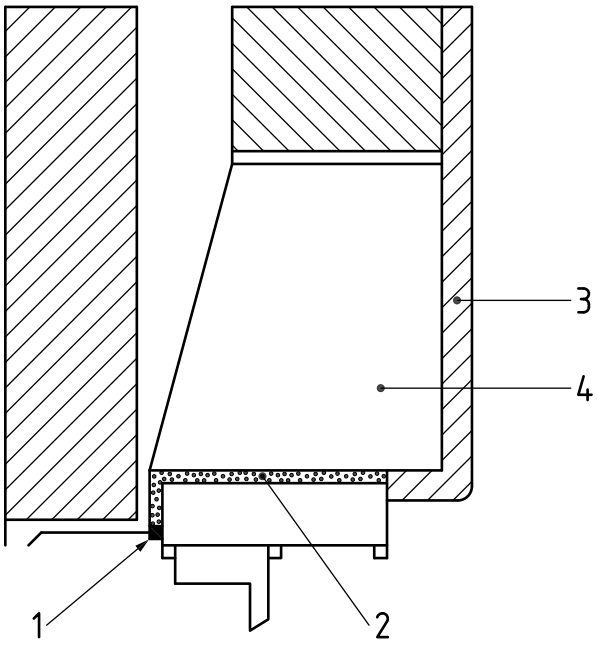
Figure B.10 **Box sash (cords and weights) replacement into cavity wall with open cavity**



Key

1 External sealant
2 Insulation
3 Packing piece
4 DPC
5 Insulated cavity closer or fire barrier
6 Finishing trims/plaster

Figure B.11 **Box sash replacement into check reveal head**

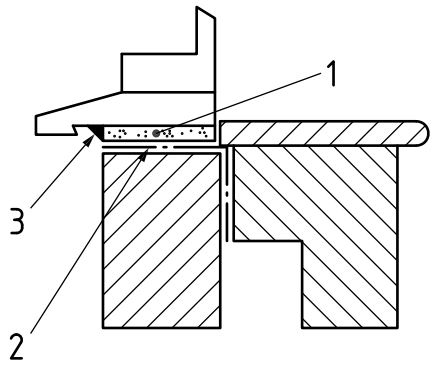


Key

1 External sealant
2 Insulation
3 Finishing trims/plaster
4 Check reveal lintel

NOTE This arrangement also applies to standard windows.

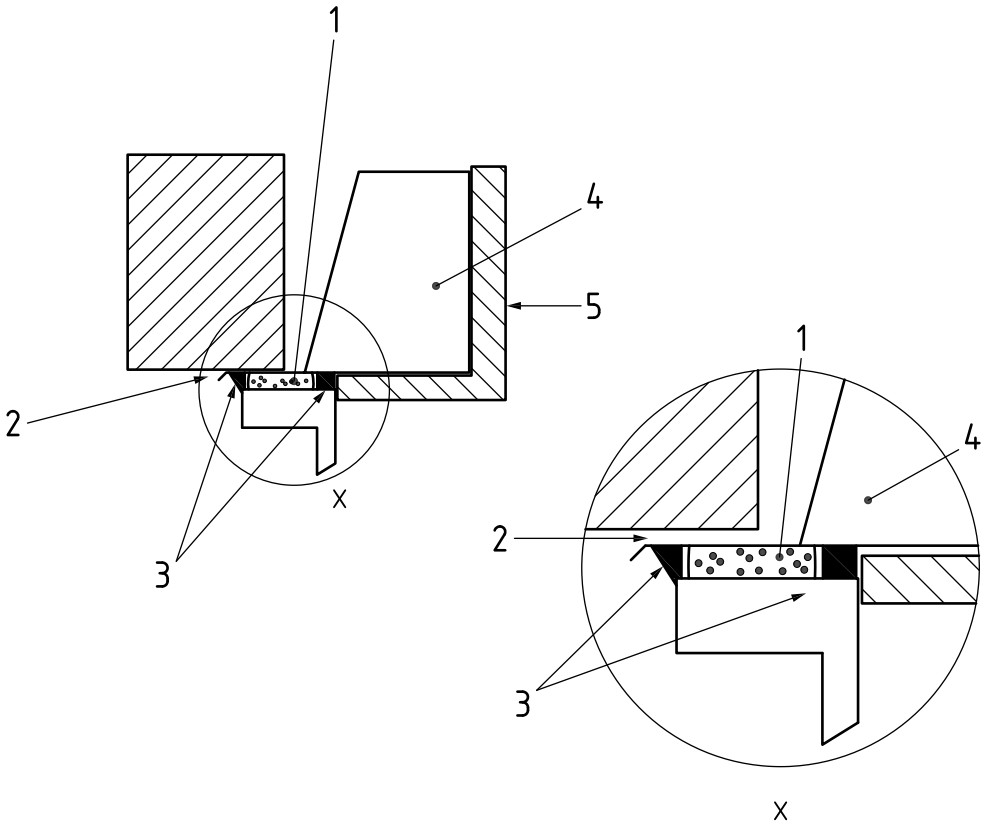
Figure B.12 **Sill bedding and finishing arrangement**



Key

1 Bedding/insulation
2 DPC (for timber windows)
3 Sealant or pointed bedding

Figure B.13 **Head arrangement**



Key

1 Insulation
2 Drainage path – do not block
3 Sealant
4 Steel lintel
5 Finishing trims/plaster

Annex C (informative) Typical checklists

C.1 Surveyor's checklist

A typical surveyor's checklist is shown in Figure C.1.

Figure C.1 **Typical surveyor's checklist**

	Y/N
Have risk assessment(s) been completed (see BS 8213-4:2015, 5.1)?	
Is the condition of the aperture satisfactory and without evidence of damp or cracks?	
Is the aperture square and even to within 5 mm height and width and 10 mm diagonals?	
Will any loads be carried by the building and not the window or doorset?	
Has the size and method of fixing any sill been determined?	
Will the proposed style function without being fouled by plaster, etc.?	
Will any trickle vents fitted function without being fouled by plaster, etc.?	
Will hinges function without being fouled by plaster, etc.?	
Are curtain tracks and nets clear of the proposed design?	
Is the size and configuration within the manufacturer's limits?	
Will the products exposure category be suitable for the location?	
Will the installation conform to Building Regulations?	
Is the method of drainage appropriate for the installation and product?	
Has the purchaser confirmed the position and handing of opening lights?	
Has any additional hardware been specified?	
Is the access for installation safe?	
Has the fixing method been determined?	
Has the extent of making good been agreed with the purchaser?	

NOTE: It can be of benefit to make a photographic record of the existing installation in case of dispute over Building Regulations compliance at a later date.

C.2 Final inspection checklist

A typical final inspection checklist is shown in Figure C.2.

Figure C.2 **Typical final inspection checklist**

		Y/N
Visual appearance	Is the frame installed plumb and square?	
	Are the beads fitted correctly and evenly?	
	Are exposed faces – including beads – free from damage?	
	Is the frame clean with all protective tape removed?	
	Has any damage to aperture been correctly made good?	
	Have all trims been fitted correctly?	
	Has all site debris been removed?	
Glazing	Is all glazing as specified on contract?	
	Are all sealed units free from scratches and signs of failure?	
	Are obscure and coated glasses oriented properly?	
	Are sealed unit spacer bars covered by frame and beads?	
	Is the glazing held properly by beads/gaskets, etc.?	
	Is safety glass used where necessary?	
Operation	Do all openers open close and lock as intended?	
	Are seals on frames without gaps?	
	Are cams free from binding against strikers?	
	Is all operating gear lubricated as necessary?	
	Is all hardware attached with correct numbers of fixings?	
Sight lines	Are all sight lines visually correct?	
	Are adjacent opening lights aligned as appropriate?	
	Are all decorative features, e.g. leading, correctly aligned?	
Sealing	Are all joints smooth and correctly formed?	
	Is the sealant continuous around the frame?	
	Is the frame face free from excess sealant?	
Drainage	Are all drainage channels free from obstruction?	
Miscellaneous	Are sill end caps fitted if required?	

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