

BRITISH STANDARD

Windows, doors and rooflights –

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

ICS 91.060.50



British Standards

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Summary of pages

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Foreword

Publishing information

This part of BS 8213 is published by BSI and came into effect on 30 March 2007. It was prepared by Subcommittees B/538/1, *Windows*, and B/538/2, *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This part of BS 8213 supersedes BS 8213-4:1990, which is withdrawn.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. It brings up to date the guidance given in the previous edition and takes into account the publication of a number of European Standards published since 1990.

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.

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.

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.

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 2000 and subsequent amendments [1], the Building (Scotland) Regulations 2004 [2] and the Building Regulations (Northern Ireland) 2000 [3], 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-loadbearing windows and external doorsets of any material, to be installed vertically (within 15°) into the external face of buildings. It gives guidance on 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 much of the guidance given is relevant to other types of installation.

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

This part of BS 8213 does not apply to load-bearing windows, load-bearing doorsets or roof windows. It does not cover curtain or ribbon walling, although its guidance also applies to separate window and door elements within those particular types of assemblies. It does not cover good business practice issues such as warranties, complaints, etc.

NOTE For roof windows or when the windows and external doorsets to be installed fall outside the scope of this part of BS 8213, e.g. non-rectangular products, it is necessary to seek specialist advice from the manufacturer.

2 Normative references

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

BS 6100-1, *Building and civil engineering – Vocabulary – Part 1: General terms*

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

BS 7619, *Specification for extruded cellular unplasticized PVC (PVC-UE) profiles*

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

BS EN 1670:1998, *Building hardware – Corrosion resistance – Requirements and test methods*

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

3 Terms and definitions

For the purposes of this part of BS 8213, the terms and definitions given in BS 6100-1 and the following apply.

NOTE For consistency with the terminology in BS 6100, the phrase "sub-sill" is used in place of the more commonly but incorrectly used word "sill".

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 door assembly

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

[BS EN 12519]

3.3 doorset

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

[BS EN 12519]

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

3.4 dormer window

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

3.5 DPM (damp-proof membrane)

device, usually comprising a layer or strip of impermeable material, placed within a wall, chimney or similar construction to prevent the passage of moisture

3.6 finishing

final covering and treatment of surfaces and their intersections

3.7 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

3.8 frame

surround to a door leaf, window, etc., enabling it to be fixed into position

3.9 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.

3.10 installer

company and/or individual carrying out the works

3.11 lintel

beam supporting loads over an opening

3.12 manufacturing size

overall dimensions, which result from making the appropriate deductions from the structural opening size

NOTE 1 This is also known as "work size".

NOTE 2 It should be identified whether this includes or excludes any add-ons or extension pieces.

3.13 oriel window

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

3.14 structural opening

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

3.15 structural opening size

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

3.16 structure

organized combination of connected parts designed to provide some measure of rigidity, or construction works having such an arrangement

3.17 surveyor

qualified or otherwise 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

4 Materials

4.1 Fixings

Fixings should be at least as corrosion-resistant as BS EN 1670:1998, Grade 3.

4.2 Sealants

The purpose of perimeter sealants is to repel water 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 this period. It is essential that sealants are compatible with the frame material and the substrate.

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

Sealants 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 and high elasticity, with movement capability of at least 20%. These characteristics should be identified on their packaging as class 20LM or 25LM.

NOTE 1 A guide to the use of BS EN ISO 11600 is given on The British Adhesives and Sealants Association website at www.basa.uk.com.

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 will minimize the potential for staining. A comprehensive list of UK sealant manufacturers can be found at www.basa.uk.com.

4.3 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-UE trims should conform to BS 7619.

5 Surveying for replacement windows and doorsets

5.1 General

NOTE 1 Attention is drawn to the legal requirement to identify the need for any planning permission, e.g. for listed buildings or in conservation areas.

NOTE 2 An example of a surveyor's checklist is given in Annex A.

Good surveying is the basis of ensuring a quality installation. Surveyors should be fully trained in window and doorset installation techniques, and in the manufacturer's recommendations for the particular system being used.

In order to demonstrate compliance with Building Regulations (see Note 3), it is advisable to record the style of the window or doorset being replaced along with the size of any opening lights and the positions of any mullions and transoms. Ideally, this would be with the use of photographs and witnessed by the purchaser and countersigned. The surveyor should inform the purchaser of any enhancements that could be made with respect to any apparent security issues.

NOTE 3 Attention is drawn to the Building Regulations 2000 and subsequent amendments [1], the Building (Scotland) Regulations 2004 [2] and the Building Regulations (Northern Ireland) 2000 [3].

A risk assessment should be carried out for the suitability of the window or doorset design. The responsibility for this lies with the designer of the window or doorset, and it should be carried out by a competent person (commonly the surveyor). Suitable written records should be retained.

NOTE 4 Information on the safety of windows (including door-height windows) in use and during cleaning is given in BS 8213-1. In the case of domestic replacement windows and doorsets, the designer is the person or organization taking the order from the purchaser.

A risk assessment for the installation process should also be carried out by a competent person.

NOTE 5 Attention is drawn to the Construction (Design and Management) Regulations 1994 [4] and the Control of Substances Hazardous to Health Regulations 2002 [5].

When a load-bearing situation is suspected or confirmed then it is essential that the system supplier's recommendations are followed.

5.2 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 reveals and existing DPM, in so far as this is possible.

5.3 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. 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.

5.4 Weathertightness

The surveyor should determine the design wind load for the application, and then determine whether the windows and doorsets are suitable for that exposure. BS 6375-1 gives guidance on selection and specification of windows and doorsets.

Where any doubts exist, the manufacturer should be consulted.

5.5 Lintels

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 providing this support should be provided.

5.6 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 reference made to the system supplier's instructions.

5.7 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, visual appearance and position of the coupling.

5.8 Opening type and direction

The surveyor should confirm with the purchaser whether the window or door is to be inward or outward opening and the handing. On outward opening doors, it is strongly recommended that a restriction device, e.g. a door stop positioned as close to the opening stile as possible, is 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.

5.9 Doorsets

The following additional aspects should be taken into consideration for doorsets:

- thresholds – consideration should be given to the type of threshold and any protection for it that might be required;

NOTE 1 Attention is drawn to Part M of the Building Regulations 2000 [1], the Building (Scotland) Regulations 2004 [2] and the Building Regulations (Northern Ireland) 2000 [3].

- letterplates – the size and location of any letterplate should be confirmed with the purchaser;

NOTE 2 Reference may be made to BS EN 13724.

- hardware – any requirements for additional hardware such as trickle vents, cat flaps, spy holes, etc., should be clearly specified;
- side panels – on doorsets with side panels, it might be necessary to take mullion bounce into account and stiffen the mullion to limit this. Any such stiffening should be clearly specified.

5.10 Brickwork removal

Where bricks are to be removed to install products, the method of any cavity closing should be specified. The method of making good should be agreed with the purchaser.

NOTE It is advisable to consult local authority building control to ensure that any local interpretations, for instance with respect to cavity closing, are taken into account.

5.11 Drainage

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

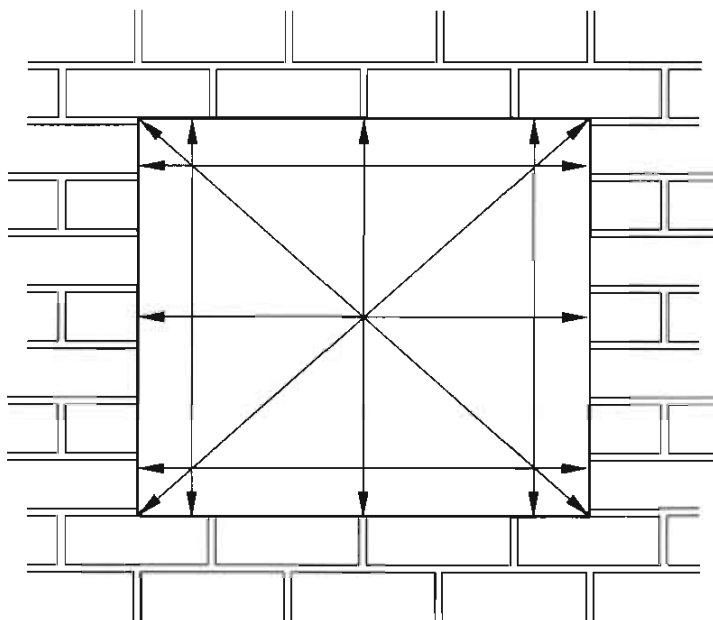
5.12 Decorative glass

The surveyor should specify 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.

5.13 Measurement

Three measurements of width and height should be taken and the squareness of the aperture determined by, for example, taking diagonal measurements (see Figure 1). The smallest measurement of width and of height is used to determine manufacturing sizes.

Figure 1 Measurement of flat windows and doorsets



The need for any sub-sill should be determined. The size of the sub-sill should be such that there is an overhang of at least 25 mm from the face of the building. The surveyor should determine how the sub-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.

5.14 Surveying a window or doorset in a check reveal

It is a good idea to remove an internal architrave from the window or doorset to see exactly how deep the reverse brick detail really is, to identify how much of the outer frame can be put behind in the width.

A hole should be drilled through the head of the existing box frame to ascertain the maximum height the window or doorset can be put behind the brick. Quite often this differs greatly from the width.

Once the amount of rebate is determined, the window/door height and width should be calculated, taking into account the deductions from Table 1 (see 5.15). If the rebate is sufficient, a 12 mm minimum overlap per side should be allowed. A deeper outer frame might be needed to allow opening out lights to adequately clear the masonry.

5.15 Manufacturing sizes

With some framing materials, significant expansion and contraction is to be expected due to temperature fluctuations, and this should be taken into consideration.

Allowances should also be made with regard to the window or doorset and building aperture tolerances. Table 1 gives the deductions that are recommended for windows and doorsets.

When calculating height deductions, due allowance should be also made for the thickness of any silicone or mortar bed at the sub-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)}
GRP	5	10	15	15
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

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

NOTE 2 The gap required for effective polyurethane 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.

5.16 Installation techniques

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

NOTE See Clause 8 for standard installation techniques.

6 Surveying for new build

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 surveyor should ensure that the details agreed are suitable for the products to be used and are clearly defined.

NOTE 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 abuse that doors are often subjected to, caution should be exercised in adopting this method for the installation of doorsets. If in doubt, advice should be sought from the system supplier/manufacture.

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.

7 Removal of existing windows and doorsets

7.1 General

The installation team should ensure that all relevant documentation, e.g. drawings, survey sheets, special instructions, etc., 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 will inevitably be caused to the reveals adjacent to the installation, and it is essential that reasonable care 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, for example 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 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 5.3). This might require the services of the appropriate service provider.

7.2 Safety

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. 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 [6] and to the Control of Asbestos at Work Regulations 2002 [7].

Window and doorset removal and installation can be a dangerous operation. 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. Important safety precautions include the following.

- 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 7671:2001, Section 604); or
 - work on 240 V with a residual current detector of 30 mA maximum rating, especially where moisture is present.
- c) A safe working platform to give safe access to the structural openings is essential.

NOTE 3 Attention is drawn to the Work at Height Regulations 2005 [8]. Guidance is given in the GGF code of practice "Working at heights in the domestic replacement window industry" [9]. Guidance on working at height is also available in the HSE's 2003 "Height safe" leaflet [10], which was not published in relation to the regulations but is still relevant.

- d) When operating a grinding disc, the following safety precautions should be observed.
- Heavy gloves, face visors and helmets should be worn.
 - Clear access should be provided.
 - Care should be taken that sparks cannot ignite combustible material such as dustsheets.
 - All non-essential personnel should be moved a safe distance away.
- e) Old windows and doorsets and other debris should always be stored and disposed of safely.

NOTE 4 The components of old windows and doorsets should be recycled wherever possible.

Additional guidance on removing existing windows and doorsets is given in Annex B.

8 Installation

8.1 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. These loads might be due to:

- wind loads;
- operating loads;
- gravity;
- accidental impact;
- attempted burglary.

Fixing methods are affected by:

- the presence or absence of a wall cavity;
- the nature and condition of any cavity;
- the relative position of the frame and cavity;
- the position of the plaster line and the need to minimize disturbance and damage to interior decorations;
- the design of the reveal;
- any requirements for fire resistance.

8.2 Methods of fixing

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

Screws should be sized to penetrate at least 25 mm into timber, plugged holes in brick, block, or masonry, unless equivalent demonstrable provision can be made by other means, e.g. in accordance with an appropriate structural code. Connections to steelwork up to 2 mm thick such as folded sheet lintels should be made with appropriate thread cutting screws. Connections to steelwork over 2 mm thick should be either into pre-tapped holes with machine screws of minimum 5 mm diameter, or with power-driven hardened self-drilling screws.

NOTE Other proprietary mechanical fixing methods are available but will not necessarily be suitable for a given application. It is the responsibility of the installation company to ensure suitability, whether by recourse to third-party assessment or by some other means.

8.3 Fixing distances

NOTE The surveyor is responsible for specifying the nature, location and quantity of the fixings, taking into account the manufacturer's instructions.

8.3.1 General

Wherever practicable the sides of the frame should be secured in accordance with the recommendations in 8.3.2 to 8.3.5. 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 pre-cast concrete or steel lintels can make it impracticable or pose severe difficulties in achieving the recommended fixing distances. In these instances the use of polyurethane foam has proved a useful adjunct to mechanical fixings, but foam fixings should under no circumstances be used as the sole method of fixing the entire frame into the reveal.

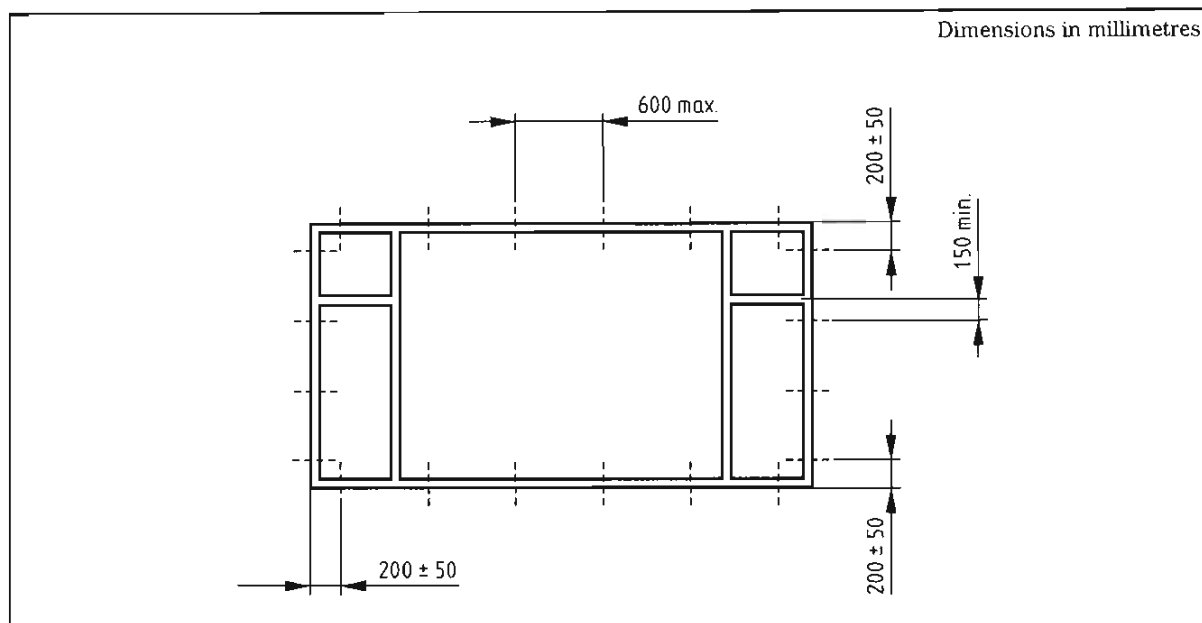
8.3.2 PVC-U windows and doorsets

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) No fixings should be less than 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 polyurethane 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.

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

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



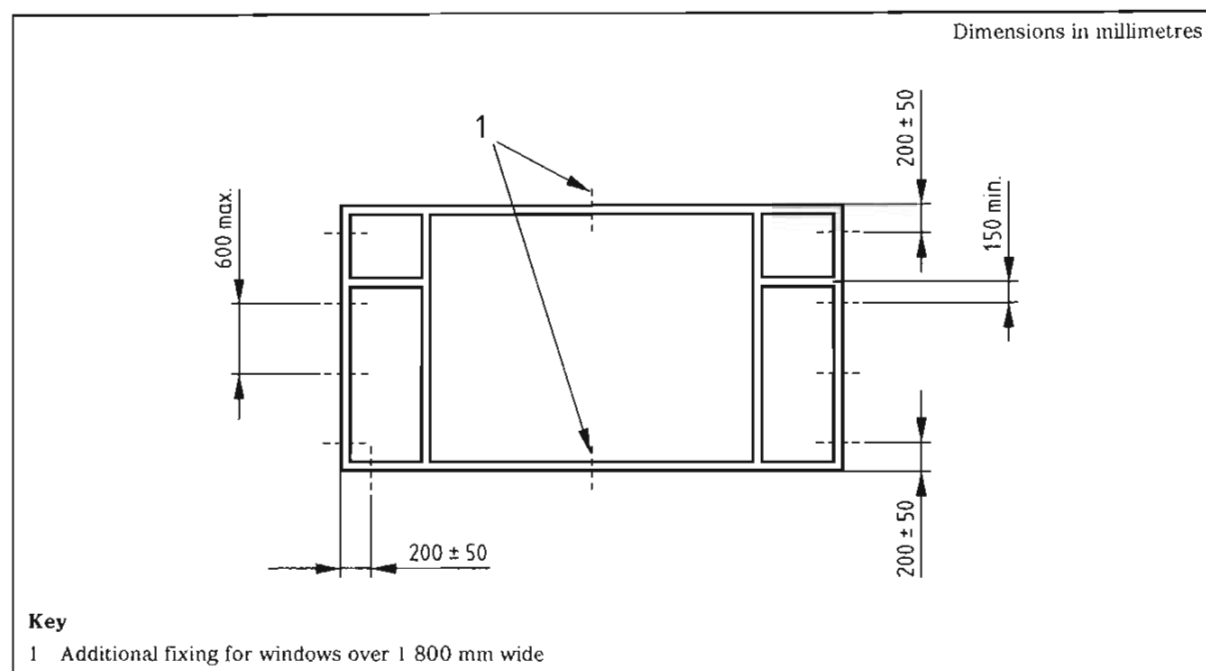
8.3.3 Timber windows and doorsets

Wherever practicable the 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 sub-sill fixings should be provided.

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

Figure 3 Fixing distances for timber windows and doorsets



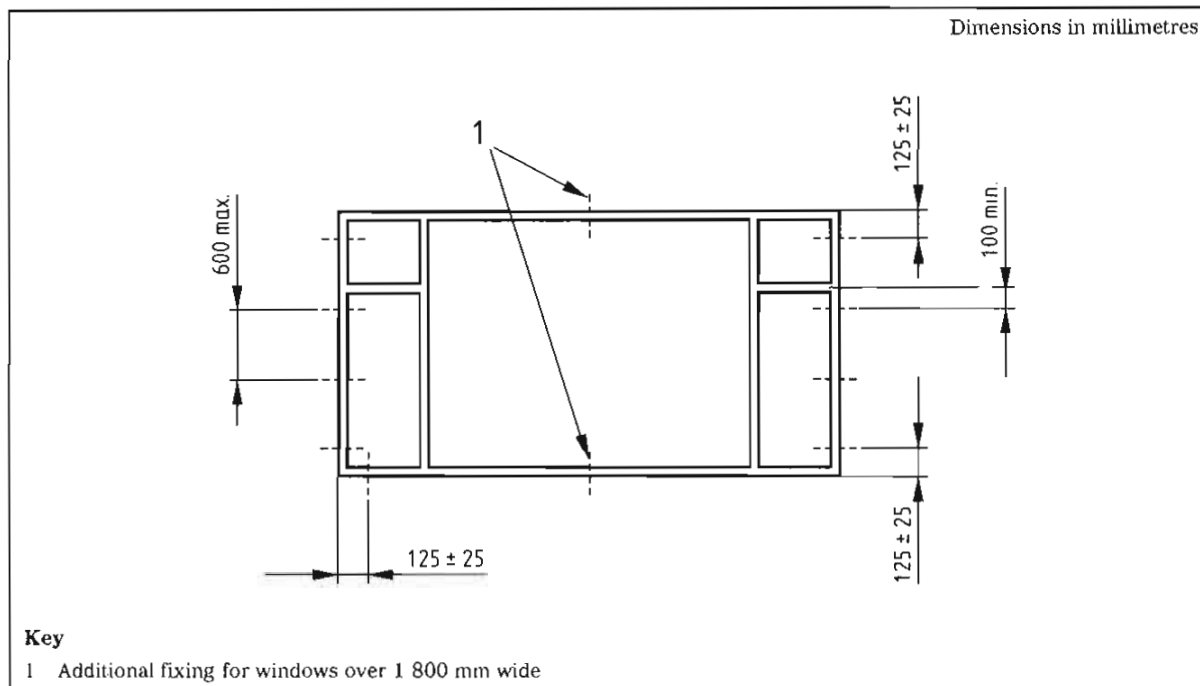
8.3.4 Aluminium windows and doorsets

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

- Corner jamb fixings should be between 100 mm and 150 mm from the external corner.
- No fixings should be less than 100 mm from the centre line of a mullion or transom.
- Intermediate fixings should be at centres no greater than 600 mm.
- There should be a minimum of two fixings on each jamb.
- On windows and doorsets over 1 800 mm wide, central head and sub-sill fixings should be provided.

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

Figure 4 Fixing distances for aluminium windows and doorsets



8.3.5 Steel windows and doorsets

The recommended maximum pitch of fixing positions for steel frames is:

- 175 mm from corners, and then at 750 mm intervals, for steel frames of hot rolled solid section;
- 200 mm from corners, and then at 900 mm intervals, for steel frames of cold formed hollow section.

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

8.4 Fixing lugs

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

8.5 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.

Recommendations for the materials to be used in finishing trims are given in 4.3.

Cellular extruded PVC-UE trims should be fitted in accordance with the manufacturer's instructions.

8.6 Coupled assemblies

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 bedding mastic, expanding bituminized 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 manufacturer's instructions. Where the coupling is structural, the system supplier's recommendations should be followed.

8.7 Replacement windows and doorsets

8.7.1 General

Windows and doorsets should be installed plumb and square within the aperture, without twist, racking or distortion of any member in accordance with the manufacturer's recommended tolerances, to operate correctly after installation and in accordance with the surveyor's instructions.

8.7.2 Frame position

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

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

- a) The new frame should bridge the DPM. Any damaged DPM should be repaired.
- b) The frame should be set as far back in the reveal as is feasible for better weather performance.
- c) The correct movement gap should be provided.

8.7.3 Open cavities

Open cavities discovered between inner and outer skins of brick or blockwork should be bridged or closed with an insulating material. Care should be taken to maintain the integrity of the DPM, and adequate purchase for fixing screws should be ensured, if need be with extended fixing lugs.

8.7.4 Replacement of box sash windows

When replacing a box sash window into a flush brick detail, follow the recommendations for a normal casement window (see 8.3), together with the following guidelines.

- a) When replacing a window into the original check reveal, the window should be fitted from the inside, with the outer frame hidden behind the brickwork.
- b) Packing should be placed at the ends of the sill to transfer the weight of the replacement sash window into the structure, without bowing the sill member. A bowed sill will result in the hardware not engaging.
- c) It is essential that the window be fitted level, without twist and with parallel jambs. Jambs bowing outward will make the sash window draughty, and jambs bowing inwards will 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.
- d) 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.

8.7.5 Installation packers

Installation packers should be used adjacent to fixing positions to prevent outer frame distortion during installation. Installation packers should be resistant to compression, rot and corrosion. They should span the full depth of the outer frame. The fixings should be tightened so that the frame is held securely against the packers. Over-tightening can lead to distortion and should be avoided.

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

Where enhanced security is required, additional packers might be necessary adjacent to hinge and locking points.

8.7.6 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.

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

Sand and cement should not be used to fill the gap between the outer frame and the substrate except for backfill for steel windows, nowadays usually limited to windows in stone surrounds or interior fair-faced brick and concrete.

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 render should be as agreed with the purchaser.

8.8 New build

The position of the window or doorset within the reveal is normally agreed at the time of original design (see Clause 6). The installation should be in accordance with the agreed design.

The recommendations given in 8.7 should be followed wherever practicable.

NOTE Attention is drawn to the Building Regulations 2000 and subsequent amendments [1], the Building (Scotland) Regulations 2004 [2] and the Building Regulations (Northern Ireland) 2000 [3] in respect of new build installations.

8.9 Glazing

8.9.1 General

All glazing should conform to the recommendations given in the relevant part of BS 6262 and in BS 8000-7. In addition, any glass or insulating glass unit manufacturer's instructions should be followed. Figure 5 shows the setting and location block positions recommended in BS 6262, which are reproduced here for convenience.

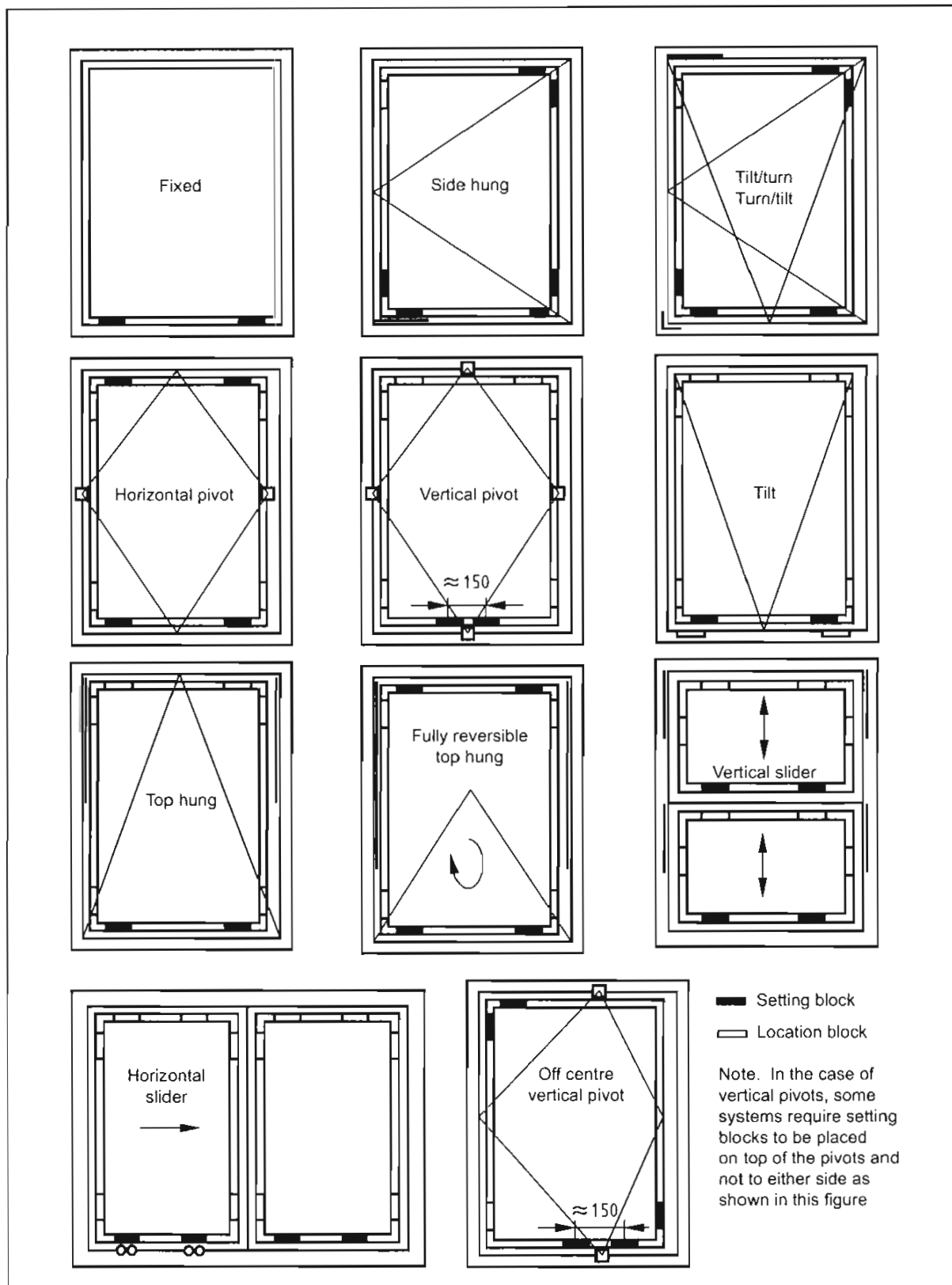
All insulating glass units should be examined for damage prior to installation. Defective units should not be used.

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

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

Insulating glass units with low emissivity coatings should be oriented in accordance with the manufacturer's instructions. Failure to do so can render the coating less effective.

Figure 5 Setting and location block position



8.9.2 Glazing methods

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

Some, particularly steel windows, require butyl-based, polyethylene, PVC or acrylic glazing tapes. When used externally, these should be capped with silicone sealant.

Others use non-setting compounds, gun-grade solvent release types, one- or two-part curing sealants or two-part rubberizing compounds.

In all cases the manufacturer's instructions should be followed. Insulating glass units, setting and location blocks (see Figure 5), 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.

NOTE In the case of vertical pivots, some systems require setting blocks to be placed on top of the pivots and not to either side as shown in Figure 5.

8.10 Sealing

The presence of old oil-based mastics and bituminous DPMs can adversely affect the behaviour or appearance of otherwise correctly specified and applied 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 DPMs.

Perimeter joints should be sealed on the outside, and also on the inside for new build, with a sealant appropriate to:

- the frame surface;
- the substrate material;
- joint size and configuration;
- anticipated joint movement;
- anticipated exposure to weather.

Annex C 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 These recommendations can be achieved through the use of a closed-cell, oversize circular foam strip.

For steel and aluminium framed windows and doorsets, recommended best practice is to have an insulating fill inserted or injected wherever practicable around their full perimeter behind the external seal between frame and structural opening (see Annex C).

8.11 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. An example of a final checklist is given in Annex A.

It is essential that the purchaser is made aware of the method(s) of operation, locking and unlocking and fire egress. This should be accompanied by written operating and maintenance instructions such as those published by trade federations. Ideally, all occupants of a household, other than small children, should carry out the operation of 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 passed on.

Information on the ordering of spare keys should be provided.

In addition, 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) Typical checklists

A.1 Surveyor's checklist

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

Figure A.1 Typical surveyor's checklist

	Y/N
Have risk assessment(s) been completed (see BS 8213-4:2007, 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 sub-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.

A.2 Final inspection checklist

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

Figure A.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 sub-sill end caps fitted if required?	

Annex B (informative)

Window and doorset removal techniques

B.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.

B.2 Removal of frame

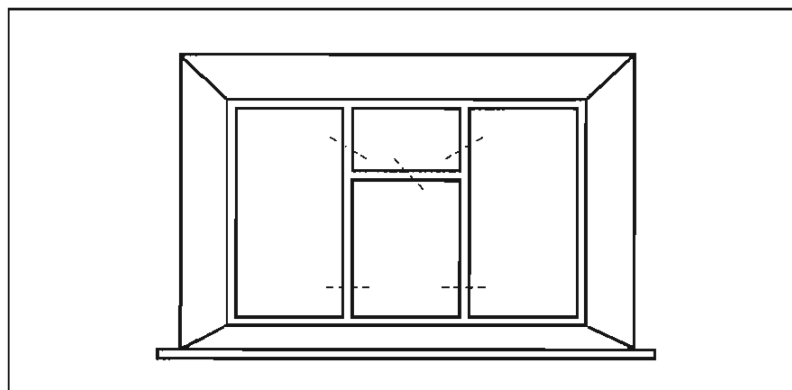
B.2.1 General

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.

B.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 B.1). This provides working space, and reduces the weight.

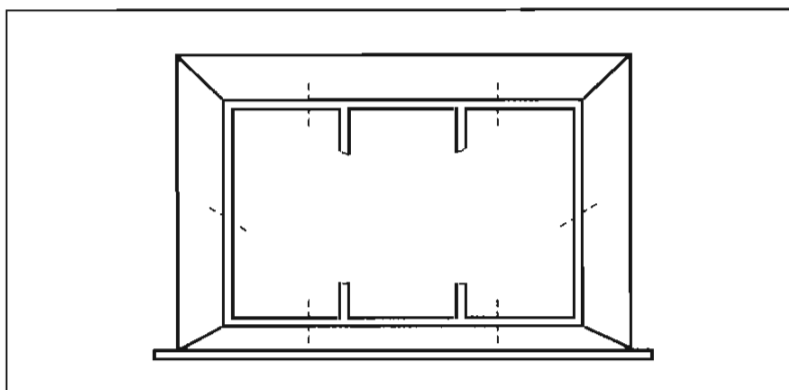
Figure B.1 Cutting through transoms and mullions



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 B.2.

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.

Figure B.2 Cutting through the outer frame



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.

B.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 sub-sill, if this is not part of the outer frame.

B.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 (B.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.

B.2.5 Plastics 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.

Plastics 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.

B.2.6 Sub-sills

Sub-sills, and sometimes heads, windowboards, and mullions, are often horned into the fabric of the aperture. This can conceal DPMs, 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 DPM is damaged, then it needs to be repaired or replaced.

Annex C (informative)

Examples of replacement frame position and joint construction

Figures C.1 to C.8 show examples of replacement frame positions and joint constructions.

NOTE Expansion gaps around the perimeter are not needed for timber windows and doorsets.

Figure C.1 **Flush reveal with joint width less than 6 mm and frame bridging DPM**

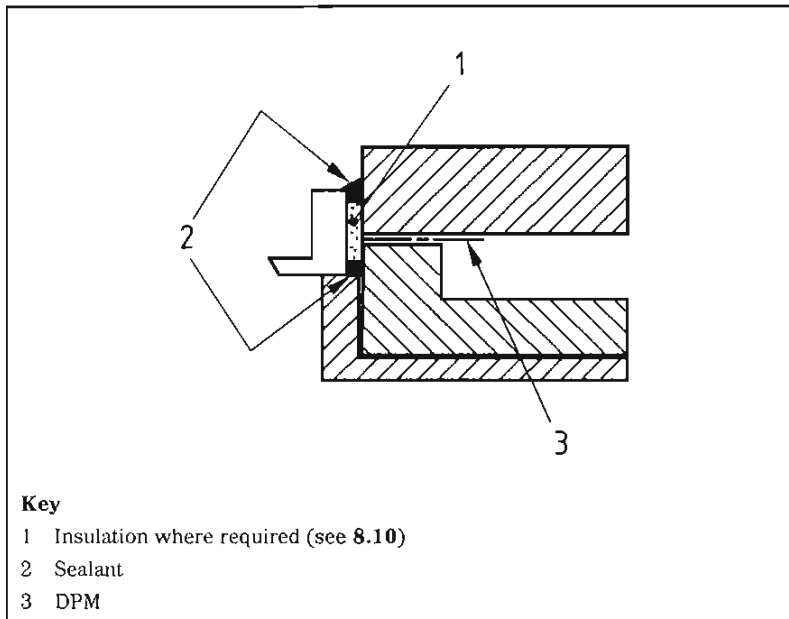


Figure C.2 **Flush reveal with joint width from 6 mm to 15 mm and frame bridging DPM**

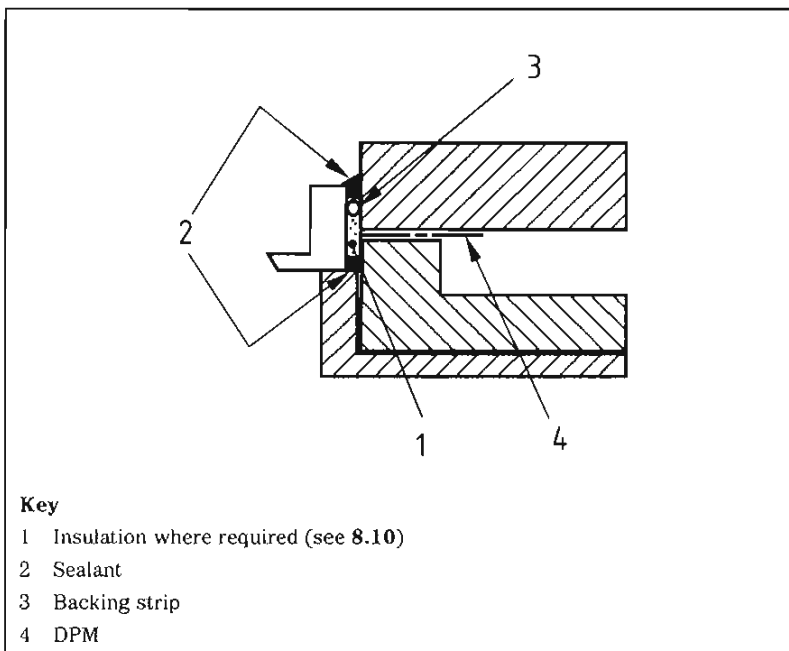


Figure C.3 Flush reveal with external render, for replacement frames

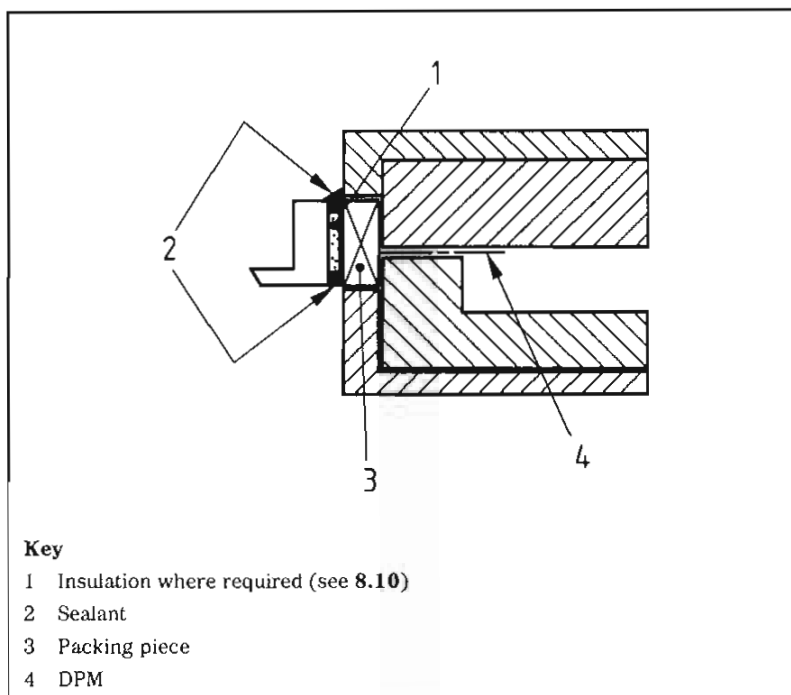


Figure C.4 Flush reveal with external render, for replacement windows/doorsets with frame shuffled into position

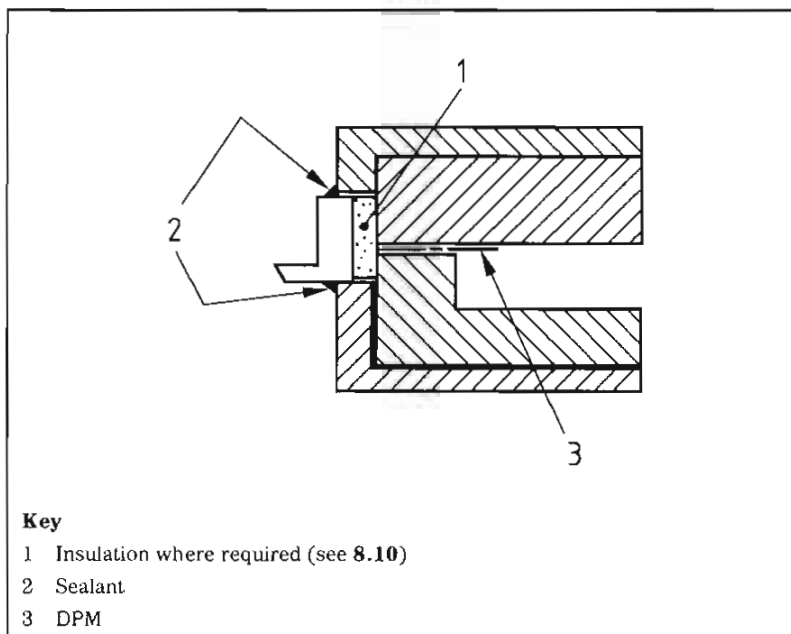


Figure C.5 Box sash replacement

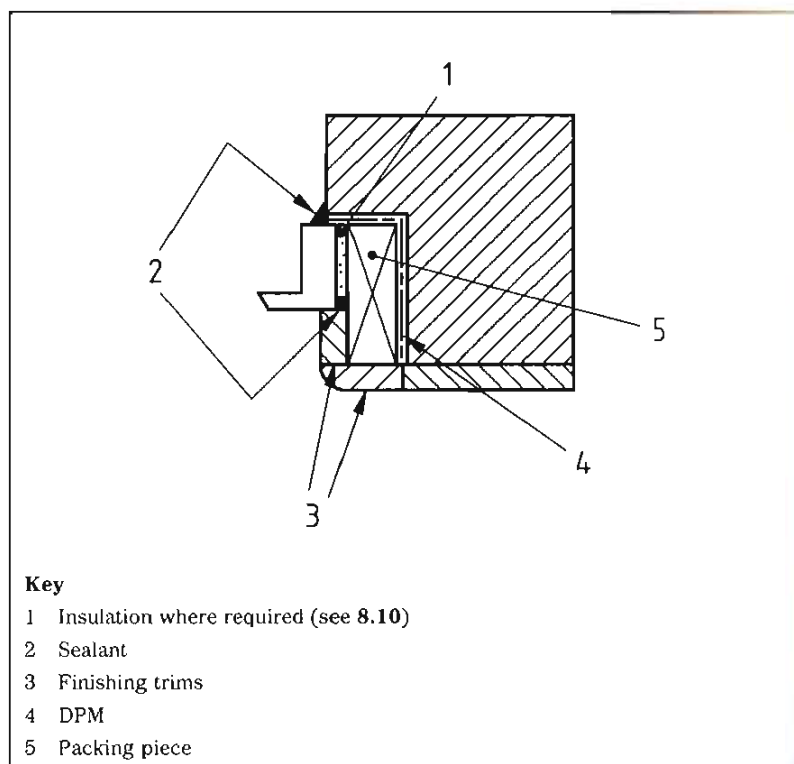


Figure C.6 Frame forward of DPM

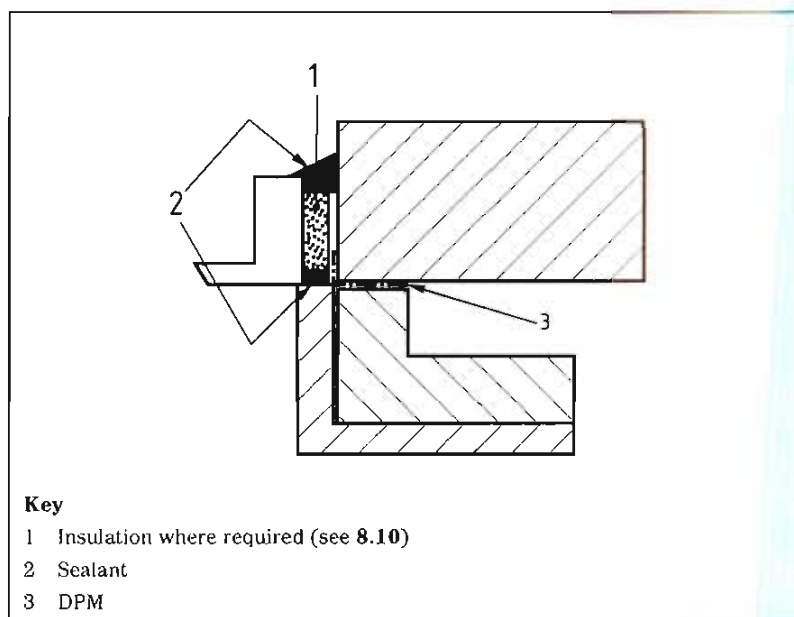


Figure C.7 Sub-sill arrangement

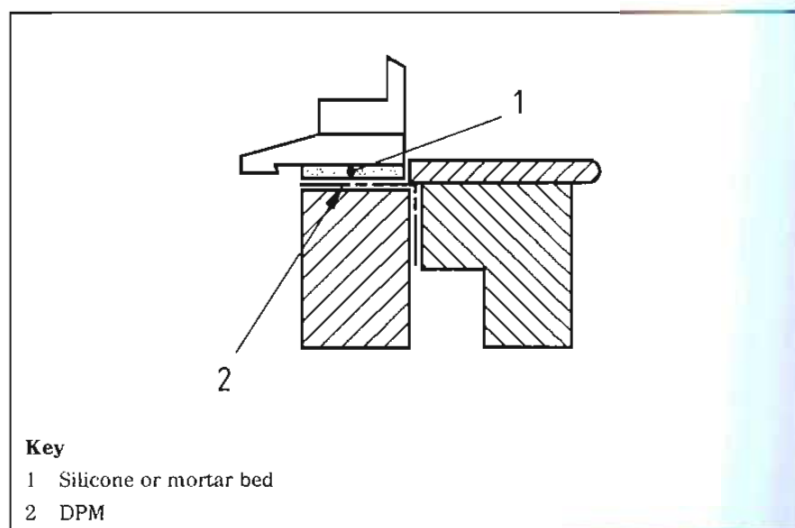
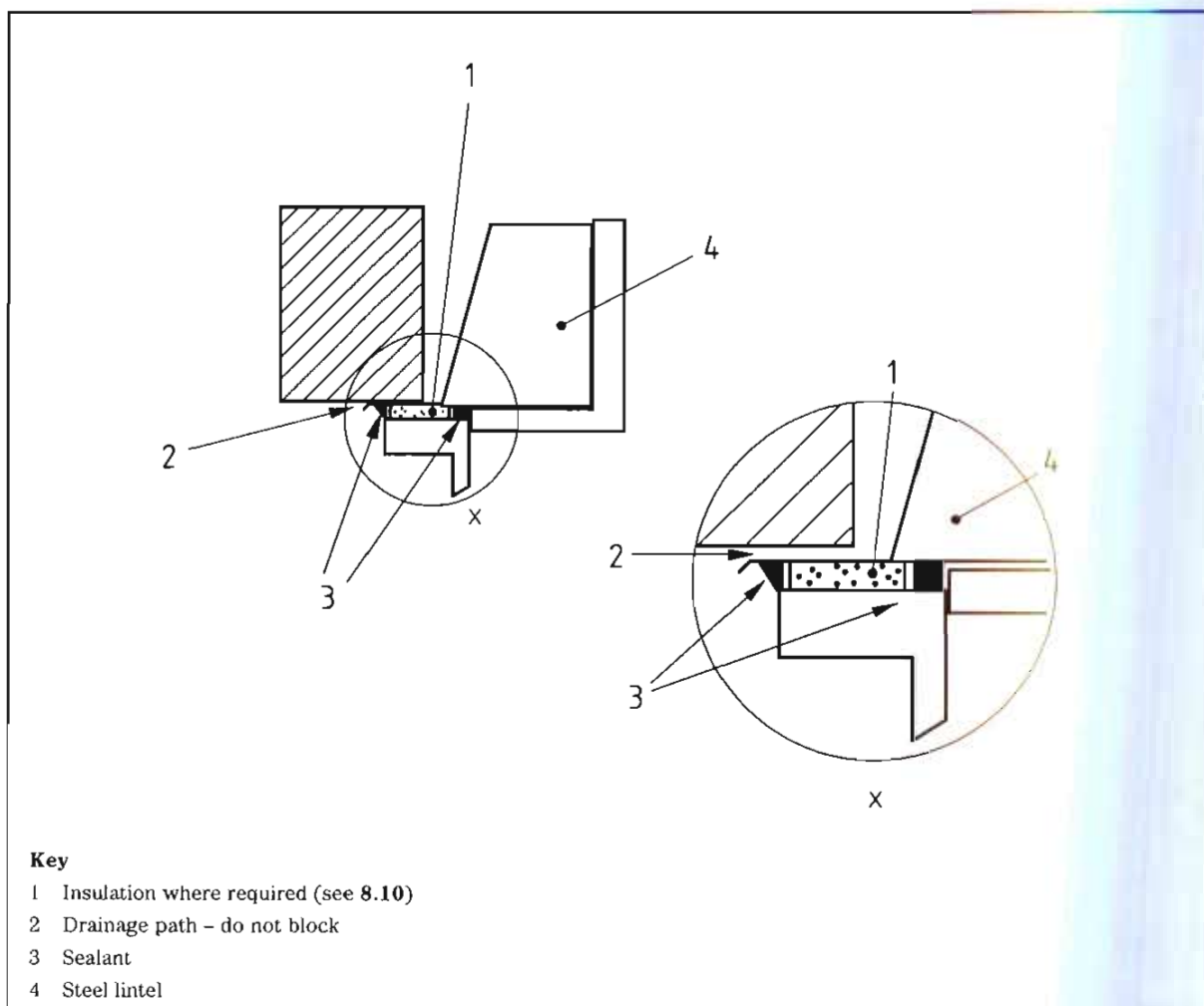


Figure C.8 Head arrangement



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