

# FUNCTIONAL REQUIREMENTS

## 7.4 WINDOWS AND DOORS

### Workmanship

- i. All workmanship must be within the tolerances defined in Chapter 1 of this Manual.
- ii. All work is to be carried out by a technically competent person in a workmanlike manner.
- iii. Certification is required for any work completed by an approved installer.

### Materials

- i. All materials should be stored correctly in a manner that will not cause damage or deterioration of the product.
- ii. All materials, products and building systems shall be appropriate and suitable for their intended purpose.
- iii. Whilst there is and can be no Policy responsibility and/ or liability for a window and/ or door performance life of 60 years or less, windows and/ or doors shall be designed and constructed so they have an intended life of not less than 15 years.

### Design

- i. The design and specifications shall provide a clear indication of the design intent and demonstrate a satisfactory level of performance.
- ii. Structural elements outside the parameters of regional Approved Documents must be supported by structural calculations provided by a suitably qualified expert.
- iii. The design and construction must meet the relevant regional building.

### Limitations of Functional Requirements

- i. The Functional Requirements are limited by the recommendations applied to the specific areas covered in this chapter.
- ii. These Functional Requirements do not and will not apply to create any policy liability for any remedial works carried out by the contractor or otherwise, nor to any materials used in those remedial works.

## CHAPTER 7: Superstructure

### 7.4.1 Windows and doors

Timber used for external joinery should be a species classified as suitable in BS EN 942 and preservative treated; if not, use a moderately durable species or better (sapwood excluded). Guidance on selection is provided in TRADA Wood Information Sheets 3.10 and 4.16.

Workmanship should follow the recommendations of BS 1186: 2. The design and construction of factory assembled windows must meet BS 644:2009. Non factory assembled units and 'bespoke' units are also expected to meet the same standard.

Preservative-treated joinery cut or adjusted on-site should be brushed liberally with an appropriate and coloured preservative. Where the colour of the preservative will adversely affect the final appearance of the joinery, an appropriate clear preservative should be used. Where a painted finish is proposed to the window / door frame and opening units; the primer coat should be applied to all final exposed parts, including rebates prior to glazing installed or bottoms of doors.

Bay, oriel and dormer windows require particular care in detailing and fitting so that they are stable, weather tight and reasonably air tight.

Doors and windows should be selected to withstand the design weather conditions and be classified and tested in accordance with the following weather performance standards BS 6375-1 Weather tightness.

- Air permeability - BS EN 12207 – Classification & BS EN 1026 - Test method
- Water resistance - BS EN 12208– Classification & BS EN 1027 - Test method,
- Wind resistance - BS EN 12210— Classification & BS EN 12211 – Test method

Bespoke / Handmade window and door units must be designed and constructed to meet the same level of weather tightness as factory made tested units. Where these are proposed, there must be a detailed specification of the design, construction and durability of the proposed units submitted to the Warranty provider before installation on site.

For bespoke / handmade windows; Site testing for water penetration of the joints to windows and doors in accordance with the CWCT test methods is recommended to check the site workmanship of the building envelope as constructed. See CWCT Technical Note No. 41 for guidance on site hose testing.

Roof lights should be proprietary components, fixed within prepared openings in accordance with the manufacturer's instructions and have effective weather sealing.

Non-timber components should comply with the following British Standards (as appropriate), and be installed and fixed in accordance with the manufacturer's recommendations:

- BS 4873 Aluminium alloy windows and doorsets
- BS EN 514 PVC-U windows
- BS 7412 PVC-U windows
- BS 6510 Steel windows and doors

PVC-U windows and doors should also be subject to independent third-party certification.

Windows and doors should comply with the current Building Regulations taking into consideration:

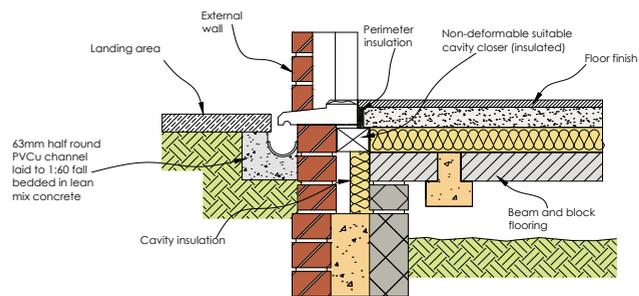
- Means of escape in the event of a fire
- Thermal insulation
- Ventilation
- Safety
- Security

### 7.4.2 Thresholds and sills

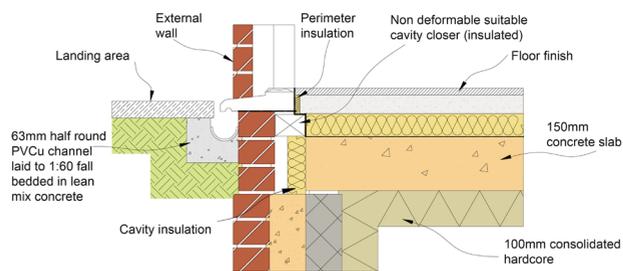
Thresholds and sills should be at least 150mm above finished ground level. However, where a level (threshold) access is required, builders can follow the general guidance given in Figures 1, 2 and 3, ensuring a high level of supervision and workmanship, together with the correct specification of materials and consideration to design, location and exposure.

## CHAPTER 7: Superstructure

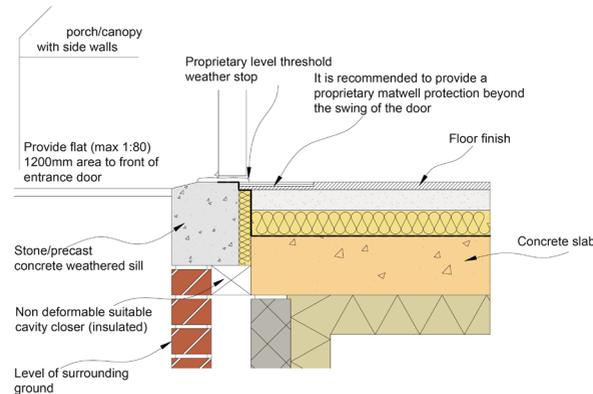
Wherever possible locate the entrance door away from the prevailing weather and provide a storm porch. Where a drainage channel is provided, this must be connected to the storm drainage system to prevent flooding occurring and water ingress into the building.



**Figure 1: Typical level threshold suspended beam and block floor**



**Figure 2: Typical level threshold suspended concrete slab**



**Figure 3: Typical level threshold with canopy protection**

It is recommended that a matwell be constructed within the entrance hall to accommodate the swing of the door without fouling the carpet and/or the proprietary door seal to maintain the integrity of the seal.

External doors and opening lights to windows should be reasonably air tight by ensuring that effective draught seals are fitted.

External joinery should be designed and constructed in accordance with the requirements of the following British Standards:

- BS 4787: 1 Internal and external wood door sets, door leaves and frames
- BS 6262 Code of Practice for glazing for building
- BS 6375: 1 Performance of windows
- BS 644: 1 Wood windows
- BS 8213: 1 Windows, doors and roof lights

### 7.4.3 Security

The design and specification of doors and windows which provide access into a dwelling or into a building containing a dwelling should take into account the requirements of current regional building regulations to ensure the system is classified and tested to the appropriate burglar resistance class.

In addition:

- The frames of secure doorsets and windows should be mechanically fixed to the building structure in accordance with the manufacturer's tested specifications.
- Where a doorset is installed in a lightweight framed wall, a resilient layer should be incorporated to reduce the risk of anyone breaking through the wall to access the locking systems. The resilient layer should be for the full height of the door and 600mm either side of the doorset, 9mm timber sheathing or expanded metal may be used.
- Any glazing which if broken in an attempt to gain access to the locking device on a door must be a minimum class of P1A in accordance with BS EN 356:2000.
- A means of caller identification should be provided at the main door to the dwelling to allow means of seeing callers. The same door sets should also have a securely fixed door chain or door limiter fitted

## CHAPTER 7: Superstructure

**7.4.4 Protection from falling**

For houses and flats the guidance in Approved Document K2 (Building Regulations England and Wales) specifies a minimum guard height of 800mm to window openings in the external wall. This would normally be achieved by forming window openings of at least 800mm above the finished floor level. The wall beneath the opening is therefore considered to be the barrier to falling.

Where window openings are formed less than 900mm from the finished floor level, permanent guarding should be provided to the opening in accordance with the design requirements specified in the relevant Building Regulations.

If window openings are formed less than 900mm from the finished floor level, and there is no permanent guarding provided, and the glass is required to act as the barrier and provide containment to persons falling against it; the glass needs to be designed in accordance with the requirements of BS 6180. The designer shall determine the potential impact energy by establishing the perpendicular unhindered distance that could be travelled prior to impact.

In the absence of an assessment by a suitably qualified person, any glass which is required to provide containment must meet with BS EN 12600 Class 1(C)1.

**7.4.5 Control of condensation**

Minimise the effects of condensation on glazing and frames by;

- Using insulated metal frames
- Using details that prevent condensation running onto walls or floors
- Housing window boards into frames to prevent condensation entering the joint
- Providing thermal insulation to walls at lintels, sills and jambs. Guidance on this subject is provided in BRE's report Thermal insulation: Avoiding risks.

**7.4.6 This subsection has been removed****7.4.7 Means of escape**

In terms of emergency egress windows in two storey dwellings, with the exception of kitchens, all habitable rooms in the upper storey served by one stairway shall be provided with a window:

- With an unobstructed opening area of at least 0.33m<sup>2</sup>.
- At least 450mm high x 450mm wide.
- With the bottom of the opening area not more than 1100mm above the floor.

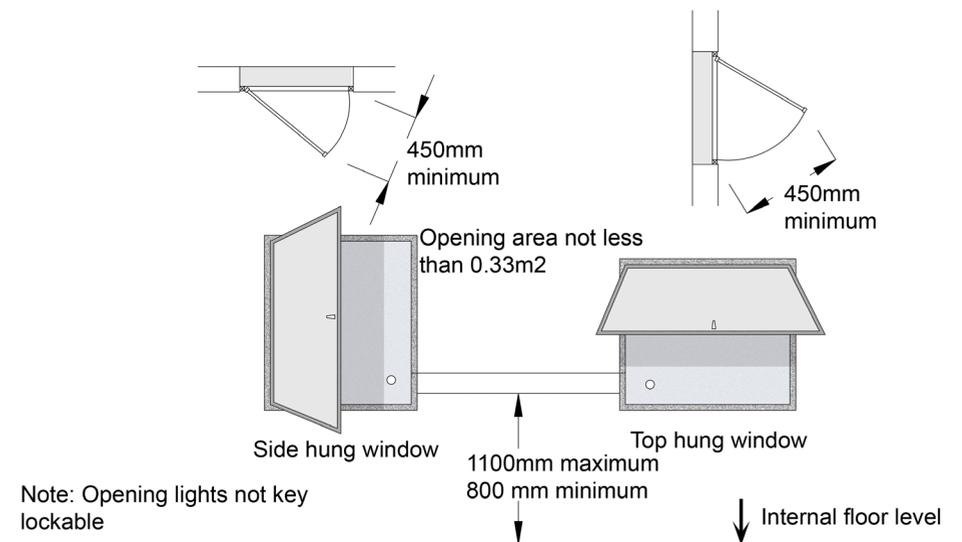


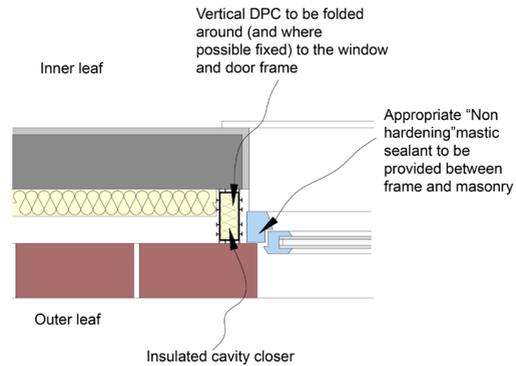
Figure 5: Emergency egress window provision

## CHAPTER 7: Superstructure

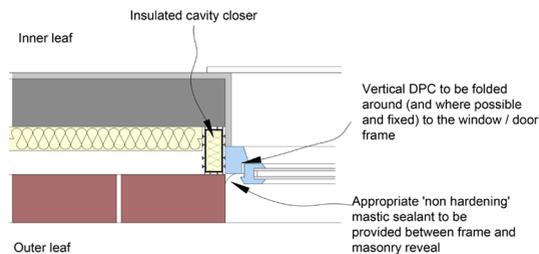
**7.4.8 Installation of doors and windows**

Window and door frames should be installed so that;

- They do not carry loads unless designed to do so.
- The external face of the frame is set back at least 38mm from the masonry face. The masonry on the external side of a vertical DPC should not be in contact with internal finishes.
- The window head is set back behind the edge of the cavity tray.
- The frame to wall junction is weather tight and reasonably air tight.
- In areas of very severe exposure, checked rebates should be provided. The frame should be set back behind the outer leaf and should overlap it, as shown in Figure 6. (see also Chapter 13)
- Distortion of doors should be minimised by not locating radiators or other heaters close to doors.
- The water drip to window and door sills, projects beyond the wall or sub-sill by at least 10mm and the sill edge by at least 25mm
- The reveal should be protected throughout its width by a continuous dpc. The width of the dpc should be sufficient to be fixed to / or overlap, the frame and fully protect the reveal. Alternatively, an insulated finned cavity closer with third-party certification may be used.



**Figure 6: Rebated window framed for areas of very severe exposure**



**Figure 7: Typical window reveal detail (normal exposure)**

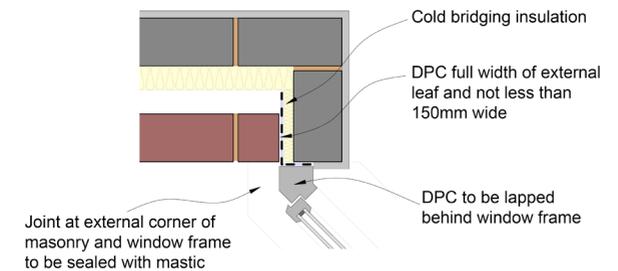
Proprietary materials with third-party certification should be used to close cavities at window and door openings. They should also be installed in accordance with the manufacturer's recommendations.

**7.4.9 Fire doors**

Any door between a dwelling and an attached or integral garage should be a half-hour fire-resisting door and frame.

**7.4.10 Bay windows**

The vertical DPC and cavity closer should be installed as shown in Figure 8.



**Figure 8: Typical bay window detail**

**7.4.11 Workmanship**

Window and door frames should be installed either by building in tightly as work proceeds or by fitting into pre-formed openings, suitably dimensioned to provide an accurate fit for the frame plus the perimeter weather tight joint.

Timber frame windows and doors can be installed so that they abut the masonry. Any gap provided should not exceed 10mm, and for gaps less than 5mm, the sealant must cover both the frame and the masonry by 6mm. For gaps greater than 5mm, a backing strip should be provided behind the sealant. The sealant should have a minimum depth of 6mm.

## CHAPTER 7: Superstructure

PVC-U frame windows and doors should be installed with a gap of between 5mm and 10mm to allow for thermal expansion. For large framed units, such as patio doors, the gap can be up to 15mm.

Frames should be fixed in accordance with the manufacturer's recommendations or, if no instructions are given, with the following guidance:

- Fixings should be at 600mm maximum centres and within 150mm of corners of the frame.
- Frames should be fixed either by galvanised steel cramps or by non-corrodible screw fixings to the surrounding wall.

#### 7.4.12 Glazing critical locations

Glazing in doors and windows in areas known as 'critical locations' need to be given special consideration in order to prevent potential injury to people within or around the building.

These 'critical locations', as shown in Figure 9, are:

- In a door or, in a side panel adjacent to a door; where the glazing is within 300mm of the door and the glazing is situated between floor level and a height of 1500mm.
- In an internal or external wall or partition between floor level and a height of 800mm.

It is important that any glazing within these 'critical locations' should be either:

- Provided with permanent protection
- Small panes
- Robust
- Break safely

If permanent protection is provided, there is no requirement for the glazing itself to be of a special type. Permanent protection may take the form of railing or barriers and should:

- Be designed to be robust.
- Have a maximum opening or gap in any railing of 75mm or less.
- Be a minimum of 800mm high.
- Be non-climbable (especially where floor is acting as a balcony).

Small panes, either an isolated pane within glazing bars or copper or lead lights, should be restricted in size so that any breakage would be strictly limited.

Small panes should be:

- No more than 0.5m<sup>2</sup> in area
- No wider than 250mm

Where concealed annealed glass is used, a minimum of 6mm thickness is recommended (4mm for copper or lead lights). Some materials are inherently strong, such as glass blocks or polycarbonates, whereas concealed annealed glass will need to be of an increased thickness as the area of the panel increases to be considered

'safe'. As an alternative to any of the above solutions, it is possible for the material to break 'safely' when tested to BS EN 12600, which would mean that:

- Only a small opening was created with a limited size of detached particles.
- The balance would create only small pieces that are not sharp or pointed.
- The pane disintegrates with only small detached particles.

A glazing material would be suitable for a critical location if it meets the requirements of BS 6262 – 4 Table 1 when tested in accordance with BS EN 12600. Glass installed in a door or in a side panel to a door that exceeds 900mm wide must meet the relevant requirements of BS EN 12600 and BS 6262 - 4. (See figure 9 below for the critical locations)

Glazing should be in accordance with BS 6262. Insulated glass units (IGU) should meet requirements of BS EN 1279 – Glass in building – insulating glass units, be CE marked and carry third-party accreditation. This includes windows in possession of a BBA certificate and timber windows.

- They should have continuous dual seals; single seal units are not acceptable.
- Desiccant should be provided to spacer bars.
- Any glazing on-site must have a drained and ventilated bottom bead with a minimum gap of 5mm between the edge seal of the insulated glass unit and the bottom channel of the frames glazing rebate.

## CHAPTER 7: Superstructure

- Any glazing with an area greater than 1m<sup>2</sup> must have a drained and ventilated bottom bead with a minimum gap of 5mm between the edge seal of the insulated glass unit and the bottom channel of the frames glazing rebate.
- Glazing with an area less than 1m<sup>2</sup> may be solid bedded.
- All spacer bars should be stamped with BS EN 1279.
- PVC-U frames and spacer bars should be stamped with BS 7412, 7413 and 7414.

Linseed oil glazing putty should not be used when the joinery is finished with vapour permeable paint or stain. Glazing putty should also not be used with organic solvent-based stains, the putty should be neatly finished to receive a protective paint coat.

Putty is not suitable for laminated glass and double-glazed units, the workmanship should be in accordance with BS 8000: 7. To ensure the compatibility of the whole glazing system is to a high level of workmanship and control, it is recommended that factory pre-glazed systems be installed in all external openings.

External glazing beads should be pinned at a maximum of 150mm centres (a maximum of 50mm from corners) or screwed at 200mm centres (maximum 50mm from corners).

The preferred method of installation for double-glazed units is either;

- Drained and ventilated frames, as recommended by the Glass and Glazing Federation (GGF), where possible this method should be adopted for external glazing.
- Solid bedding of units in 16mm–18mm deep frame rebates; 18mm rebates are recommended by the GGF to allow for tolerances. In all cases, sealants should not be sensitive to ultraviolet light. External glazing beads should be fixed at a maximum of 150mm centres, and the glazing bedded in non-setting putty. Louvre windows should not be used and double-glazing should be fixed and bedded as recommended by the GGF.

#### Control of condensation

Minimise the effects of condensation on glazing and frames by;

- Using insulated or thermally broken metal frames.
- Using details that prevent condensation running onto walls or floors.
- Housing window boards into frames to prevent condensation entering the joint.
- Providing thermal insulation to walls at lintels, sills and jambs.
- Using trickle ventilators, or similar, to provide background ventilation where required by the Building Regulations. Further guidance on this subject is provided in BRE report BR 262, Thermal insulation: Avoiding risks 2002.

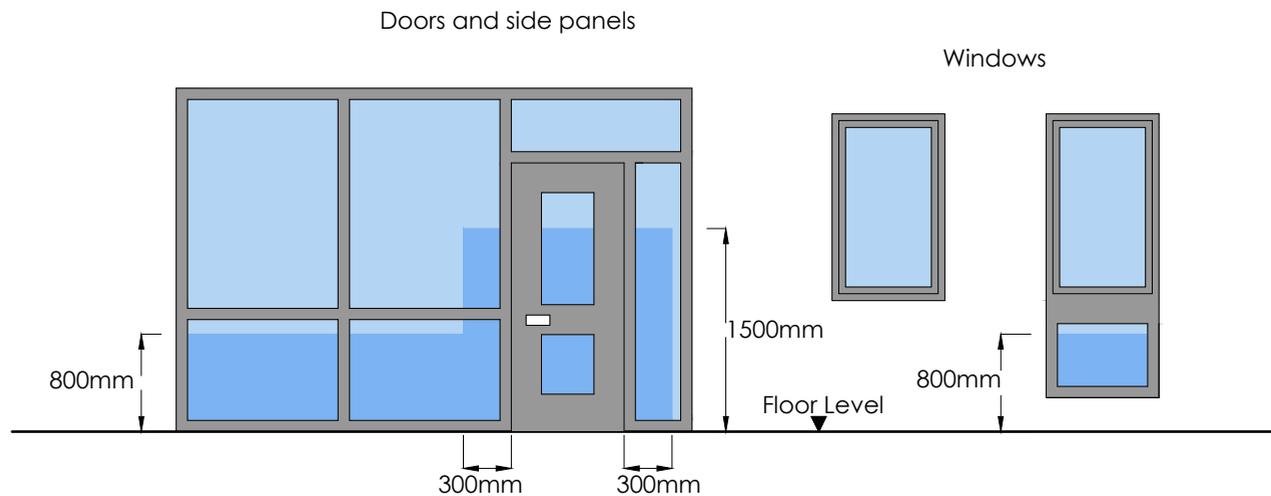


Figure 9: Glazing to critical locations

## CHAPTER 7: Superstructure

**Nickel sulphide inclusions in glazing**

Toughened glass which is installed in windows and patio doors which are externally beaded in buildings that exceed 3 storeys in height must be Heat Soak Tested in accordance with BS EN 14179-1. The glass must be permanently marked in accordance with BS EN 14179-1, or copies of test certificates must be disclosed for all affected panes.

**Appearance of glazing**

Glass must meet the visual assessment criteria of the Glass and Glazing Federation and CWCT Technical Note 35 (TN 35). The total number of faults permitted in a glass unit shall be the sum total of those permitted by the relevant BS EN Standard for each pane of glass incorporated into the unit concerned.

Faults include;

- Inclusions, bubbles, spots and stains.
- Residues within the insulated glass unit cavity. Fine scratches not more than 25mm long.
- Minute particles

When assessing the appearance of glass:

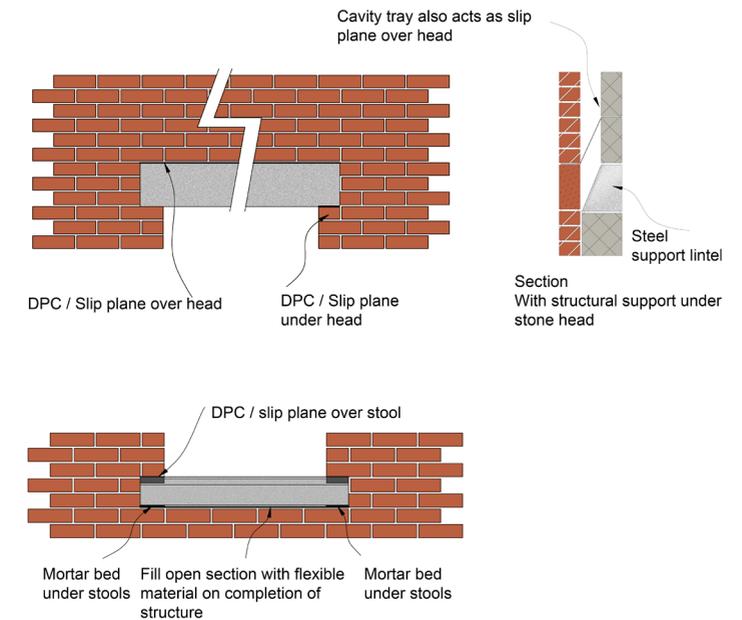
- The viewing distance used shall be the furthest stated in any of the BS EN Standards for the glass types incorporated in the glazed unit. In the event of doubt the viewing distance shall be three metres.
- The viewing shall commence at the viewing distance and shall not be preceded by viewing at a closer distance.
- The viewing shall be undertaken in normal daylight conditions without use of magnification.

The above does not apply within 6mm of the edge of the pane, where minor scratching is acceptable. Scratches on doors, windows and frames and factory finished door and window components should not have conspicuous abrasions, or scratches when viewed from a distance of 0.5m.

- Surface abrasions caused during the building-in process should be removed in accordance with the manufacturer's instructions, which may include polishing out, re-spraying or painting.
- In rooms where there is no daylight, scratches should be viewed in artificial diffused light from fixed wall or ceiling outlets and not from portable equipment.

**7.4.13 Cast stone jambs and mullions**

Stainless steel dowels in the sides of the jambs should be bedded into adjacent mortar joints as the masonry is constructed.



**Figure 10: Stone heads and sills**

## CHAPTER 7: Superstructure

**Cast stone heads**

A cavity tray must be provided above all heads as this not only discharges water to the outside face of the masonry, but also acts as a slip plane. A slip plane will be required at the end of the cast stone head as well as a soft joint between the top of the head and the steel support lintel.

**Cast stone window/door surrounds**

Where cast stone butts up to other materials, allowance must be made to accommodate differential movement e.g. where cast stone abuts clay brickwork, a slip surface between the two materials must be incorporated or the cast stone should be flexibly jointed.

**Sills**

The DPC should be overlapped by the vertical DPC at the jambs and should be turned up at the back and ends for the full depth of the sill.

The mortar bed below sills should be trowelled smooth, allowed to set, cleaned off, and then a DPC laid over. The open section below the sill should be sealed with a flexible material only on completion of the structure.

To control water penetration through joints in window surrounds, e.g. at junctions between jambs and mullions and sills, rectangular and T-shaped water bars should be provided.

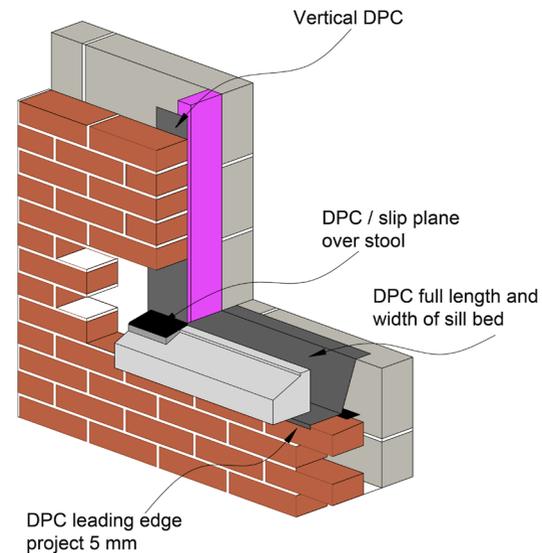


Figure 11: Stone sill with insulated cavity closer