

**DURABILITY**

The inherent durability of masonry has long, since been established, as evidenced by the number of 16th century buildings and structures still standing or being used today.

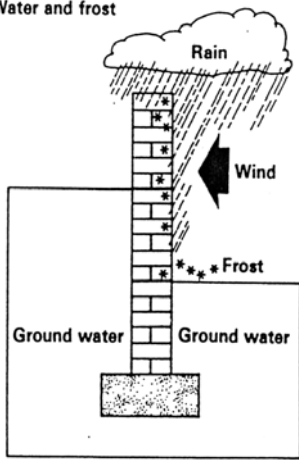
Three of the potentially destructive agents affecting masonry are;

- Water
- Frost
- Temperature Change

Brickwork absorbs water falling as wind driven rain washing over the surface. Some areas will absorb more water than others, notably horizontal and inclined surfaces and parts in contact with the soil, and these may be potentially at risk from frost attack.



Water and frost



It is important to understand that it is not the coldest winters which lead to frost failure but recurring freeze/thaw cycles, in a saturated state, which do the damage.

Brick surfaces may flake or spall and mortar joints crumble when frost failure occurs.

The degree of wetting is therefore important and this will depend on the degree of exposure to the weather, and the frequency of such exposure. In areas prone to high driving rain, architectural features which minimise saturation should be adopted. As a guide refer to the map shown.

All areas within 8km of the coast and major river estuaries should be considered as being one 'grade' of exposure higher than that indicated on the map. The same applies to high buildings or buildings on high ground. The degrees of exposure will also depend on the position of the brickwork in the building or structure and the way in which the detail has been designed.

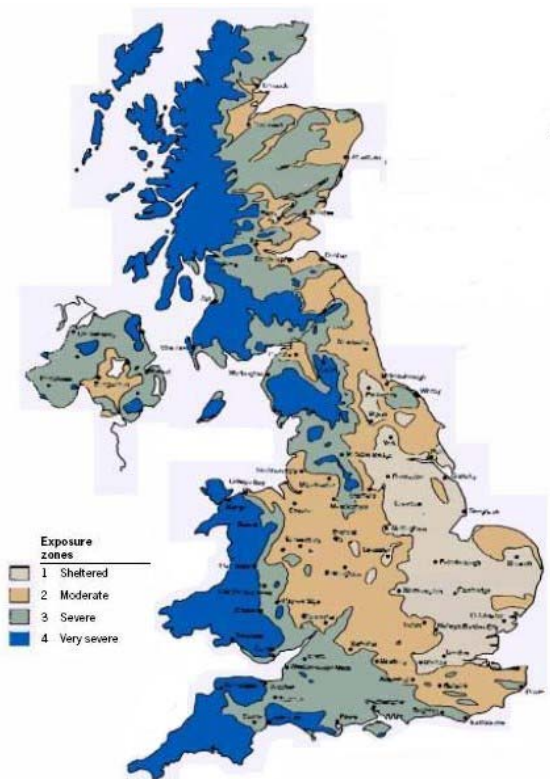
Generally external works such as retaining walls, garden walls and copings, and building features such as sloping areas, parapets, cills and areas between ground level and DPC are subject to more severe exposure than the rest of the building.

**Clay Brick Types**

**Facing-** Sold for appearance-available in a wide range of facing brick types, colours and textures. Some may not be suitable in positions of extreme exposure. Some have engineering properties.

**Engineering-** Suitable for ground works, manholes and sewers, as ground level dpc to free-standing walls and situations where high strength and low water absorption are the most important factors. They are not sold for appearance.

**Commons/Rejects** – These are only suitable for internal use or under protective claddings or in footings. They do not have a durability warranty.



**Frost Attack**

The repeated action of rain - water freezing and subsequently thawing in saturated brickwork can cause spalling of the brick surface.

**Sulphate Attack**

In saturated brickwork soluble salts from certain types of bricks may cause a chemical reaction with a constituent of the Portland cement in the mortar. The surface of the mortar joint will crack, and the inside crumble and expand, disrupting the brickwork. In areas of high saturation, sulphate resisting cement should be used in mortar with bricks of S1 salt content.

**Use the right brick for the job.**

All clay bricks have a Durability Designation rating and it is important to know which bricks to use and where.

Bricks fall into three categories.

**F2** – Frost resistant – can be used in all normal building situations and degrees of exposure.

**F1** - Moderately frost resistant are also durable except where they may remain saturated and are subjected to repeated freezing and thawing.

Generally they can be used between dpc and eaves although caution should be exercised on sites in elevated, exposed locations.

F1 rated products should not be used;

- ◆ Below ground level dpc.
- ◆ For cills
- ◆ For coping/cappings
- ◆ Beneath cappings
- ◆ In projecting details (plinths)
- ◆ In exposed site locations.
- ◆ In landscaping.



**F0** – Not frost resistant – should not be used externally.

**Note: They do not look different so ask your supplier for the rating. If bricks are not rated they should be assumed to be '0' not frost resistant. The product guarantee may be invalidated if the correct design details are not applied.**

The use of bricks for treads and risers for external steps in garden paths in areas of severe exposure is not recommended.

**Mortars**

Mortar joints are vulnerable. Mortar is an essential ingredient of brickwork and is subject to the same exposure as the brick, generally mortar mix (iii) will be sufficient for the majority of brickwork undertaken within the dwelling. For free-standing walls, brickwork below ground level dpc and chimneys, mortar mix (ii) will be stronger and more durable in the wetter locations. Consider mortar mix (i) for use below ground level dpc, also for copings/cappings, cills and chimneys in very wet locations. However, the mortar should not be stronger than the bricks used.

Mix (i)	Mix (ii)	Mix (iii)
<b>1 part Portland Cement</b>	<b>1 part Portland Cement</b>	<b>1 part Portland Cement</b>
<b>1/4 part Lime</b>	<b>1/2 part Lime</b>	<b>1 part Lime</b>
<b>3 parts Sand</b>	<b>4 1/2 parts Sand</b>	<b>5 or 6 parts Sand</b>

**Mortar Joint Profiles**

The long-term performance of the brickwork is highly dependant on the correct mortar joint profile for the efficient shedding of rainwater. Brickwork that remains saturated is more susceptible to frost damage. The choice of joint profile should therefore be based on performance criteria as well as aesthetic considerations. These are the four most commonly used profiles.

**Curved recessed (bucket handle)**

An efficient joint with a softer appearance.

**Weather Struck**

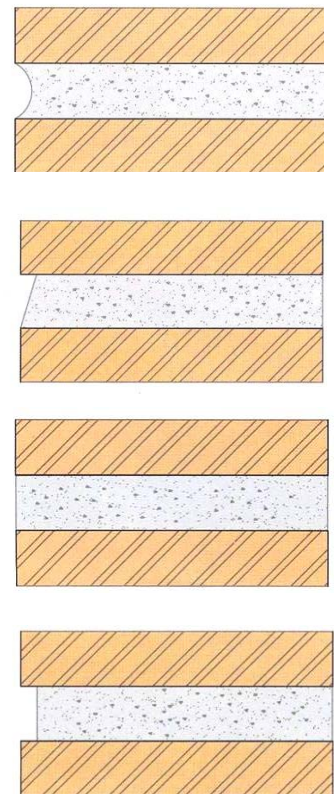
An efficient and attractive joint giving the shadow effect of a recessed profile but better weathering properties.

**Flush**

A common profile that is efficient in terms of shedding water if tooled, but will alter dramatically the overall colour of the brickwork.

**Square recessed.**

An attractive profile- but it should only be used in a sheltered location. It is not recommended for free-standing walls or any exposed situations. The depth of recess should be kept to a minimum necessary to achieve the desired appearance, but should not be greater than 3-4mm. Recessed joints should not be used where there is danger of saturation occurring.



**Vulnerable brickwork**

**Cills and plinths.**

Cills to window openings and projecting plinth brickwork are subject to greater exposure from rainfall than vertical walling-they will become saturated.

**Cills**

Use only F2 rated special shaped bricks i.e. a single cant, plinth or cill brick to construct a cill, which will shed the water run off from the glazing, protecting the brickwork below. Cills should ideally project to give the necessary protection to the bricks below.

**Plinths**

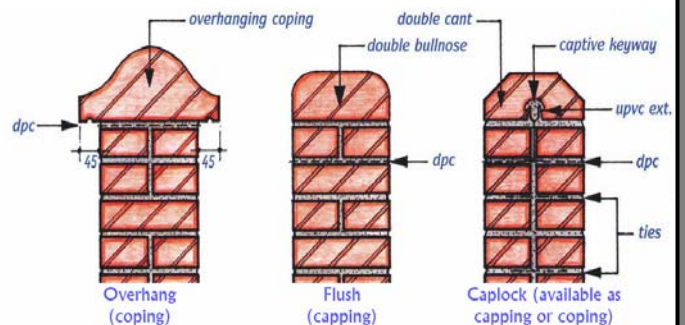
Any projecting plinth brickwork must also be F2 rated. Because of its position it is more exposed and in addition will receive water run-off.

**Copings and cappings**

Use a coping or capping to protect the brickwork beneath.

A coping to the top of a wall is the preferred finish; they include an overhang with drip groove that will help direct the water to fall clear of the brickwork below.

Cappings are generally flush with the walling. In all instances they must be F2 rated and must be used in conjunction with a high bond dpc which will help protect the walling below from saturation.



For further information and advice regarding this topic please contact Ibstock's Design & Technical Helpline on 0844 800 4576.