TECHNICAL INFORMATION SHEET

A12

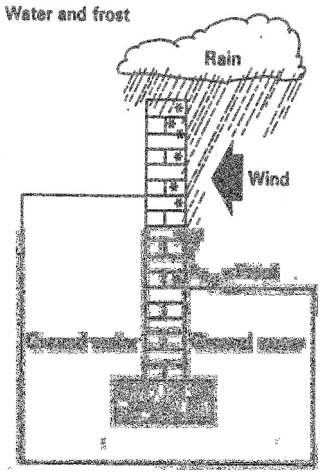
Design & specification considerations

DURABILITY – Specification best practice

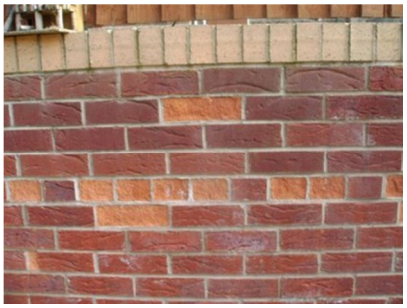
The inherent durability of masonry has is evident by the number of 16th century buildings and structures still standing or being used today. Their longevity is related to their design and workmanship and materials chosen for the local conditions.

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.



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 will crumble and expand, disrupting the brickwork.

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 durability 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: Bricks with any of these ratings 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. F2 products may be covered by a durability warranty however this will be invalidated if the correct design details are not applied.

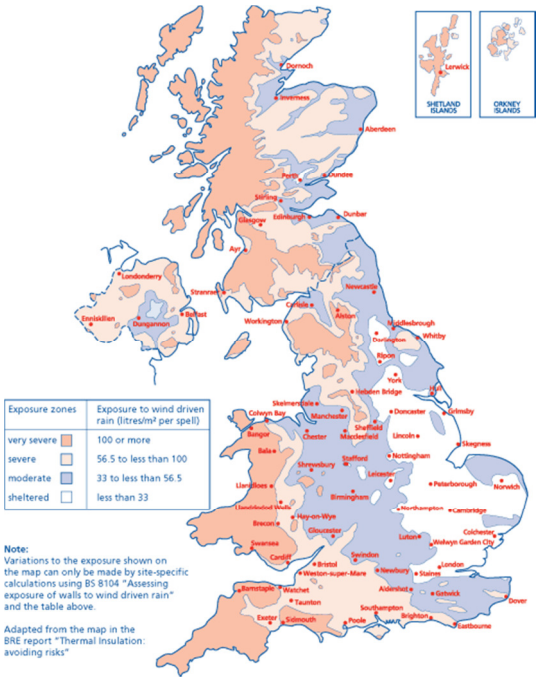
Mortars

Mortar joints are vulnerable to frost failure. 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 elevations of a 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, sills and chimneys in very wet locations. However, the mortar should not be stronger than the bricks used.

Mix (i)	Mix (ii)	Mix (iii)
1 part Portland Cement	1 part Portland Cement	1 part Portland Cement
$^1/_4$ part Lime	$^1/_2$ part Lime	1 part Lime
3 parts Sand	$4^1/_2$ parts Sand	5 or 6 parts Sand

Exposure

The Country can be divided into areas rated as sheltered, moderate, severe and very severe exposure to wind driven rain based on extensive metrological studies. There is a link between high exposure areas and the likelihood of brickwork suffering the consequences of frost attack if design, detailing and construction have not been properly addressed.
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, sills and areas between ground level and DPC are subject to more severe exposure than the rest of the building. This coupled with the geographical location classed as severe or very severe must be designed and constructed with due consideration.

Please refer to our Get It Right information leaflets for retaining and free-standing walls for further information on correct construction techniques. Failure to follow our recommendations will result in the durability warranty being invalidated should a problem arise.

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. Beware, products downgraded to non-best for not achieving their technical specification may be available on the market which are not F2 durability. Always check with the supplier or manufacturer as they may only be suitable in footings or internally.
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.

Mortar Joint Profiles- Refer to TIS A6 Mortar Joint Profiles

The long-term performance of the brickwork is highly dependent 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
Sills, plinths, brick on edge cappings.
Sills to window openings and projecting plinth brickwork are subject to greater exposure from rainfall than vertical walling- they will become saturated. Brick on edge cappings may not be the most suitable method of topping a boundary wall in some geographically exposed locations. Their flat surface may attract water pooling and unless creasing tiles and dpcs are incorporated they will give little protection to brickwork beneath.
Sills
Use only F2 rated special shaped bricks i.e. a single cant, plinth or sill brick to construct a sill, which will shed the water run-off from the glazing, protecting the brickwork below. Sills 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. An overhanging coping with drip grove at the top of a wall is the preferred finish, especially in areas rated as severe exposure; they 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.

Note: The use of bricks for treads and risers for external steps in garden paths is not recommended.

For further information or advice regarding this topic please contact Ibstock's Design & Technical Helpline on 0844 800 4576 or email technical@ibstock.co.uk

BRICK SERVICES

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