Chelmer Valley

For Quality Clay Paving

Guidance Notes On Garden Walling

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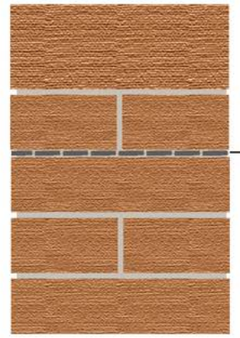
In addition to the correct choice of brick, careful consideration must be given to the detailing and construction of freestanding garden and retaining walls to safeguard their durability and long-term performance. Garden walls, often exposed and unprotected, are open to being saturated, prone to extremes of temperature and possibly subject to sulphate attack from soils, particularly in the situation of a retaining wall.

Good site practice and workmanship is also important during the construction phase, but it is essential to prevent or minimize the possibility of the masonry becoming saturated to improve the durability and performance of the structure.

Product Selection

A garden wall requires 3 distinct performance criteria as it is subject to different conditions and degrees of exposure.

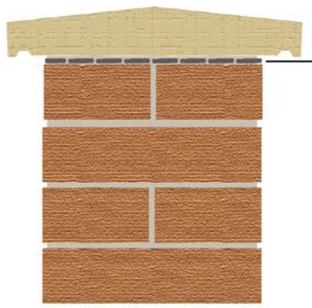


Brick on edge capping

High band DPC incorporated within mortar

Copings or Cappings –

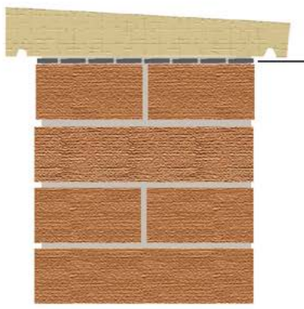
Often referred to the head or top of the wall where it is recommended to use an Engineering quality brick or purpose designed capping/coping rated as F2 frost resistant and a water absorption of <10%, preferably with a smooth texture to help water run-off. It is recommended a well bonded DPC is placed 2 courses down from the wall copings to prevent migration of moisture from the saturated copings to the brickwork underneath. A DPC in this position will help maintain stability should the copings be accidentally removed.



DPC (high bond)

Twice weathered coping
(sheds water clear of the wall face)

Copings, often project a minimum of 40mm from both sides of the wall and incorporate a drip to the underside to prevent water running down the face of the brickwork. Cappings, which fit flush to the face of the wall, play an important part to the visual appearance and finish to the wall whilst preventing moisture entering the brickwork underneath and preventing the staining of brickwork. Both can be manufactured in clay or concrete and also natural stone dressed to fit. Traditional creasing tiles can also be incorporated and provide an attractive capping detail.



DPC (high bond)

Once weathered coping
(sheds water clear of the wall face)

Main Wall –

Similarly a product rated as F2 frost resistant and S2 (active soluble salt content) should be used. There is a current trend to use clay pavers as walling, continuing the horizontal to the vertical aspect, pavers being particularly suitable due to their high resistance to frost attack and excellent durability. It is recommended to use a Designation (ii)/M6 class mortar for this section of brickwork. Should the main wall play its part as a retaining structure and not simply a free-standing wall, it will be necessary to provide a waterproof membrane between the wall and the retained earth to prevent transmission of water into the wall. A further explanation can be found in the later section ‘Retaining Walls’.

Wall Damp Proof Course –

Coming out of the ground at the base of the wall a Class A or Class B Engineering Brick should be used, these being extended to two courses above finished surface level. It is not recommended to use a DPC at this point, however, in conjunction with using Class A or B Engineering bricks it is also important to consider a Designation (i)/M12 mortar, further explained below.

Mortar Mixes

The location of the wall, type of brick and the degree of exposure will impact the decision of mortar specification, an important element of the construction.
The British Standard Categorisation of Mortars suggests Mortar Designation Types (i) and (ii) which offer different compressive strengths and suitability for specific locations as follows:-

Mortar Mix Proportions (proportion of materials by volume)	
Mortar Designation (i) **Compressive Strength Class M12**	1 : 0 to ¼ : 3 Cement/Lime/Sand with or without air entrainment (12N/mm2 strength at 28 days)
Mortar Designation (ii)	1 : ½ : 4 to 4½ Cement/Lime/Sand with or without air entrainment 1 : 3 to 4 Cement/Sand with or without air entrainment 1 : 2½ to 3½ Masonry Cement/Sand (inorganic filler alternative to lime) 1 : 3 Masonry Cement/Sand (lime)
Compressive Strength Class M6	(6N/mm2 strength at 28 days)

In general, we would suggest a M12 mortar mix for cappings/copings and mortar work below and including the brick DPC, with a M6 mortar mix for the main body of the wall.

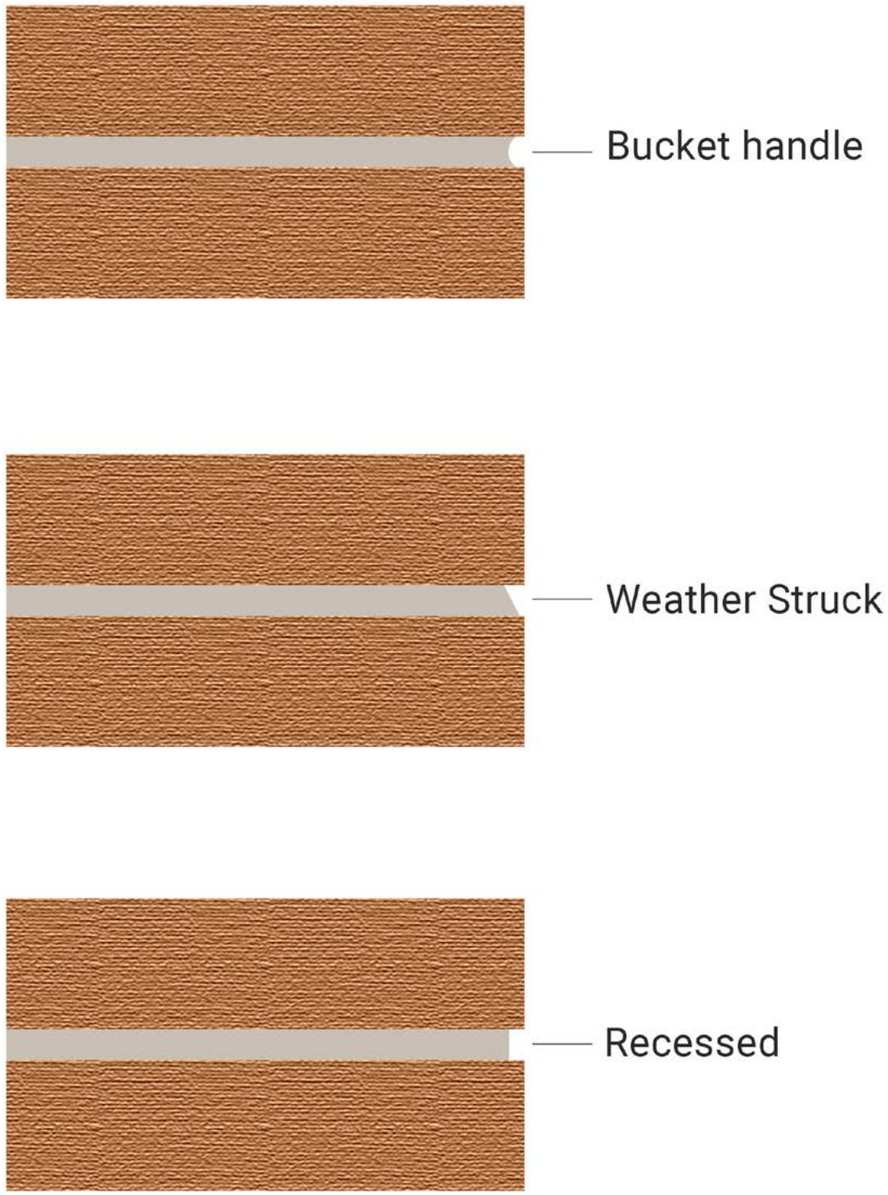
Presence Of Sulphates In Soil

Though this is not a common problem, soluble sulphate salts possibly present in soils used to backfill retaining walls, in combination with constantly saturated earth, may result in the expansion and disturbance of the mortar joints over time. This is known as sulphate attack and if there is a risk associated with this then S2 designated bricks should be used. This risk can be minimized by vigilant design and detailing to prevent the ingress of water into the construction by incorporating DPC's, DPM's between the retaining wall and backfill, cappings and copings.

Brick Joint Profiles

It is important to prevent mortar joints from becoming saturated or to retain moisture so it is necessary to provide either a bucket handle or weather struck finish. A recessed joint, though considered visually attractive, can hold water increasing rain penetration. However, in the case of tumbled bricks, or bricks where the arriss is uneven, it may be beneficial to use a slightly recessed mortar joint as weather struck and bucket handle joints, which naturally follows the contours of the brick edge, will appear uneven and wider.

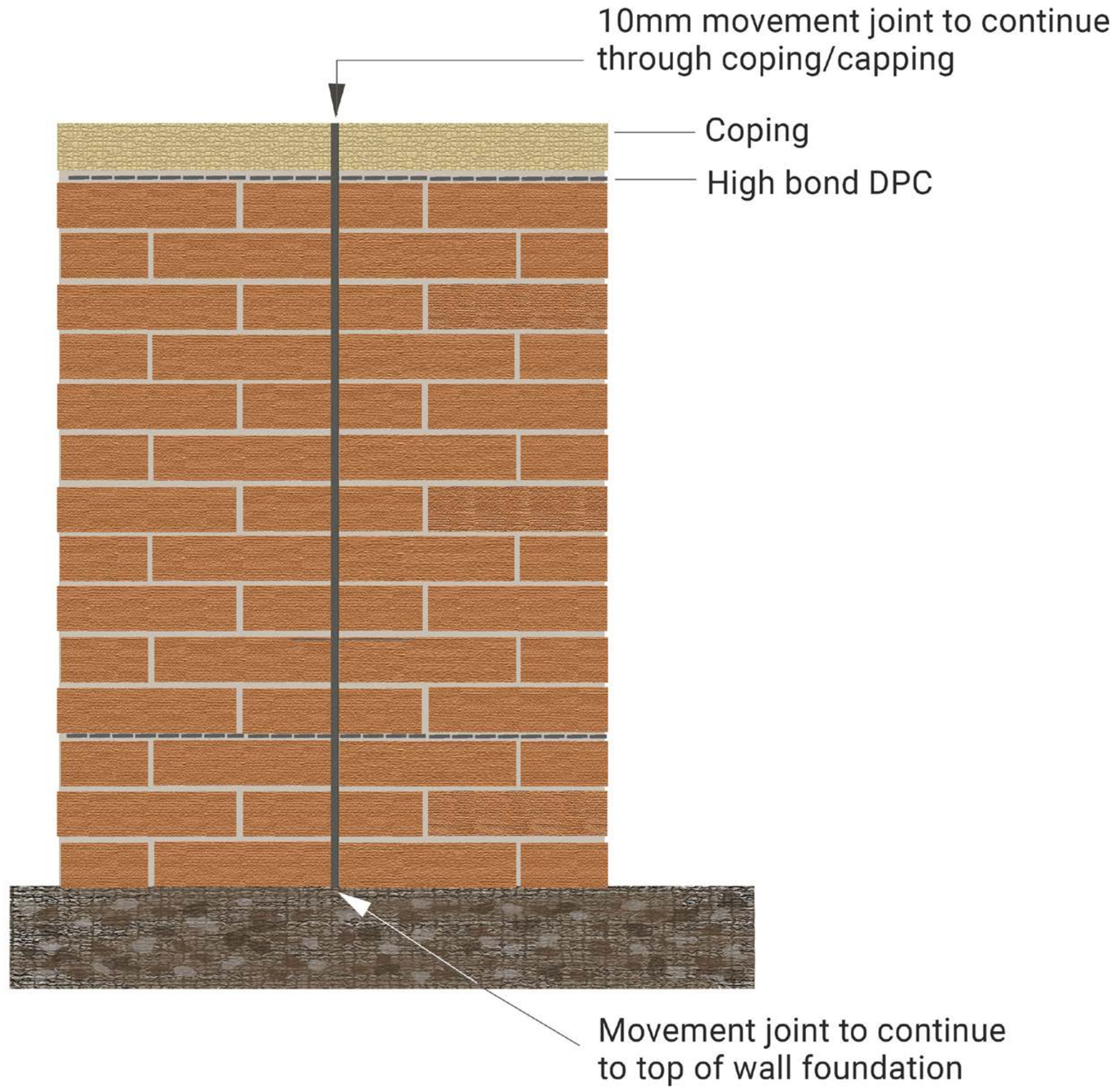
Jointing Profiles



Movement Joints Within Brick Walls

All materials expand upon exposure to heat and contract when cooling. Moisture also contributes to movement in the longer term. Though there are many factors which can influence the degree of movement within brick walls, in garden and retaining walls it is advised to incorporate a movement joint every 6m. This vertical joint must originate from the top of concrete foundation and continue into the copings/ cappings using an easily compressible joint filler such as cellular polyethylene or polyurethane with a polysulfide face sealant to match the mortar colour.

Should it be necessary to consider movement joints where the length of the wall exceeds 6m, it is recommended to incorporate ties with de-bonding sleeves fixing the panels of brickwork/blockwork together to maintain structural stability.



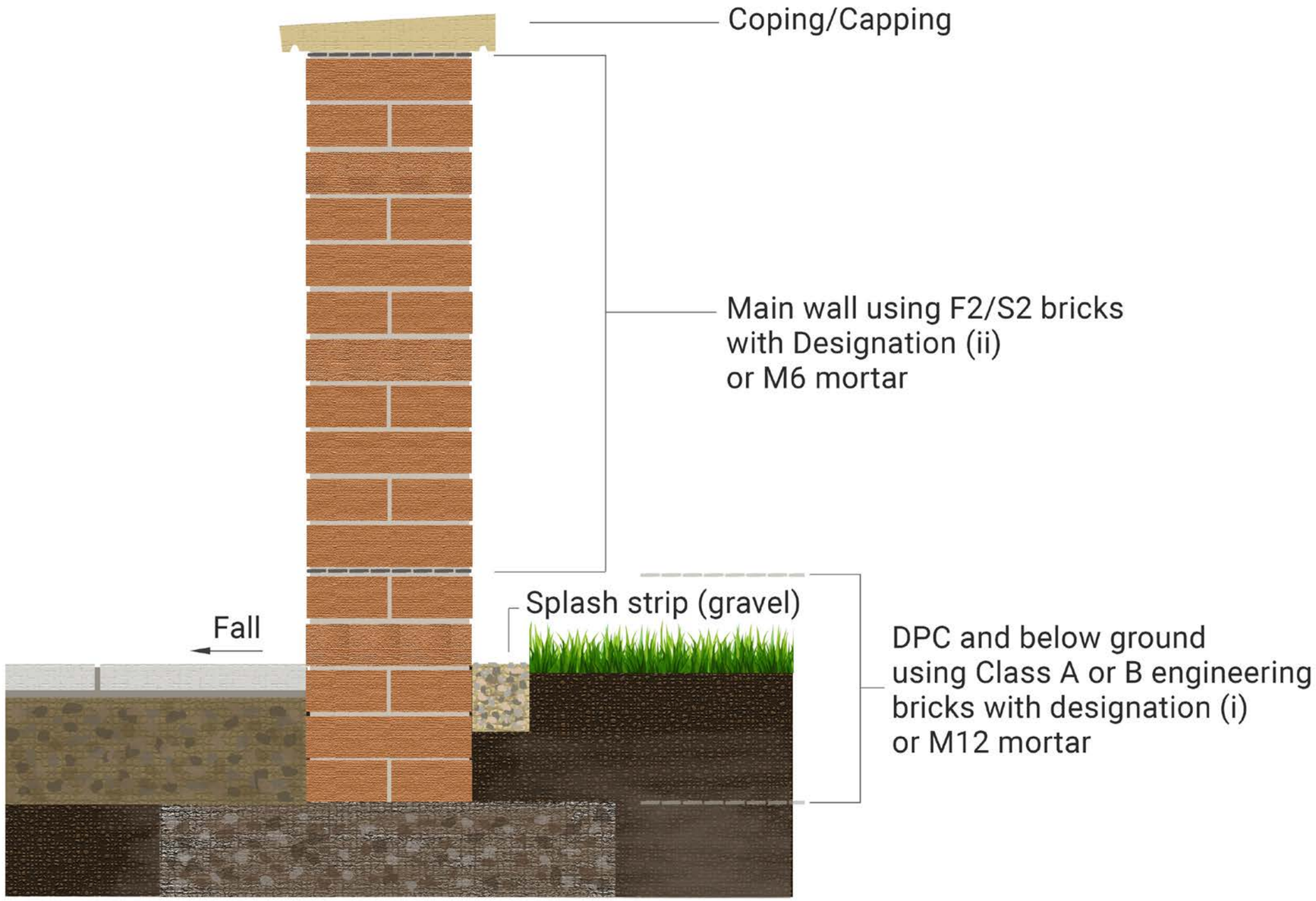
Retaining Walls

In a retaining wall situation, it is important to incorporate either a Damp Proof Membrane or a liquid applied barrier to prevent transmission of moisture from the back-fill material into the brickwork as these transmitted salts from the backfill and leachates from the mortar may cause discoloration on the face of the exposed brickwork.

The structural stability of the wall can also be affected as surface water permeating into the subsoil behind the retaining wall and becoming trapped will result in a buildup of pressure behind the wall which may result in serious structural damage. This pressure can be relieved by incorporating a granular drainage layer which can freely drain into land drains and weep holes such as plastic pipes through the wall. Gravel splash strips at the base of the wall prevent moisture entering the brickwork with paving falling away from the wall.

It is also possible to use concrete block as the inner leaf to a double skin wall, the exposed facing brickwork effectively being the cladding, however, it is recommended ties with de-bonding sleeves are used to tie the panels of brickwork/blockwork together to maintain structural stability.

Free Standing Wall



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PLEASE NOTE THIS GUIDE OFFERS INFORMATION RELATING TO THE DESIGN OF WALLING IN A DOMESTIC GARDEN SITUATION WHERE LOADINGS ARE MINIMAL. WE WOULD STRONGLY RECOMMEND PROFESSIONAL ADVICE BE SOUGHT FOR STRUCTURAL COMPLIANCE OF WALLS EXCEEDING 1 METRE IN HEIGHT.

For further technical guidance and information relating to severely exposed brickwork and brickwork mortar please view or contact the Brick Development Association as follows: -

https://www.brick.org.uk/admin/resources/mortar-for-brickwork-1.pdf

For More Information Contact:- info@chelmervalley.co.uk