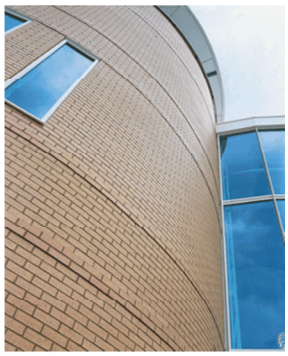
TECHNICAL INFORMATION SHEET

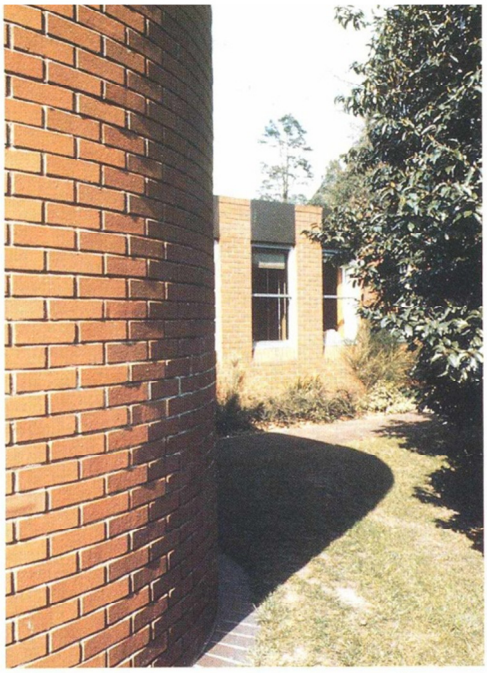
A8

Design & specification considerations

Curved Brickwork using Standard Format Bricks



To create curved brickwork with standard format bricks the mortar joints need to be tapered. This will create a degree of faceting depending on the curvature required. The perpend joints will also overhang the stretcher face below casting a shadow. The acceptability of appearance hinges on how pronounced the overhang looks with the desired radius.
The type of finish the bricks possess also affects visual acceptability, bricks with a multi colour and rugged texture are more likely to soften the effect compared to straight arrissed smooth finishes.



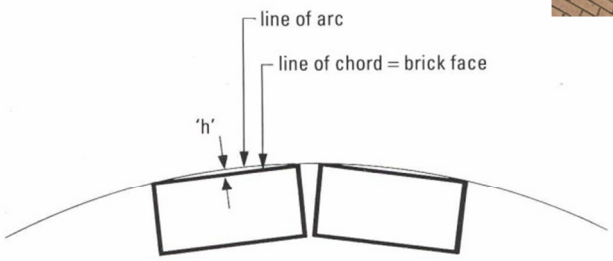
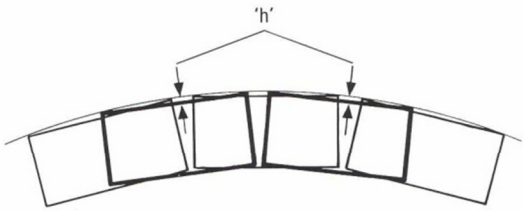


Figure 1 Faceting due to difference of arc and chord



The bond pattern can also affect the successful appearance of the curve. Curves of a smaller radii can be achieved using Flemish bond or Header bond rather than Stretcher bond.
Stack bond eliminates the overhang effect however it accentuates faceting and has no structural integrity.
An acceptable appearance using stretchers can usually be achieved for radii down to 3.5 to 4m and for header bond, radii down to 2.5 to 3m.

Mortar cross-joint widths can be visually acceptable between 6mm and 15mm however to minimise water penetration it is most important that wider joints have the correct specification of mortar, are solidly filled and the bond between brick and mortar is good.
If necessary, maintain a minimum 4mm cross joint width on concave non fair-faced brickwork.

Flemish Bond

Joint finishing is also important as it will have an overriding influence on the appearance of finished brickwork.
BS EN 771-1classifies bricks into 3 main size tolerances and, even if the product falls into the tightest tolerance bracket, variances occur when compared to each other, within consignments and between consignments. As the cross-joints in curved brickwork are subject to more extreme scrutiny by deviating from the normal nominal 10mm, consideration of the brick tolerance is advised.

Workmanship on site also contributes to the joint widths so extra care is needed especially setting out, mixing bricks from multiple packs and checking plumb of perpends. As string lines cannot be used, frequent checks are needed with spirit level, gauge rod and templates which will be time consuming and should be allowed for.

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BS BRICK SERVICES

Movement
Consider increased provision for movement in curved walling.

Calculating Joint Widths and Brick Numbers

To calculate the internal radius of a curve from the external radius:

**The term 'unit' refers to a group of up to 3 bricks depending on the bonding pattern adopted.*

r = R – W *
External **R**adius of brickwork minus the **W**idth of unit*.
i.e for 1 brick thick stretcher bond if the external radius is 4m, r = 4000-215 = 3785mm internal.
(or for vice versa r = R + W)

To calculate by how much the width of a cross joint on the convex side of a curved wall will exceed that of the concave side: $X = \frac{(L \times W)}{(p \times r)}$
(**L**ength of unit x unit **W**idth(÷ (bonding factor 'p'# x internal radius of wall).
i.e. for 1 brick thick stretcher bond if external radius is 4m, X = (215x215) ÷ (1x3785) = 12.2mm difference.
If both sides are fair face external joint could measure 17.5mm and internal 5mm.
The narrow internal joint thickness and brick type used may not be visually acceptable and special shape radial units should be considered in this instance.

To calculate the **N**umber of bricks in a complete 360° ring: $N = \frac{2\pi r}{(L + [p \times d])} \times n$
2 x 3.14 x internal radius mm ÷ (Unit length + [bonding factor 'p'# x width of cross joint on concave side mm]) x number of bricks per unit.
i.e for 1 brick thick stretcher bond if external radius is 4m, (2 x 3.14x 3785) ÷ (215 + [1x5]) = 108 x 2 = 216 bricks

#Factor 'p' is also dependant on the bonding pattern. The appropriate values are:

	'L' Length of unit (mm)	'W' Width of unit (mm)	'n' number of bricks per unit*	'p' factor
Half brick wall (102mm) Stretcher bond	215	102	1	1
One brick wall (215mm) Stretcher bond	215	215	2	1
One brick wall Flemish bond	317	215	3	2
One brick wall Header bond	102	215	1	1

For curved brickwork requiring Special Shapes a range of radial headers and stretchers are available from Ibstock, also transition bricks for areas where curved sections lead into straight.

Refer to the BDA Design Note 12, 'The Design of Curved Brickwork' for more detailed information.

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