

Rods and Mortar

Rods & Mortar is the proven traditional system for installing glass blocks. It can be used for virtually any type of project, internally, externally, straight or curved panels and fire-rated walls. It also forms the basis for precast panels. It is the preferred loose-build system of professional glass block contractors in the UK.

The Rods & Mortar system comprises a range of essential accessories:

- Colmef Vetromix glass block mortar
- Stainless steel ribbed reinforcement rods
- Bitumen cill expansion
- Perimeter expansion fibre
- Rods & Mortar expansion joint sealant
- Joint spacer pegs

Points to consider when specifying or constructing with Rods & Mortar:

To install Rods & Mortar successfully, preparation, planning, following the golden rules and understanding the reasons for each accessory is crucial.

The golden rules of building with Rods & Mortar

Glass block walls are self supporting, but not load bearing. In addition to their own weight, they can withstand wind loads, horizontal live loads and impact loads. A lintel provides the head for the panel to be anchored into whilst ensuring no downward pressure is placed on the glass blocks.

Openings must be square and perpendicular and the opening dimensions must be designed to suit glass block modules. Glass blocks cannot be cut like masonry bricks or tiles.

Glass block walls are connected to the surround by reinforcement bars being inserted into pre-drilled holes (or panel anchors). For best integral strength, panels should be installed into a four-sided pre-prepared opening. The opening can be timber, brick, steel, concrete or blockwork.

Between the opening and glass blocks it is essential to incorporate expansion joints to the perimeter to allow the panel to expand and contract freely with temperature change. The foam must not be bridged by mortar (render/plaster etc...) and caulked with Rods & Mortar expansion joint sealer (fire-retardant in fire-rated applications).

Glass blocks should not be installed when the surrounding temperature is 5°C and falling or 30°C and rising.

Using standard glass blocks the maximum panel size without intermediate support or slip joints is 25m², with no dimension exceeding 6m in either direction. For TF30 and TF60 fire blocks, the maximum panel size permissible is 9m² (in line with test specification).

How a mortar joint works

Glass Block Technology mortar is a specially formulated premix bedding and finishing compound, available in one bag to be mixed with water. It is manufactured under factory controlled conditions so all additives are accurately blended and designed for maximum performance of strength, flexibility, water repellence and U-value.

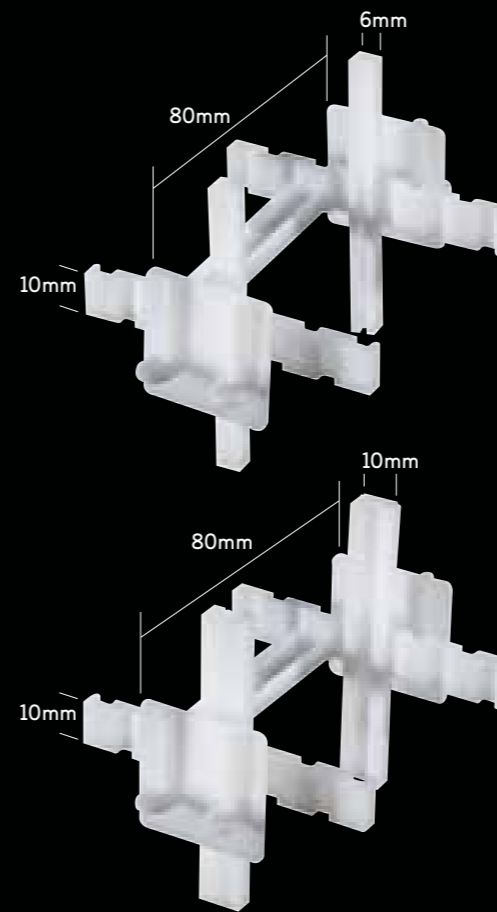
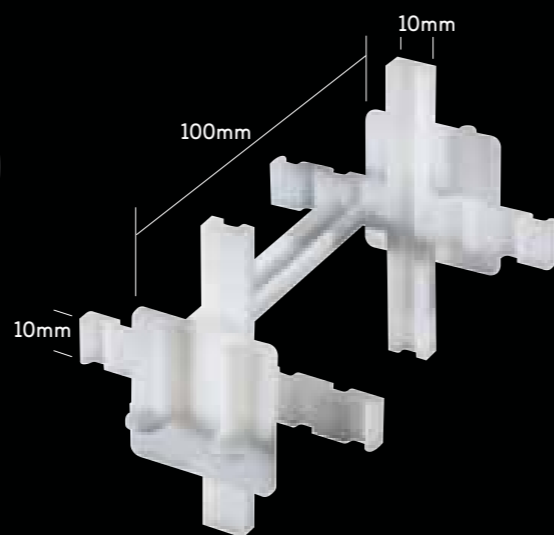
A mortar joint will cure in reaction to air just like normal mortars, so it is important that the joint size is not below 6mm. This guarantees total curing and maximum strength. Vetromix will become solid within hours of construction. Total curing is achieved after 21-28 days.

Glass is impervious unlike brick and concrete, therefore mortar is not absorbed into a glass block. The strength and support of a joint is created by the shape of the mortar profile (oval). The edge or collar of a block is concaved so when two are laid next to each other an oval joint is created.

This oval joint enables the glass block wall to resist impact or applied loads resulting in the panel being stable and self-supporting, but not load-bearing. Stainless steel reinforcement bars are used to restrain the panel to the surrounding aperture, whilst also giving the panel integral support and a wind-loading value.

The minimum recommended joint is 6mm and the most common used is 10mm. However, this is only the distance on show; the centre of the oval joint is always deeper from collar to collar. This area houses the stainless reinforcement bars, which should never be in direct contact with the glass surface.





Perimeter expansion joints

Glass blocks will expand and contract by 0.25mm per 25°C temperature change. Soft expansion joints must be incorporated into the perimeter between the substrate opening and block, being caulked with a white silicone (or fire-stop mastic). This will visually look similar a standard mortar joint.

For the head and jambs of an opening, 10mm-thick foam is used. This is a white expansion fibre. The horizontal expansion joint between the first row of glass blocks and the base of the opening is formed using high-density bitumen or neoprene material to supports the weight of the panel. Alternatively two coats of bitumen emulsion can be applied as the barrier between the bottom course mortar joint and base of opening.

Joint sizes and spacer pegs

10mm is the most common joint size for specifying and building glass blocks. A 190x190mm block plus a 10mm spacer modulates to 200mm. Spacer pegs serve multiple functions:

- They prevent mortar squeeze, increasing the number of courses that can be constructed in a day.
- They prevent stainless steel reinforcement bars coming into direct contact with the glass block as metal and glass have different expansion and contraction properties.

When a spacer peg is fitted and the wall is finished, the tabs at the end twist off and can then be grouted over.

Other spacers are available for 80mm-thick blocks - 6mm x 6mm and 6mm x 10mm and also for 100mm-thick blocks - 10mm x 10mm

Building freehand is not as accurate as using spacers; weight compression could cause the blocks to slump or joints to be uneven.

Panel reinforcement and tying back to the perimeter opening

Stainless steel ribbed reinforcement bars are used to tie to the opening. The rods penetrate the expansion material and anchor the panel in place by connecting to the perimeter frame. This can be located by drilling an over-sized hole a minimum depth of 25–35mm and should be filled with silicone to cushion any movement of the re-bar.

Rods are 1200mm long and when the panel is larger than the reinforcement bar, rods are overlapped by a minimum of 150mm and are loosely joined using tie wire/cable tie.

One reinforcement bar should be used in each horizontal and vertical joint as a minimum. More rods may be required if using end glass blocks or a TF30 or TF60.

For situations where connecting the rods to the opening may prove difficult, panel anchors can be used (similar to the brick-tie principle secured by either screw or bolt-fixing or can mechanically shot fired).





Glass blocks specialist mortar • Colmef Vetromix

Colmef Vetromix is a specifically designed and formulated premix mortar for glass block construction it ensures accuracy and consistency of performance. It can be used internally, externally, straight, curved and fire-rated glass block walling. Vetromix has a fine texture, low slump and the whitest mortar available. It is used as bedding and pointing mix, therefore there are no bonding issues between building and grouting. Mixing instructions are on the reverse of each bag and should be strictly adhered to, 10 kilos will build approximately twelve 190x190x80 blocks. The surrounding temperature should not be 5°C and falling or 30°C and rising and the joint width should not exceed 22mm.

Expansion joint sealer sealant

After construction, the perimeter joint should be cleared of any residue mortar and caulked with Rods & Mortar expansion sealant (or fire stop mastic). Bridging the joint would restrict flexibility and movement and negate the expansion fibre and can cause glass blocks or joints to crack.



	Blocks per m ²	Blocks per bag 10mm joint	Blocks per bag 10mm joint curved	Blocks per bag 6mm joint
115x115x80	64	19	16	32
145x145x80	44	16	13	27
145x145x98	44	13	11	22
190x90x80	50	16	13	22.5
190x190x80	25	12	10	20
190x190x100	25	10	8	16
240x115x80	32	13	11	21
240x240x80	16	9.5	8	16
300x300x100	10	6	5	10

Rods & Mortar



Calculating Opening Sizes

When detailing a glass block wall, calculating the opening size correctly is the first and most important step as glass blocks cannot be cut. An opening can be calculated using a formula:

The dimension of the block plus the width of the joint multiplied by the number of glass blocks, plus one more joint width, equals minimum opening size.

If incorporating framing (such as U-channel or box section) the dimensions and tolerances need to be added to the formula measurement. If slip joints or support steel are required then this may also affect the opening size dimensions.

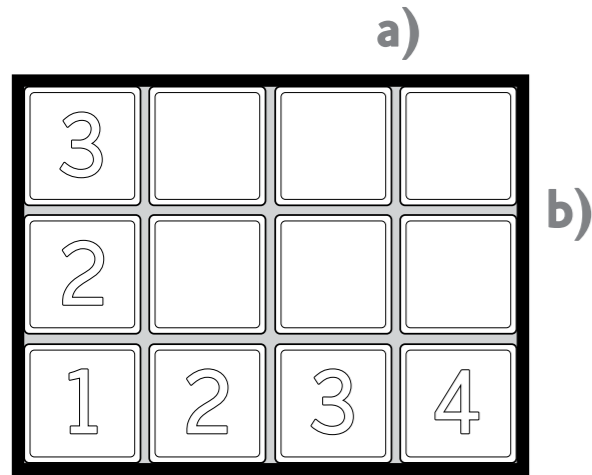
Curved Openings

For curved walls the same formula is used to calculate the opening width but only applies to the inside face of the curve (shorter radius) (e.g., 10 blocks and 11 joints is 2010mm, the same as a straight panel). The outside width dimension of the curve (longest radius) will be increased dependent on the radii as the blocks are faceted and external joint width will become wider.

The calculation for the height of straight or curved is the same.

The minimum radius required for various block sizes is covered in detail in 'Curved Panels'.

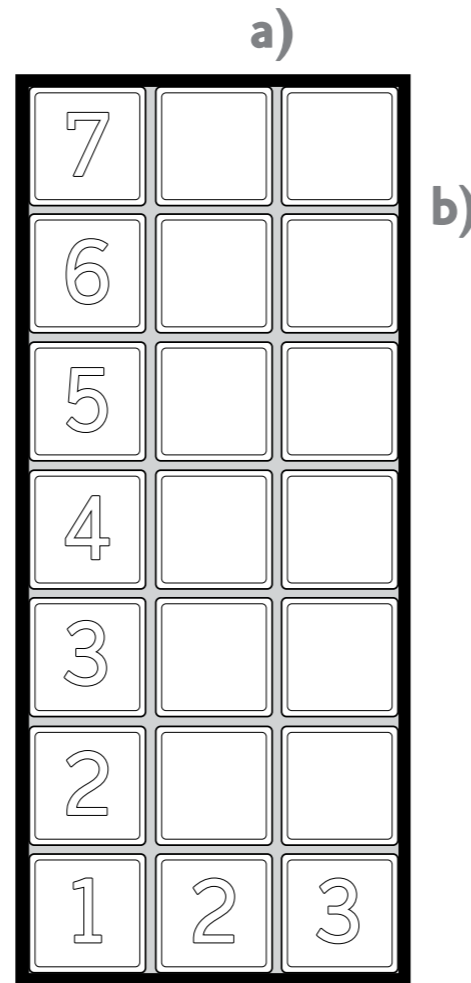
Examples using 10mm joints & 190x190mm glass blocks.



190mm glass block
and 10mm joint: 200
Number of blocks a) x 4
Number of blocks b) x 3
Plus perimeter joint: 10mm

a) Minimum Opening Width: **810mm**

b) Minimum Opening Height: **610mm**



190mm glass block
and 10mm joint: 200
Number of blocks a) x 3
Number of blocks b) x 7
Plus perimeter joint: 10mm

a) Minimum Opening Width: **610mm**

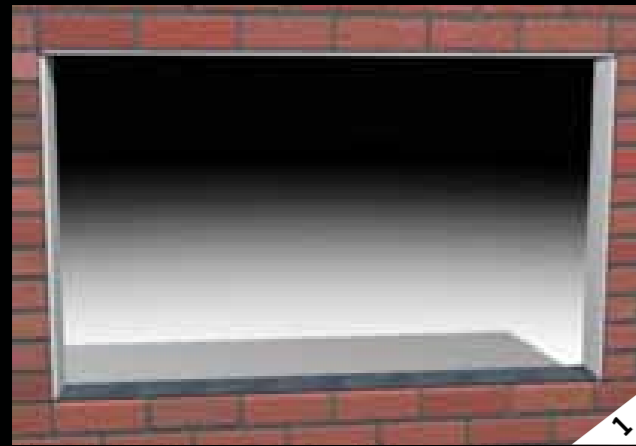
b) Minimum Opening Height: **1410mm**

The expansion material is incorporated into this measurement.

Matrix

RM1/1 (210x210)	RM2/1 (410x210)	RM3/1 (610x210)	RM4/1 (810x210)	RM5/1 (1010x210)	RM6/1 (1210x210)	RM7/1 (1410x210)	RM8/1 (1610x210)	RM9/1 (1810x210)	RM10/1 (2010x210)	RM11/1 (2210x210)	RM12/1 (2410x210)
RM1/2 (210x410)	RM2/2 (410x410)	RM3/2 (610x410)	RM4/2 (810x410)	RM5/2 (1010x410)	RM6/2 (1210x410)	RM7/2 (1410x410)	RM8/2 (1610x410)	RM9/2 (1810x410)	RM10/2 (2010x410)	RM11/2 (2210x410)	RM12/2 (2410x410)
RM1/3 (210x610)	RM2/3 (410x610)	RM3/3 (610x610)	RM4/3 (810x610)	RM5/3 (1010x610)	RM6/3 (1210x610)	RM7/3 (1410x610)	RM8/3 (1610x610)	RM9/3 (1810x610)	RM10/3 (2010x610)	RM11/3 (2210x610)	RM12/3 (2410x610)
RM1/4 (210x810)	RM2/4 (410x810)	RM3/4 (610x810)	RM4/4 (810x810)	RM5/4 (1010x810)	RM6/4 (1210x810)	RM7/4 (1410x810)	RM8/4 (1610x810)	RM9/4 (1810x810)	RM10/4 (2010x810)	RM11/4 (2210x810)	RM12/4 (2410x810)
RM1/5 (210x1010)	RM2/5 (410x1010)	RM3/5 (610x1010)	RM4/5 (810x1010)	RM5/5 (1010x1010)	RM6/5 (1210x1010)	RM7/5 (1410x1010)	RM8/5 (1610x1010)	RM9/5 (1810x1010)	RM10/5 (2010x1010)	RM11/5 (2210x1010)	RM12/5 (2410x1010)
RM1/6 (210x1210)	RM2/6 (410x1210)	RM3/6 (610x1210)	RM4/6 (810x1210)	RM5/6 (1010x1210)	RM6/6 (1210x1210)	RM7/6 (1410x1210)	RM8/6 (1610x1210)	RM9/6 (1810x1210)	RM10/6 (2010x1210)	RM11/6 (2210x1210)	RM12/6 (2410x1210)
RM1/7 (210x1410)	RM2/7 (410x1410)	RM3/7 (610x1410)	RM4/7 (810x1410)	RM5/7 (1010x1410)	RM6/7 (1210x1410)	RM7/7 (1410x1410)	RM8/7 (1610x1410)	RM9/7 (1810x1410)	RM10/7 (2010x1410)	RM11/7 (2210x1410)	RM12/7 (2410x1410)
RM1/8 (210x1610)	RM2/8 (410x1610)	RM3/8 (610x1610)	RM4/8 (810x1610)	RM5/8 (1010x1610)	RM6/8 (1210x1610)	RM7/8 (1410x1610)	RM8/8 (1610x1610)	RM9/8 (1810x1610)	RM10/8 (2010x1610)	RM11/8 (2210x1610)	RM12/8 (2410x1610)
RM1/9 (210x1810)	RM2/9 (410x1810)	RM3/9 (610x1810)	RM4/9 (810x1810)	RM5/9 (1010x1810)	RM6/9 (1210x1810)	RM7/9 (1410x1810)	RM8/9 (1610x1810)	RM9/9 (1810x1810)	RM10/9 (2010x1810)	RM11/9 (2210x1810)	RM12/9 (2410x1810)
RM1/10 (210x2010)	RM2/10 (410x2010)	RM3/10 (610x2010)	RM4/10 (810x2010)	RM5/10 (1010x2010)	RM6/10 (1210x2010)	RM7/10 (1410x2010)	RM8/10 (1610x2010)	RM9/10 (1810x2010)	RM10/10 (2010x2010)	RM11/10 (2210x2010)	RM12/10 (2410x2010)
RM1/11 (210x2210)	RM2/11 (410x2210)	RM3/11 (610x2210)	RM4/11 (810x2210)	RM5/11 (1010x2210)	RM6/11 (1210x2210)	RM7/11 (1410x2210)	RM8/11 (1610x2210)	RM9/11 (1810x2210)	RM10/11 (2010x2210)	RM11/11 (2210x2210)	RM12/11 (2410x2210)
RM1/12 (210x2410)	RM2/12 (410x2410)	RM3/12 (610x2410)	RM4/12 (810x2410)	RM5/12 (1010x2410)	RM6/12 (1210x2410)	RM7/12 (1410x2410)	RM8/12 (1610x2410)	RM9/12 (1810x2410)	RM10/12 (2010x2410)	RM11/12 (2210x2410)	RM12/12 (2410x2410)

ALL DIMENSIONS IN MM



Preparation of Opening

Calculate the correct opening size. Make sure the opening is square and perpendicular. Lay bitumen expansion material along base of opening. Secure expansion foam to jambs and head. All four sides of the opening should now be covered in expansion material. Bitumen is necessary on the base to take the weight of the glass block wall.



Set out dry the first row of glass blocks to ensure opening size is correct. Mark accurately and drill oversized holes in between the blocks, vertically and horizontally where rods will be positioned. Fill holes with silicone and fit vertical bars in place.



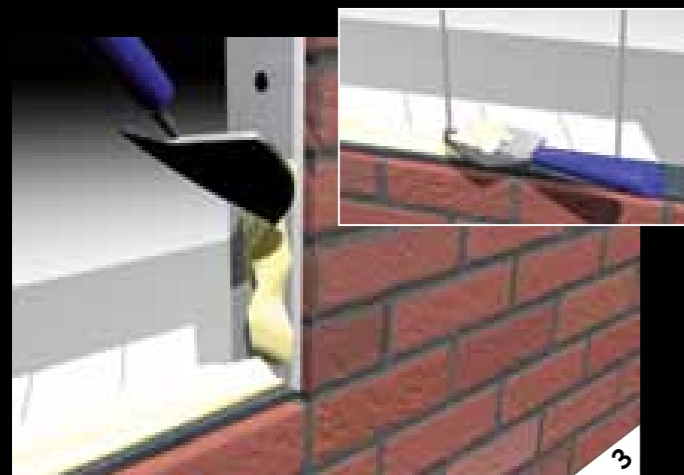
Building the Panel

After the first row is completed insert spacer pegs in between blocks and between the block and aperture they can be formed in to a T shape, by snapping or cutting the legs of the spacer peg. This prevents steel rods from touching glass.



Lay half the quantity of mortar and fix the horizontal rod in position, not forgetting to put silicone in the holes, and then cover over the rod with remainder of mortar. Rods have to be positioned every row vertically and horizontally.

Fit next row, remembering to check vertical and horizontal alignment.



Laying First Course

Mix Colmef Vetromix glass block mortar following instructions on reverse of bag. The mix should be a semi-dry consistency (slump 1 or less). Lay down a bed of mortar.



Fit first block and tamp down gently, fit second block and repeat. Ensure there is enough mortar between the blocks and the base to create sufficient adhesion, compact the vertical mortar joint using a wooden instrument. Spacer pegs are required between base and first row of blocks.



Finishing the Glass Block Panel

When the wall has set, snap off spacer tabs and grout all joints with diluted Colmef Vetromix mortar.



Sealing and Weatherproofing

Ensure that all excess residue mortar is cleared and mastic around perimeter of expansion foam to create a weatherproof seal using the Rods and Mortar expansion joint sealer. When installing fire rated glass blocks, Fire Stop mastic should be used.

Initial Clean and After Care Maintenance

Do not clean with any acidic products. Periodic cleaning is required. The best product is clean water. Buff up with a chamois leather and polish each block with a soft, lint free cloth using good old elbow grease.

Note: Clean face of block as work proceeds.

The glass block installer should have left the glass block wall in a clean, unblemished condition, requiring only periodical cleaning to maintain an excellent appearance. However, there may be a residue of cement on the glass surface left from mortar/tiling grout identified by whitish bloom when dry. This may be removed by use of proprietary cement stain remover.

Hydrofluoric Acid or Derivatives Must Not Be Used

Paint or cement may be removed by a blade, taking care not to scratch the surface of the glass.



Joint Sizes and Minimum Radii

When designing or building a curve, the internal radius dimension is one of the first items to consider to ensure the external vertical joint is not too wide and looks aesthetically in proportion with the horizontal joints. Also it is crucial that it does not exceed 22mm, as it may be susceptible to cracking.

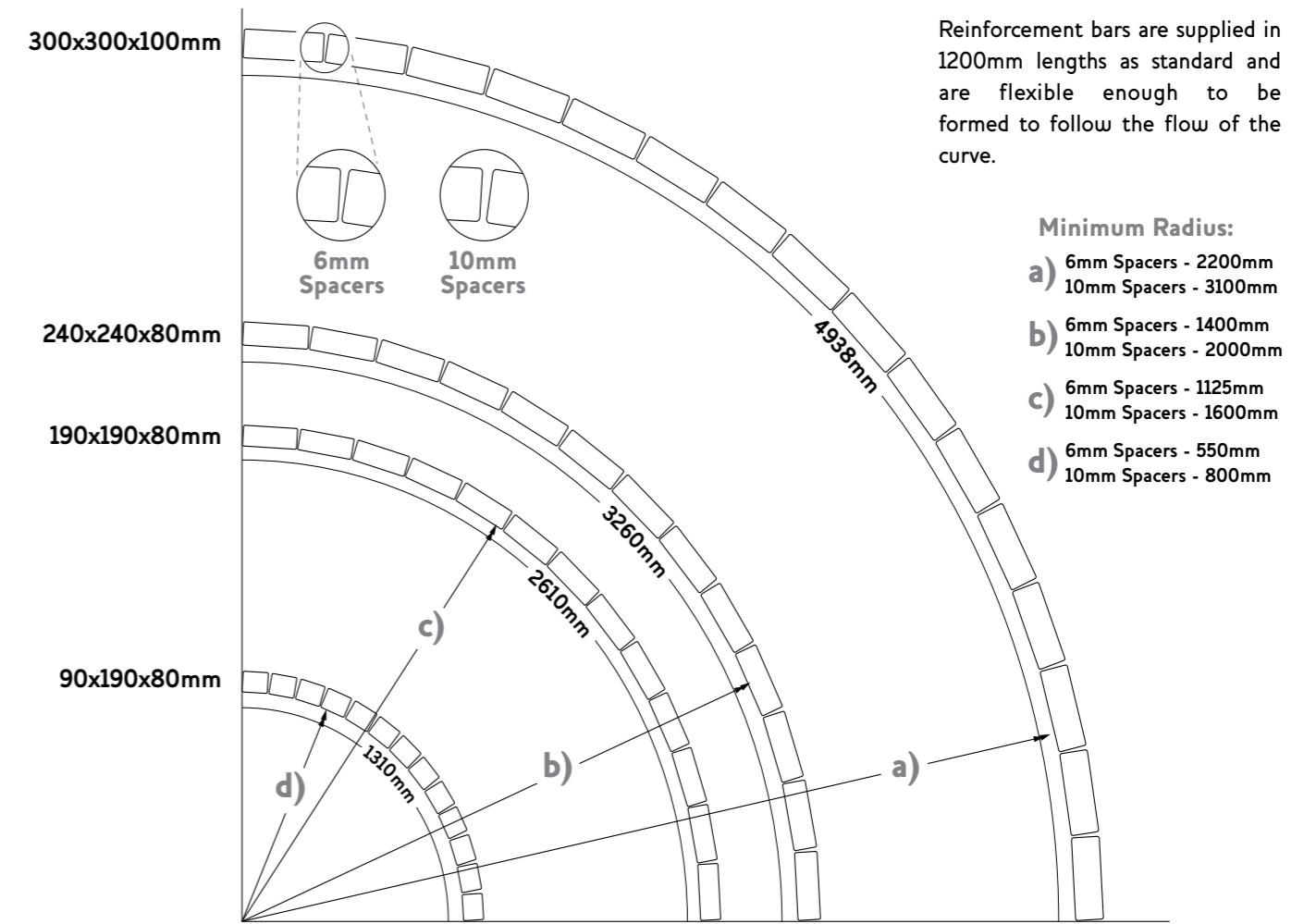
The radius is calculated in conjunction with the block dimension, so a smaller radius is possible with a 90x190mm block in comparison with a 190x190mm block.

A 6mm spacer used internally will achieve a narrower external vertical joint. This works well in conjunction with smaller format or half blocks, resulting in slimline vertical and horizontal internal and external joints.

Opening size & Restraint

To set out the opening size dimensions for a curved glass block wall panel, the calculation is done in the same manner as a straight panel. However the calculation should be done from the inside face of the curve (shortest radii). The outer width of the curve will be wider because the vertical joint is opened to form a curve (longest radii).

Reinforcement bars are supplied in 1200mm lengths as standard and are flexible enough to be formed to follow the flow of the curve.



Rods & Mortar - Curved Glass Block Walls

Curved glass block walls can only be constructed using Rods & Mortar.

Planning the design of a curved wall uses the same principles of constructing a flat wall. Additional considerations to address are calculating the opening size, ensuring the internal radius is sufficient in respect of the block size being used and positioning of intermediate vertical slip joints.

Expansion joints and curved glass block walling

Curved walls are very stable, due to the shape. However, ensuring they are restrained sufficiently to the perimeter opening is important. Between the opening and glass blocks, should be an expansion joint (soft joint) incorporated to the head and jambs. A bitumen fibre or high-density neoprene should be inserted at the base.

The perimeter soft joint should be sealed by caulking with silicone and not grouted over with mortar as bridging the joint will restrict expansion and contraction and may lead to either the blocks or mortar joints cracking. Intermediate vertical expansion joints are also required whenever the curve changes plane. The joint only needs to be incorporated vertically and is designed to cope with lateral forces – the opposite flows of the curve expand towards each other, absorbing the compression.

A joint caulked with a Rods & Mortar white sealant will visually look similar to a standard mortar joint.



Mulia Clear Flemish 1/2 glass blocks and end blocks, sandblasted one side. Constructed with Rods & Mortar.

LaRochere Clear Flemish blocks, Precast concrete panel, channel powder coated specific blue RAL shade.



walls precast

Precast Wall Panels

Precast glass block elements are a modular dry fix panel system designed to offer solutions to speed up the installation process for glass block walling. It lends itself to various types of projects where multiple panels are repeated or speedy installation is a necessity. For example: A housing project using the same style of panels over & over can be fitted without using specialised glass block installation contractors on an as and when basis as site demands mean that a rigid fitting schedule cannot be followed & local, on site labour crews can be utilised.

Another example was a build programme where an entire property had to have renovation over three days, with lots of community volunteered labour & as the job was well planned the panels were cast six weeks early & precast panels were fitted & sealed within a 30 minute slot; demonstrating the ease & speed of installation.

Prefabricated glass blocks wall panels offer many benefits like the advantages of quality control as they are manufactured under factory controlled conditions, ensuring regularity of joints & guaranteeing a first class, premium finish. Weather conditions, also are not an issue that affect the installation of external glass block precast units unlike insitu construction.

Precast glass block wall panels can be considered for various applications like internal, external and fire rated glass block situations. Precast elements are made to order to a unique size & specification to suit particular requirements. In the interest of health & safety restrictions are placed on panels that are manually being installed in comparison to mechanical lifting. In this event, for larger openings, horizontally or vertically interconnecting precast panels can be used that seamlessly join together to aesthetically look like one panel.

