

Sitework guide



Achieving project completion on time
and with the minimum of difficulty

Forticretemasonry



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Forticretemasonry

Product procurement

As the originator of Specification Masonry in the U.K. with five decades of experience in its manufacture and application and as one of the UK's leading manufacturers of Cast Stone products, Forticrete is able to provide valuable guidance to the contractor, to ensure optimum performance on-site, whilst reducing operating costs.

The company is renowned for the depth of its technical expertise and is committed to providing its customers with a level of service that extends well beyond the factory gate.

This Sitework Guide provides step-by-step details from ordering to delivery and construction which are intended to assist in the process of achieving project completion on time and with the minimum of difficulty.

As a firm of BSI Registered status, Forticrete is able to give an assurance not only of product quality but also the support facilities available from our Customer Support Centres. These are located at our major manufacturing facilities and linked to our other manufacturing bases by the most up-to-date IT systems, ensuring that customer requirements are progressed rapidly.

Although we strive constantly to ensure that the highest standards are maintained, we are aware that problems can occur from time to time. Forticrete operates a policy of registering any complaint, be it product or service based, with every problem assessed and responded to at the earliest opportunity to minimise inconvenience to our customer.

Should you wish to record any difficulty with the quality of service or product please ring us directly – on **01909 775000**.



Masonry ordering procedures

To ensure that the correct materials are produced to meet your requirements, the following information should accompany your order details:

1. Product type & colour (e.g. Textured, Straw)
2. Size, type & reference (e.g. 390 x 90 x 190 cill type K21)
3. Finish, including nominated faces (e.g. Textured 1F, 1E)
4. Quantities of each type (e.g. 1000m²)
5. Dimensional drawings of all non-standard specials.

For guidance the following key is applicable when ordering products with associated ancillary treatments such as texturing or polishing:

1F One Face – 2F Two Faces – 1F, 1E One Face & One End –
1F, 2E One Face & Two Ends – 2F, 2E Two Faces & Two Ends –
1F, S One Face & Soffit – 2F, S Two Faces & Soffit –
Ext External Faces (Quoins) – Int Internal Faces (Quoins)

Co-ordinating sizes

When converting from co-ordinating sizes to number of units the following criteria are applicable:

400 x 200 = 12.5 blocks per m² e.g. 100m² = 1250 blocks
450 x 225 = 9.88 blocks per m² e.g. 100m² = 988 blocks

Quantities

It is normal policy to manufacture all Masonry products to specific order requirements. It is therefore in the interest of the Customer to ensure accuracy in quantifying order details to avoid any subsequent variances in site delivery needs.

Delivery scheduling

The provision of a fully detailed delivery schedule will ensure that materials are provided to suit site programme requirements, this should include the following:

1. **A quantified sequence of delivery requirements by product type.** Masonry products are manufactured in a basic Fairface™ or moulded format and are then allowed to reach a state of maturity prior to either delivery and/or ancillary processing, such as polishing, splitting or texturing. The product therefore remains in its basic form until such time as called forward for preparation. On completion of ancillaries the products are packaged for delivery at which point alterations will obviously cause disruption and should be avoided where possible.
2. **An indication of delivery dates,** either specific or week ending.
3. **Details of specific packaging requirements.** Specialist pack preparation can be arranged by prior negotiation.
4. **Details of abnormal delivery hours.** Adequate provision should be made for associated costs.
5. **Vehicular requirements.** The flexibility of an articulated vehicle makes it the preferred choice for delivery. If this is not appropriate because of site access please contact our despatch office.

Product procurement (continued)

Delivery format

Forticrete products can be supplied to site in cubes for mechanical offloading or on pallets for offloading by fork lift truck. They should be stored as close as possible to the place of work and rehandling should be kept to a minimum. The tables below show typical delivery details for Forticrete's major product groups.

Table 1 Specification masonry

Thickness	Block type	Weight Kg each	Blocks per layer	Layers per cube	Blocks per cube	Weight per cube tonnes	Number of pallets
Co-ordinating face size 400 x 200mm actual face size 390 x 190mm							
90	Solid	14.0	16	5	80	1.12	19
	Hollow	11.1	16	5	80	0.89	19
140	Solid	21.8	12	5	60	1.31	16
	Hi-Light®	16.7	12	5	60	0.94	16
	Hollow	12.7	12	5	60	0.76	16
190	Solid	29.6	8	5	40	1.18	18
	Hollow	17.7	8	5	40	0.71	18
Co-ordinating face size 450 x 225mm actual face size 440 x 215mm							
90	Solid	17.9	18	4	72	1.29	17
100	Solid	19.8	16	4	64	1.27	17
	Hi-Light®	15.6	16	5	80	1.25	17
	Hollow	14.8	16	5	80	1.18	17
140	Solid	28.0	12	4	48	1.34	16
	Hi-Light®	19.0	12	5	60	1.14	16
	Hollow	18.5	12	5	60	1.11	16
215	Solid	37.7	8	4	32	1.21	16
	Hollow	25.3	8	5	40	1.04	16

Medici®, Florentine® and Venezia™ units are supplied to site with the polished faces protected and on wooden pallets. They must be offloaded by fork lift truck and should be stacked one cube high only. Florentine® and Venezia™ cube sizes and weights are the same as specification masonry.

Table 2 Medici®

Thickness	Block type	Weight Kg each	Blocks per layer	Layers per cube	Blocks per cube	Weight per cube tonnes	Number of pallets
Co-ordinating face size 400 x 200mm actual face size 390 x 190mm							
90	Solid	15.3	16	5	80	1.22	15
Co-ordinating face size 450 x 225mm actual face size 440 x 215mm							
90	Solid	18.5	8	8	64	1.28	20

Timber pallets

Due to the nature of some products, it is necessary for the units to be supplied on timber pallets in the interest of both safety and protection.

The following products are therefore always supplied on timber pallets:

- All polished product groups
- All Splitface™ product groups
- All special block shapes
- All precast products
- All cast stone

It is also recommended that standard masonry units are taken palletised to allow for ease of site transportation, protection of the product and in the interest of safety. This can be arranged upon request at the time of order placement.

Ownership of the timber pallet is therefore transferred to the customer who is then responsible for disposal or recycling/sale.

Forticrete and its contract haulier do not accept liability for the removal of timber pallets and packaging from site.

Sample panel

The construction of a representative panel is recommended as normal practice to determine the general standard of the product and its application, including workmanship and mortar joint type.

Standard panels:

As a general principle materials will be supplied free of charge in the form of eight full and four half blocks (450 x 225 format) or ten full and five half blocks (400 x 200 format). This will enable the construction of a 1m² sample panel.

Non-standard panels:

These are normally detailed by the Specifier and may include larger areas and/or specials. Individual requirements will be assessed dependent upon content and it may therefore be necessary to invoice for materials needed in addition to the 1m² allowance of the standard panel.

For complex projects, our commitment to Customer Support provides you with the opportunity to utilise the services of our dedicated Contracts Managers, each of whom is experienced in value engineering. They can provide early guidance in preparing take-off details and delivery schedules to ensure the provision of optimum products and service to meet your site programmes.

Note: For stone products please refer to product literature.

Site preparation

Handling and safety

Legislation

The Manual Handling Operations Regulations places duties on employers to carry out a risk assessment on all manual handling tasks.

The Construction (Design & Management) Regulations places duties in the form of a mandatory Health & Safety system on contractors.

Interpretation of legislation

In an attempt to provide practical guidance for meeting the requirements of these two Regulations the Health & Safety Executive (HSE) has issued Construction sheet 37 'Handling Building Blocks' which advises that there is a risk of injury in the single-handed repetitive manual handling of blocks heavier than 20kg. The guidance given in Construction sheet 37 is not mandatory, but gives a method of meeting the requirements for the Regulations.

Units of greater than 20kg should be handled mechanically.

The HSE guidance does not prevent an individual handling manually a small number of units greater than 20kg. In particular, ancillary units such as quoins or reveals would fall into this category and it would not be expected that these would be handled mechanically.

Blocks and construction options

Units of greater weight than 20kg are essential in many situations, as they offer specific benefits for:

- Structural Performance
- Fire Resistance
- Sound Insulation
- Thermal Insulation

and their use should create no problems provided that appropriate handling methods are used.

For users who, for design reasons, would otherwise select units of greater than 20kg but would prefer not to, a number of options exist. The appropriate choice from the options available will depend on the units or wall properties dictated by the application.

Choices include:

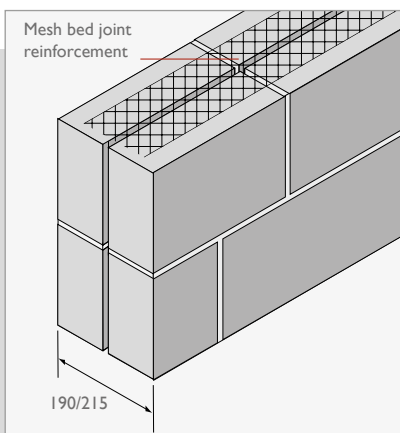
- Using Hi-Light® units instead of solid units (having almost identical properties to solid units)
- Using metric units having sufficiently similar properties
- Using hollow units instead of solid units
- Using alternative construction techniques such as collar jointing* units to form a 190 or 215mm width wall (particularly suited to facing applications)

Note: Whenever making the choice of units it is essential to ensure that the desired performance characteristics of the finished wall are not compromised.

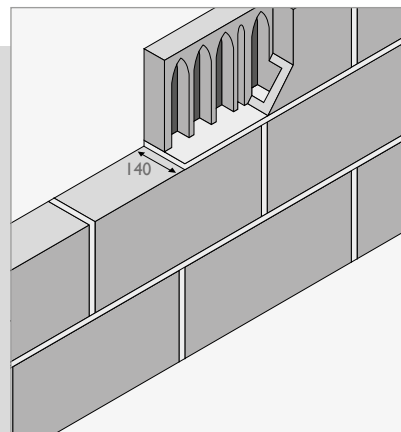
*Collar jointing is laying units back to back in normal aspect with a 10-15mm space between the adjoining faces of the units. The two leaves may be tied together. If tied, either normal ties or bed joint reinforcement may be used. Collar jointed walls are not suitable for separating walls in dwellings.

Large Precast units can have sockets cast into them or they can be made in smaller units for ease of handling.

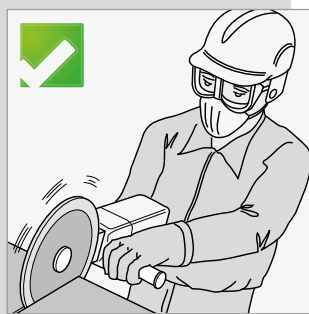
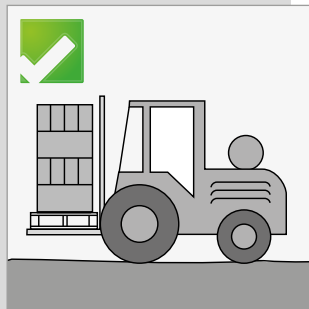
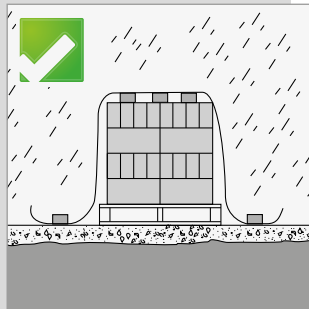
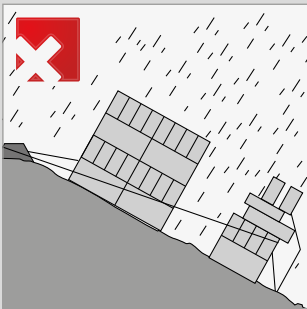
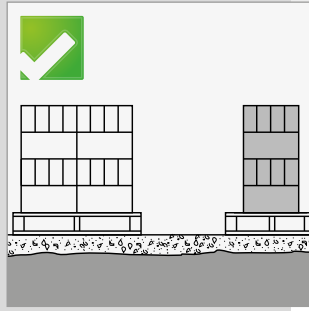
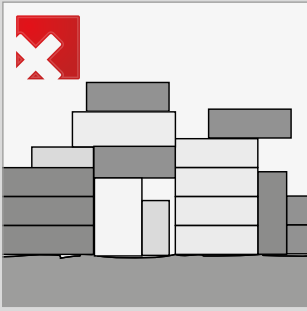
Helpful hint



Collar jointing
Suitable for Fairface™ work
(not party walls)



Hi-Light® masonry



Storage

Care should be taken to store the blocks separately according to type to allow easy and accurate identification when needed. They should be stored as close as possible to the place of work keeping rehandling to a minimum.

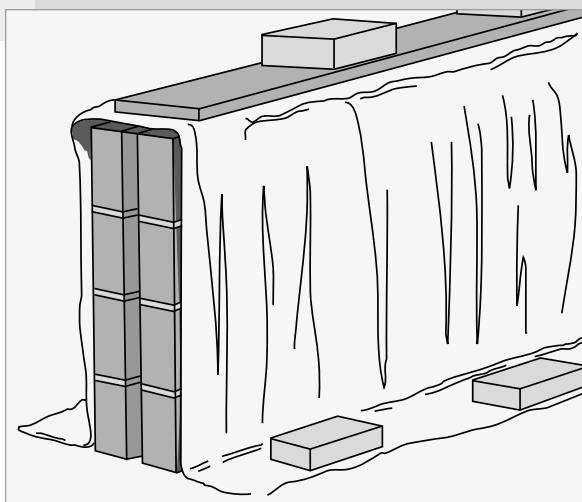
Consideration should be given at an early stage as to the method of handling on site and mechanical means, e.g. forklift. The packs should be stored on firm, level ground away from areas of high traffic or where mud splashes may occur. It is important that blocks are stored under cover, such as polythene or tarpaulin to prevent saturation prior to laying.

Much can be done to improve the safe handling and use of concrete blocks by following simple and straightforward good working practices and giving adequate consideration to health and safety aspects at the appropriate stage in the construction programme.

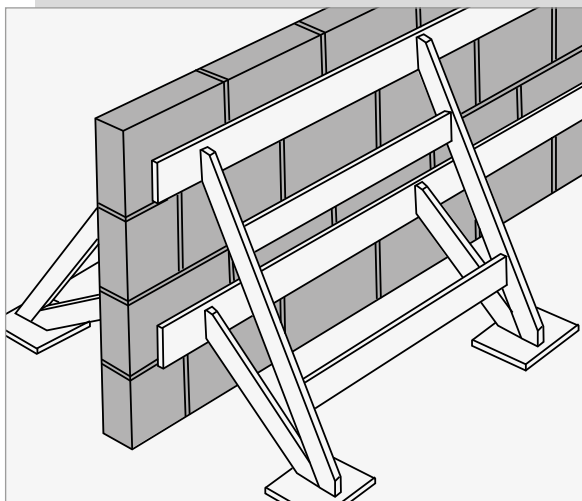
Careful consideration of the block layer's working area can also contribute significantly to safe working.

Points to take into consideration include:

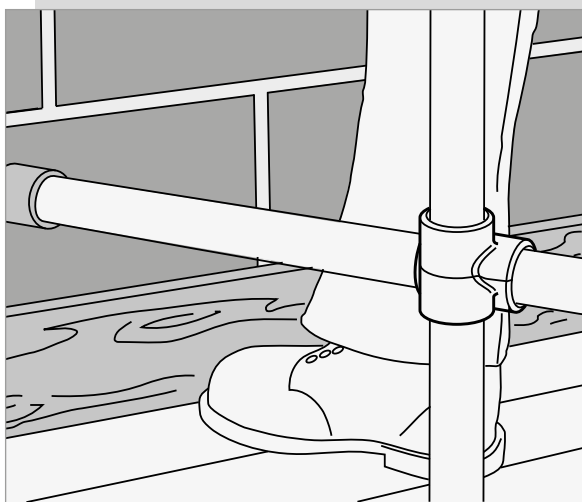
- Move units in packs and by mechanical means whenever possible
- Load units out to above knee height
- Ensure that normal protective equipment appropriate to construction sites is both provided and used
- Ensure that appropriate eye protection and dust suppression or extraction measures are provided when mechanically cutting or chasing units



Overnight protection



Temporary propping of high or long walls



Toe boards and scaffolding caps will prevent damage

Protection

All blockwork, Cast Stone and Precast units should be protected from rain as much as possible. At the end of each day blockwork should be covered, this is particularly important in the case of hollow blocks to avoid saturation. Prevention of excessive moisture will reduce the risk of efflorescence or lime bloom which is generally attributable to a build up of moisture somewhere within the wall.

Consideration should also be given to propping high or long walls where they are not properly restrained until completion of the walls. This could also apply to internal walls, originally not designed for wind loads, being constructed before the envelope of the building is complete.

Good protection should be maintained throughout the construction of the project, including the use of toe boards on scaffolding and polythene sheeting to plinths and cills to prevent staining from mortar splashes. Sheeting should be left in place until completion and further protection given to areas exposed to site traffic or following trades.

Unless the work is protected when proceeding there is always the risk that sudden frosts or showers will cause damage.

Note: The appearance of finished masonry may be affected by failure to protect the work during construction.

Use below DPC

All Forticrete Masonry Products are suitable for use below DPC and below ground level up to DS-3 conditions.

Use below ground in sulphate bearing conditions

Sulphates can occur naturally, mainly in London or Oxford clay or can be as a result of industrial pollution. Sulphates attack cement and can result in a breakdown or expansion of the concrete causing considerable damage. In order to determine which blocks can be used it is essential to establish the level of sulphates in the ground. This is carried out by soil mechanics within a site investigation.

Recommendations for the use of aggregate concrete blocks in sulphate bearing ground conditions are given in BRE Special Digest 1, as follows:

Where Design Sulphate class DS-2 or DS-3 conditions are encountered, confirmation should be sought from the site investigation findings that sulphate levels apply to the depth of soil against which the blocks will be placed.

Design recommendations:

For Design Sulphate Class DS-1 conditions:

Blocks conforming to BS EN771-3:2003 and with BS 5628:Part 3 for use below ground will be satisfactory.

For Design Sulphate Class DS-2 and DS-3 conditions:

Blocks conforming to BS EN771-3:2003 and BS 5628 Part 3 for use below ground, with more than 20% of their cross-sectional area carbonated may be used. The carbonated area may be estimated by breaking a block and applying phenolphthalein as described in BRE information paper 6/81.

Setting out

Guidance for the use and workmanship relating to masonry units is given in BS 5628 Part 3 and BS 8000: Part 3.

Building tolerances

The standard of the completed facing masonry will largely depend on the skill of the blocklayer and the attention to adequate site supervision.

Care must be taken to ensure accuracy of initial setting out and it is important to maintain uniformity of joint thickness and alignment of vertical joints. As masonry units are larger in size than bricks there are fewer joints to take up discrepancies, however, the reliability of Forticrete dimensional tolerances minimises this factor. A table of permissible deviations in the finished construction is available within BS 8000 Part 3.

The most specified form of walling is stretcher bond and care should be taken to ensure accuracy in the initial setting out to half length bond. In cases where stack bonding is applied, attention should be given to the need for inclusion of bed joint reinforcement where appropriate.

When setting out masonry, care should be taken to reduce the cutting of masonry units to a minimum and to avoid irregular or broken bond, particularly at openings or in piers. Great care should be taken to ensure accuracy in the setting out of the first course of masonry units in order to avoid subsequent inaccuracies in the finished work.

Table 3 Dimensional tolerances cast stone & precast products to BS 1217

Unit Length	Tolerance
0-600mm	±2mm
601-1000mm	±3mm
1001-2500mm	±4mm
2501-4000mm	±5mm
>4000mm	±6mm

Dimensional tolerances

Below are dimensional tolerances allowed by British Standards for blockwork in accordance with D1.

Table 4 BS EN771-3 tolerances

	Height	Thickness	Length
Length allowable tolerance in mm	+3, -5	+3, -5	+3, -5

All Forticrete Masonry Products are manufactured to the required tolerances of BS EN 771-3: 2003, Class D1 and BS EN 771-5: 2003 and Cast Stone to BS EN 1217. However, in conjunction with the company's Quality Assurance registration, Forticrete has targeted an improvement on the British Standard tolerances, as shown in Table 5.

Table 5 Forticrete tolerances

Product	Length	Thickness	Height
Specification Masonry			
Textured	+2,-2	+2,-2	+2,-2
Fairface™	+2,-2	+2,-2	+2,-2
Twinbloc™	+2,-2	+2,-2	+2,-2
Ribloc®	+2,-2	+2,-2	+2,-2
Sparstone™	+2,-2	+2,-2	+2,-2
Novastone®	+2,-2	+2,-2	+2,-2
Polished Masonry			
Florentine®	+2,-2	+1,-3	+2,-2
Venezia®	+2,-2	+1,-3	+2,-2
Medici®	+2,-2	+1,-3	+2,-2
Splitface™ Masonry			
Splitface™	+2,-2	N/A	+2,-2
Ribloc	+2,-2	N/A	+2,-2
Sparstone™	+2,-2	N/A	+2,-2
Glazed Masonry			
Astra-Glaze®-SW™	To ASTM C90- Type I		
Cast Stone			
Dressings (see table 3)			
Regency® Ashlar	+2,-2	+2,-2	+2,-2
Standard Masonry			
Arenabloc™	+2,-2	+2,-2	+2,-2
Painting Quality	+2,-2	+2,-2	+2,-2
Commons	+3,-5	+3,-5	+3,-5

Construction procedures

Mortars

Selection of the correct grade of mortar is an important factor in the performance of a wall. The mortar must have sufficient strength, be durable, resist rain penetration as much as possible and yet be flexible enough to accommodate slight movement within the wall.

Mortars without retarding agents should be used within approximately two hours of mixing. To restore workability within the two hour period a small amount of water may be added but should be thoroughly mixed in.

If coloured mortar is being used no retempering should be allowed as it may lighten the specified colour. The working life of the mortar will be longer in colder weather and should only be prepared in batches appropriate to the planned rate of use, so that workability remains constant. On a hot day covering the mortar can help to prevent excessive evaporation.

For all Forticrete Masonry products up to and including 20 N/mm² and all Cast Stone Dressings, grade III mortar should be used (1:1:5/6).

It is preferable that a cement lime sand mix be used as these mortars have increased resistance to rain penetration, have greater bond strength and will accommodate movement.

It is recommended that mortars are obtained from a reputable supplier please see Product Guide.

Stone dust mortars, which are regularly used with natural stone masonry and dressings, can also be used with Cast Stone to add to the aesthetic appeal.

Typical mix proportions for most situations would be:

Table 6 Stone dust mortar		
White Portland Cement	Lime	Portland Stone Dust
1	1	5/6

Table 7 is an extract from BS 5628-1:2005 and shows the relationship between strength and the various other properties; the new references transferred from BS EN 998-2:2003 and compressive strength at 28 days.

Astra-Glaze® units should be pointed using a suitable waterproof grout, which should be gun-applied. The ceramic tile method of smearing grout all over the face must not be used. Waterproof grouts are available from: Laticrete Ltd: 0151 448 1982.

Mortar additives

At copings to parapets, freestanding walls, dwarf walls etc., where the risk of deterioration due to the effects of rain and frost may be severe, and where the masonry may be subjected to human activity or impact damage, the use of a mortar additive that will both increase the bond strength and improve waterproofing qualities is recommended.

Use of mortars

Mortar should be of a buttery rather than a fluid texture with just sufficient water added to provide workability.

Blockwork should normally be laid on a full bed of mortar with full, well compacted perpend joints.

Mortar should be allowed to harden slightly and should then be finished according to specification and tooled.

Prevent mortar from smearing on to the face of the block, as cleaning at a later stage is sometimes difficult and can lead to expensive and time-consuming remedial treatments.

The BSI guide PD6678 'Guide to the specification of masonry mortar', covers:

- Site made masonry mortar
- Factory made masonry mortar conforming to BS EN 998-2

Copies are available from BSI Customer Services on 020 8996 9001.

Helpful hint

Table 7 Masonry mortars							
	Traditional mortar designation	BS EN 998-2 Mortar Class (Compressive Strength Class)	Prescribed mortars (proportion of materials by volume) [see notes 1 and 2]				Compressive strength at 28 days N/mm ²
			Cement ^a : Lime: Sand with or without air entrainment	Cement ^b : Sand with or without air entrainment	Masonry Cement ^c : Sand	Masonry Cement ^c : Sand	
 Increasing ability to accommodate movement, e.g. due to settlement, temperature and moisture changes	(i)	M12	1 : 0 to 1/4 : 3	—	—	—	12
	(ii)	M6	1 : 1/2 : 4 to 4 1/2	1 : 3 to 4	1 : 2 1/2 to 3 1/2	1 : 3	6
	(iii)	M4	1 : 1 : 5 to 6	1 : 5 to 6	1 : 4 to 5	1 : 3 1/2 to 4	4
	(iv)	M2	1 : 2 : 8 to 9	1 : 7 to 8	1 : 5 1/2 to 6 1/2	1 : 4 1/2	2

a Cement, or combination of cements, in accordance with Clause 13, except masonry cements

b Masonry cement in accordance with Clause 13, (inorganic filler other than lime)

c Masonry cement in accordance with Clause 13, (lime)

NOTE 1 Proportioning by mass will give more accurate batching than proportioning by volume, provided that the bulk densities of the materials are checked on site.

NOTE 2 When the sand portion is given as, for example, 5 to 6, the lower figure should be used with sands containing a higher proportion of fines whilst the higher figure should be used with sands containing a lower proportion of fines.

Laying

In the case of cavity walls both leaves should be raised at the same time, taking care to correctly position all damp proof courses and prevent damp from penetrating to the inner leaf. No one leaf of cavity wall construction should be built more than 1.2m higher than the other leaf.

The horizontal distance between cross joints in successive courses should normally be not less than one-quarter of the length of the units but in no case less than 75mm.

- It is essential that cavities are kept clean at all times and mortar should not be allowed to dry on wall ties.
- For facing blockwork it is essential to avoid mortar smearing and staining of any sort.
- Mortar droppings must be removed as work proceeds.
- Blockwork should not normally be raised more than 1.5m high in any one day and for facework, lifts between corners should be completed at the end of the day's work.
- All blockwork should be laid in accordance with BS 8000, BS 5628 and industry best practice.

The use of Catnic Brikmat plastic ladder type spacing system will produce a uniform depth of horizontal mortar joints and enable a greater number of successive courses to be laid. This is especially advantageous when using Medici® or Precast units.

Helpful hint

The use of quoin blocks is recommended at corners to ease setting out and improve aesthetic appeal.

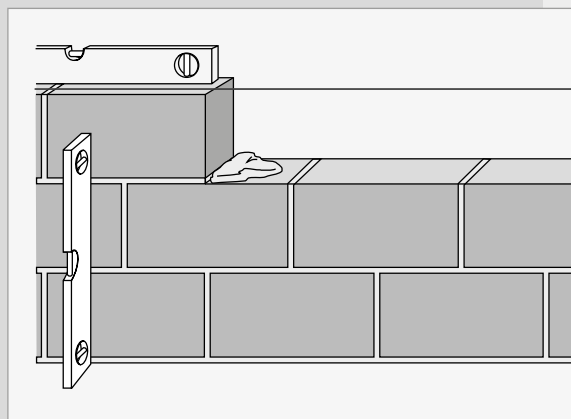
Helpful hint

Laying in wet/cold conditions

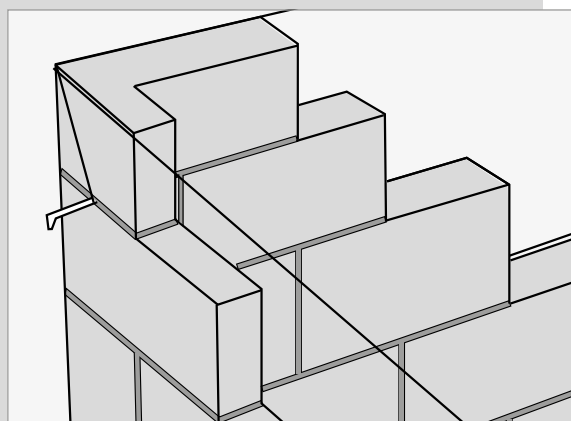
Because of the possible damage that could occur to the masonry/ mortar during construction in very cold conditions, no masonry units should be laid when the temperature is at or below 3°C, unless precautions are taken to ensure that the mortar has a minimum temperature of 4°C when laid and that the masonry is protected from becoming frozen until the mortar has hardened. In addition, precautions may be required where the temperature is above 3°C when the mortar is laid but where the subsequent temperature may fall below freezing before the mortar has hardened, e.g. overnight.

Antifreeze admixtures, particularly calcium chloride should not be used to improve workability of mortars. This type of admixture does not give satisfactory results and can attack any embedded metal items within the mortar joints, causing failure at a later stage.

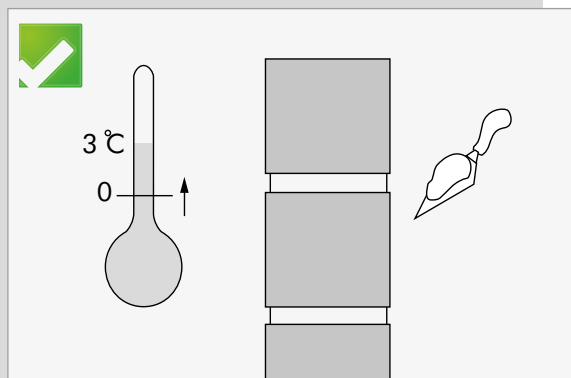
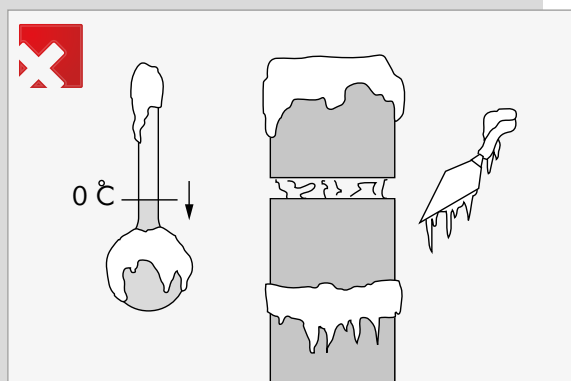
If blockwork is damaged by frost, take it down and rebuild.



Correct setting out and alignment are essential



Building up corners



Jointing

Jointing is preferable to pointing as it leaves the bedding mortar undisturbed. The best type of joint are: Bucket handle, Recessed and Weathered. Recessed joints should not be used where there is a danger of excessive wetting which may lead to damage by frost action or rain penetration. The depth of the recess should be related to the distance of any perforation of cavity from the exposed face of the unit.

All joints should be tooled where possible as this compacts the joint, increasing the weather resistance and reducing mortar shrinkage. Pointing of blockwork should be avoided.

Weepholes in perpend joints may be formed by inserting a timber packer which can be withdrawn at the end of the day when the mortar has hardened. Alternatively, proprietary weephole components can be used.

Helpful hint

A recessed joint enhances the appearance of the masonry finish and is especially recommended for use with Textured and Polished Masonry.

Helpful hint

Damp-proof courses

Horizontal damp-proof courses should be positioned so as to fully cover the leaf thickness, be laid on an even bed of fresh mortar and covered by mortar so as to maintain regular joint thickness. While exposed they must be protected from damage. Vertical damp-proof courses should be fixed so as to separate the inner and outer leaves of the wall. It is good practice to insert a damp proof course under all types of cill unit.

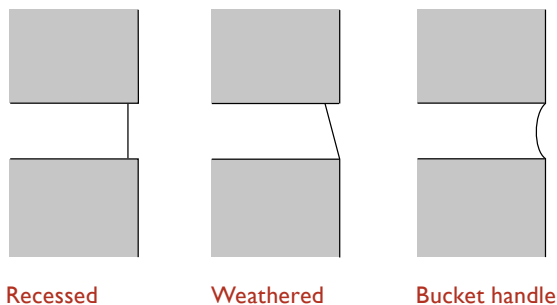
Wall ties

See BS 5628: Part 3 for the specification of wall ties which must take into account conditions of exposure, sound insulation and structural requirements. Ties used for cavity wall construction should be embedded 50mm in the mortar and the vertical twist type, or other approved types, are required for cavities over 100mm wide, (BS 5628 Part 3). Wall ties should be staggered in alternating courses and spaced in accordance with the following requirements:

Table 8 Wall tie spacing - BS 5628

Leaf thickness	Cavity width (mm)	Spacing of ties horizontal (mm)	Vertical	No of ties per m ²
<90mm	50-75	450	450	4.9
>90mm	50-300	900	450	2.5

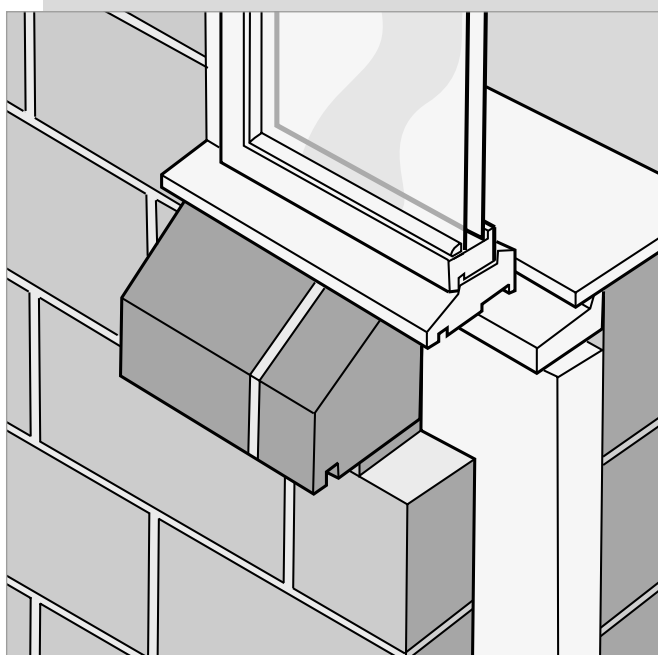
Note: If 200mm height blocks are used, the Code allows different spacing to that in the table, provided the number of ties per square metre is no less than the figures given.



Cill units

Cills are available in various sizes within the Forticrete Masonry, Precast & Cast Stone ranges or can be manufactured to specific design details.

Blocks should be laid to the horizontal alignment of the lower cill angle and projecting from the main wall for weathering purposes, also a drip groove should be detailed to assist in protection from staining. All cills should be adequately protected as construction proceeds.



Cill detailing

All Precast and Cast Stone one piece cills should be bedded at the ends only. The cill should be solidly pointed as the scaffold is taken down upon completion of the construction.

Helpful hint

Reinforced masonry lintels

Forticrete reinforced masonry lintels may be used to span openings in wall panels whilst maintaining the appearance of the block units. Tables 9, 10, 11 and 12 provide an indication of the loading that the lintels can sustain for a given span.

The lintels should be designed in accordance with

BS 5628 Part 2 'Code of Practice for the Use of Reinforced Masonry'. The tables have been developed applying the recommendations of this British Standard. The infill assumed is a C32/40 concrete with 10mm aggregate size.

The values given within the tables are for guidance only. The reinforcement quantities and the application of the lintel should be approved by the project Structural Engineer.

The safe working loads within the tables are assumed uniformly distributed and a partial factor of safety on loading of 1.50 has been adopted to convert the lintels' ultimate strength to the safe working loads indicated. The span of the lintel is typically the distance between the centre line of the bearings. To achieve durability for Exposure Situation E3 (BS 5628 Part 2), stainless steel reinforcement is required as indicated with an *.

Note: Spans indicated within the tables represent the structural span of the lintel only.

The end bearing of the lintels should be calculated paying due allowance to the compressive strength of the blockwork at the bearings and the anchorage requirements of the reinforcement at the bearings. In some cases the ends of the reinforcement may require a full hook to achieve the required bond length. For further advice on the design and application of Forticrete lintel units, refer to the Forticrete Technical Department.

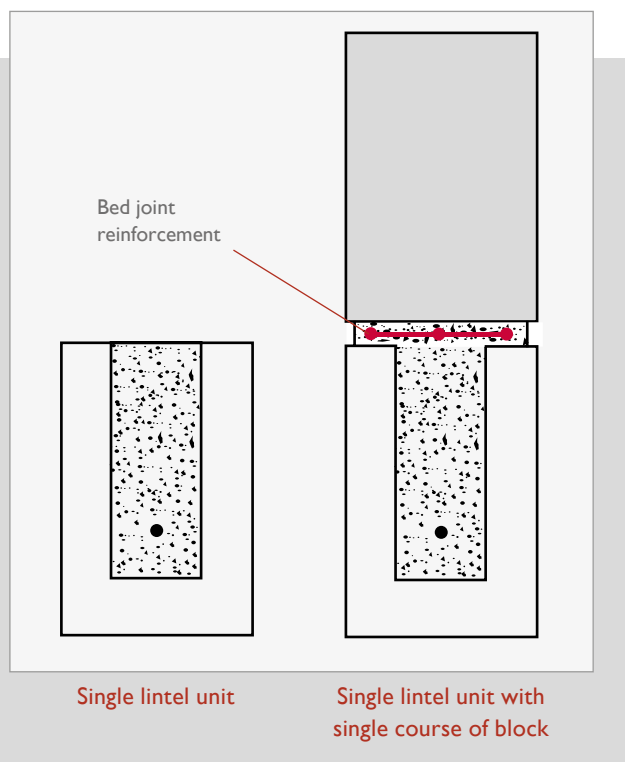


Table 9 390 X 190mm lintel unit with one course of masonry and bed joint reinforcement above

Lintel Width	Block Ref	Reinforcement (high yield)	ULS Moment (kNm)	ULS Shear (kN)	Safe UDL in kN/m for span (mm)							
					600	900	1200	1500	1800	2100	2400	
90	K28/K14	1H6*	3.2	5.1	11.3	7.6	5.7	4.5	3.8	3.2	2.8	
		1H8*	5.4	5.3	11.8	7.9	5.9	4.7	3.9	3.4	2.9	
		1H10*	7.8	5.5	12.2	8.1	6.1	4.9	4.1	3.5	3.1	
140	P28/P14	1H6*	3.3	7.8	17.3	11.6	8.7	6.9	5.4	4.0	3.1	
		1H8*	5.7	8	17.8	11.9	8.9	7.1	5.9	5.1	4.4	
		1H10*	8.5	8.2	18.2	12.1	9.1	7.3	6.1	5.2	4.6	
190	R28/R14	2H6	6.4	10.6	23.6	15.7	11.8	9.4	7.9	6.7	5.9	
		2H8	10.7	10.9	24.2	16.1	12.1	9.7	8.1	6.9	6.1	
		2H10	15.5	11.4	25.3	16.9	12.7	10.1	8.4	7.2	6.3	

Table 10 390 X 190mm lintel unit only

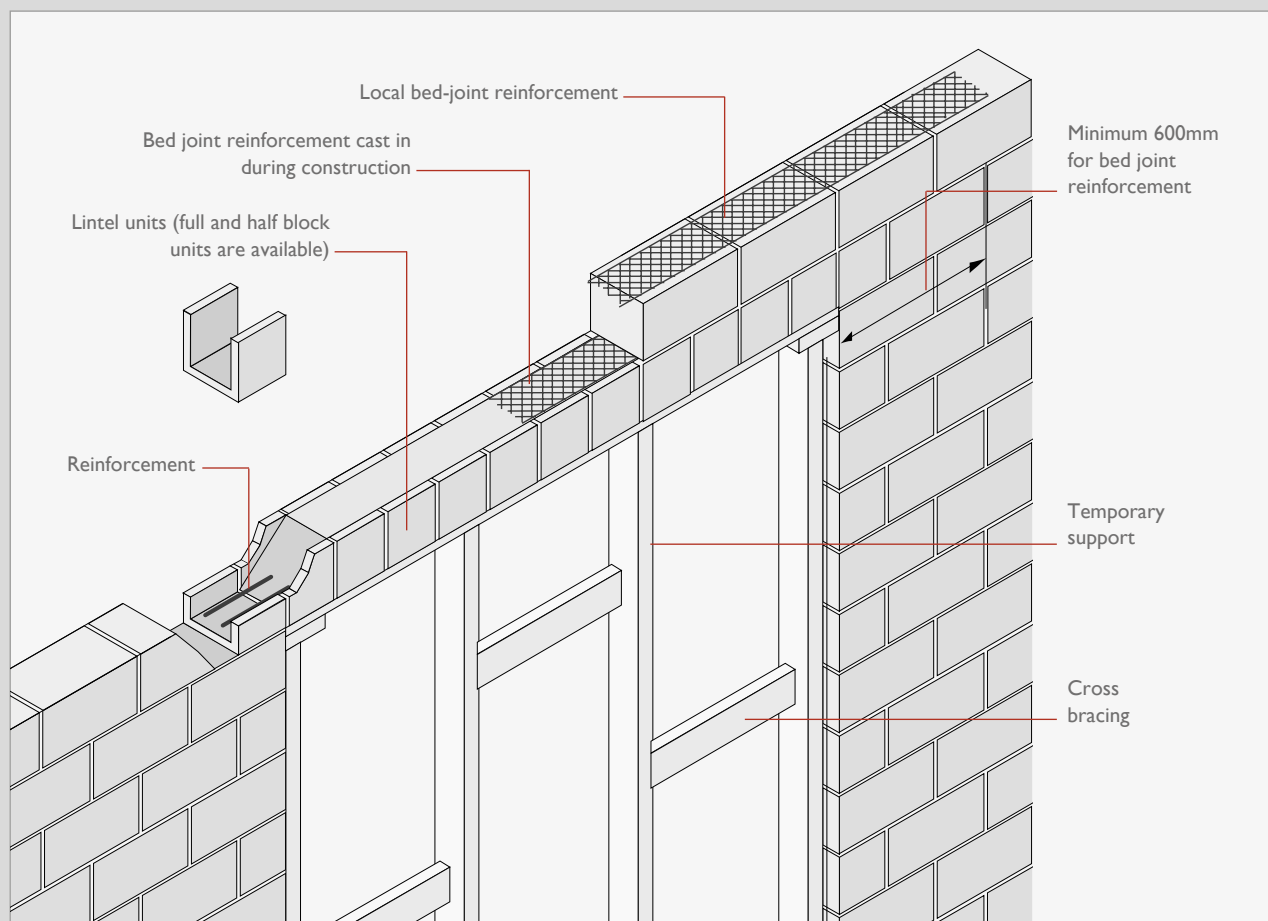
Lintel Width	Block Ref	Reinforcement (high yield)	ULS Moment (kNm)	ULS Shear (kN)	Safe UDL in kN/m for span (mm)						
					600	900	1200	1500	1800	2100	
90	K28/K14	1H6*	1	1.9	4.2	2.8	2.1	1.7	1.4	1.2	
		1H8*	1.3	2.1	4.7	3.1	2.3	1.9	1.6	1.3	
		1H10*	1.3	2.3	5.1	3.4	2.6	2.0	1.7	1.5	
140	P28/P14	1H6*	1.1	2.9	6.4	4.3	3.2	2.6	1.8	1.3	
		1H8*	1.7	3.1	6.9	4.6	3.4	2.8	2.3	2.0	
		1H10*	2	3.3	7.3	4.9	3.7	2.9	2.4	2.1	
190	R28/R14	2H6	1.9	3.9	8.7	5.8	4.3	3.5	2.9	2.3	
		2H8	2.4	4.3	9.6	6.4	4.8	3.8	3.2	2.7	
		2H10	2.4	4.7	10.4	7.0	5.2	4.2	3.5	2.9	

Table 11 440 x 215mm lintel unit with one course of masonry and bed joint reinforcement above

Lintel Width	Block Ref	Reinforcement (high yield)	ULS Moment (kNm)	ULS Shear (kN)	Safe UDL in kN/m for span (mm)							
					600	900	1200	1500	1800	2100	2400	
100	D28/D14	1H6*	3.8	6.5	14.4	9.6	7.2	5.8	4.8	4.1	3.5	
		1H8*	6.6	6.7	14.9	9.9	7.4	6.0	5.0	4.3	3.7	
		1H10*	9.6	6.9	15.3	10.2	7.7	6.1	5.1	4.4	3.8	
140	H28/H14	1H6*	3.8	8.9	19.8	13.2	9.9	7.9	6.3	4.6	3.5	
		1H8*	6.6	9	20.0	13.3	10.0	8.0	6.7	5.7	5.0	
		1H10*	9.9	9.3	20.7	13.8	10.3	8.3	6.9	5.9	5.2	
190	A28/A14	2H6	7.4	12.3	27.3	18.2	13.7	10.9	9.1	7.8	6.8	
		2H8	12.3	12.7	28.2	18.8	14.1	11.3	9.4	8.1	7.1	
		2H10	17.5	13.1	29.1	19.4	14.6	11.6	9.7	8.3	7.3	
215	F28/F14	2H6	7.6	13.8	30.7	20.4	15.3	12.3	10.2	8.8	7.0	
		2H8	12.9	14.1	31.3	20.9	15.7	12.5	10.4	9.0	7.8	
		2H10	19.1	14.6	32.4	21.6	16.2	13.0	10.8	9.3	8.1	

Table 12 440 X 215mm lintel unit only

Lintel Width	Block Ref	Reinforcement (high yield)	ULS Moment (kNm)	ULS Shear (kN)	Safe UDL in kN/m for span (mm)							
					600	900	1200	1500	1800	2100	2400	
100	D28/D14	1H6*	1.3	2.6	5.8	3.9	2.9	2.3	1.9	1.6	1.2	
		1H8*	2	2.8	6.2	4.1	3.1	2.5	2.1	1.8	1.6	
		1H10*	2.2	3	6.7	4.4	3.3	2.7	2.2	1.9	1.7	
140	H28/H14	1H6*	1.3	3.4	7.6	5.0	3.8	3.0	2.1	1.6	1.2	
		1H8*	2.1	3.5	7.8	5.2	3.9	3.1	2.6	2.2	1.9	
		1H10*	2.7	3.7	8.2	5.5	4.1	3.3	2.7	2.3	2.1	
190	A28/A14	2H6	2.3	4.8	10.7	7.1	5.3	4.3	3.6	2.8	2.1	
		2H8	2.8	5.2	11.6	7.7	5.8	4.6	3.9	3.3	2.6	
		2H10	2.8	5.6	12.4	8.3	6.2	5.0	4.1	3.4	2.6	
215	F28/F14	2H6	2.5	5.3	11.8	7.9	5.9	4.7	3.9	3.0	2.3	
		2H8	3.9	5.7	12.7	8.4	6.3	5.1	4.2	3.6	3.2	
		2H10	4.2	6.1	13.6	9.0	6.8	5.4	4.5	3.9	3.4	



Lintel units

Forticrete's precast capability offers the creation of bespoke lintels to complement all major finishes. For Textured and Fairface™ products, trough lintels are available to span openings and provide aesthetic continuity of adjacent blockwork.

The sequence of trough lintel construction is as follows:

- Build the blockwork to the soffit height of the lintel
- Provide temporary propping to the lintel units
- Lay the lintel units with a 10mm wide x 20mm deep temporary spacer in each joint. Temporary joint spacers can be of any material which provides adequate retention of the concrete infill and can be removed for pointing (e.g. polystyrene)
- Fit plastic spacers to the reinforcement to ensure correct concrete cover
- Place reinforcement as appropriate
- Complete in-situ filling, tamping by hand
- After curing period strip propping, remove temporary joint spacers and point joints carefully to match surrounding blockwork

- The minimum specification for infill concrete is:
- Aggregate: 10mm (maximum)
- Concrete strength: C32/40 (minimum)
- Slump: 75mm (minimum)

To achieve the figures in Tables 9 and 11, for a lintel unit with one course of masonry and bed joint reinforcement above, both the reinforcement and the course of masonry must be bedded into the concrete during construction, in a single operation, and left to cure.

Helpful hint

Cutting

Forticrete is able to offer a comprehensive cutting service for the creation of special shapes and sizes. The use of this service can substantially reduce costs and the possibility of cutting errors on site. The general tolerance on cut dimensions is +2, -2mm, although in certain circumstances it is not possible to achieve this, e.g. where a shallow cut is less than 25° to a face. The general tolerance on cut angles is $\pm 1.5^\circ$ and taper-to-cut faces will be within +1, -1mm.

Cutting masonry on site

The range of specials Forticrete produce to aid the construction process significantly reduces the amount of cutting needed on site. However, when faced with limiting situations, it is not always possible to manufacture a unit to accommodate every situation and therefore site cutting of units may be necessary. It is advisable to cut blockwork on a clipper bench station with a Diamond-tip blade and a fresh supply of clean, uncontaminated water. The size and thickness of blade is also very important. For instance, if cutting a full block into two halves, a 10mm blade is necessary to ensure that 2 x 215mm blocks are achieved, thus eliminating any extra length by using a thinner blade, (i.e., a 4mm blade will give 2 x 218mm units).

The cutting slurry produced is unavoidable and needs to be washed away from the face of the units immediately after cutting. The chemical reaction caused by cutting reactivates the cement which hardens onto the first material it makes contact with after cutting. This is accelerated by the heat generated in the cutting process. Dry cutting is not recommended because of this reaction.

Astra-Glaze®

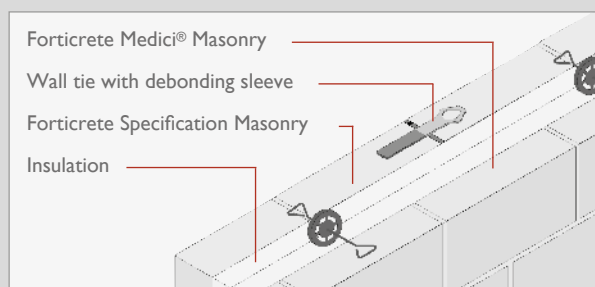
When cutting Astra-Glaze® units, this must be carried out from the front face to the back of the block. It should be noted, however, that this will create a sharp, rather than rounded arris.

Structural heads

Structural heads should not be cut, drilled or chased.

Polished masonry should not be cut on site as the appearance of the masonry can be affected by the cutting slurry produced by this process. Forticrete's in-house cutting process offers the ability to re-polish all units after cutting. This service of re-polishing is carried out at no extra cost to our customers over and above that for the cutting service.

Helpful hint



Control joint with lateral restraint

Movement control

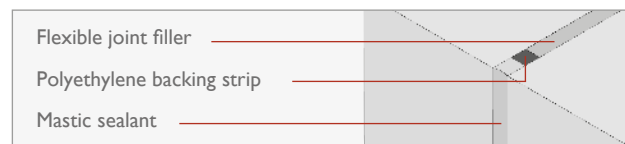
Movement control joints should be set out as per the architectural drawings. As a general guide for Forticrete products, refer to Table 13.

Table 13 Recommended spacing of movement control joints

Product range	Internal spacing (m)	External spacing (m)
Specification Masonry (except Novastone®), Polished Masonry, Splitface™ Masonry	12.2	9
Glazed Masonry, Novastone®, Cast Stone, Walling Stone	6	6
Standard Masonry Dense, Standard Masonry Lightweight	9	6
	6	6

Formation of control joints

The wall is built in the 'normal' half bond manner with the exception that on alternate courses, half length blocks are used to form a straight vertical joint.



Control joint

The sealant should be one of the following or similar:

- An acrylic based sealant, such as those produced by Tremco Ltd tel: 01942 251400
- A two-part polysulphide, such as those produced by Fosroc Ltd tel: 01827 262222
- A silicone-based sealant, such as those produced by Adsheed Ratcliffe & Co Ltd tel: 01773 826661

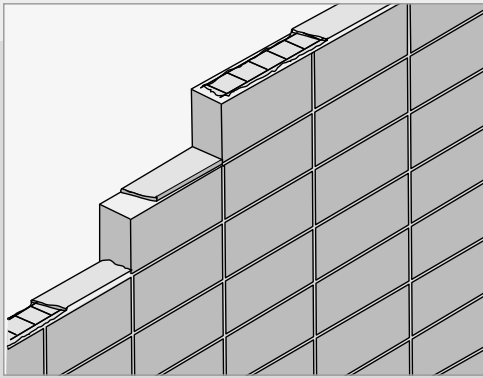
Internally the joint should be left open as long as possible to enable the wall to dry out thoroughly. Control joints should be carried through all finishes.

In cavity walls the control joints in each leaf should be offset. The flexibility of the cavity ties is normally sufficient to compensate for the very small differential movement between two leaves.

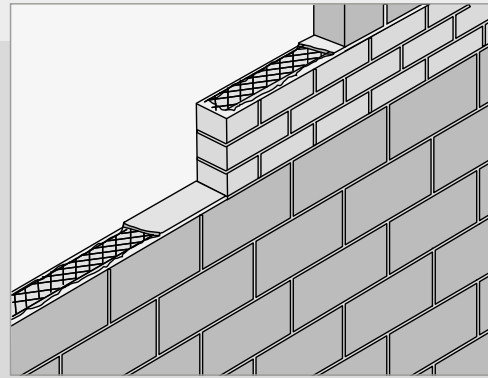
Generally, the joint spacing is greater on the inner leaf so the staggering of joints is relatively simple. Additional wall ties should be provided either side of the control joint to enhance stiffness. The diagram below indicates how the control joint should be constructed incorporating a standard wall tie and plastic sleeve which may be used to create a debonding effect, for example that supplied by: Ancon Ltd, tel: 0114 275 5224. Halfen Ltd, tel: 01582 470300

Sealing of movement joints

The width and depth of seal for movement joints is important. To ensure adequate bond to the masonry, the depth of seal should be at least 10mm. The sealant should be applied against a firm backing so that it is forced against the sides of the joint under sufficient pressure to ensure good adhesion. The back-up material should be resilient and not adhere to or react with the sealant. Unless a polyethylene flexible filler is used, it will be necessary to provide a polyethylene backing strip to prevent adhesion of the filler to the sealant.



Bed joint reinforcement in stack bonding



Bed joint reinforcement where blocks and bricks meet

Bed joint reinforcement

Bed joint reinforcement is used to control the stresses induced in masonry walls, including the control of shrinkage. Bond beams can have the same effect, but bed joint reinforcement may be more effective in controlling movement and is generally more economical.

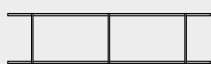
Where bed joint reinforcement is required to enhance structural performance e.g. improving the flexural strength of stack bonded construction, it should be of the wire weld (ladder) type. Care must be exercised in selecting the correct width of reinforcement which should be approximately 40mm less than the width of the masonry unit. It is also important to ensure that the reinforcement is fully bedded in mortar and adequate adhesion between blocks is maintained.

Where reinforcement in joints is specified, flush up blockwork with mortar to provide a full even bed. Lay reinforcement in the mortar as follows and complete joint to normal thickness.

- Keep reinforcement 20mm back from external and internal building faces.
- Lap reinforcement 225mm at joints in the length and fully at angles.

Bed joint reinforcement may be used for a variety of purposes and locations, as set out in table 14 below either for structural applications or crack control only.

Table 14 Types of Bed Joint Reinforcement



Ladder type



Expanded metal type

Table 15 The use of Bed Joint Reinforcement

Purpose/Location	Ladder type for structural applications	Expanded metal type for crack control only (below & above openings and tying)
Increased panel sizes	•	
Alternative to using windposts	•	
Increased movement joint spacing	•	
Feature courses, corbels, plinths	•	•
Collar joint walls	•	•
Corner and 'T' junction pieces	•	•
Stack bonded panels	•	
Differential movement control	•	•
Brick/block banding	•	•

Stack bonding

In cases where Stack Bonding is applied, attention should be given to the need for bed joint reinforcement, where appropriate. Generally, bed joint reinforcement should be included at every other course. Reinforcement must not bridge movement joints. Please refer to the Forticrete Design Guide for full information.

Brick and block combinations

Over recent years, walls combining both clay and concrete masonry have become increasingly popular. If chosen, due account should be taken to accommodate differential movement.

Two design approaches can be used. BS 5628 suggests that slip planes are incorporated at the junction of the two dissimilar materials. However, this would considerably reduce the flexural strength of the wall. The preferable approach is to tie the dissimilar materials together using bed joint reinforcement, which reinforces the interfaces sufficiently to withstand the stresses induced by differential movement. In either case it is advisable to ensure that movement joints are spaced at approximately 6m centres.

The combining of dissimilar materials, such as clay and concrete, must be considered carefully. Forticrete can provide cut blocks at brick height and with varying colours and textures to create banding features without inducing differential movement.

For further information please contact the Forticrete Technical Department on 0800 262136.

Typical manufacturers of bed joint reinforcement:

Expamet Building Products:
Tel: 01429 866655

Bekaert Ltd BU Building Products
Tel 0114 242 7480

Ancon Ltd
Tel 0114 275 5224

Helpful hint

Subsidiary trades

Fixings

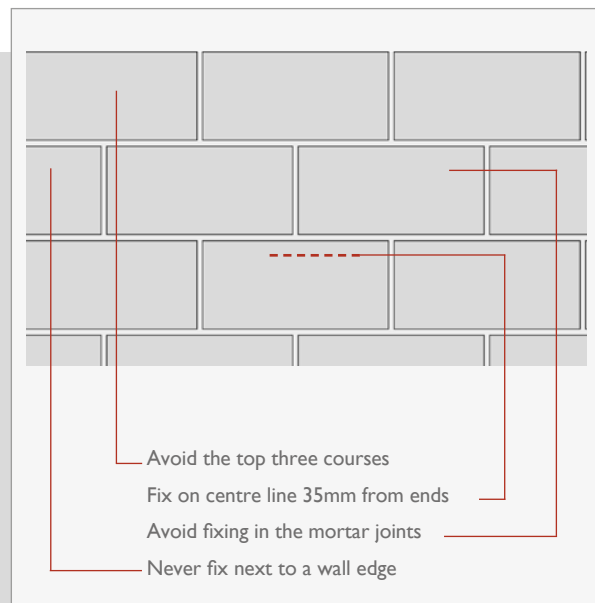
Fixings can easily be accommodated in Forticrete products, although care should be taken to consider the use of solid blocks where heavier fixings are likely to be required.

When fixings have to be considered after the completion of the building, there are numerous additional factors to consider.

These include:

- The range of blockwork strengths
- The possibility of voids if unknown
- The variable quality of mortar
- The difficulty of avoiding mortar joints when the surface is rendered or plastered
- The correct choice of fixing system to suit loading and whether hollow Hi-Light® or solid blocks are the supporting background

The diagram below is a useful indicator of where to locate fixings within a blockwork wall. It may be used at the design stage, during construction and after the building has been occupied.



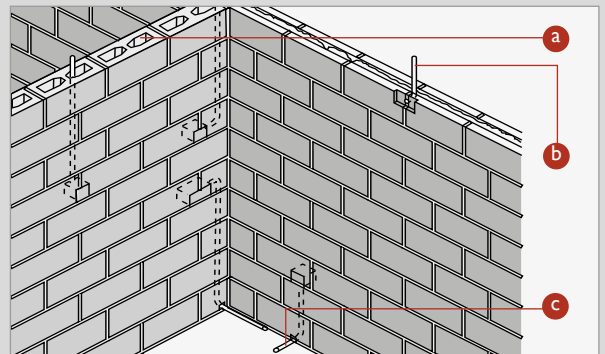
Positioning of fixings

If conduit is used in hollow blocks it should be installed in short lengths to enable the masonry to be 'threaded' over it.

Helpful hint

Provision for services & fittings

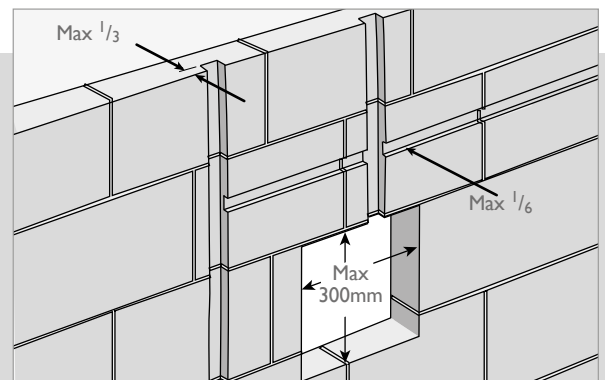
- In single skin walls, hollow units can be used to accommodate cabling and pipework subject to the thickness of the conduit.
- Services can run in the cavity of an insulated wall, between the insulant and face of the inner cavity. **Note:** Holes for service outlets should be cut prior to laying.
- Where necessary, the bottom layer of blocks can be 'notched' to accommodate cabling. **Note:** This must be pre-planned.



Services

Service runs may be fixed to wall surfaces, concealed within the fabric or behind finishes. When making provision for services and services fittings, ensure that none of the functions of the wall are impaired by fixings, chases or holes.

Consider the effects of chasing on stability, particularly where walls or leaves are constructed of hollow units. In walls or leaves constructed of solid units, the depth of horizontal chases should not normally exceed one-sixth of the thickness of the single leaf at any point, whilst the depth of vertical chases should not normally exceed one-third of the thickness of the single leaf at any point. The cutting of holes up to approximately 300mm square in the wall to accommodate items of equipment may be permitted.



Chasing and cutting for services

Note: When chasing using Hi-Light® blocks, a minimum of 15mm between the back of the chase and the void should be maintained. Alternatively, solid blocks can be used in areas where chasing is going to be carried out.

Cleaning procedures

General cleaning down

For guidance, the following procedures should be applied after completion of the masonry construction, for the purpose of general cleaning down: For the removal of general dirt and grime mild detergent such as 'Sugar Soap' may be used. This can be obtained from most builders' merchants. In the event of staining which cannot be removed by general cleaning techniques, CMI mortar cleaner by Hydron* may be used subject to clarification from the Forticrete Technical Department.

This method should not be attempted until all other less aggressive options have been considered.

Under no circumstances should acid or non-approved cleaners containing acid be applied to Forticrete Specification Masonry, Cast Stone, Precast or Astra-Glaze® products.

Remedial cleaning procedures may affect the final appearance of facing masonry. Therefore it is advisable to carry out the initial cleaning procedure on an affected area that will not be seen.

Architectural masonry & cast stone products

The effects of marks and stains can be reduced with the use of a stiff bristle brush (not wire).

For the removal of general dirt and grime a mild detergent such as 'Sugar Soap' may be used. This can be obtained from most builders' merchants. The use of 'brick acid' is not recommended for the cleaning of Forticrete Masonry, as it can seriously attack the cement and aggregate matrix of the blockwork. In the event of staining which cannot be removed by general cleaning techniques, CMI mortar cleaner by Hydron may be used subject to clarification from the Technical Department.

Power wash treatments are not recommended as they could 'blast out' the fines of the blockwork or damage the mortar joints at high pressures. However, a standard hose may be utilised when washing down.

Please note that mortar which does encroach on to the face of the masonry should be cleaned off as work proceeds. It should not be allowed to 'go off'.

Polished masonry products

Any mortars, plasters or materials sticking to the block should be removed with a plastic or wooden scraper prior to the contaminant 'going off'. Care should be taken to ensure that this process does not scratch the surface of the block.

The area must then be cleaned down using a mild detergent such as 'Sugar Soap', washed thoroughly and allowed to dry.

A proprietary marble cleaner can be used to restore the product's sheen if the polished face is damaged during cleaning. A lamb's wool buffer with a bee's wax polish can further enhance the product's sheen. Vegetable-based waxes should not be used as they can attack the cement content of the concrete blocks.

Please note that mortar which does encroach onto the face of the masonry should be cleaned off as work proceeds. It should not be allowed to 'go off'.

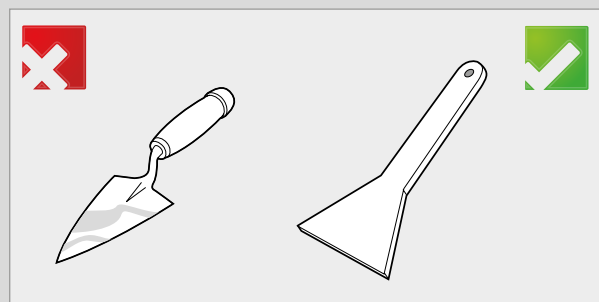
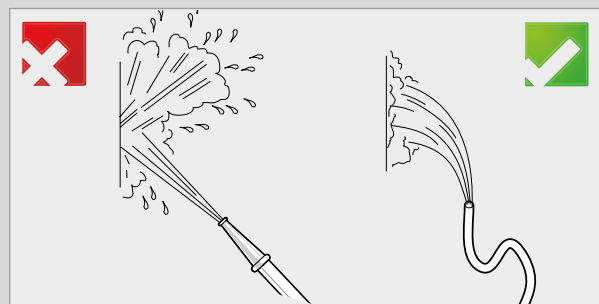
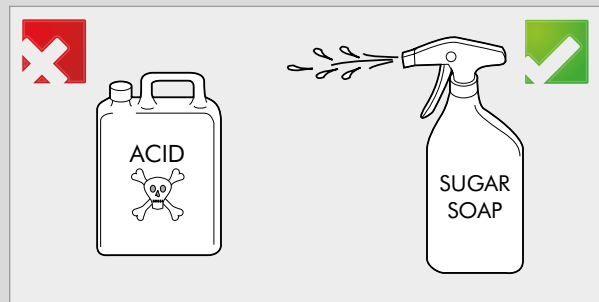
*Hydron Protective Coatings Ltd., Unit 7, Phoenix Road, Wednesfield, Wolverhampton WV11 3PX.
Telephone: 01902 450950

Astra-Glaze®

Any grouts, mortars, plasters or materials sticking to the block should be removed carefully with a plastic scraper prior to the contaminant 'going off'. When grout is being used to point Astra-Glaze® it must be gun applied and wiped immediately off the face of the block if it encroaches upon it.

Helpful hint

Prevention is preferable to difficult and costly remedial treatment.



Cleaning procedures

Remedial treatment

Forticrete Masonry Products are manufactured with the incorporation of the highest quality raw materials which are closely monitored for consistency of grading and colour. Due to the cementitious content of the products the curing process, whilst producing initial strength and handling requirements, will continue for some considerable period of time.

In extreme cases of site damage, vandalism etc it is possible to perform certain remedial treatments in-situ and the following notes are provided for guidance:-

Chipped units

For all products, badly damaged units should be carefully cut out of the wall and replaced, ensuring that the mortar colour is blended closely to the existing.

For Polished Masonry, Cast Stone and Precast products, minor chipping can be repaired using an epoxy compound with the inclusion of basic raw materials. This process requires a high degree of expertise and should only be performed by experienced personnel.

Astra-Glaze® units with minor chipping can be repaired. For information please contact the Forticrete Technical Department.

Colour tinting

For Specification Masonry, Cast Stone and Precast products, this can be achieved readily to either components or mortar by the application of oxide pigments associated with the original manufacture, but should be applied by a specialist.

For Polished Masonry, colour tinting can be achieved by the application of processes typical to manufacture, which should only be carried out by experienced personnel.

Restoring polish

Polish may be restored to Polished Masonry by following the method detailed in this section titled General Cleaning Down. However, badly damaged units may require replacement.

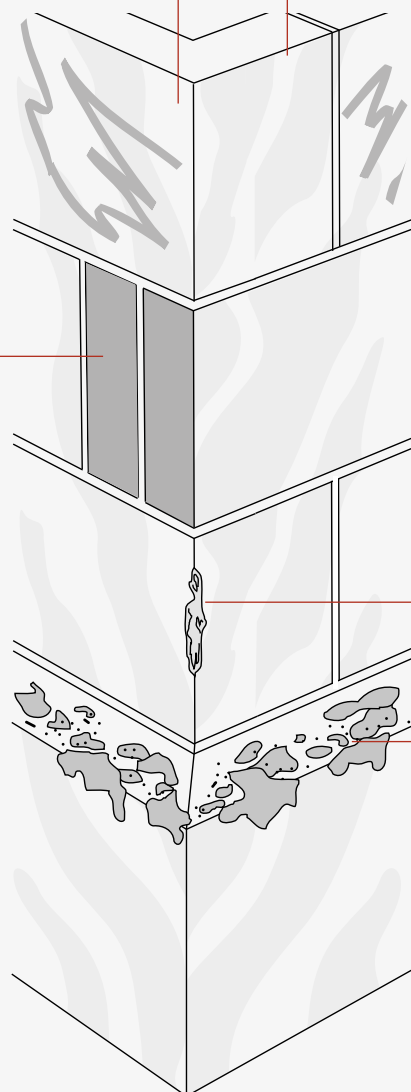
Note: Forticrete do not provide a remedial service although advice can be offered, including recommendations of qualified specialists in remedial work.

Mortar should be prevented from smearing the surface of a block. Once hardened it is difficult to remove and may even show through painted and plastered walls. However, mortar droppings should be allowed to dry before removal otherwise they will smear.

If severe staining difficulties are encountered, please contact our Technical Advisory Service on Freephone 0800 262136. Advice on the most appropriate specialist to contact will be given.

The use of quoin blocks is recommended at corners to ease setting out and improve aesthetic appeal

Scraping the surface of masonry units can cause irreparable damage



Unprotected plinths will be damaged by mortar droppings

Unprotected corners will be exposed to damage

Ensure that all exposed faces are finished for the purpose

Surface treatment

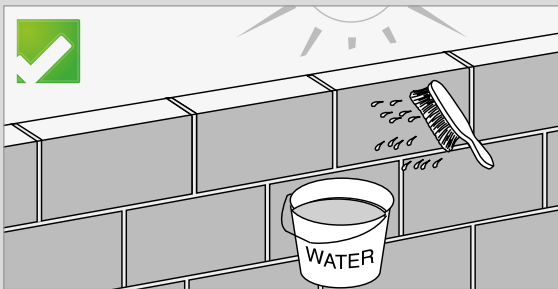
Graffiti control

Anti-graffiti control can be provided by the use of water-based impregnation products which are available for internal and external use.

These products give a good protection from graffiti such as that created with permanent markers, spray paint, etc. and they also act as a barrier against general dirt and grime from industrial pollution. For complete protection, it is preferable that the blockwork is treated before vandalism or contamination takes place. Failing to pre-treat a product in a high-risk area will result in time consuming and costly remedial action. Providing the blocks have been pre-treated, any graffiti can be removed with the use of proprietary cleaning materials.

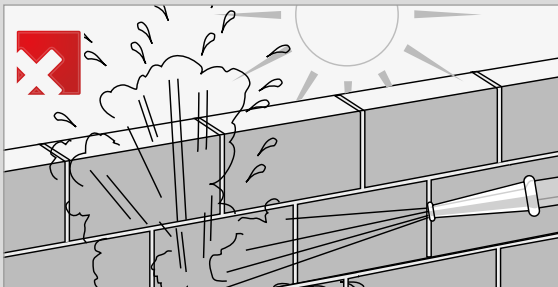
It is possible to remove graffiti from untreated blockwork with the use of specialist products, although the quality of the finish cannot be guaranteed.

Graffiti control products are available from a wide range of manufacturers. Good results with minimal colour variation to the treated masonry have been achieved using products available from: Hydron Protective Coatings Ltd., Unit 7, Phoenix Road, Wednesfield, Wolverhampton WV11 3PX.
Telephone: 01902 450950 Fax: 01902 451050.



Prior to rendering

Walls should be cleaned to remove dust, light particles etc. if the wall is very dry it should be dampened.



Walls should not be overwetted

As this will affect the adhesion of the plaster, each coat should not be allowed to dry out too quickly.

Sealing

The surface of Forticrete Masonry products may be sealed to provide an invisible, dust-free surface by applying one or two coats of Unibond PVA adhesive.

Note: Before use the adhesive must be diluted in accordance with the manufacturer's recommendations.

Painting

Forticrete Painting Quality is a dimensionally accurate product with sharp, clean arrises and with water repellant additives to ensure an exceptional surface coating which reduces paint absorbency, offering substantial cost savings. Whatever coating is used, the block surface should be free of dirt, dust, grease, oil and mortar efflorescence before application of the paint.

Plastering, rendering and tiling

Plasters

The most common range of lightweight plasters used is the Carlite range by British Gypsum.

Application should be carried out in accordance with the British Gypsum White Book. Carlite Browning and Multifinish plasters are most suitable for use on Forticrete blockwork. However, for products with a strength in excess of 7.3 N/mm² or a density in excess of 2000 Kg/m³ the use of Carlite Bonding, or similar, is recommended.

Where it is necessary for plaster to have an increased resistance to impact damage or to be denser for sound reduction, we suggest a 1:1:6 cement/lime/sand. The lime/sand should be obtained from reputable suppliers e.g. Tarmac Ltd. and should be applied to British Standard guidelines.

Rendering

It is important that the undercoat in two coat rendering is stronger and thicker than the finishing coat and the recommended mixes for cement/lime/sand are as follows:

For lime/sand gauged in the proportions 1:6, cement should be added in the ratio 1:5 for the undercoat and 1:6 for the finishing coat. On dense concrete blockwork it is advisable to apply a splatterdash comprising 1 part cement to 2-3 parts sharp sand before undercoating. Renders should be applied with reference to BS 5262.

Wall tiling

Before tiling, all walls should be allowed to dry to the level recommended by the wall tile manufacturer. Wall tiles should not be allowed to bridge movement joints. Block walls should be free from dust and dirt to allow adequate bonding of the adhesive.

Helpful hint

All blockwork to be plastered or rendered should have raked out joints to provide a key.

Masonry, Anstone® and Shearstone™ Walling:

Forticrete Ltd
Anstone,
Kiveton Park Station
Kiveton Park
Sheffield S26 6NP

Tel: **01909 775000**

Fax: 01909 775043

Email: masonry@forticrete.com

E-mail: walling@forticrete.com

Cast Stone:

Tel: **01909 775000**

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E-mail: caststone@forticrete.com

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