LIGNACITE
Sustainable Masonry


# SITEWORK GUIDE

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**Introduction**

The standard of site practice and workmanship during the course of construction will have the greatest influence on the quality of the finished work. Concrete blocks from Lignacite Ltd and other related materials, such as bricks and insulation wall ties, must be specified in accordance with all appropriate codes and best practice.

A good standard of workmanship and site practice will result in durable masonry construction which will require little or no maintenance throughout its service life.

This guide sets out to assist the construction team and associated trades with good site practice and workmanship when laying concrete blocks.


# 2. HEALTH & SAFETY

## Health & Safety

Health and safety issues are paramount in ensuring a safe environment and good working conditions for the construction team.

### Regulations and Guidance

Two pieces of legislation are relevant to the manual handling of blocks:

- The Manual Handling Operations Regulations 1992, as amended by the Health and Safety (Miscellaneous Amendments) Regulations 2002.

This legislation places a duty on employers to conduct a risk assessment on manual handling tasks.

- The Construction (Design and Management) Regulations 2015.

These regulations impose mandatory health and safety requirements on clients, designers and contractors.

Guidance on the manual handling of concrete blocks is given in HSE Construction Sheet No. CIS77 'Preventing injury from handling heavy blocks' (Construction Industry Advisory Committee), which is in accordance with the Manual Handling Regulations 1992 (as amended). This concludes that there is a high risk of injury to individuals who repetitively manually handle blocks in excess of 20kg. Where practical, mechanical handling equipment should be used to transport block packs to the area of work.

### Design Considerations

The comprehensive product range from Lignacite Ltd ensures a wide range of choice for the specification of building blocks for any construction project. Projects can be designed using our range of aggregate blocks to meet essential technical requirements while also satisfying manual handling guidelines.

Traditionally, heavy full-width blocks in excess of 20kg have been used to construct 200-215mm walls. By laying blocks flat or creating a wall of two leaves of blocks back-to-back (see Figs 1 and 2), this can be avoided.

However, using units in different aspect ratios, such as laying blocks flat, will affect the characteristic compressive strength (fk) of the blockwork. To assist designers in assessing structural performance, information on structural characteristics can be found in the Structural Design section of our Design Guidance.

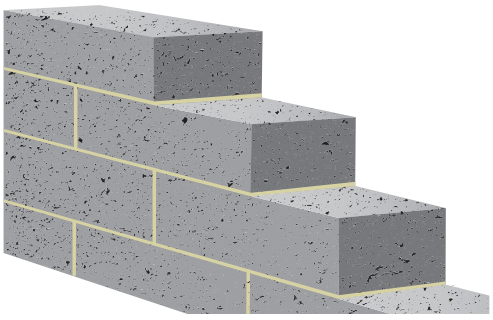


*Fig 1- 100mm or 140mm blocks laid flat*

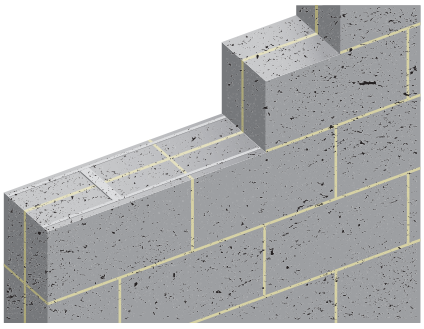


*Fig 2 - Double leaf collar jointed wall*

Additionally, some products have also been specifically developed to meet manual handling requirements while still providing good technical performance. For example, 140mm-wide walls can be built using the following product options:

- Lignacite SP (440 x 140 x 215mm)
- Lignalite (440 x 140 x 215mm)
- Lignacrete Midi (290 x 140 x 215mm)

The core solutions to satisfy manual handling requirements are summarised in Table 1 overleaf.

# HEALTH & SAFETY

*Table 1 – Typical commodity block solutions to satisfy manual handling requirements.*

| Wall width | Product | Category | Block or construction solution |
|---|---|---|---|
| 100mm | All 100mm blocks comply | All types | |
| 140mm | Ash GP | Medium Density | 140mm Ash GP solid 3.6 -10.4N/mm$^2$ |
| | Fibo 850/950 | Super Lightweight | 140mm Fibo 850 3.6N/mm$^2$<br>140mm Fibo 950 7.3N/mm$^2$ |
| | Lignacite Fair Face or Paint Grade | Medium Density | 140mm Lignacite SP solid 3.6 - 7.3N/mm$^2$ |
| | Lignacrete | Dense | 140mm Lignacrete Midi 7.3 - 22.5N/mm$^2$<br>140mm Lignacrete Hollow 7.3 - 10.4N/mm$^2$ |
| | Lignalite Paint Grade | Super Lightweight | 140mm Lignalite Paint Grade Solid 7.3N/mm$^2$ |
| 190-200mm | Lignacite Fair Face or Paint Grade | Medium Density | 2 x 100mm Lignacite solid (any strength), units laid back-to-back |
| | Lignacrete | Dense | 2 x 100mm Lignacrete solid (any strength), units laid back-to-back |
| | Lignalite Paint Grade | Super Lightweight | 190mm Lignalite Paint Grade Solid 7.3N/mm$^2$ |
| 215mm | Ash GP | Medium Density | 100/140mm Ash GP blocks laid flat |
| | Lignacite Fair Face or Paint Grade | Medium Density | 2 x 100mm Lignacite Solid (any strength), units laid back-to-back |
| | Lignacrete | Dense | 100mm Lignacrete solid (any strength), units laid flat<br>2 x 100mm Lignacrete solid (any strength), units laid back-to-back |

*Refer to the product datasheets for the technical specification of our products or consult our Technical Services department for advice.*

## Health & Safety Data

Key information on the safe use of our products can be found in the Lignacite Product Health & Safety Datasheet and in our Terms & Conditions. These documents are available to view and download from www.lignacite.co.uk.

# 3. CONTROL OF MATERIALS ON SITE

**Control of Material On Site**

Adequate planning and supervision will ensure the efficient and safe use of our products from receipt of delivery to installation. The following points represent best site practice.

## Packaging

A range of packaging options is available to suit individual site requirements.

Standard blocks are supplied banded. Banding blocks to pallets and shrink-wrapping to pallets are optional extras. Returnable and non-returnable pallets are available.

## Delivery

If Lignacite is to deliver the goods to site, the customer shall:

- Provide safe and adequate access to the offloading point, including adequate manoeuvring space for the delivery vehicle (in each case, to Lignacite's reasonable satisfaction)
- Set out sufficient pallets to facilitate offloading if the goods need to be placed onto pallets at the delivery location
- Provide Lignacite with any relevant information in connection with the delivery of the goods prior to the agreed date for delivery

The risk in the goods shall pass to the customer on completion of delivery or collection.

For further information, please see our full Terms & Conditions, which are available to view and download from www.lignacite.co.uk.

## Transporting On Site

- Concrete blocks must not be tipped or roughly handled
- Use mechanical methods, such as a telescopic forklift truck
- Packs to be lifted by tower crane should be netted and placed in cages before lifting
- Minimise manual handling tasks by delivering units as close to the point of laying as safety considerations permit
- A brick trolley can be used to move smaller quantities of blocks, but this method is not suitable for facing-quality blocks as they are likely to be damaged

## Storage

- Blocks should be carefully unloaded and stacked on their bedding ends on firm, level ground, clear of standing water, and close to the location where they are to be used. They should be protected against rain and snow in a manner that allows air to circulate between the blocks. Particular attention should be taken to ensure the protection of the block
- Blocks should remain in the packs until required for use
- When manually handling blocks, reduce the risk of injury from falling loose blocks by avoiding stacking blocks above head height
- Generally, block packs should be stacked no more than two to three packs high. Ensure upper packs are adequately supported by the lower packs
- Palletised blocks should be stacked using the pallets supplied and stacked no more than three packs high
- In all cases, reduce the stack height if the ground conditions are unsuitable
- Paint Grade and Fair Face blocks should never be stacked on their faces

## Handling

- Due account must be taken of the manual handling risk of lifting blocks, as outlined in this guide
- Where blocks are banded or strapped, care should be taken to avoid injury as band tension is released and operatives should be aware of the risk of loose blocks falling from the pack. Use eye protection when cutting the banding on packs
- Shrink wrapping should be removed carefully by cutting it open; it should NOT be torn or ripped open as this may damage the corners/edges of the products
- Provide personal protective equipment (PPE) and ensure they are used. This includes safety helmets, safety footwear and suitable gloves
- Blocks should be stacked as close as possible to where they are to be used, allowing sufficient access to all sides of the stack
- Handle blocks close to the body and avoid overreaching or twisting. Ensure good grip when handling and secure foot holding
- Ensure the block laying area is clear of obstructions and is properly organised
- Raise scaffolding to ensure the work is carried out below shoulder height
- Raise mortar spot boards to a convenient working height to avoid bending

# 4. COMPLEMENTARY MATERIALS

## Mortars

The designer should specify the mortar. Guidance on the selection of mortars is available from various sources, including BS EN 1996-1-1 (Eurocode 6) and BSI Published Document PD 6697. The range of masonry mortars is shown in Table 2.

*Table 2 – Suitable mortars*

| | Mortar designation | Compressive strength class | Prescribed mortars (proportion or materials by volume) (see notes a and b) | | | | Compressive strength at 28 days (N/mm²) |
|---|---|---|---|---|---|---|---|
| | | | Cement[c] lime: sand with or without air entrainment | Cement[c] sand with or without air entrainment | Masonry cement sand | Masonry cement sand | |
| Increasing ability to accommodate movement, e.g. due to settlement, temperature and moisture changes | (i) | M12 | 1:0 to ¼:3 | 1:3 | Not suitable | Not suitable | 12 |
| | (ii) | M6 | 1:½:4 to 4½ | 1:3 to 4 | 1:2½ to 3½ | 1:3 | 6 |
| | (iii) | M4 | 1:1:5 to 6 | 1:5 to 6 | 1:4 to 5 | 1:3½ to 4 | 4 |
| | (iv) | M2 | 1:2:8 to 9 | 1:7 to 8 | 1:5½ to 6½ | 1:4½ | 2 |

*NOTES:*
*a) Proportioning by mass will result in more accurate batching than proportioning by volume, provided that the bulk densities of the materials are checked on site.*
*b) 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.*

The following is for general guidance.

### Work below ground level DPC (Damp-Proof Course)

For work below or near the external ground level, Class M6/Designation (ii) mortars are advocated when there is a risk of saturation with freezing.

### Work above ground level DPC (Damp-Proof Course)

Excluding parapet walls, a compressive strength Class M4/Designation (iii) mortar is generally suitable for work above the damp-proof course. Stronger mixes may be specified for particular applications; for example, in conjunction with high-strength blockwork or where the blockwork is to be reinforced. In general, cement: lime: sand mortars give a stronger bond than plasticised mortars of similar compressive strength.

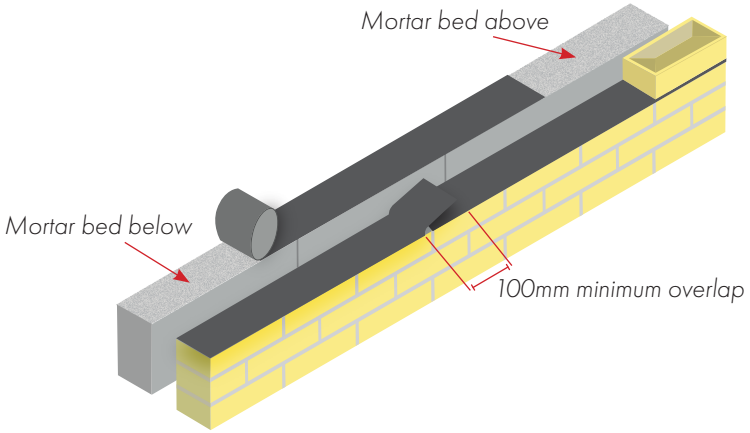
Incorporating lime into the mix is also beneficial in terms of the ability it gives the mortar to accommodate movement.

### Additives

Additives should only be used as specified by the designer and strictly in accordance with the manufacturer's instructions. For further information, refer to the Lignacite Design Guidance - Mortars.

# COMPLEMENTARY MATERIALS

DPCs (Damp-Proof Courses)



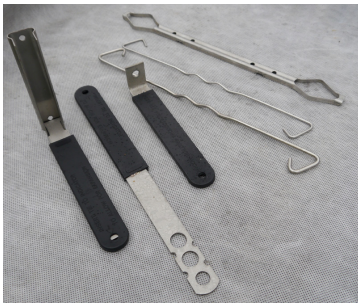

DPCs are required to adequately resist the passage of moisture towards the inside of the building.

Horizontal DPCs should be installed to fully cover the leaf thickness, laid on an even bed of mortar and covered by mortar to maintain regular joint thickness.

Vertical DPCs should be fixed to separate the inner and outer leaves of a cavity wall.

All DPCs should be either welded or lapped by at least 100mm. They should also be linked to any damp-proof membrane.

## Wall Ties



Install wall ties at the specified frequency and spacing. As a guide, for cavity walls with a minimum leaf thickness of 90mm, wall ties should be spaced at 900mm horizontal and 450mm vertical centres, with additional ties (every block course) at openings or where movement joints are installed. In such situations, the ties should be placed no more than 225mm from the wall edge.

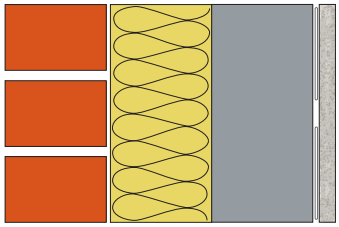
*Table 3 – Wall tie spacings*

| Leaf Thickness | Cavity Width mm | Horizontal Spacing mm | Vertical Spacing mm | Ties per $m^2$ |
|---|---|---|---|---|
| Less than 90mm | 50-75 | 450 | 450 | 4.9 |
| Over 90mm | 50-150 | 900 | 450 | 2.5 |

Wall ties should have a minimum 50mm embedment in each leaf and be built in as the work proceeds; they should never be pushed into joints after the joints have been completed. The type of wall tie should be compatible with the cavity width and intended design loads; refer to BS 5628-1 or other masonry design codes for further advice. For separating walls, butterfly or Type A ties should be used, as specified in Approved Document E or in accordance with Robust Details specifications.

## Cavity Insulation

All of our products are compatible with common full-fill and partial-cavity insulation materials. The levels of achievable thermal performance (U-values) can be found in our product Data Sheets as well as the Lignacite Design Guidance - Part L Energy Efficiency Standards.



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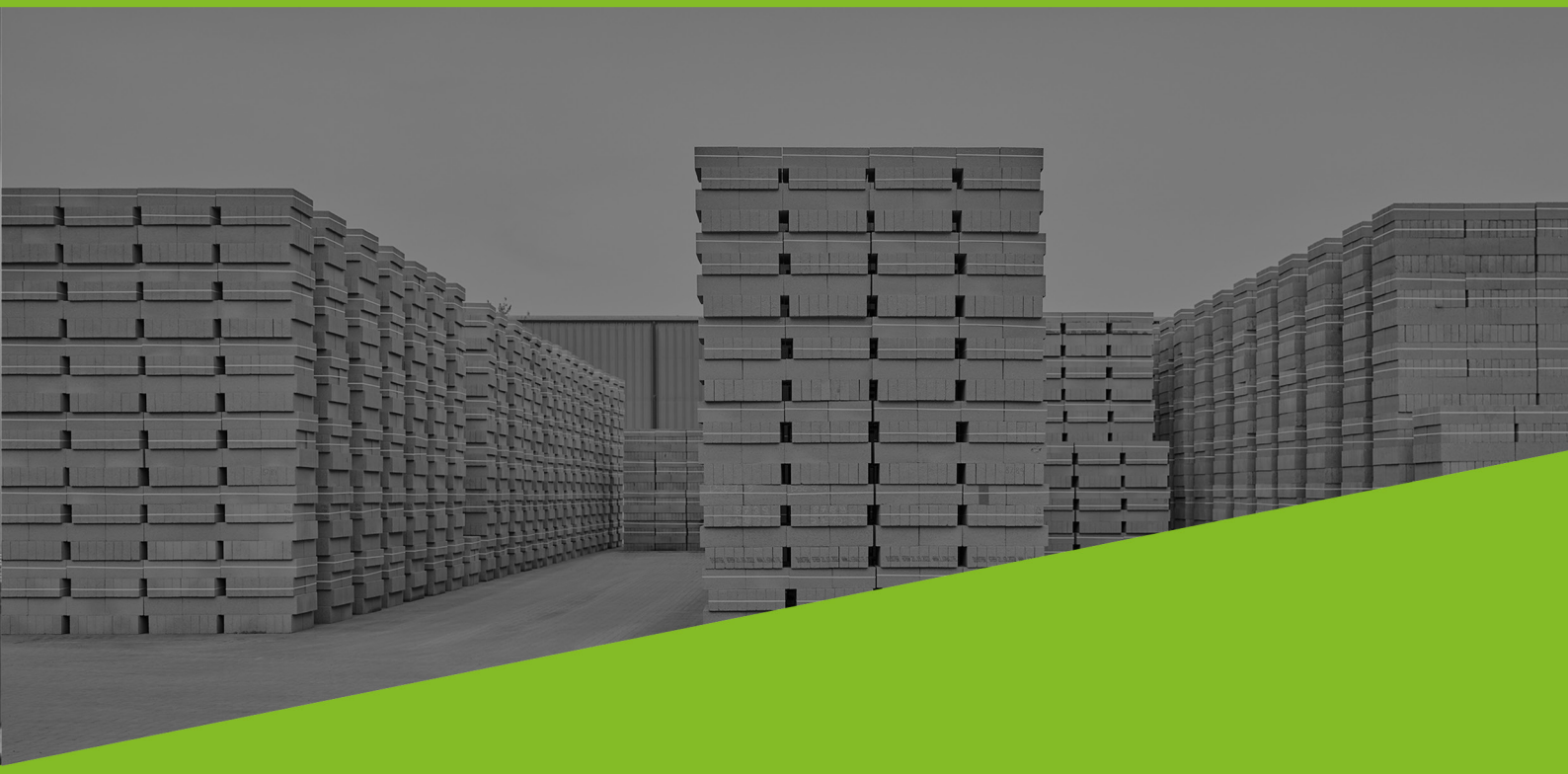

# 5. BLOCKWORK

## Blockwork

Adherence to these recommendations will ensure that a satisfactory standard of workmanship is achieved.

For products that are to be built fair faced, sample panels are recommended to establish the general standard of blockwork, including mortar, jointing and workmanship. They should be built prior to commencing block laying and serve as a benchmark for defining and specifying the quality of work required. It is advisable to view sample panels at a distance of about 3m from the wall in good, natural light. Please note that some colour variation is to be expected when using Fair Face blocks.

### Weather Conditions

Block laying should be discontinued during inclement weather unless the work is protected. When work stops for more than an hour, the top of the work should be protected against rain, snow and frost.

The face of the blockwork should also be protected against splashes from the ground, scaffolding and other construction activities. No block laying should be carried out when the air temperature is at or below 3°C unless it is at least 1°C and rising. Conditions should be regularly monitored, and the wind chill factor taken into account. The use of covers will protect materials when not for immediate use. Frozen materials must not be used. It is essential to protect newly laid masonry from frost damage

### Block Laying

Unless otherwise specified, blocks should be laid to conform to the following:

a) Using a stretcher bond. Whenever possible, the minimum bond should be no less than one-quarter of the length of the block
b) Laid on a full bed of mortar with all vertical joints substantially filled and vertically aligned in fair face work
c) Mortar joints should be 10-12mm thickness
d) Blocks should be laid level and to a uniform joint thickness
e) Shell bedding of hollow blocks should only be permitted with the designer's permission
f) Corners and other advance work should not be raked back higher than 1.2m above the general level. For paint grade and fair face work, the whole lift should be completed within one period of operation. However, any one leaf should not be constructed by more than 1.5m in one day
g) For paint grade and fair face work, mortar joints should be tooled to the specified joint profile as the work proceeds
h) Use Coursing Blocks of the same materials as the main wall to infill small areas, such as between joists, and to complete coursing heights. Their use will help to maintain productivity and reduce cutting. A range of Coursing Blocks is available for this application. Refer to the Coursing Block datasheet

i) Remove excess mortar as the work proceeds
j) Tool the mortar joint to the required profile when thumbprint hard. For general background work, joints should not be left proud but struck off as work proceeds
k) Protect the work against rain and frost using waterproof sheeting until the mortar is fully cured. Upon the cessation of work, the tops of the walls should be covered against wet weather or frost

## Cutting


Blocks can be cut using conventional hammer and bolster, a hydraulic block splitter or mechanical disc cutter. For more accurate cutting, for example when using Fair Face blocks, a bench saw should be used.

When using a bench saw, there must be a sufficient supply of clean water to ensure the slurry from the cutting process is fully removed from the face of the block. If left on, the slurry will harden on the face, turning the block white or a lighter shade before becoming virtually impossible to remove. Following cutting, the blocks must be allowed to dry fully before being built in.

## Chasing

Chases can be formed using a chase-cutting tool. This is similar to an angle grinder but with two parallel cutting discs and a depth setting. The operator sets the depth gauge and then runs the grinder up/down or across the wall, making two parallel cuts. The waste between the cuts is then knocked out using a cold chisel. Limitations on the depth of horizontal and vertical chases should be followed to ensure that chases do not impair the strength or stability of the wall.

- Limited to 1/6 of the depth of the leaf where horizontal
- Limited to 1/3 of the depth of the leaf where vertical
- Maintain a residual thickness of 15mm between the chase and the void of hollow or cellular blocks

## Tolerances

The specifier should define the accuracy of the work. Guidance for a general standard of accuracy, in terms of permissible deviations, is given in several key documents:

- BS EN 1996-2 Eurocode 6 – 'Design of masonry structures - Design considerations, selection of materials and execution of masonry'
- Published Document PD 6697 – 'Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2'

However, these permitted deviations should not be regarded as defining the acceptability of appearance. Closer dimensional deviations may need to be specified.


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# 6. MOVEMENT JOINTS AND BED JOINT REINFORCEMENT

**Movement Joints and Bed Joint Reinforcement**

All buildings and building components move during their lifetime. To allow for normal movement, suitable precautions should be taken, including:

- Introduction of movement joints at suitable spacings
- Use of localised bed joint reinforcement to areas of raised stress. For example, above and below openings
- Avoidance of over-strong mortar
- Protection of blocks and partially complete construction from the adverse effects of weather

## Movement Joints

Movement joints are vertical separations built into the blockwork and positioned at locations where excessive stress will normally occur. The position of movement joints should be detailed on the project drawings. For guidance on movement joint locations, refer to Lignacite Design Guidance – *Movement Control.*

## Formation of Movement Joints

Movement joints should be formed as the work proceeds and are typically built as a straight joint with a width of 10mm to coordinate with the standard block module. The joint is filled with a pre-compressed filler such as a polyethylene strip and, for fair face work, sealed with a suitable mastic.

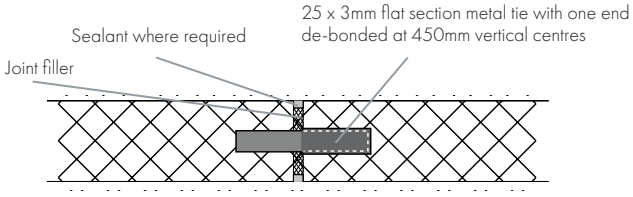


*Fig 3 - Movement joint to wall with plaster finish*

Where a wall is required to meet a specified fire resistance, the joint material must provide similar fire protection. There are a number of fire-rated joint materials available, such as flexible intumescent seals.

Movement joints should be made continuous through any applied rigid finishes, such as plaster or rendering.

Much can be done to disguise the appearance of movement joints. For example, by locating them in internal corners or adjacent to rainwater pipes. Similarly, where walls are rendered, the use of a colour-matching sealant will minimise the visibility of movement joints. In this rendered house example, a vertical movement joint is positioned above the porch roof but is barely noticeable.

## Bed Joint Reinforcement

Introducing bed joint reinforcement can be beneficial and may be considered for the following applications:

- Above and below openings to control movement to these areas of raised stress
- Differential movement control. For example, between blockwork and band courses of brickwork
- To reduce the number of movement joints beyond that recommended for unreinforced walls. In this application, bed joint reinforcement is installed continuously to every bed joint, or alternative bed joints, depending on the spacing of movement joints required. The requirements for bed joint reinforcement should be specified by the designer
- To tie the leaves together in collar-jointed walls

# MOVEMENT JOINTS AND BED JOINT REINFORCEMENT

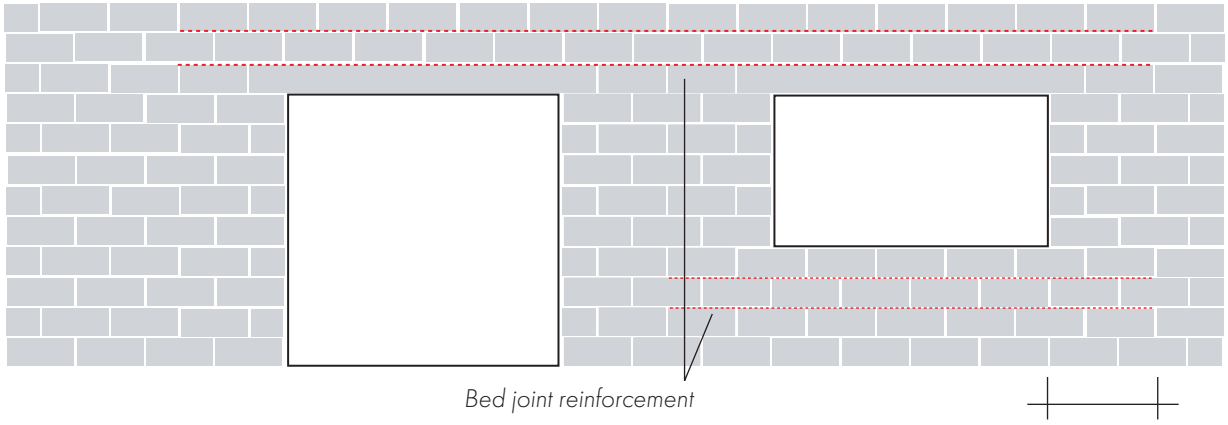


*Fig 4 - Use of bed joint reinforcement used to control movement at openings*

Ensure the correct grade of bed joint reinforcement is used and that it is of a width to suit the wall thickness, less the required mortar cover to the reinforcement.

Bed joint reinforcement should be laid on a full mortar bed, keeping the reinforcement 20mm away from the internal and external faces of the wall. Reinforcement should be lapped 225mm along its length and lapped fully at returns.

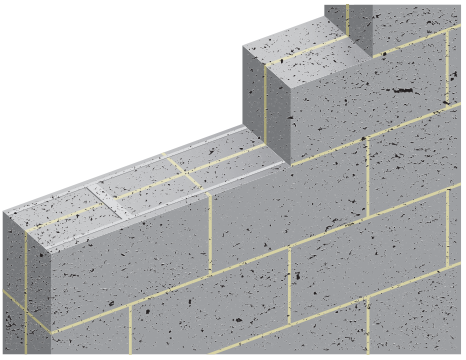

*Fig 5 - Bed joint reinforcement used to tie the leaves together in a blackwork collar jointed wall.*

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# 7.0 FIXINGS

All product types have the potential to provide a strong and secure background for the application of fixings. Where heavyweight items are required to be fixed, the use of solid blocks is recommended. Where possible, fixings should be located as shown in the diagram below.

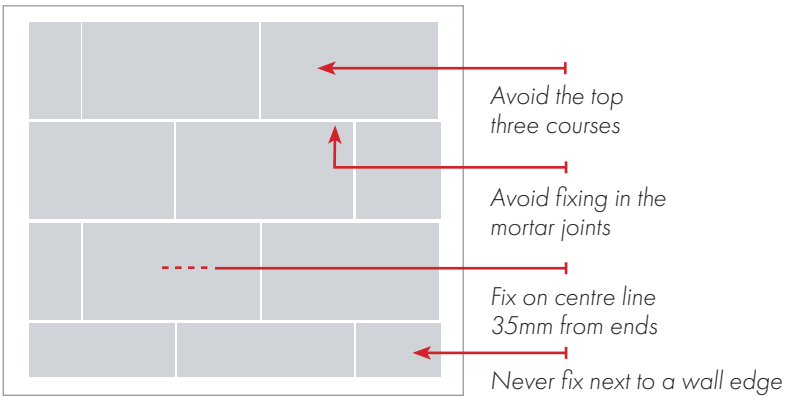



*Fig 6 – Guide to locating fixings*

Depending on the block type and the loads to be supported, suitable fixings include plastic and metal plugs, frame fixings and chemical anchors. Typical pull-out loads of various fixings supplied by Fisher Fixings UK Ltd. are shown.

*Table 4 - Pull-out loads for various fixings*

| Block Type | Description of Fixing | | Fixing Tested | Average ultimate load kN | Allowable load kN |
|---|---|---|---|---|---|
| 100mm solid Lignacite 3.6N/mm² | Nylon plug and wood screw |  | Fischer SX 10 x 50 | 2.74 | 0.26 |
| 100mm solid Lignacite 3.6N/mm² | Resin anchor |  | RGM 10 x 130 stud set with FIS V 360 S resin | 10.94 | 3.31 |
| 100mm solid Lignacite 3.6N/mm² | Self-tapping concrete screw |  | FBS - 8/15 S | 7.6 | 1.37 |
| 100mm solid Lignacite 7.3N/mm² | Resin anchor |  | RGM 10 x 130 threaded rod + FIS V 360 S resin | 15.46 | 3.0 |
| 100mm solid Lignacite 7.3N/mm² | Nylon plug and screw |  | FSXS 10 x 60 FUS | 5.96 | 0.77 |
| 100mm solid Lignacite 7.3N/mm² | Nylon plug and Powerfast screw |  | SX 10 x 50 nylon plug (with 8 x 80 Powerfast screw) | 3.0 | 0.28 |
| 140mm solid Lignacite SP 7.3N/mm² | Nylon plug and wood screw |  | UX 10 x 60 nylon plug + 7mm woodscrew | 2.06 | 0.46 |
| 140mm solid Lignacite SP 7.3N/mm² | Nylon plug and wood screw |  | SX 10 x 50 nylon plug + 7mm woodscrew | 4.2 | 0.60 |
| 140mm solid Lignacite SP 7.3N/mm² | Self-tapping concrete screw |  | FBS 6/25 P concrete screw | 3.92 | 0.49 |
| 140mm solid Lignacite SP 7.3N/mm² | Special screw for door and window installation |  | FFS 7.2 x 72 frame fixing screw | 3.4 | 0.34 |

| Block Type | Description of Fixing | | Fixing Tested | Average ultimate load kN | Allowable load kN |
|---|---|---|---|---|---|
| 140mm solid Lignacite SP 7.3N/mm² | Resin anchor |  | FTR M 10 x 130 BZP + FIS V 360 S | 14.0 | 3.53 |
| 140mm solid Lignacite SP 7.3N/mm² | Nylon plug and wood screw |  | SXR 10 x 80 FUS | 6.1 | 0.61 |
| 140mm cellular Lignacite 3.6N/mm² | Nylon plug and wood screw |  | SXSXR 10 x 60 FUS | 1.94 | 0.15 |
| 140mm cellular Lignacite 3.6N/mm² | Special screw for door and window fixing |  | FFS 7.5 x 72 frame fixing | 1.28 | 0.22 |
| 140mm cellular Lignacite 3.6N/mm² | Resin anchor |  | FIS V 360 S + FIS H 18 x 85 N + M 10 threaded rod | 6.56 | 1.47 |
| 140mm cellular Lignacite 3.6N/mm² | Frame fixing |  | FUR 10 x 80 FUS Art No: 93572 | 3.2 | 0.30 |
| 140mm solid Lignacrete 7.3N/mm² | Self-tapping concrete screw |  | FBS 8/15 S concrete screw | 9.8 | 1.49 |
| 100mm solid Lignacrete 20.0N/mm² | Self-tapping concrete screw |  | FBS 8/15 S concrete screw | 19.80 | 4.92 |
| 100mm solid Lignacrete 20.0N/mm² | Nylon plug and wood screw |  | UX 10 x 60 universal nylon plug + 8mm woodscrew | 1.90 | 0.26 |
| 100mm solid Lignacrete 20.0N/mm² | Resin anchor |  | FIS V 360 S + M 10 threaded rod | 26 | 6.0 |
| 190mm solid Lignalite 7.3N/mm² | Resin anchor |  | FIS V 360 S + M 10 30 stud | 8.4 | 2.16 |
| 190mm solid Lignalite 7.3N/mm² | Frame fixing |  | FUR 10 x 80 FUS Art No: 93572 | 4.3 | 0.56 |

*Note: A global safety factor (V) of 5 has been applied to the Characteristic Resistance NRk1 for fixings using a plastic plug. To other fixings a global safety factor (V) of 3 has been applied.*

# 8.0 SURFACE FINISHES

## Surface Finishes

### External Rendering

Rendering can provide an attractive and durable finish. Concrete blockwork can provide a strong background on which to apply renders. The choice of the render mix will depend upon factors such as the desired appearance, exposure conditions, nature of the background and the functional requirements.

According to experience, renders should not be overly strong and those with an open or rough textured finish are likely to give the best results for most applications. Successive render coats must be specified as being no stronger or thicker than the previous coat.

*Rising Sun Hill - Hartog & Hutton*

### Preparation

Before applying the render, the background should be clean, dry and free of dirt and all loose particles. An assessment of the background and its suitability for the direct application of the render should be made. As a guide, medium-density blocks such as Ash GP and Fibo 850/950 blocks have good suction and usually provide sufficient key for the direct application of renders.

Dense and close-textured blocks may require some pre-treatment, such as the application of a spatterdash coat or proprietary bonding slurry.

A stipple or spatterdash coat should consist of 1 part cement to 2 parts sharp sand, mixed to a thick creamy consistency with water and a bonding agent such as styrene-butadiene rubber (SBR). For a stipple coat, the slurry should be vigorously brushed onto the wall to coat the surface and then immediately stippled with a freshly loaded brush. Alternatively, an adhesive slurry, such as Weber Rend Aid, can be applied to the surface.

It is also good practice to ensure that mortar joints are raked back squarely 10mm to 12mm deep.

### Number of Coats

A render normally comprises at least two layers: an undercoat and a final coat. The minimum total thickness of two-coat renders should be 15mm. Two-coat renders in conjunction with cavity masonry should provide sufficient durability for most conditions of exposure. Metal lathing, sometimes used in severe exposure conditions or on weak backgrounds, should have two undercoats.

Where improved resistance to rain penetration is desired, two undercoats should be used in addition to a final coat. The minimum total thickness of three-coat renders should be 20mm.

The undercoat should be applied and built up to a thickness of 8-12mm. The render should then be scratched to provide a key for subsequent coats and allowed to shrink and dry. The final coat of render should be applied to a thickness of 6-8mm.

# SURFACE FINISHES

## Factory-Made Renders

These are cement-based renders that incorporate admixtures such as silicone water repellents. They are characterised by renders that have the following benefits:

- Water repellent
- Low maintenance
- Allows structure to breathe
- Natural-looking finish
- Extensive colour range

Factory-made renders should be applied strictly in accordance with the advice from the individual manufacturer, including advice for the installation of ancillary components. Attention should also be given to the recommendations provided by the NHBC Standards, Chapter 6.11. This includes advice on the minimum thickness of single-coat renders.

## Render Mixes

Table 5 gives general information on mixes suitable for rendering. Mix designation (iii) mixes are advocated for use on all block types and are suitable for most categories of exposure. Where a stronger mix is required or is traditional (e.g., roughcast), we recommend this is applied to a Lignacrete dense block background.

The use of lime in render mixes helps to make the mix more cohesive (cement and sand mixes can be harsh, depending on the grading of the sand) and more able to accommodate movement.

*Table 5 - Suitable mixes for rendering*

| Mix designation | Mix proportions by volume based on damp sand | | | | |
|---|---|---|---|---|---|
| | | Cement/ready mixed lime/sand* | | | |
| | Cement/lime/sand | Ready mixed lime/ sand | Cement/ready mixed material | Cement/sand* (using plasticiser) | Masonry cement/sand* |
| ii | 1:½:4 to 4½ | 1:91/2:½:4 to 4½ | 1:2½ to 3½ | 1:3-4 | 1:2½- 3½ |
| iii | 1:1:5 to 6 | 1:6 | 1:4 to 5 | 1:5-6 | 1:4-5 |
| iv | 1:2:8 to 9 | 1:4½ | 1:8-9 | 1:7-8 | 1:5½- 6½ |

Notes

1. With fine or poorly graded sands, the lower volume of sand should be used.
2. For cement: ready mixed lime/sand, the appropriate Designation/Strength Class should be specified.

Freshly applied renders should be protected from drying out too rapidly. Similarly, during very cold weather protective sheeting should be applied to avoid frost damage.

## Movement Control

As a guide, movement joints should be introduced at approximately 6m spacings. The movement joint should be continuous through the blockwork and the render. Render stop beads should be introduced to either side of the movement joint. When the rendering is thoroughly dried out, the gap between the stop beads should be sealed using a polysulphide or other approved sealant.

In areas of concentrated stress, such as above and below window openings and above door heads, consideration should be given to the introduction of bed joint reinforcement to limit movement. Typically, two courses of external grade reinforcement should be installed immediately above and below the opening, extending at least 600mm beyond the sides of the opening.

## Further Information

Further information on the design, preparation and application of external rendering can be obtained from EN 13914 Code of Practice for external rendering and BS 8000-10: Workmanship on building sites, Code of Practice for plastering and rendering.

## External Cladding

Concrete blockwork provides a strong background to secure decorative claddings such as weatherboarding and tiles. Typically, the claddings are fixed to timber battens, which are nailed or screwed to the blockwork. All block products are suitable for external cladding.

## Plastering

Dense and lightweight plasters are suitable for use on all block types. Proprietary lightweight plasters should be used strictly in accordance with the manufacturer's recommendations.

## Preparation

Before applying the plaster, the background should be clean, dry and free of dirt and all loose particles. An assessment of the background and its suitability for the direct application of the plaster should be made. For the application of dense plasters, dense blocks with a close texture finish may require some pre-treatment; for instance, the application of a spatterdash coat or proprietary bonding slurry such as Weber Rend Aid.

## Dense Plasters

Dense plasters will normally consist of a cement and sand-based undercoat and a gypsum-based finishing coat. The undercoat should consist of a 1:1:6 cement, lime, sand or other designation (iii) mix built up to a thickness of 10-12 mm. The undercoat should be left to dry and finished with a setting coat, such as Thistle Multi-Finish.

## Lightweight Plasters

Lightweight plasters should be compatible with the key and suction properties of the blockwork. As a guide, the plasters shown in Table 6 are suitable for a range of our products. These are based on plasters from the British Gypsum range, but other proprietary plasters can also be used.

*Table 6 - Lightweight and Dense Plasters*

| Lightweight Plasters | Backing and Finishing Coats | | | |
|---|---|---|---|---|
| Product | Thistle Hardwall & finish | Thistle Bonding & finish | Thistle Browning & finish | Thistle Tough Coat & finish |
| Ash GP | √ | | √ | √ |
| Fibo 850/950 | √ | | √ | √ |
| Lignacite | | √ | | |
| Lignacrete | | √ | | √ |
| Dense Plasters | | | | |
| Backing coat | 1:1:6 cement:lime:sand<br>1:6 cement:sand and approved plasticiser<br>1:5 masonry cement:sand | | | |
| Finishing coat | A gypsum finishing coat applied in accordance with the manufacturer's instructions | | | |

## Further Information

Further information on the design, preparation and application of plasters can be obtained from BS EN 13914-2: Design, preparation and application of external rendering and internal plastering. Design considerations and essential principles for internal plastering can also be found in BS 8000-10: Workmanship on building sites, Code of Practice for plastering and rendering.

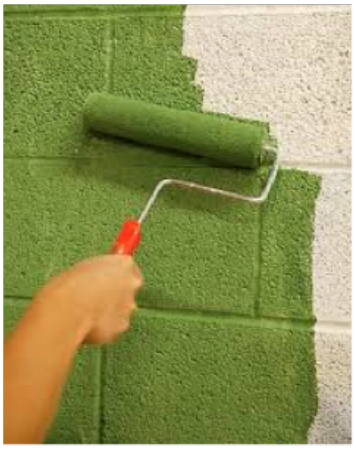
# SURFACE FINISHES

## Dry Lining

Plasterboard can be fixed to blockwork using a proprietary adhesive. The adhesive is applied using the dot-and-dab method. A continuous ribbon of adhesive is provided around the perimeter of the board to prevent air leakage.

Alternatively, metal channels or timber battens can be fixed to the blockwork and the plasterboard attached using plasterboard nails or approved screws.

Thermal plasterboard laminates can be fixed using plasterboard adhesive. However, they will also require secondary fixings as per the manufacturer's recommendations.



## Painting

For internal applications, blockwork can be painted directly using cement and water-based paints. Walls must be dry and dust–free beforehand. For the application of emulsion paint, the blockwork surface should firstly be sealed using a suitable sealer or a diluted coat of emulsion. This should be followed by two coats of emulsion applied by brush, roller or spray. Coverage will depend upon the quality of the paint and the number of coats applied. Other types of paints should be applied strictly in accordance with the manufacturer's instructions.

## Sealing

Where internal fair face walls are required to provide an invisible dust-free surface, a PVA sealer can be applied. PVA sealers are available from manufacturers including:

- Sealocrete from Bostik Limited
- SikaBond Contractors PVA from Sika Limited

## Glazed Tiling

Before beginning work, the wall must be dry. Apply 1:4 cement and sand-levelling coat and allow to dry for 14 days before tiling with a proprietary adhesive. Movement joints in the tiles should be provided to coincide with the control joints in the blockwork and at any other locations recommended by the tile manufacturer.

For more detailed information, please consult BS 8000-11, Code of Practice for Wall and Floor Tiling.

## Efflorescence

Efflorescence is a natural condition that sometimes results in a crystalline deposit of water-soluble salts on the surface of masonry walls. Although efflorescence is unsightly and a nuisance to remove, it is not usually harmful to block masonry, nor does it affect the structural integrity of the construction. Efflorescence tends to occur when the following are present:

- A source of water into the masonry
- Soluble salts within the masonry
- A path for the water to get to the surface of the masonry and evaporate

It is difficult to predict when efflorescence will occur. It is usually associated with wet and cold weather and tends to occur during the early life of the building or sometimes during construction. The source of the salts may be from either the cement and/or lime in the mortar, but salts can also originate from the blocks themselves. Efflorescence can occur in all types of masonry. The salt deposits may vary in amount and composition, according to the nature of the soluble materials and atmospheric conditions.

Weather conditions will influence efflorescence. In summer, even after long rainy periods, moisture evaporates so quickly that comparatively small amounts of salt are brought to the surface. Efflorescence is usually more common in winter when a slower rate of evaporation allows the migration of salts to the surface. Over time, efflorescence becomes lighter and less extensive, unless there is an external source of salt. Dark surfaces highlight the deposits much more than light-coloured surfaces.

Efflorescence-producing salts are usually carbonates of calcium, potassium and sodium; sulphates of sodium, potassium, magnesium, calcium and iron (ferrous); bicarbonate of soda; or silicate of sodium. In most cases, salts cause efflorescence to come from beneath the surface, but chemicals in the materials can also react with elements in the atmosphere.

To minimise the risk of efflorescence occurring, store blocks off the ground and cover them with waterproof sheeting, as described in this guide. Ensure that partially complete work is protected from the elements during inclement weather.

Where staining is required to be treated, specialist advice should be sought.