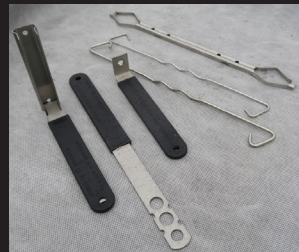


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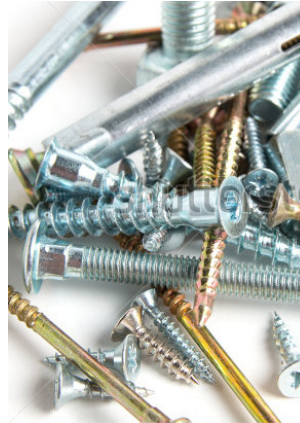
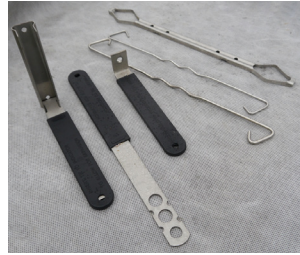
Sustainable Masonry

Sitework Guide



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Health & Safety



1. Health & Safety

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



Regulations and Guidance

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

- Manual handling. Manual Handling Operations Regulations 1992 (as amended) places duties on employers to carry out a risk assessment on manual handling tasks
- The Construction (Design and Management) Regulations 2015, imposes mandatory health and safety requirements on clients, designers and contractors.

Guidance on the manual handling of concrete blocks is given in Health & Safety Executive (HSE) Construction Sheet 37 'Handling building blocks'. This can be used to assess manual handling risks and advises that there is a higher risk of injury in single-person repetitive lifting of units heavier than 20kg. It is recommended that units heavier than 20kg, if handled repetitively, should be handled mechanically or by 2-man teams.

Design Considerations

The comprehensive product range from Lignacite Ltd ensures the maximum choice available for the specification of building blocks for any construction project.

Projects can be designed using our range of aggregate blocks to meet the essential technical requirements and at the same time satisfy manual handling guidelines. Alternatives to units weighing more than 20kg include laying blocks flat, or constructing two leaves of blocks back to back, to achieve the required wall width. Additionally some products have also been specifically developed to meet manual handling requirements, whilst providing good technical performance. For example, 140mm wide walls can be built using the following product options:

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

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

Facing Masonry

Most Facing Masonry blocks (440 x 215mm face size) or Roman bricks (440 x 65mm face size), are supplied in 100mm width and will satisfy manual handling guidelines for single person repetitive handling. For 140mm walls, cellular blocks (440 x 215mm face size) satisfy the manual handling guidance.

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	Ashlite	Medium density	140mm Ashlite solid 3.6 to 10.4N/mm ²
	Fibo 850	Lightweight	140mm Fibo solid 850 3.6N/mm ²
	Lignacite	Medium density	140mm Lignacite SP solid 3.6 to 7.3N/mm ² 140mm Lignacite Cellular or hollow blocks 3.6 to 7.3N/mm ²
	Lignacrete	Dense	140mm Lignacrete Midi 7.3 to 22.5N/mm ² 140mm Lignacrete Low Height 7.3 to 17.5N/mm ² 140mm Lignacrete Cellular or Hollow 7.3 N/mm ²
190mm	Lignacite	Medium density	2 x 90mm Lignacite solid (any strength), units laid back to back
	Lignacite	Lightweight	190mm Lignacite Paint Grade solid 7.3N/mm ²
	Lignacrete	Dense	2 x 90mm Lignacrete solid (any strength), units laid back to back
215mm	Lignacite	Medium density	100mm Lignacite solid (any strength), units laid flat 2 x 100mm Lignacite solid (any strength), units laid back to back
	Lignacrete	Dense	100mm Lignacrete solid (any strength), units laid flat 2 x 100mm Lignacrete solid (any strength), units laid back to back

Refer to the Product Data sheets for the technical specification of our products or consult our Technical Services department for advice.

1. Health & Safety



Health & Safety Data

The following information is provided by Lignacite Ltd under the Control of Substances Hazardous to Health Regulations (COSHH) and the Consumer Protection Act, both of which require that we provide the relevant information regarding our products in respect of their properties, correct use, storage/handling and disposal in a manner which minimises the risk to health.

1. Product and company information	
Product Names	Ashlite, Carbon Buster, Fibo 850, Houseblock, Lignacite, Lignacrete, Lignalite, Facing Masonry ranges
Company	Lignacite Ltd Norfolk House Brandon Suffolk IP27 0AX
2. Composition /information on ingredients	
Description	Precast concrete aggregate building blocks
Application	A range of aggregate blocks is manufactured in various sizes, strengths and densities for use in construction. They should be used in accordance with Lignacite Ltd's technical literature (www.lignacite.co.uk) and relevant national and European masonry standards and codes of practice.
Composition	Products are manufactured from cement, partial cement replacements and, dependent on product type, various types of lightweight and dense aggregates. In addition, Lignacite blocks are manufactured with a proportion of graded wood particle. Products from the Facing Masonry range will contain admixtures such as colour pigments and waterproofing admixtures.
3. Health hazards	
Following manufacture, the products are not deemed to be hazardous within the meaning of the Health and Safety at Work Act 1974, nor are they chemically aggressive. The main hazards applicable are:	
Eye contact	Any dust which may be generated could cause irritation and discomfort by abrasion, similar to "grit in eye".
Skin contact	Prolonged or repeated contact with dust or rough surfaces may cause dryness and abrade the skin.
Manual handling	Blocks may vary in weight and size. The manual handling risk should be assessed to minimise injury; poor posture when bending or twisting may cause strain.
4. First aid measures	
In normal use, the routes to exposure would be as follows:	
Inhalation (dust)	Remove to fresh air. If irritation of respiratory tract persists, seek medical advice.
Eye contact (dust)	Irrigate immediately with plenty of water, seek medical attention if symptoms persist.
Skin contact	Wash with soap and water, apply a sterile dressing. If irritation persists seek medical advice.
Ingestion	Do not induce vomiting. Drink plenty of water and seek medical attention.

1. Health & Safety

5. Fire Fighting Measures

Concrete blocks are non-flammable.

No special fire-fighting procedure, extinguishing media or explosion hazard is identified.

6. Accidental release measures

Block waste can be recycled or disposed of with normal builders' waste in accordance with Local Authority regulations.

If dust is created, it should either be dampened before physical recovery or cleaned up using a vacuum system fitted with a HEPA (high efficiency particulate air) filter. Do not allow disposal into drains or sewers. Contaminated materials should not be used and should be safely disposed of according to Local Authority regulations.

Dust particles may also arise from handling packaged products and may cause irritation if allowed to enter the eyes, respiratory tract or contact with the skin is made. Where dust arises in the atmosphere, suitable eye, face, hand, respiratory and body protection should be employed by all persons involved in the operation, and the area ventilated so far as is reasonably practicable. Correct hygiene procedures should be followed before taking food, drink or smoking.

7. Handling and storage

See advice provided under the Construction Design & Management Regulations

8. Exposure controls/personal protection

Workplace Exposure Limit (WEL):

Airborne dust can be generated when the blocks are mechanically worked, i.e., cutting, grinding. The following Workplace Exposure Limits for airborne dust are given in the HSE Guidance Note EH40 for reference.

	Workplace Exposure Limits (WEL)	Time Weighted Average (TWA)
Total dust	10mg/m ³	8 hours
Respirable dust	4.0mg/m ³	8 hours
Crystalline silica (respirable)	0.1mg/m ³	8 hours

Personal Protective Equipment (PPE):

Material may be rough in texture. Loose particles and dust that may arise from handling these products may cause irritation if allowed to enter the eyes or respiratory tract. Suitable personal protective equipment, e.g. safety footwear, head, eye, face, hand and respiratory protection, should be used.

Where cutting of blocks is undertaken, suitable eye, face, hand, respiratory and body protection should be employed by all persons involved in the operation. If cutting is undertaken by mechanical means (e.g. band saw, portable cut-off saw or angle grinder etc.) the cutting equipment should comply with the relevant Statutory and Regulatory requirements and cutting should be carried out only by suitable trained and competent persons.

9. Physical and chemical properties

Form:	Products are available in solid, cellular and hollow block form.
Colour:	This varies according to the product types, and factory of origin. The Facing Masonry ranges include an extensive range of colour options – refer to the Product Data sheets for details.
Odour:	None.
pH:	N/A
Bulk Density	Varies according to product type. The density range of our products is 800-2100 kg/m ³ .
Solubility:	N/A
Auto flammability:	N/A
Lower Explosive Limit (LEL):	N/A

10. Stability and reactivity

Stability:	Product is chemically stable.
Reactivity:	No hazardous chemicals are known to be formed during use of this product.
Conditions to avoid:	Damp conditions during storage.

1. Health & Safety

11. Toxicological information	
Skin:	Abrasive, may cause skin irritation.
Eyes:	Abrasive, discomfort and irritation.
Ingestion:	Unlikely to be a problem.
Inhalation:	Unlikely to be a problem.
12. Ecological information	
Environmental:	Overall environmental impact is regarded as insignificant. Product is made using a high proportion of recycled materials.
Mobility:	Non soluble
Biodegradability:	Not biodegradable
13. Disposal considerations	
Dispose of surplus material and packaging via authorised waste contractor in accordance with local authority regulations.	
14. Transport information	
Treat as non-hazardous product.	
UN No:	None
IMO Classification:	None
ADR Classification:	None
IATA Classification:	None
15. Regulatory information	
Risk and Safety Phrases:	None

Other information

The information given above does not constitute or serve as a substitute for the user's own risk assessment when using this product in the workplace. It is the user's responsibility to ensure the information given above is made available to anyone in their employment who will handle or use this product.

There is a higher risk of injury when single-handed, repetitive lifting involves units with a weight exceeding 20kg. Table 1 gives some alternative wall constructions to avoid the use of heavy units. Where units exceeding 20kg are required lifting by mechanical means should be used wherever possible.



Control of materials on site

2. Control of materials 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:

1. Packaging

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

Commodity range

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



Facing Masonry range

Facing Masonry products are delivered banded and shrink-wrapped to non-returnable pallets.



2. Delivery

The vast majority of deliveries are by crane off load vehicles.

When vehicles are off-loading, any overhead power lines or cables should be isolated or otherwise adequately protected.



3. Transporting on site



- Concrete blocks must not be tipped or roughly handled
- Use mechanical methods, such as a telescopic fork lift 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 is not suitable for facing quality blocks as they are likely to be damaged.



2. Control of materials on site

4. Storage

- Blocks should be carefully unloaded and stacked on their bedding ends on firm, level ground, clear of standing water, close to the location where they are to be used. They should be protected against rain and snow in a manner which allows air to circulate between the blocks. Particular attention should be taken to ensure protection of the block arises
- Blocks should remain in the packs until required for use
- When manually handling blocks, to prevent risk of injury from loose blocks falling, avoid stacking blocks above normal head height
- Commodity block packs (no pallets) should be stacked no more than two to three high. Ensure upper packs are adequately supported by the lower packs
- Palletised commodity blocks should be stacked using the pallets supplied and stacked no more than 3 packs high. However it is recommended that Facing Masonry products are stacked no more than one pack high to preserve the quality of the units
- In all cases reduce the stack height if the ground conditions are unsuitable
- Paint grade and Facing Quality blocks should never be stacked on their faces.

5. 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): this includes safety helmets, safety footwear and suitable gloves and ensure they are used
- Blocks should be stacked as close as is 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 over-reaching 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.

6. Mortars

Mortar Mixes



The mortar should be specified by the designer. 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 overleaf.

2. Control of materials on site

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/mm ²)
			Cement ^c lime: sand with or without air entrainment	Cement ^c sand with or without air entrainment	Masonry cement ^d sand	Masonry cement ^e sand	
Increasing ability to accommodate movement, e.g. due to settlement, temperature and moisture changes	(i)	M12	1:0 to 1/4:3	1:3	Not suitable	Not suitable	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

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

For work below DPC level, mortars of designation (ii) (1:1/2:4 cement:lime:sand) are advocated, particularly where there is a risk of freeze/thaw, or (iii) may be used, according to soil conditions.

Work above ground level DPC

In general terms, for work above DPC, excluding parapet walls, a compressive strength class M4/designation (iii) mortar is suitable for most of our masonry unit types. Stronger mixes may be specified for specific applications, for example, in conjunction with high strength masonry or where the blockwork is to be reinforced. In the selection of mortars, as a general guide, cement:lime:sand mortars give a stronger bond than plasticised mortars of a similar compressive strength. Incorporating lime into the mix is also beneficial in terms of the ability of the mortar to accommodate movement.

Additives

These should only be used as specified by the designer and strictly in accordance with the manufacturer's instructions.

Further information

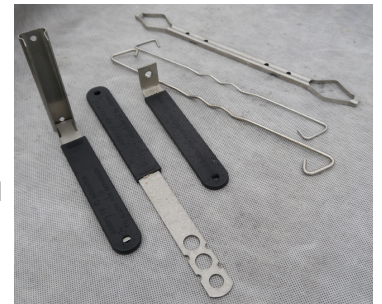
Refer to Lignacite Ltd *Design Guidance - Mortars*

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 not more than 225mm from the wall edge. Wall ties should have a minimum 50mm embedment in each leaf. Walls ties should be built in as the

work proceeds; they should never be pushed into joints after the joints have been completed. The type of wall ties 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, as specified in Approved Documents E or in accordance with Robust Details specifications, should be used.

Cavity insulation

All of our products are compatible with common insulation materials such as full and partial cavity insulation.

The levels of achievable thermal performance (U-values) can be found in Lignacite Ltd *Design Guidance - Energy Efficiency*.





Construction Process

3. Construction process - the Commodity range

These recommendations apply to Commodity blocks, including blocks that are to be painted directly. They include products such as Ashlite, Carbon Buster, Fibo 850, Houseblock 1100, Lignacite, Lignacrete and Lignalite.



Sample Panels



Sample panels would normally be applicable to Commodity blocks where the wall is to be left fair face undecorated or directly painted.

Sample panels are recommended in order 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 a good natural light.

Please note some colour variation is to be expected when using Paint Grade blocks.

Weather conditions

Block laying should be discontinued during inclement weather, unless the work is protected. When work stops for more than an hour or two, 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, from scaffolding and from other construction activities. No block laying should be carried out when the air temperature is at or below 3°C and falling, or unless it is at least 1°C and rising.

Conditions should be regularly monitored and account should be taken of the wind chill factor. 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, Commodity blocks should be laid to conform to the following:

1. Using a stretcher bond and whenever possible the minimum bond should be not less than one quarter of the length of the block
2. Laid on a full bed of mortar with all vertical joints substantially filled and vertically aligned in fair face work
3. Mortar joints should be nominal 10-12mm thickness
4. Blocks should be laid level and to a uniform joint thickness
5. Cellular blocks should be laid with the closed end uppermost to provide support for the next bed of mortar



6. Shell bedding of hollow blocks should only be permitted with the designer's permission
7. 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, except that any one leaf should not be constructed more than 1.5m in one day
8. For paint grade and fair face work, mortar joints should be tooled to the specified joint profile as the work proceeds

3. Construction process - the Commodity range

9. Use coursing blocks of the same materials as the main wall to infill small areas, such as infill between joists, and to complete coursing heights. Their use will help to maintain productivity and reduce cutting. A range of coursing blocks are available for this application. Refer to Lignacite Ltd Coursing Block data sheet



10. Remove excess mortar as the work proceeds
11. Tool the mortar joint to the required profile when thumb-print hard. For general background work, joints should not be left proud but struck off as work proceeds
12. Protect the work against rain and frost until the mortar is fully cured.
13. Protect the work against rain and frost using water proof sheeting until the mortar is fully cured. At cessation of work, the tops of the walls should be covered against wet weather or frost.



Cutting

Commodity blocks can be cut using conventional hammer and bolster, a hydraulic block splitter or a mechanical disc cutter. For more accurate cutting, a bench saw should be used or alternatively, Lignacite Ltd can provide a cutting service.



Chasing

Chases can be formed using a rotary chasing machine with depth guide or mechanical disc cutter. 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. For chasing into cellular and hollow blockwork, we recommend that at least 15mm of block material should be retained between the void and the back of the chase.



4. Construction process - the Facing Masonry range

These recommendations apply to the Facing Masonry range. These products are produced for their high aesthetic appeal and great care should therefore be taken during their installation to avoid any damage to the units or the finished work.



Common Pitfalls

- AVOID any delay in the installation of down pipes, which would otherwise lead to rain water cascading down the face of blockwork and result in serious efflorescence staining
- AVOID damage to the faces of blocks when transporting around the site
- PROVIDE adequate protection to the built blockwork
- NEVER use a pressure washer to clean down built blockwork as this is likely to result in damage to the mortar joints as well as efflorescence staining.

Packaging and protection

Facing Masonry is delivered to site, banded and shrink-wrapped on non-returnable pallets.

- These pallets must be stored on level ground, free from standing water
- Stack product one pallet high
- Do NOT stack Facing Masonry blocks on their faces.

The material should be inspected upon delivery and checked against specification and the approved standard by the designer/customer. Shrink wrapping to sides of packs should be pierced to facilitate ventilation. It is preferable to completely remove the shrink wrap once on site, and cover with a tarpaulin, allowing a through flow of air, enabling the blocks to breathe and dry out. Please note shrink wrapping should be removed carefully by cutting it open. It should NOT be torn or ripped as this may damage the corners/edges of the products.

Sample panels

Sample panels are recommended in order 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. Wherever possible, they should be built using blocks from the production run specifically made for the order.

Please note that some colour/texture variation is to be expected in Facing Masonry, as the blocks are manufactured from quarried materials that can vary from seam to seam.

It is advisable to view sample panels at a distance of about 3m from the wall in a good natural light.



Handling

Facing Masonry blocks must not be stored on their faces. They should always be stacked in the same aspect as when the units appear in the wall. Blocks should always be lifted, not dragged along the ground. Fair Face (natural finish) blockwork is particularly susceptible to damage on site, any marks showing up more obviously on a smooth surface than a textured (shotblasted/split) face. In particular, Lignacite Sahara, which has a smooth surface, needs handling with great care as the face marks easily and remedial work may not be possible.

Fair Face blocks are normally supplied on the basis of fair face to one face and one end.

If a face has a blemish, the bricklayer must turn the block round so that the good face is showing.

Weather conditions

Block laying should be discontinued during inclement weather, unless the work is protected. When work stops for more than an hour or two, 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, from scaffolding and from other construction activities. No block laying should be carried out when the air temperature is at or below 3°C and falling, or unless it is at least 1°C and rising. Conditions should be regularly monitored and account should be taken of the wind chill factor. The use of covers will protect materials which are not to be used immediately. Frozen materials must not be used. It is essential to protect newly laid masonry from frost damage.

4. Construction process - the Facing Masonry range

Protection

Good protection practice should be followed during 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 should be given to areas exposed to site traffic or following trades.

Unless the work is protected during construction, there remains the risk that sudden frosts or showers will cause damage. Please note that the appearance of the finished blockwork is likely to be compromised by a failure to protect the work during construction.

Setting out

Attention to detail regarding the accuracy of the initial setting out is paramount in ensuring the quality of the finished work.

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.

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.

It is important to maintain uniformity of joint thickness and alignment of vertical joints.

The specifier should define the accuracy of the work. Guidance for a general standard of accuracy, in terms of permissible deviations, is given in *BS EN 1996-2-2006*. However, these values should not be regarded as defining the acceptability of appearance and closer dimensional deviations may need to be specified.

Block laying

Unless otherwise specified, Facing Masonry blocks should be laid to conform to the following;

1. Using a stretcher bond and whenever possible the minimum bond should be not less than one quarter of the length of the block
2. Laid on a full bed of mortar with all vertical joints substantially filled and vertically aligned in fair face work
3. Mortar joints should be nominal 10-12mm thickness
4. Blocks should be laid level and to a uniform joint thickness
5. Cellular blocks should be laid with the closed end uppermost to provide support for the next bed of mortar
6. Shell bedding of hollow blocks should only be permitted with the designer's permission
7. Corners and other advance work should not be raked back

higher than 1.2m above the general level. The whole lift should be completed within one period of operation, except that any one leaf should not be constructed more than 1.5m in one day. In practical terms the height of masonry that can be completed in a day will depend upon a number of factors, such as the weather conditions, the consistency of the mortar etc. A general rule is that for 90/100mm thickness blocks at least 4 courses are practical to construct

8. Facing work should be finished to the specified profile as the work proceeds
9. Use coursing or cut blocks of the same materials as the main wall to infill small areas, such as infill between joists, and to complete coursing heights. Their use will help to maintain productivity and reduce cutting
10. Excess mortar at bed and perpendicular joints should be left to dry 'thumb print hard' before it is lifted away with the trowel edge. If a mortar run is created on the face of the block, this should be dabbed clean with a slightly moist sponge. If a block has a texture (i.e. shotblasted, split) the latter should be avoided, and the affected area should instead be allowed to dry completely, then carefully abraded with stiff dry brush. Under no circumstances should steel wool or other abrasive material be used
11. Tool the mortar joint to the required profile when thumb-print hard
12. Protect the work against rain and frost using waterproof sheeting until the mortar is fully cured. At cessation of work, the tops of the walls should be covered against wet weather or frost.

Cutting

Mechanical cutting of blocks using a disc cutter is advocated. We strongly recommend cutting of blocks at the factory and not on site.

For cutting on site 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 and will become virtually impossible to remove.

Following cutting, the blocks must be allowed to dry fully before being built in.

Chasing

Surface mounting of services is recommended to avoid spoiling the appearance of the wall.



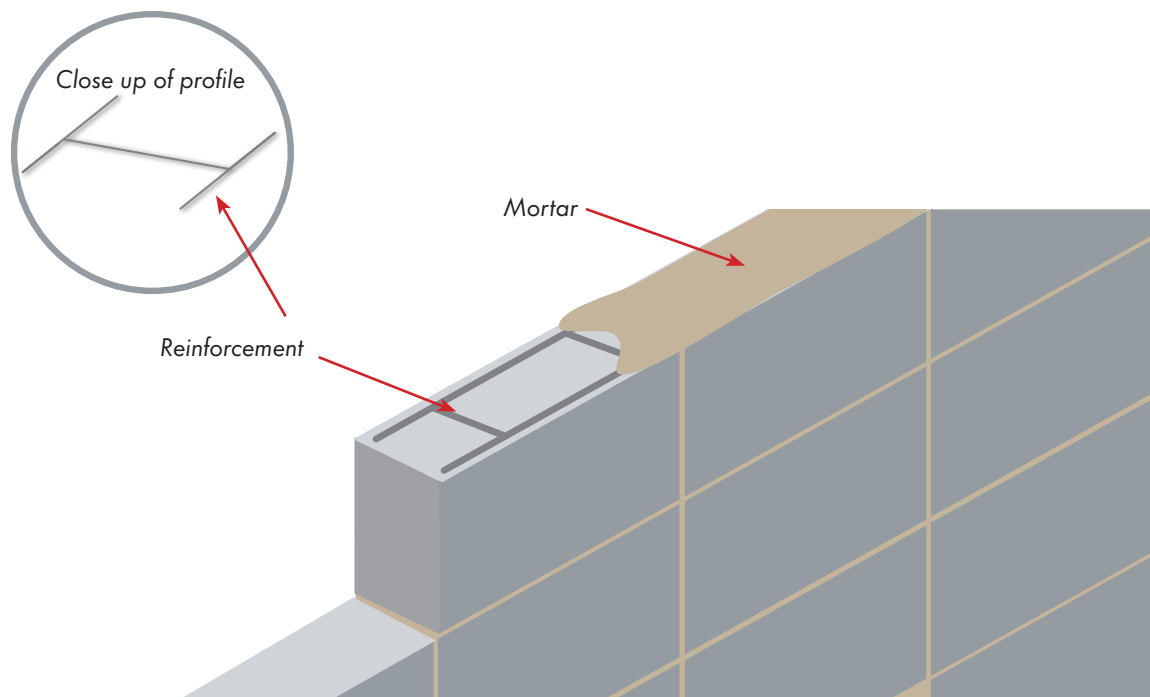
Stack Bonded Masonry

5. Stack Bonded Masonry

Where stack bonded masonry is specified, the lack of bonding between units will greatly reduce the overall flexural strength of the panel and the ability of the wall to spread vertical loads. To compensate for this, bed joint reinforcement, located in the bed joints, will increase the panel's flexural strength and improve the capacity to resist lateral loads and spread vertical loads. Generally a suitable reinforcement type e.g. Ancon referenced AMR/S/D3.5/W60, is normally recommended at every block course e.g. 225mm centres. The inclusion of bed joint reinforcement will also help to minimise the risk of cracking within the wall.



Figure 1 - Bed joint reinforcement in stack bonded masonry

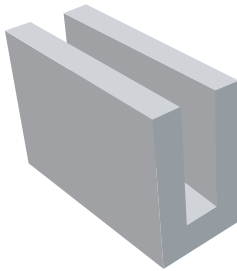




Lintels

Trough Lintels

Trough lintels are intended to span openings in walls whilst maintaining the appearance of the surrounding masonry. They are constructed using Trough Lintel Blocks, which are cut from the same blocks produced on the block machine enabling a close colour and texture match. The open core is filled on site with horizontal reinforcement and concrete infill. Trough Lintel Blocks can be produced in Lignacite, Lignacrete and the Facing Masonry ranges. For detailed specifications refer to Lignacite Ltd - Design Guide - Reinforced Beam and Trough Lintels.

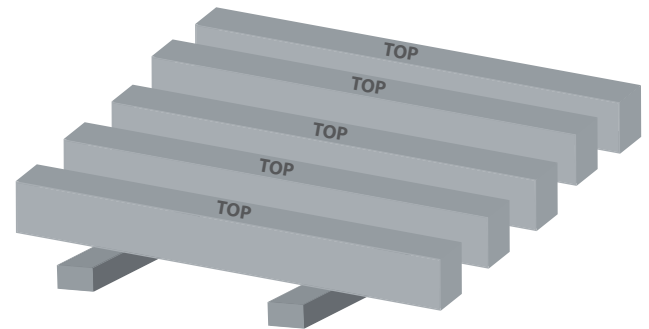


- Place reinforcement as appropriate
- Complete in-situ filling, tamping by hand
- After a curing period, strip propping, remove temporary joint spacers and point joints carefully to match surrounding facing masonry.

Reinforced Beam Lintels

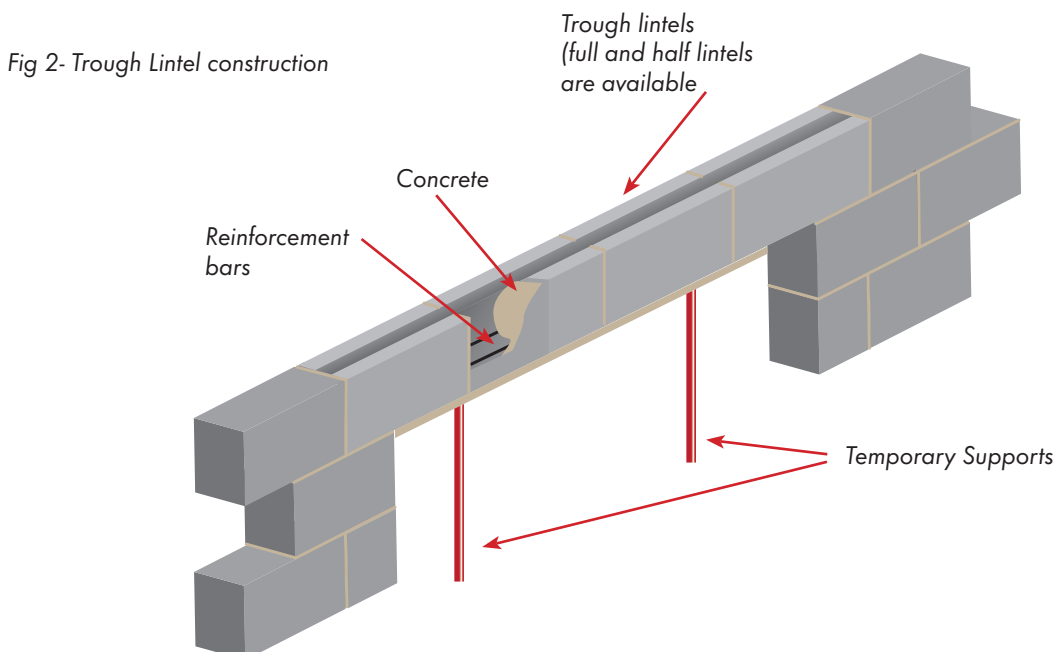
All beam lintels should be stacked top uppermost on a firm level ground supported on timber bearers. The units should be handled with care to prevent damage. Lintels must NEVER be cut on site.

We recommend that Beam Lintels are not double stacked. When built into the wall, Beam Lintels should be provided with end bearings of 215mm unless otherwise specified by the project engineer.



The sequence of Trough Lintel construction is as follows:

- Build the blockwork to the soffit height of the lintel
- Provide temporary propping to the Trough Lintel Blocks
- Lay the Trough Lintel Blocks 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)
- Place the specified concrete fill in the bottom of the trough units
- Fit plastic spacers to the reinforcement to ensure correct concrete cover





**Movement joints and bed
joint reinforcement**

7. 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, e.g. above and below openings
- Avoidance of over strong mortar
- Protection of blocks and partially complete construction from the adverse effects of weather.

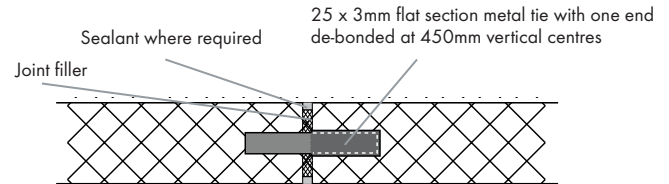
Movement joints

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, for further information refer to Lignacite Ltd *Design Guidance*.

Formation of movement joints

Movement joints should be formed as the work proceeds, and are typically formed as a straight joint of 10mm width to co-ordinate 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. Where required, the joint material may need to achieve a specified fire resistance period, and there are many products available, such as flexible intumescent seals, to achieve this. Movement joints should be made continuous through any applied rigid finishes such as plaster or rendering.

Fig 4 – Typical movement joint

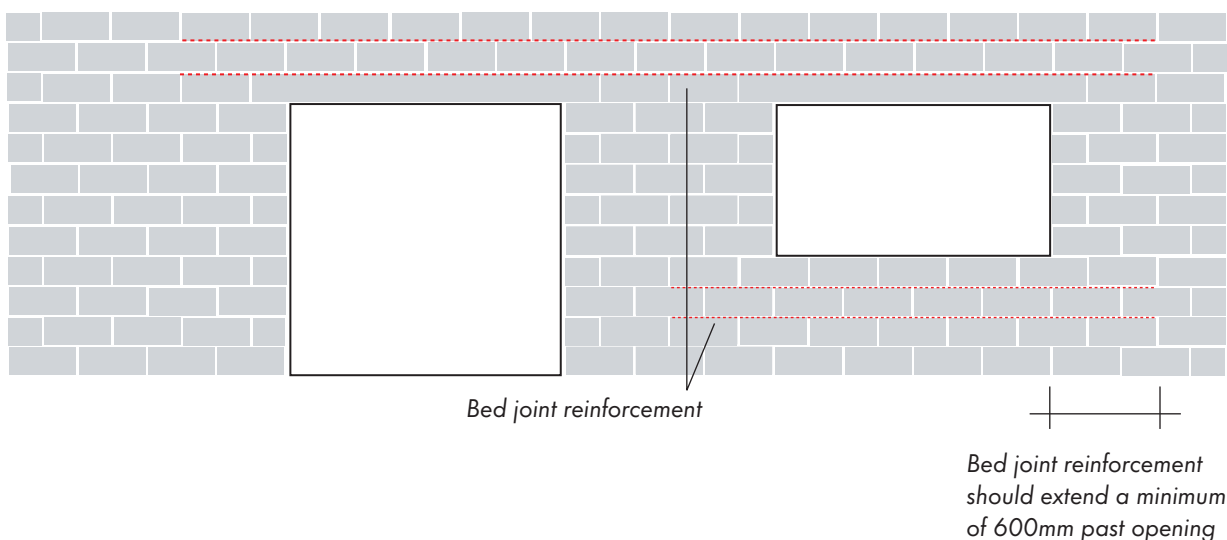


Introducing bed joint reinforcement can be beneficial and may be considered for the following applications:

- Above and below openings to control movement to these areas of raised stress
- Differential movement control, for example, between facing masonry 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.

Fig 3 - Typical 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 in its length and lapped fully at returns.

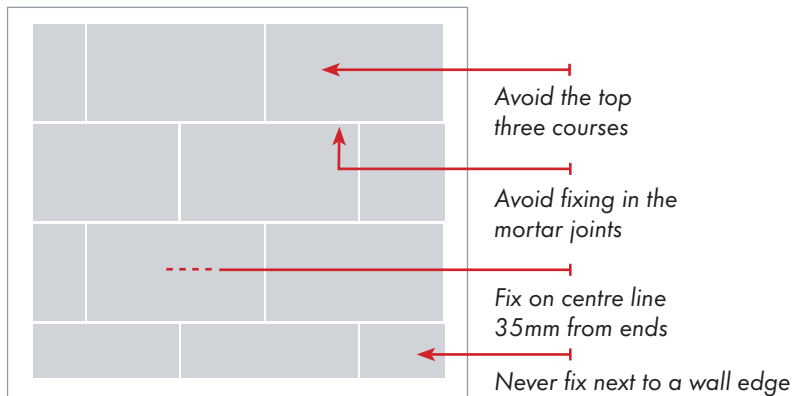


Fixings

8. Fixings

All product types have the potential to provide a strong and secure background for the application of fixings. Where heavy weight 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.










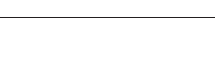
Fig 5 - Guide to locating fixings












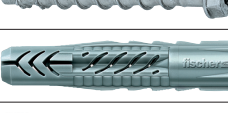
Depending on the block type, and the loads to be supported, suitable fixings include plastic and metal plugs, frame fixings and chemical anchors.

Typical pull-out loads for various fixings are shown in Table 3.

Table 3 - Pull-out values for various fixings

Block Type	Description of Fixing		Fixing Tested	Average ultimate load kN	Allowable load kN
100mm solid Lignacite 3.6N/mm ²	Nylon plug and wood screw		Fischer SX 10 x 50	2.74	0.26
100mm solid Lignacite 3.6N/mm ²	Resin anchor		RGM 10 x 130 stud set with FIS V 360 S Resin	10.94	3.31
100mm solid Lignacite 3.6N/mm ²	Self-tapping concrete screw		FBS - 8/15 S	7.6	1.37
100mm solid Lignacite 7.3N/mm ²	Resin anchor		RGM 10 x 130 Threaded rod + FIS V 360 S Resin	15.46	3.0
100mm solid Lignacite 7.3N/mm ²	Nylon plug and Screw		FSXS 10 x 60 FUS	5.96	0.77
100mm solid Lignacite 7.3N/mm ²	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/mm ²	Nylon plug and wood screw		UX 10 x 60 Nylon Plug + 7mm Woodscrew	2.06	0.46
140mm solid Lignacite SP 7.3N/mm ²	Nylon plug and wood screw		SX 10 x 50 Nylon Plug + 7mm Woodscrew	4.2	0.60
140mm solid Lignacite SP 7.3N/mm ²	Self-tapping concrete screw		FBS 6/25 P Concrete Screw	3.92	0.49
140mm solid Lignacite SP 7.3N/mm ²	Special screw for door and window installation		FFS 7.2 x 72 Frame Fixing Screw	3.4	0.34

8. Fixings

Block Type	Description of Fixing		Fixing Tested	Average ultimate load kN	Allowable load kN
140mm solid Lignacite SP 7.3N/mm ²	Resin Anchor		FTR M10 x 130 BZP + FIS V 360 S	14.0	3.53
140mm solid Lignacite SP 7.3N/mm ²	Nylon plug and wood screw		SXR 10 x 80 FUS	6.1	0.61
140mm cellular Lignacite 3.6N/mm ²	Nylon plug and wood screw		SXSXR 10 x 60 FUS	1.94	0.15
140mm cellular Lignacite 3.6N/mm ²	Special screw for door and window fixing		FFS 7.5 x 72 Frame Fixing	1.28	0.22
140mm cellular Lignacite 3.6N/mm ²	Resin Anchor		FIS V 360 S + FIS H 18 x 85 N + M10 Threaded rod	6.56	1.47
140mm cellular Lignacite 3.6N/mm ²	Frame fixing		FUR 10 x 80 FUS Art No: 93572	3.2	0.30
140mm solid Lignacrete 7.3N/mm ²	Self-tapping concrete screw		FBS 8/15 S concret screw.	9.8	1.49
140mm solid Lignacrete 20.0N/mm ²	Self-tapping concrete screw		FBS 8/15 S concrete screw.	19.80	4.92
140mm solid Lignacrete 20.0N/mm ²	Nylon plug and wood screw		UX 10 x 60 Universal Nylon Plug + 8mm Woodscrew.	1.90	0.26
140mm solid Lignacrete 20.0N/mm ²	Resin anchor		FIS V 360 S + M10 Threaded Rod	26	6.0

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.



Surface Finishes

9. 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 such factors 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. It is important that successive render coats are specified as being no stronger or thicker than the previous coat.

Preparation

Prior to 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 Ashlite and Lignacite GP blocks have good suction and usually provide sufficient key for the direct application of renders.

Dense 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 e.g. 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, to provide a stipple brush texture. Alternatively, adhesive slurry etc, such as Rendaid 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 of at least two layers, namely 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 plus 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 between 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.



Proprietary renders are available and supplied self-coloured, and are intended for single coat application. These should be applied strictly in accordance with the advice from the individual manufacturer. Particular attention should be given to the measures taken for movement control.

Render Mixes

Table 4 gives general information on mixes suitable for rendering. Mix designation (iii) mixes are advocated for use on all block types, and to suit 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 are more able to accommodate movement.

9. Surface Finishes

Table 4 - Suitable mixes for rendering

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

* With fine poorly graded sands, the lower volume of sand should be used. For other mixes please refer to BS EN 13914 or BS EN 998

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.

To 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 reinforcement should be installed immediately above and below the opening and should extend 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 by reference to EN 13914 Code of Practice for external rendering, together with BS 8000-10: Workmanship on building sites, Code of Practice for plastering and rendering.

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

Prior to 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 such as the application of a spatterdash coat or proprietary bonding slurry such as Rendaid.

Dense Plasters

Dense plasters will normally comprise a cement and sand-based undercoat and a gypsum based finishing coat. The undercoat should comprise 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 5 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 5 - Lightweight and Dense Plasters

Lightweight Plasters	Backing and Finishing Coats			
Product	Thistle Hardwall & finish	Thistle Bonding & finish	Thistle Browning & finish	Thistle Tough Coat & finish
Ashlite				
Carbon Buster				
Fibo 850				
Houseblock 1100				
Lignacite GP				
Lignacite				
Lignacrete				
Dense Plasters				
Backing coat	1:1:6 cement:lime:sand 1:6 cement:sand and approved plasticiser 1:5 masonry cement:sand			
Finishing coat	A gypsum finishing coat applied in accordance with the manufacturer's instructions			

9. Surface Finishes

Further information

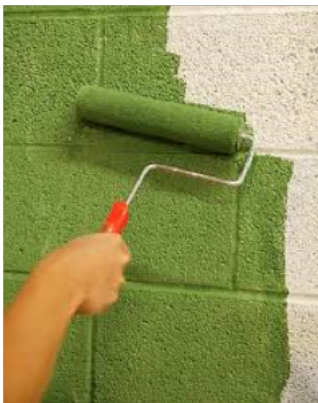
Further information on the design, preparation and application of external rendering can be obtained by reference to BS EN 13914-2: Design, preparation and application of external rendering and internal plastering. Design considerations and essential principles for internal plastering together with BS 8000-10: Workmanship on building sites, Code of Practice for plastering and rendering.

Dry Lining



Fix, using proprietary adhesive by plasterboard manufacturers, ensuring a continuous ribbon of adhesive is provided around the perimeter of the board, to prevent air leakage. Alternatively screw plasterboard to metal furrings or nail to timber battens. Plasterboard laminates require mechanical as well as adhesive fixings.

Painting



For internal applications, blockwork can be painted directly using cement and water-based paints. Walls must be dry and dust-free. For the application of emulsion paint, the blockwork surface should be sealed using a suitable sealer or a diluted coat of emulsion, followed by 2 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.

Glazed Tiling

Wall must be dry. Apply 1:4 cement, sand levelling coat. Allow to dry 14 days before tiling with 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 tiling manufacturer. For more detailed information, please consult BS 8000-11, Code of Practice for Wall and Floor Tiling.



Protective coatings

Anti-graffiti control can be provided by the use of water-based products which are available for internal and external use. These are available in a clear colour making them suitable for application onto fair face walls.

On application they can provide a permanent system which allows the easy removal of graffiti and other contaminants. Graffiti control products are available from a number of manufacturers.

In conditions where a high level of atmospheric pollution is envisaged, consideration should be given to the use of a suitable clear protective coating to help preserve the long-term appearance of the masonry. Products are available from a number of admixture suppliers. A supply and installation service is available from *Graffiti-Busters Ltd*, info@graffiti-busters.co.uk.



9. Surface Finishes

Efflorescence

Causes

Efflorescence is a crystalline deposit of water-soluble salts which can sometimes appear 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 will tend to occur when the following conditions are present:

- there must be a source of water into the masonry
- there must be soluble salts within the masonry
- there must be 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. It is possible for efflorescence to 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. 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 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 causing efflorescence come from beneath the surface, but chemicals in the materials can also react with elements in the atmosphere. Where staining is required to be treated refer to our guidance on 'Cleaning Blockwork'.



Cleaning Blockwork

10. Cleaning Blockwork

Cleaning Blockwork

These recommendations are applicable to products from the Facing Masonry range.

Cleaning of Facing Masonry blockwork is no substitute for maintaining high standards of site work practice, such as careful block handling and laying, correct use of mortar and adequate protection of the finished work. **Prevention is better than cure.**



The cleaning of Facing Masonry blockwork using cleaning agents should be undertaken with care in a quality controlled manner. Protective clothing (gloves and goggles) must be worn. Cleaning the face of the material may need more than one application. This will depend on the extent of the problem, the deposits and the texture or profile of the block involved.

All the following cleaning methods should be carried out on an inconspicuous area first to establish suitability and the effect of the process.

1. Fair Faced (natural finish) blocks

i) Mortar and Plaster 'Snots'

Where there is a build up of dry set mortar, it should be removed by placing the edge of a block of wood next to it and tapping the block sideways to lift the mortar off the face.

ii) Mortar and Plaster Smears

Where dried mortar smears or stains occur the residue can be removed by the use of a cleaning agent. Those generally available contain Hydrochloric Acid. The cleaning agent should never be used undiluted, and needs to be diluted 30 parts clean water to one part cleaning agent, except in the case of Sahara blocks, when advice should be sought from our Technical Department.

Using a bristle brush or mist sprayer, the spot or smear should be dampened with water, then apply the diluted cleaner. The mortar will be seen to dissolve and when judged to be clean, the area must be flushed with clean water again using a brush or mist sprayer.

Where wall surfaces have multiple smears and mortar

deposits over the whole face of the wall, initially treat any particularly heavy deposits as described above. Subsequently dampen the area and apply the cleaning agent over the whole face using a mist sprayer, then thoroughly irrigate the affected area.

Provided these recommendations are followed mortar joints will be no more affected than the surface of the blockwork. If a plasticiser has been incorporated into the mortar, a check should be made on the constituents for salt content as cleaning agents can be detrimental to some plasticisers.

Note:

Hydrochloric Acid based cleaners can attack other surfaces such as galvanised steel and care should therefore be taken with their application.

iii) Paint

It is essential that the type of paint and its solvent is identified - this is likely to be water, benzene, turpentine (pure), acetone or similar thinners. The solvent should be applied to the affected area, whether paint splashes or drips, using an appropriate sized brush, and should be left for a little time to soften the paint. When softened, the area being cleaned should be 'mopped' with the moist brush used for application of the solvent, the brush being squeezed after each mopping to clean it. When the paint has been cleaned from the surface of the blockwork, it must be allowed to dry. If paint residues remain, a further application of the cleaning agent, in accordance with ii) above, may prove to be necessary.

Note:

Guidance from the paint manufacturer should be obtained to determine the most suitable solvent to use.

iv) Oil, Grease, Bitumen and Tar Based Materials

Solvents must be identified. These may be Benzole, Carbon, Tetrachloride, Tetrachloroethylene, 'Dabit Off' or 'Gunk' de-greasant. The technique is the same as for the paint, but a trial and error approach may be necessary depending on the extent of the contamination.

v) Finger Marks

Apply a mist spray of clean water, followed by judicious use of household detergent and a nail brush. Finally, mist spray again with clean water and allow to dry. Repeat as necessary.

10. Cleaning Blockwork

2. Split Face blocks

As for Fair Faced blockwork above, but due to the irregular surface it will be necessary, as detailed in paragraph i), to use a piece of hardwood shaped to a chisel point. In addition stiffer brushes should be used for the treatments in paragraphs ii), iii), iv) and v). Alternatively the careful use of a needle gun can be effective.

3. Weathered blocks

vi) Mortar and Plaster 'Snots'

Where there is a build up of dry set mortar, it should be removed by placing the edge of a block of wood next to it and tapping the block sideways to lift the mortar off the face. (Using steel implements may scratch/mark the surface of the block). Where mortar is ingrained in product - see vii).

vii) Mortar and Plaster Smears

Surface mortar smears and ingrained mortar can, when dried, be removed by the use of a clean bristle brush (NOT wire brush). If this fails to remove the mortar, an acid wash as previously outlined should be used. As a last resort, if the above treatments have not proved successful, the use of light grit blasting on site will remove all ingrained material and stains.

4. Polished & Planished blockwork

Acid based cleaners must **NOT** be used on polished blocks. On no account should metal tools be used to remove mortar, paint or plaster from the face. To remove mortar smears, adopt the procedure in item ii) above, **but use water and a plastic scraper** to remove any surface material, using care to avoid damage to the polished face. To treat paint, oil/grease etc and finger-marks use the techniques set out in items i) to v) above. After treatment, the masonry must be allowed to dry. For a final cleaning and polishing apply 'Buff Up' and polish with a portable polishing mop, finishing with a clean dry cloth.

Efflorescence

Most efflorescence can be removed by dry brushing, water rinsing with brushing, or light sandblasting followed by flushing with clean water. If this is not satisfactory, it may be necessary to wash the surface with a dilute solution of Hydrochloric Acid (not more than a 5% solution). (Not to be used on Polished Blocks.) [Protective clothing and glasses must be worn when using an acid solution]. For integrally coloured concrete, not more than a 2% solution should be used. This will prevent surface etching that could change the colour and texture.

Before applying an acid solution, dampen the wall surface with clean water to prevent the acid from being absorbed into the wall and causing damage. Each application should be to areas of not more than 4 feet square. Wait 5 minutes before scouring off the salt deposit with a stiff bristle brush. The surface should be flushed immediately and thoroughly with clean water to remove all traces of acid. If the surface is to be painted, flush thoroughly with water and allow to dry.

Before any treatment is used it should be tested on a small, inconspicuous area.

Since acid and any other treatments may slightly change the appearance, the entire wall should be treated to avoid discoloration.

Pressure Washing

Never use pressure washers when cleaning down blockwork.

