

GOOD SITE PRACTICE AND WORKMANSHIP

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INTRODUCTION

The standard of site practice and workmanship in the course of construction will have the greatest influence upon the quality of the finished brickwork. Bricks, mortar and other ancillary components such as lintels, ties and cavity trays must be designed and specified in accordance with all relevant codes and best practice.

High levels of workmanship and site practice should result in durable brickwork of a natural and consistent appearance requiring little or no maintenance within its design life.

This document sets out to assist all members of the building team including, site supervisors and bricklayers by providing guidance on good site practice and workmanship relating to brickwork operations.

Brick manufacturers have a vested interest in the achievement of successful brickwork and are able to help and offer advice on all aspects of workmanship and site practice.

References

BS EN 771-1: Specification for masonry units

PAS 70 Guide to appearance and site measured dimensions and tolerance

BS 8000-3 Workmanship on building sites

PD 6697 Recommendations for the design of masonry structures.

NHBC Standards

ORDERING BRICKS

- Consult with the brick manufacturer at the earliest convenience and preferably involve them in appropriate pre-contract meetings and discussions.
- Fluctuations in market demand can affect the availability of certain brick types.
- An accurate delivery schedule with the bulk order is necessary in helping the brick supplier plan availability and delivery.
- Special shape bricks are commonly made as bespoke items and often subject to lead times. Early consultation with the brick manufacturer is imperative to avoid any inconvenient impact on the contract programme.

SITE REFERENCE PANELS

Brickwork reference panels are important and necessary. They provide the opportunity to identify and appreciate the inherent characteristics of the brick type specified such as colour, shape, size and texture. They will demonstrate and set the general standard of workmanship and appearance that can be reasonably achieved by the bricklayer from the materials specified. Site reference panels provide an essential benchmark should any issues arise during the brickwork programme.

- Site reference panels should always be constructed with the involvement of the brick manufacturer.
- Construct on a solid level base, where the panel can be viewed from a distance of 3 metres in natural daylight and in a location where it will remain undamaged and protected during the duration of the contract.
- Construct the panel so that not less than 1m² of brick faces are exposed.
- The bricks must be supplied by the manufacturer as a representative sample and not be subject to any further selection on site.
- The panel should be constructed to a standard that can be maintained by the bricklayers for the duration of the contract.
- Construct to the chosen brick bond and incorporate the specified mortar, joint profile and colour. Special shapes and other relevant features may also be incorporated.
- Judgement and acceptance of the panel should take place from a distance of 3m when the mortar has dried and in the presence of all appropriate parties which must include the brick manufacturer.

Note: The above guidance reflects Publicly Available Specification PAS 70 and brickwork supervisors should make reference to this document.



DELIVERY AND STORAGE

- Consider the access arrangements and ensure that the delivery vehicle can be safely manoeuvred to the desired point of delivery.
- Provide a firm, level, clean and well drained base to allow safe delivery and storage. This area should not be at risk of soiling from passing vehicles or other adjacent site operations.
- Check that the consignment is the correct type and quantity. A number of bricks should be randomly selected from the delivery to ensure that their appearance is reasonably consistent with the site reference panel.
- Fired clay is hard and durable but can be susceptible to chipping so care should always be taken to place the packs carefully with the forklift and avoid allowing any distortion of the pack shape to occur. Some products are not suitable for lifting by a grab, consult the manufacturer.
- Bricks must be kept covered in storage and protected from inclement weather. Excessively wet or saturated bricks are difficult to lay and can give rise to the risk of efflorescence, lime leaching and mortar staining.



HANDLING AND BLENDING

- Care should be taken during handling to avoid chipping and damage. Once the bricks are stacked at the point of use they should be protected from the elements whilst bricklaying is not in progress.
- Packs should only be opened with sharp band cutting tools. Use of a lump hammer and bolster to break the bands should be avoided as this gives rise to chipping, breakages and potential collapse of the pack.
- To avoid colour banding or patches within the finished brickwork it is important to ensure that bricks are well blended. Bricks should be blended from a minimum of 3 packs concurrently with some overlap between the deliveries where possible.
- Each manufacturer will have factory specific opening instructions for optimum blending – refer to manufacturer’s recommendations.
- Where circumstances allow it will be beneficial to take receipt of as many bricks as possible at an early stage to maximise colour consistency throughout the project.

BELOW: Correct blending from 3 packs or more concurrently as the work proceeds.

BELOW: Poor blending of bricks can result in unsightly banding or demarcation lines.



Due to the nature of fired clay one of the characteristics that can be inherent is variation in colour shade. To avoid colour banding or patches within the finished brickwork it is important to ensure that bricks are well blended. Although as much practical blending as possible will be employed at the brick factory, there is no substitute for blending on site. Bricks should be blended from a minimum of 3 packs concurrently with some overlap between the deliveries where possible. Refer to the manufacturer for any individual product enquiry. Where circumstances allow it will be beneficial to take receipt of as many bricks as possible at an early stage to maximise colour consistency throughout the project.

Care should be taken during handling to avoid chipping and damage. Once the bricks are stacked at the point of use they should be protected from the elements whilst bricklaying is not in progress.

SETTING OUT / SIZE TOLERANCE

- Bricks are manufactured to declared dimensional tolerances which acknowledge and take into account the characteristics of both the raw material and the manufacturing process. Table 1 below sets out these declared dimensional tolerances.

Table 1

DIMENSIONAL TOLERANCE T1		
LENGTH	WIDTH	HEIGHT
209mm to 221mm	98mm to 107mm	62mm to 68mm
DIMENSIONAL TOLERANCE T2		
LENGTH	WIDTH	HEIGHT
211mm to 219mm	100mm to 105mm	63mm to 67mm

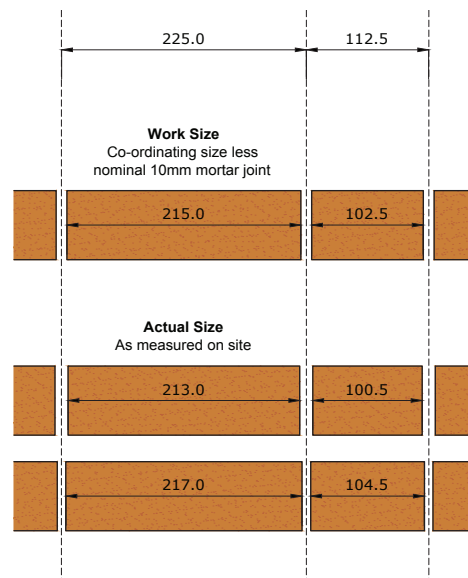
Note: for 215 x 102 x 65mm only.

- Before bricklaying commences it is advisable to set out a course of bricks dry in the required bond pattern. This dry course should be laid out to brickwork co-ordinating size and take consideration of openings.
- Time taken to set out the brickwork appropriately at this stage will help to avoid setting out errors as work proceeds.
- The setting out of general brickwork should normally be to the co-ordinating sizes of 225mm for length and 75mm for height with any tolerance within the bricks being accommodated within the mortar joints as evenly as practical, see Table 2 below.

Table 2

NUMBER OF BRICKS	CO + JOINT	CO (CO-ORDINATING SIZE)	CO - JOINT
1/2	122.5	112.5	102.5
1	235	225	215
1 1/2	347.5	337.5	327.5
2	460	450	440
2 1/2	572.5	562.5	552.5
3	685	675	665
3 1/2	797.5	787.5	777.5
4	910	900	890
4 1/2	1022.5	1012.5	1002.5
5	1135	1125	1115
5 1/2	1247.5	1237.5	1227.5
6	1360	1350	1340
6 1/2	1472.5	1462.5	1452.5
7	1585	1575	1565
7 1/2	1697.5	1687.5	1677.5
8	1810	1800	1790
8 1/2	1922.2	1912.5	1902.5
9	2035	2025	2015
9 1/2	2147.5	2137.5	2127.5
10	2260	2250	2240

Co-ordinating size used for design and setting out



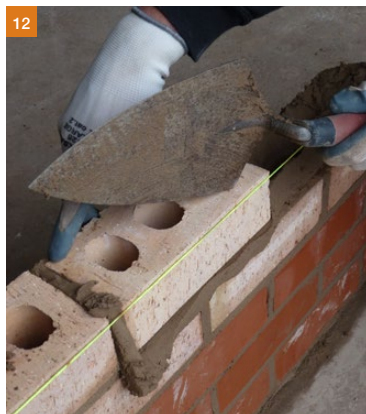
MORTAR JOINTS

- Mortar specification must be appropriate for its intended use.
- It is common practice for mortar to be provided pre-mixed or dispensed from a calibrated mortar silo on site. The mortar supplier’s recommendations should be adhered to.
- Site mixed mortar should be batched consistently and accurately using batching boxes or buckets. The use of shovels for proportioning should not be used.
- Bricklaying mortars should always be consistent and workable.

Mortar joints should be fully filled and the practice of “tipping and tailing” of perpend joints and the deep furrowing of bed joints should be avoided as this will affect the performance of the brickwork and give rise to an increased risk of wind driven rain penetration.

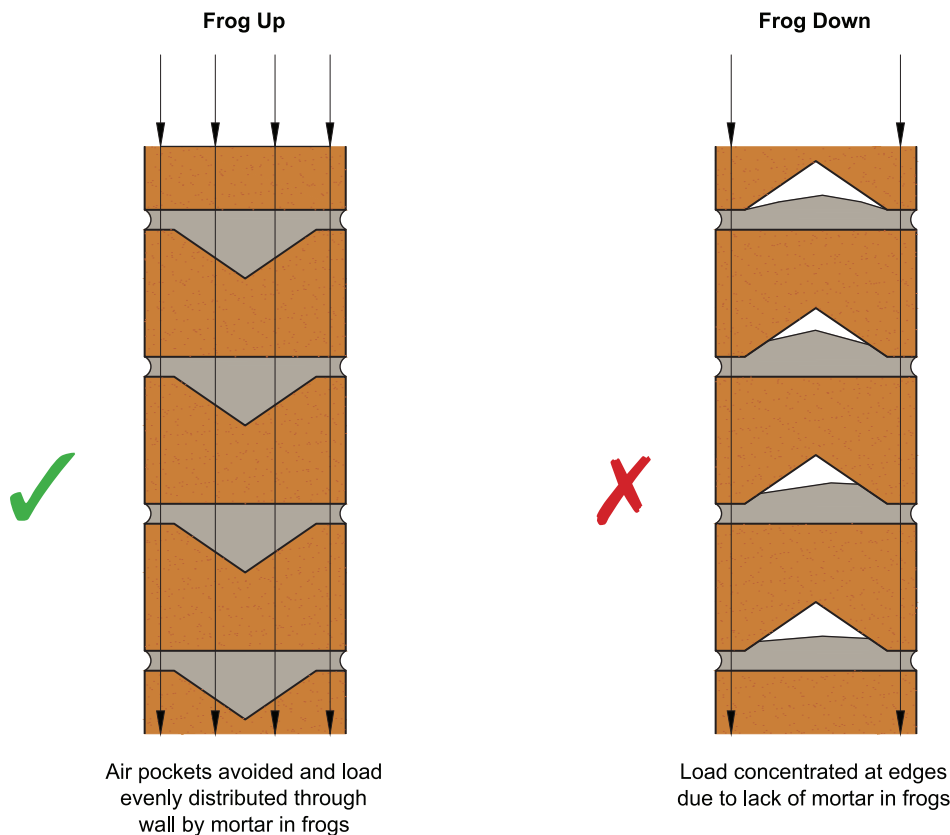


To maintain consistency in the appearance of the joint profile, particularly where there are a number of bricklayers, care should be taken to adopt the same jointing technique in respect of timing and finishing. Differences in timing and techniques may give rise to inconsistencies in the visual appearance and performance. The optimal timing of tooling the joints will depend on the brick type, mortar mix and the weather. Correct timing will become apparent to an experienced and practised bricklayer following construction of the initial courses.



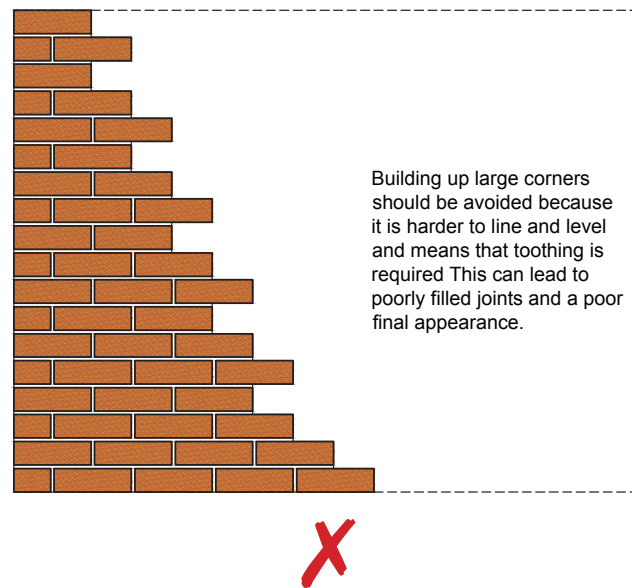
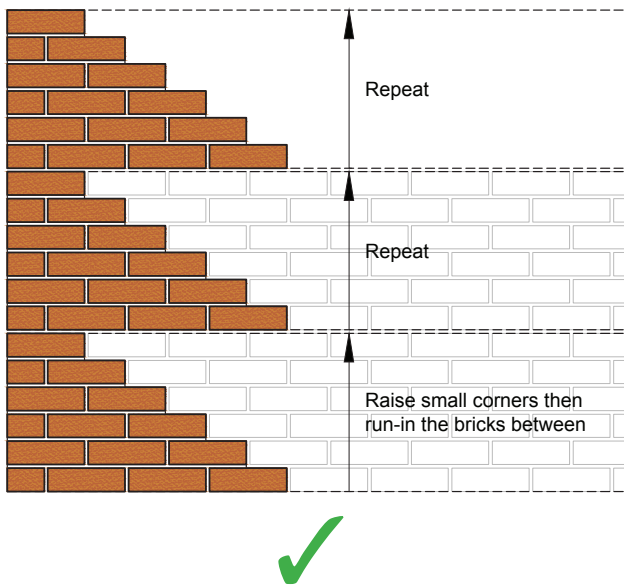
NOTES ON BRICKLAYING

- Bricks should be laid on a full bed of mortar where the practice of deep “furrowing” should be avoided. Cross joints / perpends should be fully filled and the practice of “tipping and tailing” should be avoided. Partially filled cross joints are the most significant factor in increasing the brickwork’s vulnerability to rain penetration. Bricks with frogs (shallow depressions in the bed surface) should generally be laid frog uppermost as this will maximise the brickwork’s structural performance. Individual product recommendations should be discussed with the manufacturer.



Note: Frog up bricks avoid air pockets

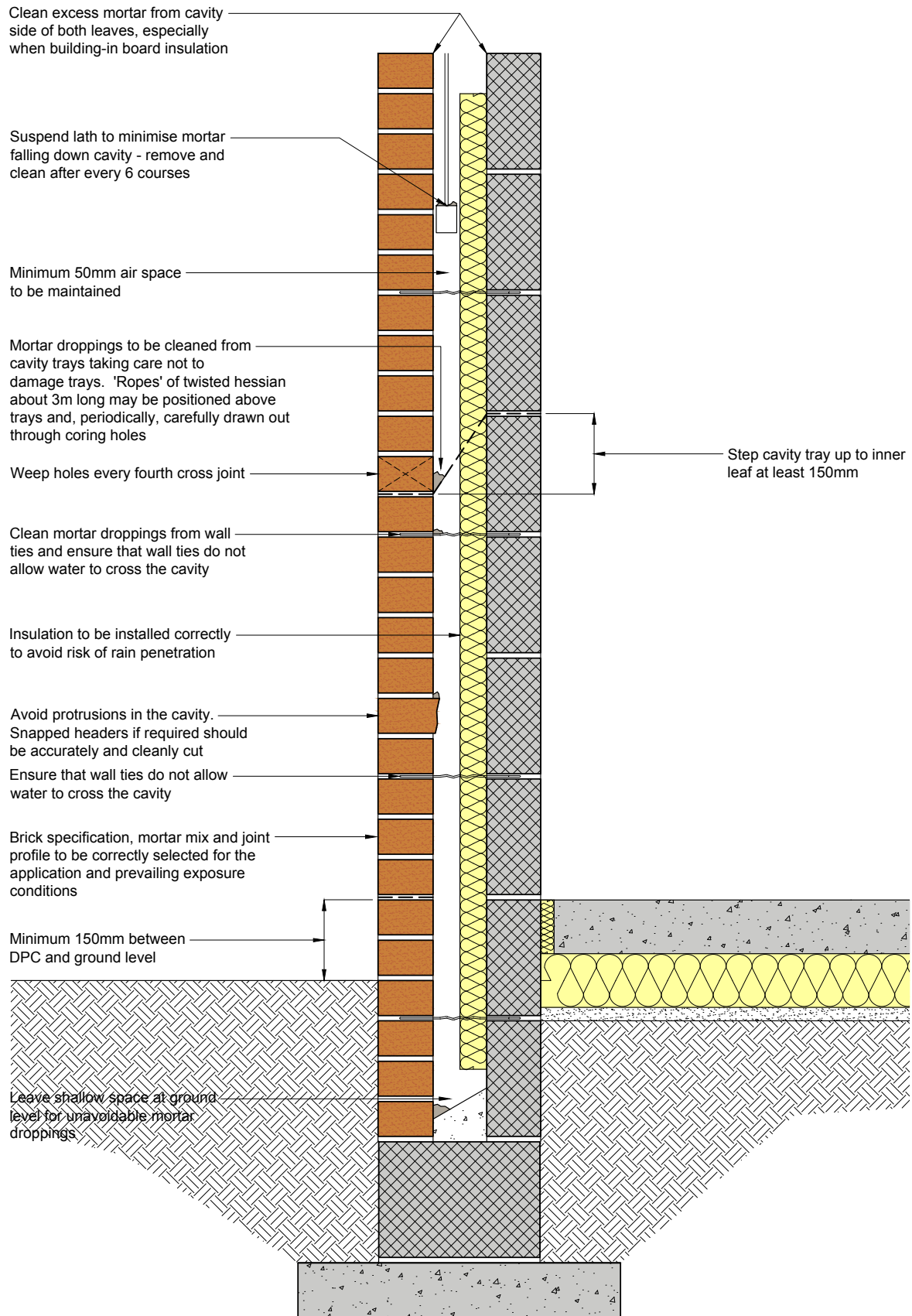
- Adjustment of laid bricks should only take place as the work proceeds and avoided as the mortar begins to set as this will affect adhesion.
- Where cut bricks are unavoidable ensure that they are cut cleanly and accurately. Masonry saws will give the best results and minimise wastage but a lump hammer and sharp bolster is normally satisfactory. On face brickwork avoid cutting with a trowel edge.
- Brickwork quoins should be formed by raking back. Tothing should not be used.
- Avoid excessive raking back of quoins or raising other advanced brickwork above the general level, otherwise the raking back may become evident in the finished brickwork.



Note: Corners should be constructed using a "racking back" technique and the practice of "toothing" should be avoided.

- Limit brickwork to 1200mm high in any one day - this will reduce stability risks of "slender" setting brickwork. A reduction of this height may be necessary when using dense bricks of very low water absorption as the mortar will set and harden much more slowly and excessive weight in the courses above may give rise to the mortar displacing. A reduction in daily build height may also be necessary in adverse weather conditions.
- Maintain the specified gauge and generally plumb every fourth perpend joint as the work proceeds and even out the joint widths between. This will help improve the overall appearance and regularity of the face brickwork.

- When constructing cavity walls, ensure that the cavities are kept clean and do not allow mortar to drop down the cavity and accumulate on wall ties, cavity trays, lintels etc. Ensure that all ancillary components such as wall ties, damp proof courses, cavity trays, movement joints, flashings etc. are of the specified type and that they are incorporated into the brickwork in accordance with design specifications.



PROTECTION OF BRICKWORK DURING CONSTRUCTION

- Brickwork should be kept clean and protected from rainfall, snow and contamination.
- Care should be taken to avoid mortar smearing or splashing as the work proceeds.
- Staining of brickwork very often originates from excessive wetting or saturation of recently built brickwork.



Saturation and efflorescence from unprotected openings.



- During breaks in construction, particular care should be taken to keep bricks and brickwork in progress covered with waterproof sheeting, to ensure that materials and brickwork are adequately protected from inclement weather.



Protection from rainfall, note stacks of bricks also covered.



- Bricklaying should normally cease when the temperature is 3° Celsius and falling and not begin again until the temperature reaches 3° Celsius and rising.
- If overnight frost is likely to occur before the mortar within newly constructed brickwork has fully set, it should be protected with an insulating layer of hessian underneath the polythene. This would normally give some protection to the mortar joints from the actions of overnight frost.
- During periods of hot and dry weather it may be necessary to reduce the initial suction rate of high water absorption bricks by briefly immersing in clean water prior to laying.
- Where practical, it is beneficial to cover newly built brickwork with hessian sacking during hot days. This will help to prevent the brickwork drying out too quickly before the cement has set and the mortar has sufficiently bonded. Contrary to common practice, hessian sacking should not be soaked in water prior to being placed over new brickwork in hot weather. It will lose its effectiveness as an insulating layer and it can give rise to staining.



Well marked brick bays.

CHECKLIST



- 1 Early discussion with brick manufacturer regarding availability, special shapes and ordering.
- 2 Can delivery vehicles access safely to a suitable storage area on site?
- 3 Prepare an adequate base for site reference panels in an appropriate area.
- 4 Agreement of reference panel by all relevant parties.
- 5 Ensure bricks are correct type on arrival – compare to reference panel.
- 6 Is adequate protection in place for storage of the bricks?
- 7 Blend bricks adequately prior to laying and take from several packs in accordance with recommendations.
- 8 Protect bricks and brickwork at point of use when work is not proceeding.
- 9 Ensure mortar is correct specification and the constituents are correct.
- 10 Ensure any site mixing of mortar is accurately gauged and mixed in a clean area free from contaminants.
- 11 Is the brickwork set out to co-ordinating sizes and do the bricks conform to the specification.
- 12 Are bricks being laid with full mortar joints?
- 13 Are bricks being laid to the manufacturer's recommendations?
- 14 Ensure cavities are being kept clean from mortar droppings and debris as the work proceeds.
- 15 Ensure consistencies in timing and profile of mortar joint finishing.
- 16 Protect newly built brickwork from inclement weather.
- 17 Is the temperature below 3° Celsius and falling?



Telephone: 020 7323 7030
Fax: 020 7580 3795
Email: brick@brick.org.uk
www.brick.org.uk
 twitter: @BricksUK

The Building Centre,
26 Store Street,
London,
WC1E 7BT



Brick Development Association

www.brick.org.uk

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