



DESIGN CONSIDERATIONS

GN-003 Dec 2017

Early Involvement

One of the most important design considerations is involving the cast stone manufacturer at an early stage in the building project. Too often the stonework is left until it is almost needed on site before it is thought about. Amber Precast's expertise in advising on all aspects of cast stone design and fixing can help save both time and money if we are involved early enough.

These are just some of the areas where forethought can be advantageous.

- Design input can reduce manufacturing costs of cast stone elements
- Build programmes can be met easily as production drawings are finalised early
- Lower construction costs
- Better buildability can be achieved and in some cases post fixing elements such as porticos is possible with specialist fixings.

Foundations

Differential settlement in foundations can occur when older, existing buildings are extended and new structures added. Stone details which, by design, are required to span or link the new with the old should incorporate movement joints that allow any vertical or horizontal differential movement to take place.

Compression

During construction increased loads are imposed on the lower structure as the building rises. This can place tensile stress onto components that are not designed as structural units. Most cast stone is designed for compressive rather than tensile loads.

Individual Technical Data Sheets have been prepared showing the correct installation procedures for cast stone elements. Please contact us for further advice.

Differential Movement

Care should be taken to allow for differential movement between adjacent materials — cast stone experiences shrinkage and clay bricks expand with moisture. This movement can take place both during construction and during the life of a building, due to cyclic thermal movement, moisture or chemical action.

Slip planes to allow free movement should be used between the cast stone elements and other dissimilar materials. A smooth DPC may be used as both a slip plane and DPC. For more information on installing slip planes in individual elements please refer to our Technical Data Sheets.

Movement Joints

Movement joints should be introduced into ashlar walls to reduce the risk of cracking as per BS 5628-3:1985. In straight walls, joints should be incorporated at a maximum of 6m centres, at all internal corners/returns and close to external corners. Width of the movement joints should not exceed 10mm and additional restraint ties may also be required at movement joints to provide lateral stability. Additional consideration should be given to circular on plan walls and the areas around openings (windows, doors, etc)

To minimise the risk of cracking, the length of the wall panels should not exceed twice the height of the panel. South and East facing walls also suffer more thermal gain from the early morning sun and extra consideration should be given for these elevations.

Masonry bed joint reinforcement will eliminate the use of frequent control joints to control shrinkage in walls with door and window openings. Reinforcement should be incorporated in the first and second courses above and below the opening and should extend no less than 450mm either side of the opening.



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Aid to Installation

One of the most important considerations at design stage is how will the units be installed on site – manually or mechanically? This decision has a direct relationship on both the manufacturing and installation cost (in labour, plant and overall on-site programme period). The size of each component affects whether cast-in sockets will be required for lifting, type and location of handling reinforcement required, and CDM Regulations also need to be taken into account.

Support & Restraint

Amber Precast can supply a range of suitable support and restraint fixings plus lifting sockets and loops. Please see separate Technical Data Sheet showing range and technical characteristics.

How cast stone units are going to be fixed is an important consideration at design stage to ensure not only that provision is made within the units for cast in channel sockets, forming pocket recesses, etc, but also to ensure that the backing structure is able to safely restrain projecting details – canopies, cornice units etc.

Good Practice & British Standards

General guidance regarding good building practice can be found in the relevant British Standards these include: BS 5628: Part 3: 1985 Code of Practice for use of Masonry BS 5390:1976 Code of Practice for Stone Masonry. BS 8000: Part 3: 1989 Code of Practice for Workmanship on Building Sites (masonry) BS 8110: Part 1: 1985 Code of Practice for Design and Construction BS 5642 :Part 1 : 1978 – Window cills BS 5642: Part 2 : 1983 – Copings BS 6073: 1981 – Precast concrete masonry units BS 6457: 1984 – Reconstructed stone masonry.

Mortars

It is extremely important that the correct mortar strength is specified when using cast stone. Guidance on varying mortars depending on varying environments is given in BS5628 : Part 3 : 1985. The standard advises that mortars should be no stronger than is necessary for the purpose as if too strong a mortar is used cracks caused by differential movement will occur and there is an increased risk of damage to the edge of the cast stone elements.

Mortars containing lime are particularly recommended and MDL Precast strongly advises that the mortar used for the installation of our cast stone units be as per the table below. We would like to point out that this is likely to be different from that used in the surrounding brickwork.

	Severe Exposure Condition	Moderate Exposure Condition
Mortar Designation	iii	iv
Cement; Lime; Sand	1 : 1 : 5 to 6	1 : 2 : 8 to 9
Masonry Cement; Sand	1 : 4 to 5	1 : 5 to 6
Cement; Sand with plasticiser	1 : 5 to 6	1 : 7 to 8

All proportions by volume.