Masonry Design Guide

BMP'S ARCHITECTURAL MASONRY BLOCKS. Book 3 Rev 1A



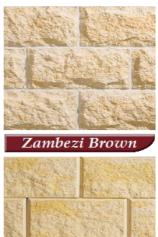


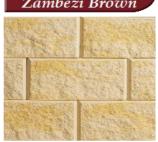


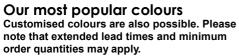














BMP Architectural Masonry Products		
воок	Page	Section
0.0		Contents
2.2	2	Part 1



For External & Internal Suitable for load bearing and non Load bearing walls.

contemporary colours. innovative -

New Pre- sealing Technology

BMP Architectural Masonry Products are made utilising the latest pre-sealing technology on the market preventing water absorption, and hence reduce the possibility of efflorescence, mould or mildew and staining.



Index

Page	Section	Part
1	Front Page	
2	Contents	1
3	About This Guide	1
4	Planning, Design & Considerations	1
5	Flaiming, Design & Considerations	2
6	Product Range & Specifications	1
7	Block Work & Mortar Joints	1
8	Planning (Modular Planing)	1
9	Mortar & Mixes for Concrete Block	1
10	Wiortar & Mixes for Concrete Block	2
11		1
12		2
13	Sill & Corner Detail 100, 150 & 200 Series	3
14		4
15		5
16	Good Building Practice and Product Cleaning	1
17	Customer support	1

BMP Architectural Masonry Products		
воок	Page	Section
		About This Guide
2.2	3	Part 1



BMP Masonry offers a comprehensive range of proven products and systems including Masonry Blocks, Masonry Bricks, Segmental Block Retaining Walls and Segmental Paving Products.

What's in this Guide

BMP Block work guide, (this book),

details a comprehensive selection of decorative, structural, walling solutions not available with other materials.

This guide has been prepared as a comprehensive BMP Product Reference Guide. It does not attempt to cover all the requirements of the Codes and Standards which apply to masonry construction. All structural detailing should be checked and approved by a structural engineer before construction. BMP reserves the right to change the contents of this guide without notice.

Please note that this guide is based on products available at the time of publication from BMP Masonry Gauteng sales Region.

Additional Assistance and Information

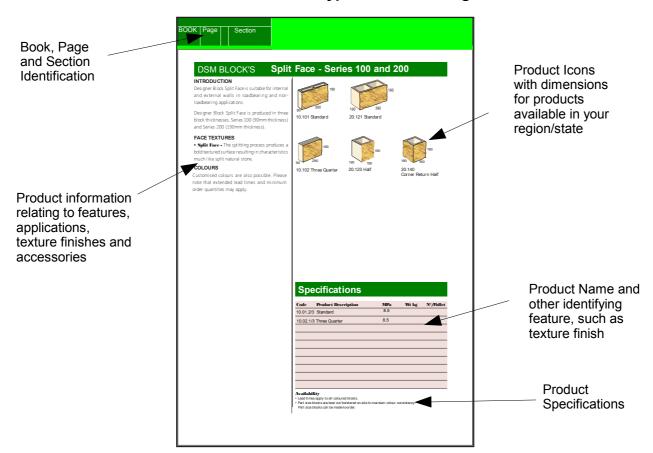
Colour and Texture Variation:

The supply of raw materials can vary over time. In addition, variation can occur between product types and production batches.

Also please recognise that the printed colours in this brochure are only a guide. Please, always ask to see a sample of your colour/texture choice before specifying or ordering.

Terms and Conditions of Sale: For a full set of terms and Conditions of Sale please contact your nearest BMP Masonry sales office.

Guided Tour of a Typical Product Page



BMP Architectural Masonry Products				
воок	Page	Section		
2.2		Planning, Design & Considerations		
2.2 4	4	Part 1		



Face Block work Design Considerations

The following items should be considered carefully during the design stage to maximise the long-term beauty and to minimise the need for maintenance of face masonry.

Block work Design Considerations

Sizes

Block's have a face dimension (nominal) of 400mm long X 200mm high. Because an allowance is made for 10mm wide mortar joints. the actual face size of the block is 390mm X 190mm. There are 12.5 blocks per m2.

For every 800 blocks or 64m2 of wall, about 1m3 of mortar mix is required, allowing for wastage.

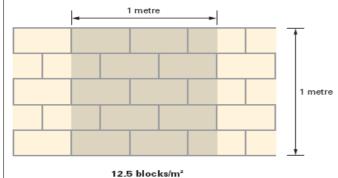


Fig B1 - Typical Block Dimensions

Core-Fill Blocks for reinforced wall construction are made in thickness's of 140mm (Series 150). 190mm (Series 200)

Modular Planning

The concrete block was one of the first building components to be designed with modular construction in mind, originally it was based on a 4 inch module (as it remains in the USA) but when the metric system was adopted in South Africa in 1961, this was changed to a 100mm module.

Module Selection

For greatest ease and efficiency when constructing with masonry block work, it is recommended to plan a building using a 200mm module, as a significant reduction in the number of 'special' or cut blocks can be achieved. Providing the design of a building is based on this module, cutting of blocks can generally be avoided. Coloured face blocks are generally made in only full length units (390mm) with part sizes (halves, etc.) being cut on-site when required (or factory cut to order) from the full length units, to maintain colour consistency.

NOTE: all saw grindings must be washed off the cut blocks. They are invisible while wet, but if allowed to dry, they appear as a paste colour and are difficult to remove (as they are cementitious).

Most building materials work to a 600mm module. Blocks can also work to a 300mm module by using part sizes, which include half height blocks, (e.g. a skirting course of half high blocks and 5 courses of full blocks = 2100mm to suit typical door head height).

Nominal widths of doors and windows are also based on this module, e.g. 900mm wide single door; and 1200mm, 1800mm or 2400mm windows and doors. The preferred way of dimensioning drawings is to show the nominal sizes on openings. however, because the blocks are made 10mm shorter than the nominal (or modular) size, the actual openings will be different. openings include one more mortar joint than units. For this reason, window and door frames are manufactured to suit openings which are 10mm wider than the module, e.g. 910mm 1210mm, 1810mm, 2410mm.

NOTE: also that the length of piers and walls is 10mm less than the modules, i.e. 890, 1790 etc., due to the omission of the last vertical joint at the end of the pier/wall.

BMP Architectural Masonry Products			
воок	Page	Section	
0.0		Planning, Design & Considerations	
2.2	5	Part 2	



Set-out of Face Block-work

When designing with split face blocks, special consideration should be given to the distances between openings and between corners and openings to facilitate the splitting and bolstering of block ends where required. Refer to additional information on Corner Details in Section Corner Details Series .

If designing using the straight split block-work, calculation must be allowed for the 15mm additional on the face of the block.

Colour and Texture Selection

The colour and texture of the unit should take into account the location of the masonry and the building. Mortar Selection.

Mortar Selection

Less staining and more aesthetically pleasing walls are achieved by ensuring the mortar colour is similar to the masonry unit. The colour of mortar is determined by the colour of the cement and sand used, and by the use or not of different coloured oxides. For colours other than greys, clean white sand will assist colour matching. Construction of sample walls is recommended to determine the appropriate mortar colour.

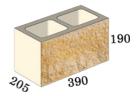
Coping's, Sills, Parapets

Sills should shed storm water from the masonry by projecting at least 30mm beyond the wall face. Coping's or parapets should also shed water by having a 'fall' towards the unexposed (inner) face. Coping's and parapets should be covered with a metal capping to prevent any water from penetrating the wall.

In-built Elements

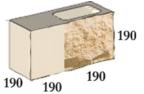
Where there are in-built elements (e.g. sign age support frames etc.) they should slope away from the masonry. The soffit of major elements, such as balconies, should be provided with a drip mould.





NOTE: There is a 15 mm facial difference between the Bolstered face and split face block.





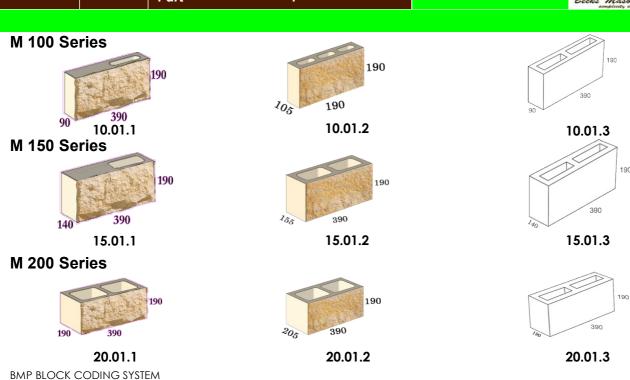
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Fore ease of construction, order our inner corner



BMP Architectural Masonry Products			
воок	Page	Section	
2.2	6	Product Range & Specifications	
		Part 1	





SERIES	SHAPE DESCRIPTION	FACIAL TEXTURE OF PRODUCT	PACAGING DESCRIPTION	PRODUCT COLOUR
10 = M100 SERIES 15 = M150 SERIES 20 = M200 SERIES 106= 106 HERITAGE MASONRY SERIES	01 = FULL BLOCK 02 = THREE QUARTER BLOCK 03 = HALF 04 = HALF HIGHT 15 = INNER CORNER 25 = CORNER	1 = ROCK FACE (CHISELLED FACE) 2 = SPLIT FACE 3 = SMOOTH FACE	PA = PROD IS ORDERED BY THE PALLET SECTION IS BLANK THEN THE PRODUCT IS SUPPLIED EA	(SS) SAND STONE (ZB) ZAMBEZI BROWN (SR) SAHARA RED (CM) COSMOS

Design notes

NOTE: BMP Masonry offers many 'fractional' sized blocks to reduce the need for on-site cutting. However to maintain better colour consistency with coloured blocks, part size blocks for these applications are best prepared on-site by cutting or splitting from full size blocks alternatively fractional sized blocks must be ordered at the same time as the full blocks.

One in four 10.01/2 and 15.01/2 blocks delivered will be half solid to enable on site bolstering to create split face textures at sides of openings and corners where required. Splitting details are on pages 11, 12 and 13, When designing with split face blocks, special consideration should be given to the distances between openings and between corners and openings to facilitate the bolstering of block ends where required

Prior to designing check.

- 1)Availability
- 2)Lead times apply.
- 3)Contact BMP Masonry for further details

FACE TEXTURES

Bolstered Face.

These products have a 15 mm individually chiselled off the face of each block, allowing each unit an individual face (No one unit is alike) BMP block-work brings designs from the yesteryear to life. The collection offers three timeless blends that closely match the natural earthy shades found in historical sandstone buildings. An authentic rock-face texture is created when blocks are split. This close attention to detail makes BMP Sandstone the finest quality choice for reproduction styles of architecture. Available in M100 series for veneer or cavity construction and M150 and M 200 series for wall construction, we also produce a number of accessories for openings and feature block work.

Split Face

The splitting process produces a bold textured surface resulting in characteristics much like natural split stone.

Colours

BMP Block Range units are available in 3 main colours. Customised colours are also possible. Please note that extended lead times and minimum order quantities may apply.

BMP Architectural Masonry Products				
воок	Page	Section		
2.2	7	Block Work & Mortar Joints		
		Part 1		



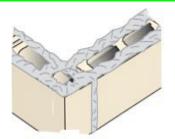




Fig B2 — Applying Mortar

Block work Mortar Joints

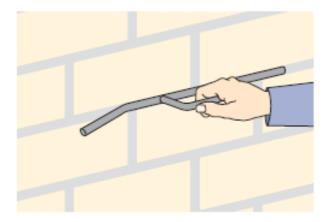
Hollow blocks are normally laid with face shell bedding, i.e. there are two strips of mortar which are laid over the face shells with no mortar being laid on the web (except at corner construction). These two strips of mortar are continued up the vertical joints. Refer to Fig B2.

Joint Finishing

Ironed Joint

The preferred finish for mortar joints in face block work is an ironed finish which provides the following benefits: The ironing tool compresses the mortar at the face of the masonry, making it denser and more durable; The mortar is pushed against the top and bottom faces of the blocks, improving the bond between the mortar and block.

The finish is obtained by ironing the joints with and ironing tool when the mortar is firm to touch (about 20 to 30 minutes after laying) and then lightly scraping off the surplus mortar with a trowel, or by lightly brushing. Refer to Fig B3. The ironing tool should be made of 12mm diameter Round rod and be more than 400mm long to ensure that a straight joint is produced.



Flush Joint

Where a plaster or textured coating is to be applied to the Block work, a flush joint may be used. Rub surface with a piece of block when the mortar is firm to provide a flat surface for the coating.

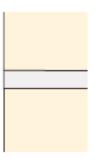


Fig B4 - Flush Joint

Raked Joint

Although the raked joint is sometimes used in face brickwork for aesthetic reasons, it should NOT be used with hollow blocks which are not to be rendered. This is to avoid:

- •Reducing the face shell mortar width,
- Adversely affecting the weatherproofing.

IMPORTANT:

Because acid cannot be used to dissolve mortar without affecting the masonry units appearance, mortar smears should be cleaned off face block work before it sets hard onto the face, or by means of a high pressure spray operation once the mortar joints can be cleaned without damage.

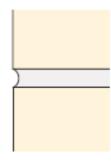
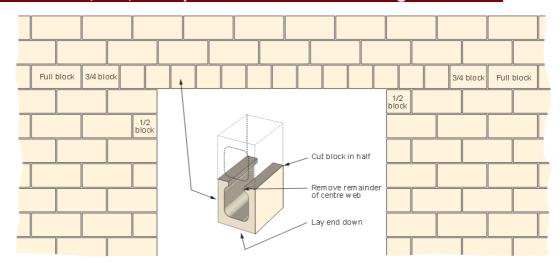


Fig B3 - Ironed Joint

BMP Architectural Masonry Products				
воок	Page	Section		
2.2	8	Planning		
		Part 1		



Sill Detail - Series 100, 150, 200 Split & Bolstered Face Designer Block



We recommend that Concrete Masonry should be laid in accordance with Standard Specification It is essential, in order to eliminate or keep cutting to a minimum, that consideration is given to setting out of block-work at the initial planning stage. Wherever possible, walls should be planned on a 200mm module both horizontally and vertically in order to use modular units. The details below show some of the problems that can arise when modular planning is not done first.

Modular Planning

Figure 1

Use only full or half block units (based upon co-ordinating (nominal) size of 400mm x 200mm units)

A= 1400mm

B = 800 mm

C = 1000 mm

D = 1400 mm (windows)

E = 2 200 mm (doors)

Non-Modular Planning

Figure 2

Standard units indicate masonry that would have to be cut

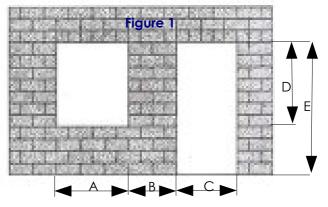
A = 1 100 mm

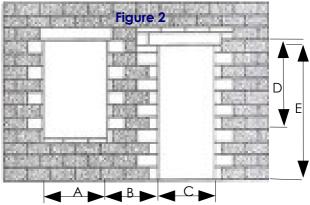
B = 850 mm

C = 900 mm

D = 1 500 mm

E = 2 100 mm





It is standard practice to specify the length and height of wall panels. (The actual dimensions are 10 mm less (SANS 993-1972(2002) Modular co-ordination in building). The standard mortar joint thickness is 10mm. It is not good building practice to vary joint thickness more than 3 mm from this amount. Window/ door/ other openings are 10 mm larger than the co-ordinating (standard) dimensions. Window and door

frames are manufactured to fit a standard nominal dimension plus 10 mm.

When it is not possible to use the 200 mm module, the introduction of ¼ or ¾ length and/or half heigh units may be satisfactory on a particular section of wall. Alternatively, If the length does not suit a 100 mm module, it is preferable to introduce cut blocks in the centre of the panel rather than at one end (see figures 22 and 23 on page 39).

BMP Architectural Masonry Products			
воок	Page	Section	
2.2	9	Mortar & Mixes for Concrete Block	
		Part 1	



Mortar Mixes for Concrete Block,s

The three principal functions of mortar are:

- 1)To provide an even bedding for blocks and allow level coursing by taking up small variations in units height.
- 2)To transmit compressive loads; and
- 3)To hold the blocks together in the wall by bonding to them, so that tensile and shear forces can be carried -Often referred to as 'bond strength. This is particularly important so that units on top of the wall are not easily dislodged.

In order to provide a good bond between the units and the mortar, the following guidelines should be followed:

An appropriate mortar mix should be selected with the following section on 'Mortar For Laying BMP product's.

The mortar should be batched accurately using some consistent form of volume measurement.

The sand used in the mortar should be clean pit sand or plasterer's sand. Clayey loam or sand containing Organic impurities will affect the mortar strength and should not be used. Sand should be well washed to ensure it is free of salt.

Mortar should be discarded and not tempered, after the initial set of the cement has taken place.

Sand

The sand used in making the mortar for BMP concrete blocks **should not be** the same as commonly used for clay bricks. 'Brickie's loam' contains clay particles, which make the mortar more workable, but also cause some additional shrinkage in the mortar. As clay masonry units tend to expand, this compensates for the mortar shrinkage. Concrete masonry units, however, tend to shrink, thus, if used with a mortar with high shrinkage, cracking of the joints may result.

For this reason, mortar for concrete block work and brickwork should be prepared with clean sharp sand, such as pit sand, or plasterer's sand. Tests have shown that the sand can contain up to 10% fines but it should not contain clay particles.

Mortar for Laying BMP Architectural Masonry Products.

- •BMP Designer Block products are manufactured using the **latest pre sealing technology** to reduce water absorption, and hence reduce the possibility of efflorescence, mould or mildew staining.
- BMP Blocks can be laid in conventional mortar, however where single-leaf BMP masonry is required to be weather-resistant; it should be laid in mortar containing Chryso Paraflow 20 Mortar Additive. (Contact BMP technical department for details)
- •Clean, sharp sand may be difficult to use without lime plasticiser and may require blending or substitution with brickies sand. For colour-matching the mortar, the brickies sand should be near-white.

Construction Considerations

Mortar Deposits.

Mortar extruded from masonry joints during laying should be cut off with an upward stroke of the trowel. In this way a clean cut can be made without smearing the face of the unit.

On completion of laying and tooling, any mortar smears which may be on the face of the work should be removed, firstly with dry brushing and secondly, if necessary, by wet brushing. Do not allow mortar smears and dags to set on the face of the masonry. If these mortar deposits are allowed to set on face masonry, high pressure water jets or in extreme cases a diluted acid solution might be needed to remove mortar stains. See 'Cleaning Face Concrete Masonry' before testing either water jets or acid solutions. Acid cleaning should be avoided as face concrete blocks can be discoloured.

BMP Architectural Masonry Products				
воок	Page	Section		
2.2	40	Mortar & Mixes for Concrete Block		
2.2	2.2 10	Part 2		



Mortar mixing procedure:

Blocks must be dry when laid. Put 12 litres of water into mixer. Add 0.5 litres of Pareflow 20 mortar additive. Add 20kg cement and sand as for M3 or M4 (exposure grade) mortar.

Laying Architectural Blocks:

- 1.Lay dry blocks only.
- 2.Spread mortar on face shells. Do not spread mortar on
- 3. Spread mortar on each side of perpends, leaving a cavity Between.

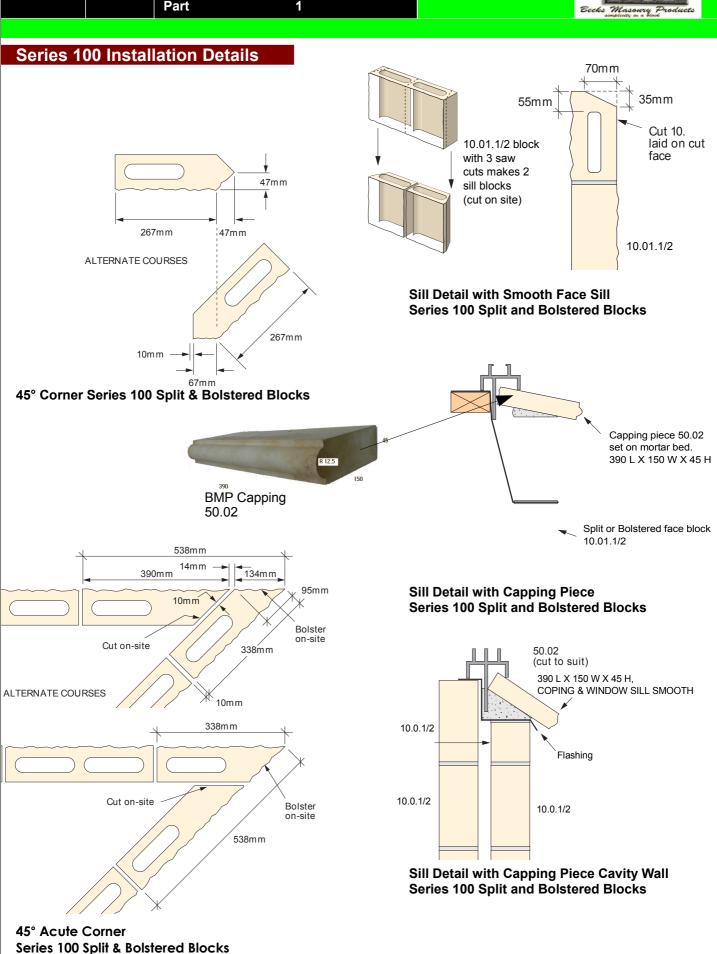
- 4. For non-grouted masonry, a horizontal weep-hole at the floor joint of each core should be provided to drain water that may be trapped inside the blocks. Partly fill the bottom course with gravel or similar drainage material to prevent mortar droppings from blocking the weep-holes.
- 5.Iron joints. Do not 'rake' joints.
- 6.Mortar smears must be cleaned off before they set as acid cleaning later can discolour masonry.
- 7. Freshly laid walls must be covered overnight and when rain interrupts work.

Table B4 — Mortar Mixes					
Mix Proportions by Volume	Sand	Additive Pareflow 20	Minimum Morter Classification	Where Used (exposure)	
G.P. Portland Classification Cement					
1	5	Yes	M3	BMP Block-work mortar for weather	
1	4	Yes	M4	resistance.	
1	6	No	M3	General purpose with moderate exposure.	
1	5	No			
1	5	No	M4	Structural blockwork and severe exposure (marine and industrial environments). External walls adjacent	
1	4	No	IVI T	to seafront, below damp-proof course, fences.	
1	5	No	M3	Calcium Silicate-Basalt Calsil	
1	4	No	M4	Calcium Silicate-dasalt Calsii	

Table B5 — Approximate Material Quantities for 1m3 of Mortar			
Blocks There are 12.5 full blocks per square metre of wall surface Area. For every 800 blocks or 64m2 of wall, about 1m3 of mortar mix is required, allowing for wastage.	Mortar Classification	Concrete Blocks and Bricks	Architectural Block Options
	M3	Mix in 1:1:6 proportions	Mix in 1 : 5 proportions
		Cement: 7 bags (40kg each)	Cement: 8 bags (40kg each)
		Lime: 2.5 bags (40kg each)	Pareflow 20 mortar additive: 8 litres
		Sand: 1.2m3 (~1.7t)	Sand: 1.2m3 (~1.7t)
		Mix in 1: 0.5: 4.5 proportions	Mix in 1:4 proportions
NOTE: BMP Block's should	M4	Cement: 9 bags (40kg each)	Cement: 10 bags (40kg each)
be laid with a light coloured aggregate to match the colour of the face of block.		Lime: 1.5 bags (40kg each)	Pareflow 20 mortar additive: 8 litres
		Sand*: 1.2m3 (~1.7t)	Sand#: 1.2m3 (~1.7t)
(* Allowed 20% extra sand for bulking) (# Use clean sand) (t = tonne) Pareflo 20 is available from Chryso SA			

BMP Architectural Masonry Products		
воок	Page	Section
2.2	11	Corner & Sill Details Series 100
		Part 1

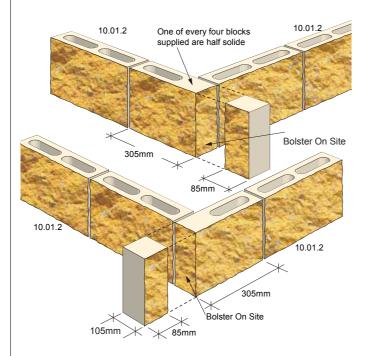


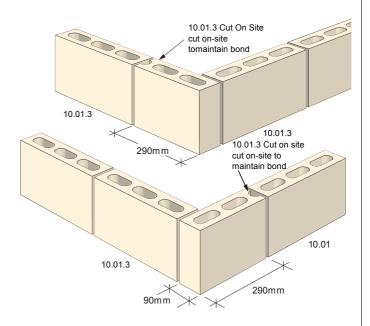


BMP Architectural Masonry Products		
воок	Page	Section
2.2	12	Corner Details Series 100
		Part 2



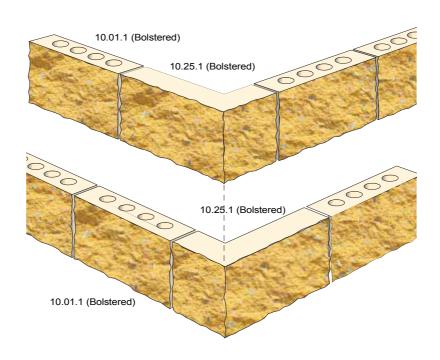
Series 100 Corner Details





Corner Bonding Details 10.01.2 Series 100 Split Face Blocks.

Corner Bonding Details 10.01.3 Series 100 Face Blocks.



Corner Bonding Details Corner Block 10.25.1 Series 100 Bolstered Face.(Rock Face)

BMP Architectural Masonry Products		
воок	Page	Section
2.2	13	Corner Details Series 150
		Part 3



Series 150 Corner Details

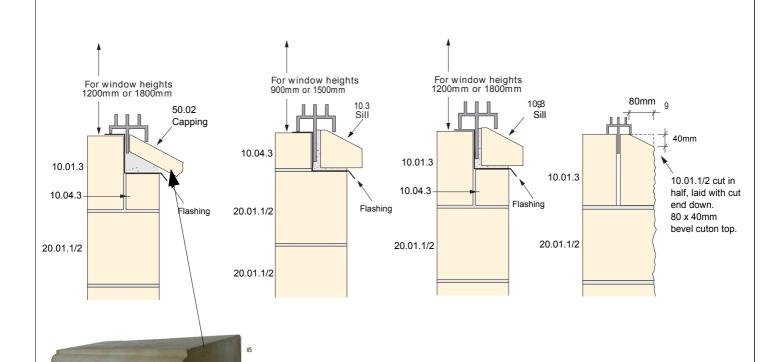


Corner Bonding Details 15.01.1/2 Series 150 Cottage & Executive Range

BMP Architectural Masonry Products		
воок	Page	Section
2.2	14	Sill & Corner Detail 200 Series
		Part 4



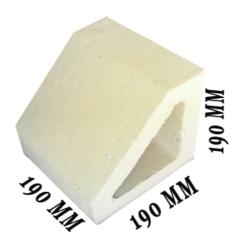
Sill Detail with Sill & Capping Piece 200 Series







190 Solid Sill

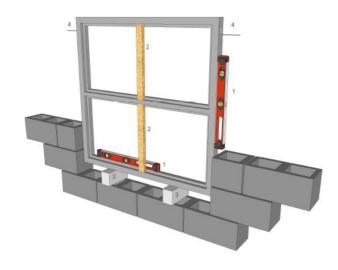


190 Hollow Sill





Standard Window Frames With Or Without Betcrete Sills



- 1. Window sill is fitted on top of the brickwork and the window on top of the sill. Check and ensure the vertical and horizontal to be level during the wet building phase
- 2. Use temporary wooden support
- 3. If no Betcrete Sill is used, wedge the bottom opening (for support)
- 4. Lugs: bend outward and build between the bricks (for further support)



Betcrete Sill

190 BLOCK WALL

BCS600x235 : 590 x 235mm BCS900x235 : 890 x 235mm BCS1200x235 : 1190 x 235mm BCS1500x235 : 1490 x 235mm

140 BLOCK WALL

BCS600x185 : 590 x 185mm BCS900x185 : 890 x 185mm BCS1200x185 : 1190 x 185mm BCS1500x185 : 1490 x 185mm

Visit Betcetcrete's www.betcrete.co.za for there full range of products and technical specifications on Door and window

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BMP Architectural Masonry Products			
воок	Page	Section	
2.2	16	Good Building Practice and Product Cleaning	
		Part 1	



Scaffolding

Scaffolding planks should be placed with a clearance of at least 150mm to the wall. This gap allows mortar droppings to fall clear of the plank instead of splattering on the plank and building, disfiguring the wall.

Concrete Droppings

Masonry, supporting reinforced concrete slabs and beams is frequently disfigured by droppings from the concrete pour. If such deposits are allowed to set it is sometimes impossible to rectify the damage. Protection is best achieved by covering the walls with plastic sheeting. Where this is not done, any concrete on the wall must be thoroughly cleaned off before it sets.

Cleaning Concrete Masonry, Good Building Practice.

Block layers must:

Keep face blocks as clean as possible while laying and tooling; Clean any dagas and mortar smears before they set hard.

Remaining stains could be removed following the procedures set out below.

(We have found mortar smears are much easier to remove from the face of the masonry units since introducing pre-sealing technology to our products.)

Pressure Cleaning

This cleaning method is not a substitute for good building practice.

Essential Preliminaries:

Allow the mortar to harden for a minimum of seven days prior to pressure cleaning; Carry out a pressure cleaning trial on a typical but inconspicuous area and allow it to dry to determine:

The effectiveness of this cleaning method; and that marking, damage or erosion of the surface has not been caused before proceeding with the general cleaning.

NOTE: If there is no inconspicuous area, a small wall could be constructed for this purpose. Pressure cleaning may be carried out with pressure not exceeding 7MPa (1000psi) and volume not exceeding 20 litres/minute and fan jet of a minimum 40 degree width, held not closer than 500mm from the wall. Cleaning should be continuous and even. The pressure jet should never be stationary and should not 'needle' or zero in on mortar stains as surface erosion will almost certainly occur.

Caution:

High pressure water blasting can cause personal injury and damage masonry. Mortar joints can be blown out and face block work marked and eroded; Zero degree or needle jets, narrow fan jets and turbo jets should not be used on block work because all concentrate the water pressure on too small an area which can cause damage; Minimal pressure should be used to avoid mortar blow-outs and/or damage to the face of units. Experienced operators should carry out pressure cleaning in accordance with the above recommendations after appropriate trials have taken place.

BMP Architectural Masonry Products			
воок	Page	Section	
2.2	47	Customer support	
	17	Part 1	



If you would like any assistance please contact your local BMP office. We are more than willing to help.

(If not sure please ask)

Brochure colours.

The printed colours in this Masonry Design Guide are only a guide. Please ask to see a sample of your colour/texture before specifying or ordering.

Colour and texture variation.

The supply of raw materials can vary over time. In addition, variation can occur between product types and production batches.

We reserve the right to change the details in this publication without notice.

For a full set of Terms and Conditions of Sale please contact your nearest BMP sales office.

New Products.







Wedge 390x190x140 Breeze Block



Arch 390x190x140 Breeze Block



TEL:0794499789

