

# Technical information

Utility Bricks & Blocks



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## Contents

Introduction	4	B Bricks - Commons 110mm Wide	
A Bricks and Blocks - Technical Information		Common	34
Brick Dimensions	6	Common - Paint Grade	35
Properties	6	Common - Load Bearing	36
Brick Strength	7	Common - Coastal Exposure Grade	37
Compressive Strength of Bricks	7	Common - Fire Resistant 2 Hour	38
Water Absorption	8	Common - Modular Height	39
Cold Water Absorption	8	Common - Modular Height Load Bearing	40
Initial Rate of Absorption	8	Common - 1½ Course (Stubbie)	41
Movement in Masonry Walls	9	Common - 1½ Course Load Bearing (Stubbie)	42
Movement Control	9	Common - Manhole	43
Brickwork Durability	11	Fire Resistance and $R_w$ for Common (110mm wide) Walls	44
Brick Durability	11	C Bricks - Special Performance 150mm Wide	
Mortar Durability	11	Special Performance	48
Cleaning of Clay Masonry	12	Special Performance - Load Bearing	49
The Basics of Brick Cleaning	12	Special Performance - 1½ Course	50
Acids - The Basics	13	Fire Resistance and $R_w$ for Special Performance (150mm wide) Walls	51
Safety Precautions	13	D Bricks - 305 Series 90mm Wide	
Fire Resistance Levels	14	Longreach	54
BCA Considerations	14	Longreach - Load Bearing	55
Chasing	15	Highreach - 1½ Course	56
Acoustic Design	16	Highreach - Load Bearing 1½ Course	57
Acoustic Performance Rating	16	Fire Resistance and $R_w$ for Longreach and Highreach (90mm wide) Walls	58
Acoustic Performance Rating - Tables	19	Maxibrick	59
BCA Deemed-to-Satisfy Walls	20	Maxibrick - Paint Grade	60
Specific Results for Acoustic Maxibrick Cavity Walls	22	Ultramax	61
Specific Results for 140mm and 190mm Masonry Block	23	Maxi-One	62
Thermal Properties	24	Maxi-Lite	63
Meeting the Standards	24	Maxi-Lite One	64
Terminology	25	Maxibrick - Load Bearing	65
Surface Density of Walls	25	Maxibrick - Tie Down	66
Joint Selection	26	Maxibrick - Downpipe	67
Joint Types	26	Fire Resistance for Maxibrick (90mm wide) Walls	68
Joint Sizes	26	Maxibrick - Acoustic Fire-Rated	69
Weepholes	26	Maxibrick - Acoustic Load Bearing Fire-Rated	70
Coursing Charts	27	Fire Resistance and $R_w$ for Maxibrick Acoustic (90mm wide) Walls	71
Coursing Height Ready Reckoner	27	Fastwall	73
Standard and Modular Brick	28	Fire Resistance - for Fastwall (90mm wide) Walls	74
Maxibrick, Ultramax, Fastwall and Longreach	29	Ultralite	75
Blockwork	30		
Building Procedures – Fastwall, Ultramax, Maxibrick, Acoustic Maxibrick, Maxi-Lite and Maxi-One	31		

## E Bricks - Modular 90mm Wide

Modular - Common	78
Modular - Common Load Bearing	79
Fire Resistance and $R_w$ for Modular Common (90mm wide) Walls	80

## Bricks -

## F Modular Special Performance 150mm Wide

Modular - Special Performance	82
Modular - Special Performance Load Bearing	83
Fire Resistance and $R_w$ for Modular Special Performance (150mm wide) Walls	84

## G Bricks - Fastwall Lintel

Fastwall/Maxibrick Lintel	86
Typical Domestic Construction	87

## H Blocks - General Information

Reinforced Core-Fill Masonry	90
Walls	90

## I Blocks - 100mm Series

100mm Series - Full and Half Height	94
100mm Series - 10.01 Concrete Block	95
100mm Series - 10.01 Concrete Block Fire Resistance	96

## J Blocks - 150mm Series

150mm Series - Full and Half Height	98
150mm Series - 15.01 Concrete Block	99
150mm Series - H Block 15.48 Concrete Block	100
150mm Series - 15.01 Concrete Block Fire Resistance	101
150mm Series - Reduced Core 120 Minute Fire Resistant Concrete Block	102
150 Wide Series - Fire Resistance and $R_w$ for 120min Fire Resistant Concrete Block	103

## K Blocks - 200mm Series

200mm Series - Full and Half Height	106
200mm Series - 20.01 Concrete Block	107
200mm Series - H Block 20.48 Concrete Block	108
200mm Series - 20.01 Concrete Block Fire Resistance and $R_w$	109

## L Blocks - 300mm Series

300mm Series - Full Height	112
300mm Series - 30.01 Concrete Block	113

## Contacts and Further Information

	116
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## Introduction

Midland Brick is one of Australia's best known brick companies and has been at the forefront of clay brick manufacture for over 65 years. Today, from our Middle Swan plant we operate one of the largest brickworks in the world.

Through our total commitment to quality product, innovation and customer service we have earned a reputation as one of the world's leading brick producers. We are also acknowledged as one of Western Australia's leading suppliers of clay bricks and pavers.

With the importance we place on quality, consistency of colour, texture and durability, our products are manufactured to the highest international standards.

Products are regularly tested and ongoing research is carried out in our NATA-accredited laboratory – not just to meet customer demand, but also to lead the way in developing new building products and materials.

The following information is a concise summary of some of the important features of bricks and masonry.

More detailed information is readily available from:

- Australian Standards relating to Masonry AS4773.1, AS4773.2 and ASNZ4455
- The Building Code of Australia
- Think Brick Australia, [www.thinkbrick.com.au](http://www.thinkbrick.com.au)
- Concrete Masonry Association of Australia (CMAA) [www.cmaa.com.au](http://www.cmaa.com.au)

### Note:

***Please refer to the online Technical Manual for latest information. Building codes and Australian Standards may change after printing. We will endeavour to update the online manual as changes occur.***

### Disclaimer

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# A | Bricks and Blocks

## **Technical Information**

## Brick Dimensions

### Properties

The size of a standard brick is:

230mm long x 110mm wide x 76mm high.

Bricks are made in many different work sizes. For example brick heights of 119mm and 162mm to match 1.5 and 2 standard size brick heights, including mortar joint, respectively. 50mm and 90mm high bricks, 90mm wide bricks and 290mm long bricks are made for different structural and aesthetic effects. Larger bricks are often used for more economical laying and as a design feature either on their own or combined with smaller bricks.

In cyclonic areas larger hollow bricks and blocks can be used to allow for concrete filling and reinforcing within the block. Wider (150mm wide) bricks can also be used in walls requiring lower sound transmission, higher fire resistance levels and higher load bearing capacity depending on the specific brick properties.

#### Example:

The “lay test” range for 20 bricks selected from a batch of bricks is as below for Category DW1

1.  $(20 \times 230) - 90 = 4510\text{mm} \leq \text{Length 20 Bricks} \leq (20 \times 230) + 90 = 4690\text{mm}$
2.  $(20 \times 76) - 50 = 1470\text{mm} \leq \text{Height 20 Bricks} \leq (20 \times 76) + 50 = 2250\text{mm}$
3.  $(20 \times 110) - 50 = 2150\text{mm} \leq \text{Width 20 Bricks} \leq (20 \times 110) + 50 = 1570\text{mm}$

Bricks are classified according to how much 20 bricks together deviate from 20 times the work size - this is known as the “lay test”.

- For standard bricks, Dimensional Category DW1 means the height and width will differ by less than plus or minus 50mm from 20 times the work size, and the length will differ less than plus or minus 90mm.
- For standard bricks, Dimensional Category DW2 means the height and width will differ by less than plus or minus 40mm from 20 times the work size, and the length will differ less than plus or minus 60mm.
- Dimensional Category DW0 means there are no requirements. This is usually reserved for non-standard shaped bricks and bricks that have been rumbled or otherwise distorted during the manufacturing process for aesthetic reasons.

## Brick Strength

### Compressive Strength of Bricks

Brick strength is defined as resistance to load per unit area and is expressed in Megapascals (MPa).

Brick strength is measured according to:

AS4456.4 Determining Compressive Strength of Masonry Units.

Individually crushing 10 bricks gives the compressive strength of each brick and the mean compressive strength of the lot. These figures are not used in masonry design, but are used to calculate the Unconfined Compressive Strength.

### Unconfined Compressive Strength

The Unconfined Compressive Strength is a calculated number based on the compressive strength. To measure the compressive strength of a brick, steel platens are used above and below.

This constrains the surface and where all other factors are equal, a shorter brick will have a higher compressive strength than a taller brick. To remove this test effect, the compressive strength is multiplied by a factor, which varies with the height of the brick.

The resulting number is called the unconfined compressive strength and reflects the performance of the brick in a wall. Theoretically, bricks which are identical except for their height should produce the same unconfined compressive strength. This figure is not now used in masonry design, but is used to calculate Characteristic Unconfined Compressive Strength.

### Characteristic Unconfined Compressive Strength ( $f'_{uc}$ )

Bricks in any one batch have a range of strengths that would usually follow a normal distribution. In a wall, the different strength bricks contribute to the strength of the whole and neither the strongest or the weakest determines the strength of the wall. The Characteristic Unconfined Compressive Strength ( $f'_{uc}$ ) of a batch of bricks is a statistical determination that considers the effect of the range of strengths within a lot. 95% of the bricks in the lot should exceed this figure. Engineers use the  $f'_{uc}$  to design the masonry structure.

## Water Absorption

### Cold Water Absorption

The amount of water that a brick can absorb is measured by the cold water absorption test. There is no distinct relationship between water absorption and the water-tightness of walls. The results of water absorption tests are used by the brick manufacturer for quality assurance.

### Initial Rate of Absorption

The initial rate of absorption (IRA) is the amount of water absorbed in one minute through the bed face of the brick.

It is a measure of the brick's 'suction' and can be used as a factor in the design of mortars that will bond strongly with units. As mortars, other than the BCA 'deemed to comply' mortars, are rarely used, the impact of the IRA is primarily on the bricklayer. Bricklayers, through practical experience, adjust the mortar, the height of a wall built in a day and the length of time before ironing the joints, according to the suction.

The bond between the masonry unit and mortar is largely influenced by the capacity of the brick to absorb water and the ability of the mortar to retain the water that is needed for the proper hydration of cement. If the brick sucks the water too quickly from the mortar, the next course may not be properly bedded. If the mortar retains too much water, the units tend to float on the mortar bed, making it difficult to lay plumb walls at a reasonable rate. In either case there will be poor bond.

The optimum value of IRA is considered to be between 0.5 and 1.5 kg/m<sup>2</sup>/min. However, IRAs can exceed these limits. The mortar's water retentivity should be matched to the brick type where good bond strength is critical.



# Movement in Masonry Walls

## Movement Control

To allow for movements in masonry (expansion and contraction and footing movement) control joints are required. These can usually be constructed so that the expansion joint and the articulation joint are one and the same.

## Co-efficient of Expansion

The phenomenon of long-term permanent change in dimensions, or simply growth, is common to all fired-clay products. It is caused by chemical reactions between water and particular minerals found in the clay body. Therefore, expansion gaps are required in clay brickwork. The location and dimension of expansion gaps are calculated on the basis of the 'Coefficient of Expansion' of the particular brick used.

The coefficient of expansion is an estimate of the potential permanent unrestrained expansion of a brick during its first fifteen years.

The coefficient of expansion is given the symbol 'em'. It has also been known as the characteristic expansion and referred to as the 'e' value; however, this is no longer the preferred terminology.

There are some other **important factors** that need to be considered:

- Mortar shrinkage accommodates approximately 10% of the brick growth in the first year after the wall is built.
- Allowances must be made for shrinkage of structural concrete elements adjacent to brickwork.

Typically the coefficient of expansion for Midland Brick products is below 0.6mm/m.

Midland Brick test its products to determine the coefficient of growth in accordance with Australian Standard AS/NZS4456.11. In critical cases where the 'em' figure is required for a particular brick these are available upon request.

## Control Joints

All building materials change size as their temperature varies or they are subjected to variations in loading. Materials such as concrete and cement products usually shrink after they have been placed in a building whereas clay bricks may expand slowly over a long period of time.

The different responses of materials to changing conditions create differential movements between materials that must be taken into account if damage to the structure is to be avoided. This is done by the provision of Control Joints between parts of the structure.

### Control joints may be in the following form:

- Expansion gaps to allow for brick growth and concrete shrinkage.
- Expansion gaps to allow for thermal expansion and contraction.
- Articulation joints to allow for the movement of foundations and footings.

Another important consideration is that only highly compressible material is placed in the gap so that potentially damaging forces are not transferred across it. A simple caulking material such as butyl-mastic is usually adequate.

### Two common faults with the sealing of gaps that may cause problems with expansion:

1. Failure to ensure that gaps were clean and free of hard materials, such as mortar droppings, before sealing.
2. The use of joint fillers that are too rigid with compressive strengths high enough to transfer significant forces.

The design of Control Joints is more fully dealt with in Design Notes published by the Clay Brick and Paver Institute ([www.thinkbrick.com.au](http://www.thinkbrick.com.au)).



## Brickwork Durability

### Brick Durability

Brick durability is classified in terms of the Durability Classifications as defined in Australian Standard AS/NZS4456.10 and the Building

Code of Australia, as shown below. Provided good brickwork detailing and construction practices are used, products will give satisfactory service in the duty specified.

#### Exposure Conditions

Classification	Application
Exposure Class (EXP)	Suitable for use in all classifications including severe marine environment and local conditions, such as: <ul style="list-style-type: none"> <li>Below damp-proof course in areas where walls are expected to be attacked by salts in the ground water or brickwork itself (salt attack or salt damp).</li> <li>On sea fronts where walls are exposed to attack from wind-borne salt spray, or in heavily polluted areas subject to deposition of atmospheric pollution (most suitable, although may need further protection in some environments).</li> <li>In retaining walls situated in aggressive soils.</li> <li>Under conditions of regular cyclic freezing and thawing.</li> </ul>
General Purpose (GP)	Suitable for all uses except exposure class.
Protected (PRO)	Suitable for use above damp-proof course provided they are protected at the top of the wall by appropriate roofs, eaves, copings or toppings in: <ul style="list-style-type: none"> <li>(a) Internal walls and</li> <li>(b) Coated or rendered external walls.</li> </ul>

General purpose and exposure grade are the two grades to which bricks are manufactured.

To ensure the best possible performance of any brickwork, the following weather protection construction techniques should be used:

- Utilise rolled, hosed or flush joints on any face brick.
- Ensure adequate eave overhang and weep holes on external walls.

- Provide a correctly installed damp-proof course and flashing where required (refer to the Building Code of Australia).
- Provide protection to top of wall by appropriate roofs, eaves, cappings or toppings.
- Salt water pools require the use of exposure grade bricks within the area of the 'splash zone' and at any other location where salt water can enter the ground near a wall.

#### Mortar Mixes

Note: Additives may be used provided they comply with the appropriate specified rate.

Mortar Class	Brick Classification (as shown above)	Mortar Mixed by Volume (Cement : Lime : Sand)	
		General Use CLS	Suitable for concrete masonry - requires the use of methyl cellulose water thickener*
M2	Protected	1:2:9	1:0:5
M3	General Purpose	1:1:6	1:0:5
M4	Exposure Class	1:0.5:4.5	1:0:4

**\*Water Thickener:** Amethyl cellulose additive for mortar which is intended to hold the moisture in suspension thus permitting the proper hydration of the cement and reducing the tendency to dry out. A water thickener may also include an agent which improves workability of the mortar.

#### Note:

- (a) Cement in mortar mixes must comply with Australian Standard AS3972.
- (b) Lime in mortar mixes must comply with Australian Standard AS1672.
- (c) Sand in mortar mixes must be fine aggregate with low clay content and free from efflorescing salts.
- (d) Water in mortar mixes must be potable (drinkable).

### Mortar Durability

Mortar is subject to degradation due to salt attack and exposure to severe conditions in the same way bricks are. Mortars also need to be suited to the location. Mortar mixes used for masonry construction must be mixed by volume in the proportions shown in the table above, as defined in the Building Code of Australia.

## Cleaning of Clay Masonry

### The Basics of Brick Cleaning

The cleaner the bricklayer leaves the wall, the easier will be the cleaning task. The majority of the mortar residues and smears should be cleaned before they set hard. However, in most cases some additional cleaning will be required to completely remove the mortar residue.

Cleaning techniques may involve high-pressure water jet equipment or hand methods. Whatever technique is used, the following requirements must be observed to ensure additional staining problems are avoided.

### Test Areas

Testing in one or more small areas is the safest way to determine the correct technique and chemical solution to remove mortar residues and stains. This must occur well before final cleaning as it will usually not be possible to assess the effectiveness of the test clean until the masonry dries.

### Clean Soluble Salt Deposits First

Efflorescence, a white 'fluffy' deposit, cannot be removed by water or acid. Dry brushing to remove the efflorescence before washing is the most effective way to remove it successfully. If efflorescence is wetted, the salts go into solution and are drawn back into the brickwork and will reappear as the masonry dries. Efflorescence will eventually disappear through natural weathering.

### Vanadium Staining

Vanadium salts produce a green or yellow efflorescence or stain (mainly seen on cream and light coloured clay bricks). Hydrochloric acid will make these stains much worse and may make them impossible to clean. It is therefore imperative that the vanadium stains are removed before the main task of removing mortar smears is commenced.

Mild vanadium stains may be treated with sodium hypochlorite (household bleach). Spray or brush on dry brickwork and leave until the stain disappears, then rinse off. Proprietary mould cleaners containing sodium hypochlorite and sodium hydroxide can be used as above and have been found very effective.

Proprietary brick cleaners may also be effective but should be used only according to the manufacturer's instructions. Proprietary cleaners usually contain acids that must be neutralised after use with a solution of 15 grams of washing soda per litre of water.

More than one chemical application may be required and the walls should be rinsed thoroughly after each treatment.

### High Pressure Cleaning

High-pressure water washing is not recommended. However if used, the pressure must be kept below 1000psi (7000kPa), the nozzle must be kept 200mm from the brick face and the nozzle must be a wide fan jet type with an angle of 15 degrees.

The following practices must be observed:

- Cleaning should not start until the mortar has hardened.
- Hard lumps or persistent smears should be removed by hand.
- Mask adjacent materials.
- Do not apply acid with the high-pressure sprayer. Use a low-pressure spray or broom it on.
- Clean from top to bottom in small sections.
- Work in the shade, ahead of the sun, if possible.
- DO NOT USE EXCESSIVE PRESSURE OR GET TOO CLOSE as this will damage the face of the brick and the mortar joint. Mortar joints that are no longer smooth with sharp edges are a clear sign of excessive pressure. Excessive pressure is used to make cleaning faster; it does not do a better job of cleaning.

### Saturate the Wall Surface

Failure to completely saturate the surface of the wall is in itself a major cause of cleaning stains. Cleaning solutions containing dissolved mortar particles and acids will be drawn into a dry masonry wall, causing staining. Furthermore, saturating the surface of the wall keeps the acid solution on the face of the masonry where the mortar smears are present. It is not true that face saturation weakens the acid and slows the cleaning.

Water should be trained on the wall until the brick suction is exhausted. The area to be cleaned must be saturated as well as all brickwork areas below. If the wall appears to be drying on the surface, reapply water until ready to apply the cleaning solution.



## » Cleaning of Clay Masonry

### Acids – The Basics

The traditional masonry-cleaning chemical is hydrochloric acid. Its main function is to dissolve the cement in the mortar mix. It has few other uses and in many stain situations should not be used.

The recommended acid strength for light coloured clay bricks is 1 part acid to 20 parts water and for other bricks is 1 part acid to 10 parts water. Acid takes time to dissolve the cement and should be left on for 4-6 minutes (or longer if needed) before washing off.

After washing the wall with water, a solution of 15g per litre of washing soda or 24g per litre of sodium bicarbonate should be sprayed on to neutralise any remaining acid. Excess hydrochloric acid will eventually evaporate from the brickwork, however, it is likely to cause staining of the bricks and damage to built-in components.

Other acids such as sulphuric acid or nitric acid will not evaporate and are not used in brick cleaning.

Proprietary masonry cleaning solutions containing a mixture of acids are available. If used, the manufacturer's recommendations must be strictly adhered to. Excessive and incorrect use of some proprietary cleaning solutions has, in the past, produced very bad staining.

### Safety Precautions

All masonry-cleaning acids are dangerous. Acids that do not dissolve cement as quickly as hydrochloric acid are not necessarily safer and can be very much more dangerous to human health.

To avoid personal injury:

- Use in a well ventilated area.
- Wear goggles, gloves and protective clothing.
- Always pour acids into water – this avoids splashes of highly concentrated acid onto the operator.
- If splashed onto the body, wash with clean water and, if possible, neutralise with a mixture of bicarbonate of soda and water.
- If splashed into the eye, wash the eye thoroughly with copious amounts of water.
- The manufacturer's instructions and safety precautions must be strictly adhered to if proprietary cleaning products are used.
- Refer to Think Brick website for additional information ([www.thinkbrick.com.au](http://www.thinkbrick.com.au)).

# Fire Resistance Levels

## BCA Considerations

Fire resistance levels (FRLs) are specified in the Building Code of Australia and the Masonry Code (AS3700). This system provides an accurate method of predicting the ability of a wall to maintain strength in a fire and to resist its spread. *Note that the fire resistance levels are now quoted in minutes.*

The fire resistance level of a wall depends not only on the thickness of the wall but also on its height, length and how the top, bottom and ends of the wall are connected to the other building elements. For this reason it is impossible to give an FRL for a particular brick – it will always depend on the details of the wall built with a particular brick.

Three different terms are used to define the overall fire resistance of a wall:

### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function.

### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases.

### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a pre-defined temperature.

A typical fire resistance level for a wall could be ‘FRL 90/90/90’, that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation.

The insulation value is a function of the material thickness of a masonry wall and is defined in the table below:

Fire Insulation Value	
Material Thickness of Wall (mm)	Fire Resistance Period For Insulation (minutes)
60	30
90	60
110	90
130	120
160	180
180	240

## Material Thickness

As a rule the material thickness is the actual thickness of the units used in the wall. However there are some qualifications. To be deemed as full thickness, bricks need to have a coring percentage of less than 30%.

## Cored or Solid Units

For a wall built from cored or solid units (including those with frogs), or from hollow units fully grouted, the material thickness is the overall thickness of the wall.

## Cavity Walls

The material thickness for insulation for a cavity wall is the sum of the material thicknesses of each of the separate leaves of the wall.

## Render

If the fire resistance period (FRP) is required for a fire approaching from either side of the wall, then render must be applied to both sides of the wall if it is to contribute to the FRP. However only the thickness of the coat on the side away from the fire (to a maximum of 20mm) is added to the wall thickness to determine the material thickness.

**Note:**

*This may lead to two different FRPs according to the thickness of the render and the direction of the fire.*

## » Fire Resistance Levels

### Chasing

#### Structural Adequacy

According to the Think Brick Fire Resistance Technical Manual and AS 3700 Section 6, chasing may be constructed in accordance with the information below.

For the purposes of structural adequacy, chases in vertically spanning walls may be ignored if:

- The chase is vertical, or
- The chase is horizontal and its length is less than four times the wall thickness.

Otherwise the slenderness ratio of the wall is to be based on the overall thickness of the wall less the depth of the chase.

Chases in walls spanning both horizontally and vertically (panel action) can be ignored if:

- The length of the chase is not greater than half the wall length (for a horizontal chase), or
- Not greater than half the wall height (for a vertical chase).

Otherwise the slenderness ratio of the wall is to be based on the thickness of the wall less the depth of the chase.

Where a vertical chase is greater than half the height of the wall the chase may be regarded as an unsupported edge and the wall designed as two sub-panels.

### Integrity and Insulation

For the purposes of integrity and insulation the effect of chases can be ignored if:

- The chase depth is less than 30mm.
- The section of chase is less than 1000mm<sup>2</sup>.
- The total chased face area on both sides of the wall is less than 100,000mm<sup>2</sup> per five square metres of walling.

Otherwise determine integrity and insulation based on the wall thickness less the chase depth. For ungrouted hollow masonry units determine integrity and insulation based on the wall thickness less the chase depth.

The Think Brick Australia publication, Design Manual 5, Fire Resistance Levels for Clay Brick Walls, available at [www.thinkbrick.com.au](http://www.thinkbrick.com.au), fully explains the system and allows designers to 'assemble' a fire resistance level by referring to several tables and taking a direct reading from the appropriate chart.

For concrete masonry please refer to Concrete Masonry Association of Australia ([www.cmaa.com.au](http://www.cmaa.com.au))

## Acoustic Design

### Acoustic Performance Rating

The BCA requirements for Class 1, 2, 3 and 9c buildings changed in May 2005 with the issue of Amendment 14. It must be remembered that the BCA requirements are the minimum requirements and some Local Authorities may require better performance. **Check with Local Councils for specific requirements above the BCA minimums.**

### Weighted Sound Reduction Index ( $R_w$ )

The sound level reduction achieved by a structural unit must be measured over a range of frequencies as different materials transmit sound differently at each frequency.

The  $R_w$  is obtained from a standard procedure (AS/NZS 1276.1) that subjects the building element to a standard range of frequencies that roughly equate to the normal human hearing range.

$R_w$  is a single-number rating of the sound reduction through a wall or other building element. Two spectral corrections can be applied to  $R_w$ : C and  $C_{tr}$ . C compensates for medium to high frequency noise and  $C_{tr}$  compensates for low frequency noise. C and  $C_{tr}$  are both negative numbers. The  $C_{tr}$  is a correction designed to allow for low frequency noise, for example – entertainment systems. A full description of acoustic performance is defined by these three terms. ie  $R_w$  (C,  $C_{tr}$ ).

Wall performance is defined in terms of  $R_w$  only or  $R_w + C_{tr}$ .

### Impact Sound Resistance

The BCA Amendment 14 says there is no appropriate test for impact sound reduction in walls. However, in the case of Class 9c buildings, the BCA allows impact sound reduction to be demonstrated by showing a wall performs no worse than a deemed-to-satisfy wall.

To achieve impact sound insulation, the BCA requires that walls consist of two leaves with at least a 20mm cavity between them and, if ties are needed in masonry walls, they must be of the resilient type. Except for the resilient ties in masonry walls there are to be no mechanical linkages between the walls, except at the periphery (ie through adjoining walls, floors and ceilings).

### BCA Deemed-to-Satisfy Walls

The BCA deemed-to-satisfy provisions for airborne sound insulation are as follows:

- Walls between an apartment and a plant room, stairway, lift shaft, public lobby or the like require an  $R_w$  of not less than 50.
- Walls between apartments require an  $R_w + C_{tr}$  not less than 50.
- Walls between a bathroom, laundry or kitchen and a habitable room (not a kitchen) in an adjoining unit, would need to be discontinuous construction and have an  $R_w + C_{tr}$  of not less than 50.
- Discontinuous construction means a wall having a cavity between two separate dwellings with no mechanical linkage between leaves, except at the periphery. Resilient wall ties are not considered to be mechanical linkage.

The BCA Amendment 14 requirements are met by:

1. Testing a sample of constructed walls to verify that they meet the Weighted Standardised Level Difference ( $D_{nt,w}$ ),
2. Constructing walls using the same materials and techniques as walls that have been constructed and tested in a laboratory and shown to meet the Weighted Sound Reduction Index ( $R_w$ ) requirements, or
3. Constructing walls using the materials and techniques in the 'Acceptable Construction Practice' section of the BCA; and,
4. Where impact sound reduction is required, it is to be achieved by discontinuous construction.
5. Except where the requirements are verified by on-site testing, chasing of services into masonry walls is not allowed and electrical outlets on either side of the wall must be offset by no less than 100mm.

BCA Volume 1 Amendment 14 Specification F5.2 Table 2 gives deemed-to-satisfy walls for sound insulation for walls separating sole occupancy units.

BCA Volume 2 Amendment 14 Table 3.8.6.2 gives deemed-to-satisfy walls for sound insulation for walls separating two or more Class 1 Buildings. These walls are the same as those in Volume 1 except only walls achieving  $R_w + C_{tr} \geq 50$  are allowed.

Deemed-to-satisfy clay brick walls are detailed on the following pages.



## » Acoustic Design

**Solid v Cavity Walls**

Acoustic performance with single leaf masonry follows the 'Mass Law'. The acoustic performance of these walls depends on their mass. More mass gives better performance.

Cavity walls behave differently to single skin walls because sound waves can resonate in cavities. The narrower the cavity becomes, the more resonance occurs. Insulation in the cavity helps absorb resonating sound and narrow cavities should have bond breaker board to prevent mortar from providing a bridge for sound to travel between the leaves.

**Brick Walls With Render**

Render on one side of a brick wall adds 2 or 3dB to the wall's  $R_w$  but adding render to the second side only adds 1dB to the wall's  $R_w$ . The render appears to fill defects in the wall surface reducing the sound transmission, but this is a one-off benefit.

**Brick Walls with Plasterboard**

Cornice cement daubs, used to fix plasterboard directly to brick walls, create a small cavity in which resonance occurs. Brick walls with daub fixed plasterboard on both sides stop **less noise** than the same walls bare. Adding extra daubs (halving spacing) gives **lower** performances, presumably due to extra 'bridges' through the daubs.

Plasterboard on furring channel is better than daub fixed. A bigger cavity between the wall and the plasterboard makes it harder for resonating energy to build up pressure on the board. When standard furring channel clips are used, this system transfers vibrations to the plasterboard via the channels and clips. Boral Impact Clips (BICs) have a rubber shank on their masonry anchor that isolates the vibrations from the masonry. The use of BIC mounts can add 3 or 4dB to the wall's  $R_w$ . Polyester and glass wool in the cavity helps prevent resonance and further decreases the sound transmission. Denser grades of plasterboard and additional layers of plasterboard (fixed with grab screws and leaving no cavities) also decrease sound transmission.

**Points to Consider**

(When Designing Walls for Acoustic Performance)

The BCA specifies minimum levels for sound isolation but experience shows that achieving the minimum standards is not always sufficient to satisfy occupants. In view of this it is recommended that architects, developers, builders, etc, consider a higher level of sound insulation, commensurate with the expectations of the end user. End user expectations are frequently related to the cost of occupying the unit.

Wall design is a balance between acoustical performance, thickness, weight and cost. Frequently it is not possible to optimise one factor without compromising the others.

**Clay Brick Construction**

(Provides Superior Sound Insulation)

Full brick construction can provide greater sound insulation from both internal and external noise. The following table shows the level of sound transmitted through typical Australian wall systems from a variety of noise sources.

**Internal (Partition) Wall Sound Transmission**

Noise Type	Brick1	Stud Wall2
Average Conversation (60dB)	12dB	27dB
WC Flushing (68dB)	16dB	29dB
Spin Dryer/Vacuum Cleaner (75dB)	26dB	36dB
Stereo - Teenagers (82dB)	41dB	50dB

Information Sourced from Acoustic Laboratories Australia, August 2005.

- Internal brick consists of 90mm masonry, rendered both sides.
- Internal stud walls consists of 92mm stud frame with plasterboard on both sides, no insulation in stud frame.

**Acoustic Performance On-Site**

The  $R_w$  ratings on walling systems are obtained from laboratory tests which comply with the Australian/New Zealand Standard (AS/NZS 1276.1) under controlled conditions. When identical partitions in buildings are tested in-situ, it is often found that the actual result obtained, called the Weighted Standardised Level Difference ( $D_{nt,w}$ ), is lower than the laboratory  $R_w$ .

This reduction in performance can be due to rooms being too small, varying size of the element being tested, flanking paths (noise passing through other parts of the building) or background noise.

## » Acoustic Design

The allowance in the BCA for a difference of 5 between the laboratory test and the field test is not to allow for poor construction practice. To repeat the performance in the field, attention to detail in the design and construction of the partition and its adjoining floor/ceiling and associated structure is of prime importance. Even the most basic elements, if ignored, can seriously downgrade the sound insulation performance.

The most common field faults include bricklayers not completely filling all mortar joints, poor sealing between walls and other building elements, electrical power outlets being placed back to back, chasing masonry and concrete walls, leaving gaps in insulation, screwing into insulation and winding it around the screw when attaching sheet materials, not staggering joints in sheet materials and poor sealing of penetrations.

Midland Brick cannot guarantee that field performance ratings will match laboratory performance. However, with careful attention during construction of the wall, correct installation to specification and proper caulking/sealing, the assembly should produce a field performance close to and comparable with tested values. The following items can also affect the acoustic performance on site.

### Perimeter Acoustical Sealing

As the  $R_w$  of a wall increases, the control of flanking paths becomes more critical. Consequently, the perimeter sealing requirements for a low sound rating wall, such as  $R_w$  45, are much less than for a high sound rating wall, such as  $R_w$  60. Note: It is neither necessary nor cost-effective to provide very high perimeter acoustic sealing for a low  $R_w$  wall.

Effective sealants have the following properties:

- Good flexibility (elastic set)
- Low hardness
- Excellent adhesion, usually to concrete, timber, plaster and galvanised steel
- Minimal shrinkage (less than 5%)
- Moderate density (greater than 800kg/m<sup>3</sup>)
- Fire rated where required. (All walls required by the BCA to be sound rated also have fire ratings).

All of the above properties must be maintained over the useful life of the building, that is, longer than 20 years.

#### Note:

*Use of expanding foam sealants is not acceptable.*

Refer to the manufacturer to ensure the particular type or grade of sealant is suitable for the purpose.

## Doors

Hollow, cored and even solid doors generally provide unsatisfactory sound insulation. Doors can provide direct air leaks between rooms lowering the overall  $R_w$  of the wall in which they are inserted. Where sound insulation is important, specialised heavyweight doors or, preferably, two doors separated by an absorbent lined airspace or lobby should be used.

### Lightweight Panels Above Doors

Panels are often incorporated for aesthetic reasons, however, they should not be used unless they have an  $R_w$  equal to or better than the wall's requirement.

### Air Paths Through Gaps, Cracks or Holes

Seal all gaps, cracks or openings, however small, with an acoustic sealant. Holes readily conduct airborne sounds and can considerably reduce the  $R_w$  of a wall.

## Appliances

Noise producing fixtures or appliances such as water closets, cisterns, water storage tanks, dishwashers, washing machines and pumps should be isolated from the structure with resilient mountings and flexible service leads and connections.

### Electrical Outlets and Service Pipes

Penetrations of all sorts should be avoided but if unavoidable, seal around them effectively. If possible introduce a discontinuity in pipe work between fittings, such as a flexible connection within or on the line of a partition. Use acoustically rated boxes for all general power outlets, light switches, telephone connections, television outlets, etc. Seal the sides of electrical boxes and the perimeter of all penetrations with acoustic sealant. Offset all power outlets on either side of a wall by at least 100mm.

## » Acoustic Design

**Acoustic Performance Rating****BCA Volume 2 Amendment 14 Requirements  
for walls separating two or more Class 1 Buildings**

Wall Separating	Wall Rating
Sole occupancy unit - all areas	Sole occupancy unit - all areas except those below $R_w + C_{tr} \geq 50$
Sole occupancy unit - bathroom, sanitary compartment, laundry or kitchen	Sole occupancy unit - habitable room except a kitchen $R_w + C_{tr} \geq 50$ and discontinuous construction

**BCA Volume 1 Amendment 14 Requirements  
for walls separating sole occupancy units from other parts of the building in Class 2 and 3 Buildings**

Wall Separating	Wall Rating
Sole occupancy unit - all areas except those below	Sole occupancy unit - all areas except those below $R_w + C_{tr} \geq 50$
Sole occupancy unit - bathroom, sanitary compartment, laundry or kitchen	Sole occupancy unit - habitable room except a kitchen $R_w + C_{tr} \geq 50$ and discontinuous construction
Sole occupancy unit - all areas	Plant room or lift shaft $R_w \geq 50$ and discontinuous construction
Sole occupancy unit - all areas	Stairways, public corridor, public lobby or areas of different classification $R_w \geq 50$

**BCA Volume 1 Amendment 14 Requirements  
for walls separating sole occupancy units from other parts of the building in Class 9c Buildings (aged care facilities)**

Wall Separating	Wall Rating
Sole occupancy unit - all areas	Sole occupancy unit - all areas except those below $R_w \geq 45$
Sole occupancy unit - all areas	Laundry, kitchen $R_w \geq 45$ and discontinuous construction or No less resistant to impact noise than a deemed-to-satisfy wall
Sole occupancy unit - all areas	Bathroom, sanitary compartment (but not an associated ensuite), plant room, utilities room $R_w \geq 45$

**BCA Amendment 14 Service separation\* in Class 1, 2, 3 and 9c buildings**

Building service	Adjacent room	Barrier rating
A duct, soil, waste, water supply or stormwater pipe passing through a separating wall	Sole occupancy unit habitable room other than a kitchen	$R_w + C_{tr} \geq 40$
	Sole occupancy unit kitchen or non-habitable room	$R_w + C_{tr} \geq 25$

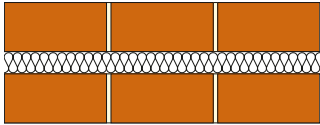
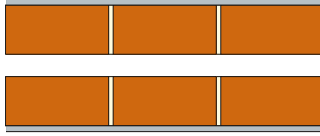
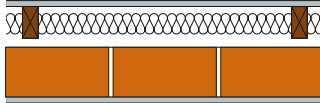
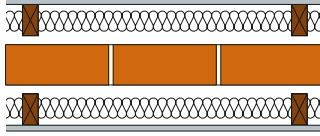
\* In Class 1 buildings the requirements apply to those services that pass through more than one building.

- In Class 2, 3 and 9c requirements apply to all stormwater pipes and other services that pass through more than one sole occupancy unit.

## » Acoustic Design

### BCA Deemed-to-Satisfy Walls

#### BCA Volume 1 Amendment 14 Deemed to Satisfy Brick Walls

Construction Description	Construction Diagram	Rating
<p>Two leaves of 110mm clay brick masonry with:</p> <ul style="list-style-type: none"> <li>(a) a cavity not less than 50mm between leaves; and</li> <li>(b) 50mm thick glass wool insulation with a density of 11 kg/m<sup>3</sup> or 50mm thick polyester insulation with a density of 20 kg/m<sup>3</sup> in the cavity.</li> </ul>		$R_w + C_{tr} \geq 50$
<p>Two leaves of 110mm clay brick masonry with:</p> <ul style="list-style-type: none"> <li>(a) a cavity not less than 50mm between leaves; and</li> <li>(b) 13mm cement render on each outside face.</li> </ul>		$R_w + C_{tr} \geq 50$
<p>Single leaf of 110mm clay brick masonry with:</p> <ul style="list-style-type: none"> <li>(a) a row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced 20mm from the masonry wall; and</li> <li>(b) 50mm thick mineral insulation or glass wool insulation with a density of 11 kg/m<sup>3</sup> positioned between studs; and</li> <li>(c) one layer of 13mm plasterboard fixed to outside face of studs and outside face of masonry.</li> </ul>		$R_w + C_{tr} \geq 50$
<p>Single leaf of 90mm clay brick masonry with:</p> <ul style="list-style-type: none"> <li>(a) a row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced 20mm from each face of the masonry wall; and</li> <li>(b) 50mm thick mineral insulation or glass wool insulation with a density of 11 kg/m<sup>3</sup> positioned between studs in each row; and</li> <li>(c) one layer of 13mm plasterboard fixed to studs on each outside face.</li> </ul>		$R_w + C_{tr} \geq 50$

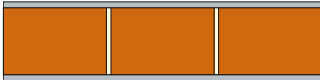

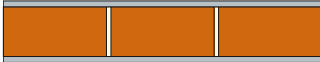

- If ties are needed in masonry walls they must be of the resilient type.



## » Acoustic Design

## » BCA Deemed-to-Satisfy Walls

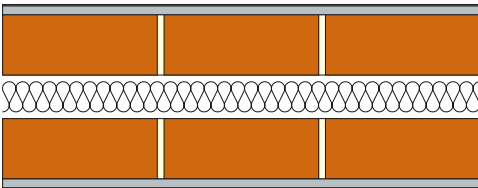
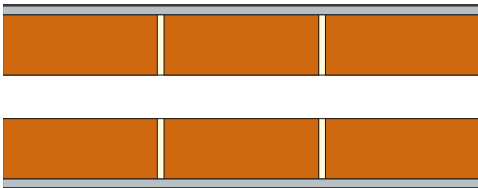
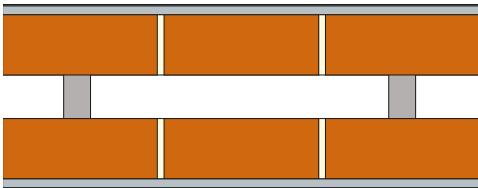
### » BCA Volume 1 Amendment 14 Deemed to Satisfy Brick Walls

Construction Description	Construction Diagram	Rating
Single leaf of 150mm brick masonry with 13mm cement render on each face.		$R_w \geq 50$
Single leaf of 220mm brick masonry with 13mm cement render on each face.		$R_w + C_u \geq 50$
Single leaf of 110mm brick masonry with 13mm cement render on each face.		$R_w \geq 45$
Single leaf of 190mm concrete solid blockwork.		$R_w \geq 45$

## » Acoustic Design

### Specific Results for Acoustic Maxibrick Cavity Walls

Tests comply with AS1191-2002. Conducted by Acoustic Laboratories Australia

Construction Description	Construction Diagram	Rating
<p>Sound reduction of wall consisting of two leaves of 90mm Acoustic Maxibrick with:</p> <ul style="list-style-type: none"> <li>(a) all joints filled solid with mortar; and</li> <li>(b) a cavity of not less than 70mm between leaves; and</li> <li>(c) 75mm thick glass wool insulation with a density of 11kg/m<sup>3</sup> in the cavity; and</li> <li>(d) no wall ties; and</li> <li>(e) 13mm render with 2mm plaster set coat on each outside face.</li> </ul> <p>Test No ALA-05-082-1</p>		<p><math>R_w</math> 67 (-2, -6)</p>
<p>Sound reduction of wall consisting of two leaves of 90mm Acoustic Maxibrick with:</p> <ul style="list-style-type: none"> <li>(a) all joints filled solid with mortar; and</li> <li>(b) a cavity of not less than 70mm between leaves; and</li> <li>(c) no wall ties; and</li> <li>(d) 13mm render with 2mm plaster set coat on each outside face.</li> </ul> <p>Test No ALA-05-082-2</p>		<p><math>R_w</math> 60 (-1, -5)</p>
<p>Sound reduction of wall consisting of two leaves of 90mm Acoustic Maxibrick with:</p> <ul style="list-style-type: none"> <li>(a) all joints filled solid with mortar; and</li> <li>(b) a cavity of not less than 70mm between leaves; and</li> <li>(c) Matrix resilient wall ties; and</li> <li>(d) 13mm render with 2mm plaster set coat on each outside face.</li> </ul> <p>Test No ALA-05-082-3</p>		<p><math>R_w</math> 59 (-2, -6)</p>

**Note:**

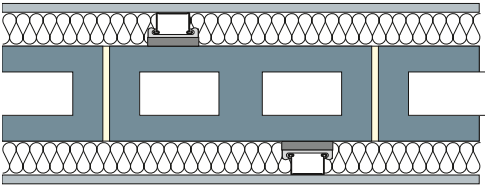
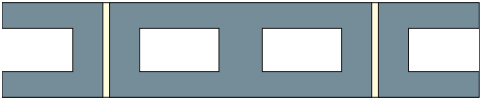
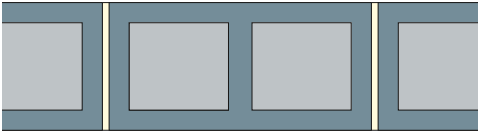
Midland Brick is not in a position to give opinions on performance of walls that fall outside the above tested wall systems.

For further information please consult a qualified Acoustic Engineer.

## » Acoustic Design

### Specific Results for 140mm and 190mm Masonry Block

Tests comply with AS1191-2002. Conducted by Acoustic Laboratories Australia

Construction Description	Construction Diagram	Rating
<p>Sound reduction of wall consisting of single leaf of 140mm reduced core hollow concrete block (15.705) with the following on both sides:</p> <p>(a) 13mm Boral plasterboard mounted on 28mm furring channels held to wall with Rondo STSC adjustable furring channel anchors; and</p> <p>(b) Insulation Solution 50mm Noise Control Batts with a density of 14kg/m<sup>3</sup> placed in both 50mm cavities.</p> <p>Test No ALA-05-083-2</p>		<p><math>R_w</math> 62 (-4, -11)</p>
<p>Sound reduction of wall consisting of single leaf of 140mm reduced-core hollow concrete block (15.705) – bare wall.</p> <p>Test No ALA-05-083-1</p>		<p><math>R_w</math> 52 (-2, -6)</p>
<p>Sound reduction of wall consisting of single leaf of 190mm hollow concrete block, core filled – bare wall.</p> <p>Test No ALA-05-083-4</p>		<p><math>R_w</math> 54 (-1, -5)</p>

**Note:**

Midland Brick is not in a position to give opinions on performance of walls that fall outside the above tested wall systems.

For further information please consult a qualified Acoustic Engineer.

## Thermal Properties

### Meeting the Standards

BCA 2011 (Building Code of Australia) Volume Two Part 3.12 Energy Efficiency provisions increased minimum house thermal performance to "6-Stars". Whilst the BCA sets minimum requirements, State Governments may adopt these minimums or may vary these requirements.

BCA 2011 provides two Deem-to-Satisfy (DTS) options: compliance with the DTS provisions listed in Parts 3.12.1 to 3.12.5, or using House Energy Rating Software (HERS) to verify a minimum 6-Star rating (plus compliance with nominated DTS provisions) BCA clause 3.12.0 - Application of Part 3.12 provides a detailed description of what is required for each option.

Research suggests that the HERS option (using AccuRate, BERS, FirstRate HERS) is likely to achieve better outcomes than can be achieved using the DTS provisions.

If the DTS provisions are used, then the eight BCA Climate Zones apply (Sydney and Perth are in Zone 5, Adelaide and Melbourne are in Zone 6, Brisbane is in Zone 2 and Canberra is in Zone 7). These zones typically allow Local Government boundaries and are detailed on a map which is available from the Australian Building Codes Board ([www.abcb.gov.au](http://www.abcb.gov.au)).

If the HERS option is used, then the 69 NatHERS (National House Energy Rating Scheme) Climate Zones apply. These allow postcode boundaries, so it is likely that there will be several zones that affect an area. For example, in WA there are 4 Metropolitan/Peel region zones - Perth (6000), Swanbourne (6010), Bickley (6076) and Mandurah (6210). Whilst there is a NatHERS Climate Zone map ([www.nathers.gov.au/about/climate-zones.html](http://www.nathers.gov.au/about/climate-zones.html)), it currently does not have the clarity needed to identify zone boundaries.

The HERS option is likely to achieve better outcomes because it models whole-of-building performance on a given site. This takes account of the benefit of good design decisions (orientation, shading, window size and placement) as well as the performance of the building fabric (floor, wall and roof).

Another benefit of using software simulation is that it can measure the performance of different parts of the building fabric. This allows for the targeted, cost effective use of roof and wall insulation. HERS data suggests that, as ceiling insulation performance increases, wall performance becomes more critical. This is the "hole in the bucket effect". If a bucket has a hole in the bottom, water runs straight out. If you seal the hole in the bottom the water level rises until it spills out the holes in the side of the bucket. For house construction, controlling energy flow is just the same. Research has shown that energy tends to flow in or out through the roof first, then windows and then the external wall. As roof performance is improved (higher R-Value ceiling insulation), window and wall performance becomes more critical [*Think Brick, Energy Efficiency and the Environment; The Case for Clay Brick (Edition 4, 2011), pages 3-7*].

Cavity clay masonry is a heavy mass walling system with a high thermal inertia (thermal lag). Heat is slowly absorbed during the day and slowly lost during the cool night. Therefore heavy mass walling in typical non-tropical diurnal temperature areas has a lower temperature fluctuation than occurs with a lighter weight construction. Targeted placement of cavity masonry wall insulation further reduces temperature fluctuation. Research data shows this is a cost effective way to achieve significant building thermal performance improvement [*Think Brick, Energy Efficiency and the Environment; The Case for Clay Brick (Edition 4, 2011)*].

For further information visit [www.thinkbrick.com.au](http://www.thinkbrick.com.au)

## » Thermal Properties

**Terminology****R-Value** ( $\text{m}^2 \text{K/W}$ )

The measure of thermal resistance. Total R-Value means the sum of the 'R' values of the individual component layers in a composite element including any air spaces and associated surface resistances. Good insulation 'R' value provides significant value in terms of comfort and energy efficiency.

**Thermal Transmittance or U-Value** ( $\text{W/m}^2\text{K}$ )

The rate at which heat moves through a wall. Total U-Value means thermal transmittance of the composite element including any air space and associated surface transmittances. This is simply the inverse of the 'R' value.

**Thermal Conductivity** ( $\text{W/mK}$ )

The rate at which heat is transmitted through a material, measured in watts per square of surface area for a temperature gradient of one Kelvin per metre thickness simplified to  $\text{W/mK}$ . Typical thermal conductivity for a 110mm clay brick is  $\text{K}0.55$ . To calculate the R-Value, divide the wall thickness (in metres) by the K-Value.

**Surface Density of Walls**

Surface density of a brick veneer wall is approximately  $187\text{kg/m}^2$ .

Listed below are examples of high-mass masonry walls  $> 220\text{kg/m}^2$ .

**Examples of High-Mass Masonry Walls  $> 220\text{kg/m}^2$** 

Description	Surface Density
Two leaves of 110mm brick with cavity, rendered one side	$358\text{kg/m}^2$
One leaf of 110mm face brick and one leaf of 90mm Maxibrick with cavity, rendered one side	$310\text{kg/m}^2$
Two leaves of 90mm Maxibrick with cavity, rendered both sides	$286\text{kg/m}^2$
Two leaves of 90mm Maxibrick with cavity, rendered one side	$261\text{kg/m}^2$
One leaf of 90mm face brick and one leaf of 90mm Fastwall with cavity, rendered one side	$246\text{kg/m}^2$

## Joint Selection

### Joint Types

The type of joint can dramatically affect the overall appearance of brick masonry. Joints can be used to create a casual, rustic or formal look to brickwork. There are many different joints; the most common ones used in Australia are shown below.

Terminology and joint preference differ in different countries and within Australia. Where there is any confusion, always use a drawing or physical sample to avoid misunderstandings.

Shallow rolled joints are recommended in areas requiring exposure-grade bricks and mortar. Tooling the joint to produce rolled and struck joints is equivalent to steel trowelling concrete and produces a dense smooth surface which sheds water and dirt better than other types of joint. Rolled and struck joints should always be used for bricks with straight sharp edges such as smooth-face bricks.

Raked joints may be used with any type of brick but they tend to retain dirt and may lead to streaks down the masonry in dirty environments. Raking must not come closer than 5mm to any core. This usually limits raking to less than 10 mm, however it is best to check the bricks that are being used before raking. AS3700 specifies that joints in walls in marine, severe marine or aggressive environments or on aggressive soils must be tooled to a dense smooth surface. This precludes raking and in practice, rolled joints are the only ones that consistently meet the requirement.

Flush joints may be used with any type of brick. However they are particularly effective with rumbled bricks as flush joints make the joints look to be of variable thickness that gives a pleasing rustic look.

### Joint Sizes

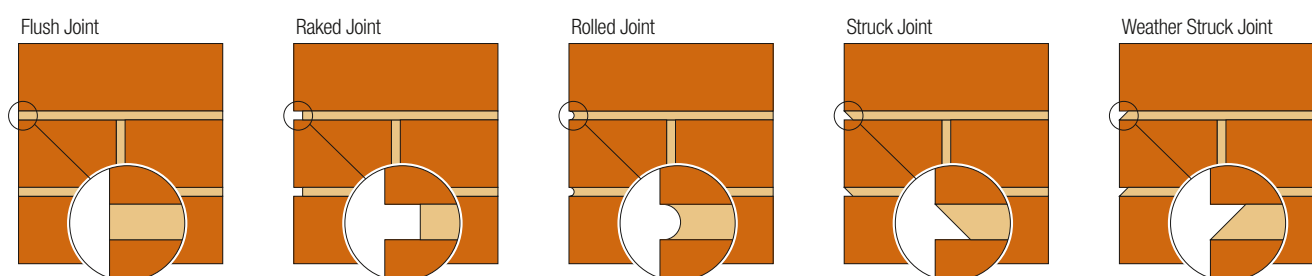
Mortar bed joints are required to be a nominal thickness of 10mm unless the design specifies another thickness. A different thickness may only be specified after the designer has considered the effect on compressive and flexural strength of the masonry. During construction mortar bed joints are allowed to deviate by  $\pm 3\text{mm}$ . Because of poor practice or lack of proper direction some slabs and footings are finished at the wrong height. Mortar joints up to 50mm thick are sometimes used to get the correct coursing, although this is not allowed under AS3700.

Perpends are to have a minimum design thickness of 5mm. In structural brickwork perpends may be up to 10mm thicker than the specified thickness but no thinner. In face brickwork perpends may deviate by  $\pm 5\text{mm}$  from the average width but in any one wall the maximum difference allowable between any two perpends is 8mm.

The preceding tolerances do not apply in the case of thin bed mortars and perpend tolerances do not apply where perpends are not filled with mortar.

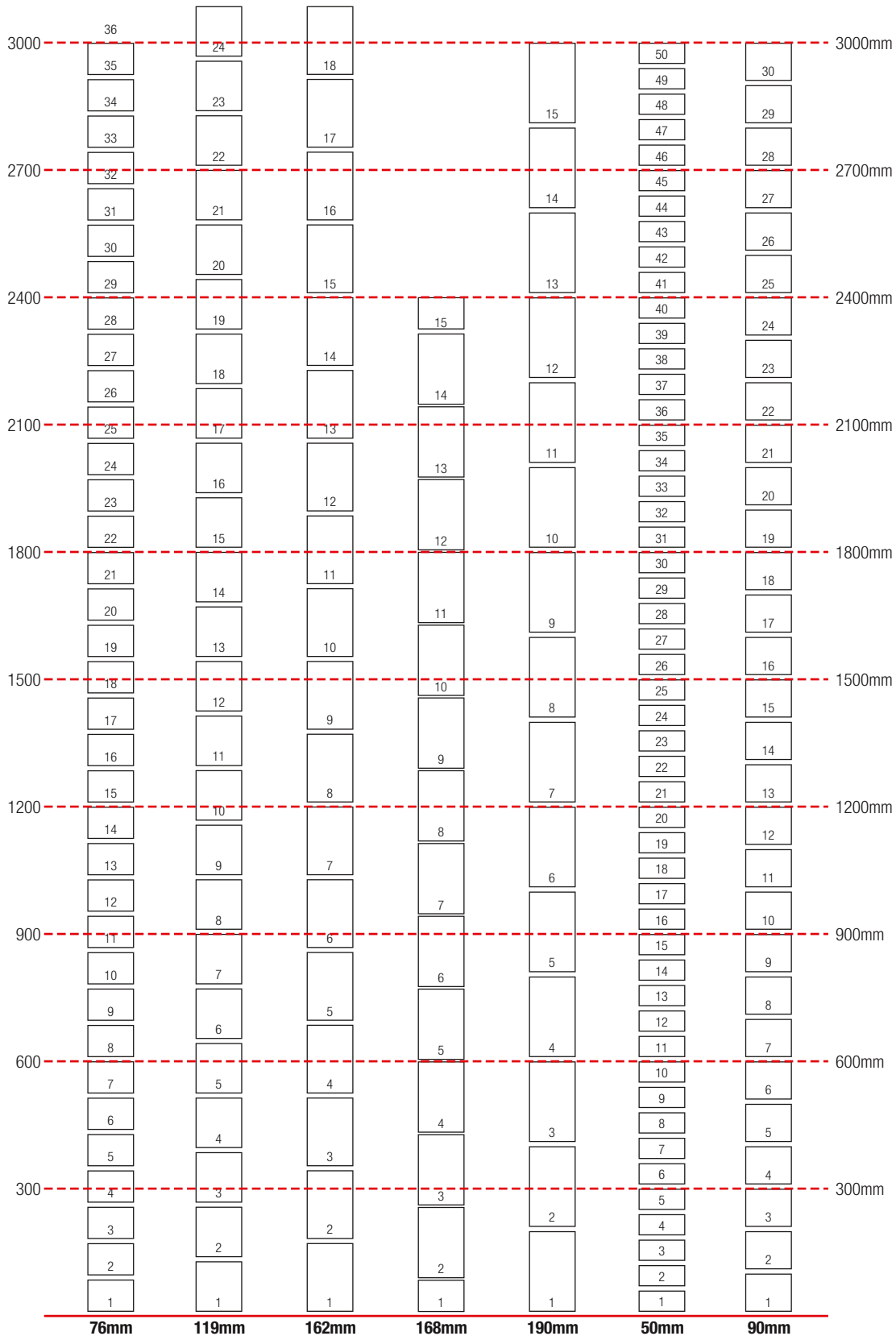
### Weepholes

Weepholes allow moisture that collects in the cavity to escape. Weepholes should be spaced at less than 1200mm centres wherever flashing is built into the masonry to shed water from the cavity. Weepholes are usually empty perpends (10mm wide) but proprietary products are available to prevent the entry of insects. In high wind areas it has been known for water to be blown up the cavity onto the inner wall and, as this is very undesirable, a greater number of narrower weepholes is usually built into the wall. It is essential that weepholes remain open and that render and other applied coatings, where used, are raked out of the joint.



# Coursing Charts

## Coursing Height Ready Reckoner





## » Coursing Charts

### Standard and Modular Brick

#### BRICKWORK DIMENSIONS

NOTE: All dimensions in mm

STANDARD BRICK: (Bricks per m<sup>2</sup> in wall = 48.5 approx.)

FORMAT SIZE: 240 x 120 x 86mm

MANUFACTURING SIZE: 230 x 110 x 76mm

VERTICAL GAUGE: 7 Courses to 600mm

No. of Bricks	Length	Opening	Height	No. of Bricks	Length	Opening	Height
1	230	250	86	26	6230	6250	2229
1½	350	370		26½	6350	6370	
2	470	490	172	27	6470	6490	2314
2½	590	610		27½	6590	6610	
3	710	730	257	28	6710	6730	2400
3½	830	850		28½	6830	6850	
4	950	970	343	29	6950	6970	2486
4½	1070	1090		29½	7070	7090	
5	1190	1210	429	30	7190	7210	2572
5½	1310	1330		30½	7310	7330	
6	1430	1450	514	31	7430	7450	2657
6½	1550	1570		31½	7550	7570	
7	1670	1690	600	32	7670	7690	2743
7½	1790	1810		32½	7790	7810	
8	1910	1930	686	33	7910	7930	2829
8½	2030	2050		33½	8030	8050	
9	2150	2170	772	34	8150	8170	2914
9½	2270	2290		34½	8270	8290	
10	2390	2410	857	35	8390	8400	3000
10½	2510	2530		35½	8510		
11	2630	2650	943	36	8630		3086
11½	2750	2770		36½	8750		
12	2870	2890	1029	37	8870		3172
12½	2990	3010		37½	8990		
13	3110	3130	1114	38	9110		3257
13½	3230	3250		38½	9230		
14	3350	3370	1200	39	9350		3343
14½	3470	3490		39½	9470		
15	3590	3610	1286	40	9590		3429
15½	3710	3730		40½	9710		
16	3830	3850	1372	41	9830		3514
16½	3950	3970		41½	9950		
17	4070	4090	1457	42	10070		3600
17½	4190	4210		42½	10190		
18	4310	4330	1543	43	10310		3686
18½	4430	4450		43½	10430		
19	4550	4570	1629	44	10550		3772
19½	4670	4690		44½	10670		
20	4790	4810	1714	45	10790		3857
20½	4910	4930		45½	10910		
21	5030	5050	1800	46	11030		3943
21½	5150	5170		46½	11150		
22	5270	5290	1886	47	11270		4029
22½	5390	5410		47½	11390		
23	5510	5530	1972	48	11510		4114
23½	5630	5650		48½	11630		
24	5750	5770	2057	49	11750		4200
24½	5870	5890		49½	11870		
25	5990	6010	2143	50	11990		4286
25½	6110	6130		100	23990		8572

Not often required. If needed add 20 to length.

#### BRICKWORK DIMENSIONS

NOTE: All dimensions in mm

MODULAR BRICK: (Bricks per m<sup>2</sup> in wall = 33.3 approx.)

FORMAT SIZE: 300 x 100 x 100mm

MANUFACTURING SIZE: 290 x 90 x 90mm

VERTICAL GAUGE: 6 Courses to 600mm

No. of Bricks	Length	Opening	Height	No. of Bricks	Length	Opening	Height
1	290	310	100	26	7790		2600
1½	390	410		26½	7890		
1¾	490	510		26¾	7990		
2	590	610	200	27	8090		2700
2½	690	710		27½	8190		
2¾	790	810		27¾	8290		
3	890	910	300	28	8390		2800
3½	990	1010		28½	8490		
3¾	1090	1110		28¾	8590		
4	1190	1210	400	29	8690		2900
4½	1290	1310		29½	8790		
4¾	1390	1410		29¾	8890		
5	1490	1510	500	30	8990		3000
5½	1590	1610		30½	9090		
5¾	1690	1710		30¾	9190		
6	1790	1810	600	31	9290		
6½	1890	1910		31½	9390		
6¾	1990	2010		31¾	9490		
7	2090	2110	700	32	9590		
7½	2190	2210		32½	9690		
7¾	2290	2310		32¾	9790		
8	2390	2410	800	33	9890		
8½	2490	2510		33½	9990		
8¾	2590	2610		33¾	10090		
9	2690	2710	900	34	10190		
9½	2790	2810		34½	10290		
9¾	2890	2910		34¾	10390		
10	2990	3010	1000	35	10490		
10½	3090	3110		35½	10590		
10¾	3190	3210		35¾	10690		
11	3290	3310	1100	36	10790		
11½	3390	3410		36½	10890		
11¾	3490	3510		36¾	10990		
12	3590	3610	1200	37	11090		
12½	3690	3710		37½	11190		
12¾	3790	3810		37¾	11290		
13	3890	3910	1300	38	11390		
13½	3990	4010		38½	11490		
13¾	4090	4110		38¾	11590		
14	4190	4210	1400	39	11690		
14½	4290	4310		39½	11790		
14¾	4390	4410		39¾	11890		
15	4490	4510	1500	40	11990		
15½	4590	4610		40½	12090		
15¾	4690	4710		40¾	12190		
16	4790	4810	1600	41	12290		
16½	4890	4910		41½	12390		
16¾	4990	5010		41¾	12490		
17	5090	5110	1700	42	12590		
17½	5190	5210		42½	12690		
17¾	5290	5310		42¾	12790		
18	5390	5410	1800	43	12890		
18½	5490	5510		43½	12990		
18¾	5590	5610		43¾	13090		
19	5690	5710	1900	44	13190		
19½	5790	5810		44½	13290		
19¾	5890	5910		44¾	13390		
20	5990	6010	2000	45	13490		
20½	6090	6110		45½	13590		
20¾	6190	6210		45¾	13690		
21	6290	6310	2100	46	13790		
21½	6390	6410		46½	13890		
21¾	6490	6510		46¾	13990		
22	6590	6610	2200	47	14090		
22½	6690	6710		47½	14190		
22¾	6790	6810		47¾	14290		
23	6890	6910	2300	48	14390		
23½	6990	7010		48½	14490		
23¾	7090	7110		48¾	14590		
24	7190	7210	2400	49	14690		
24½	7290	7310		49½	14790		
24¾	7390	7410		49¾	14890		
25	7490	7510	2500	50	14990		
25½	7590	7610		100	29990		
25¾	7690						

Not often required. If needed add 20 to length.

## » Coursing Charts

## Maxibrick, Ultramax, Fastwall and Longreach

## BRICKWORK DIMENSIONS

NOTE: All dimensions in mm

**MAXIBRICK/Fastwall:** (Bricks per m<sup>2</sup> in wall = 18.5 approx.)  
**FORMAT SIZE:** 315 x 100 x 172mm  
**MANUFACTURING SIZE:** 305 x 90 x 162mm  
**VERTICAL GAUGE:** 7 Courses to 1200mm

NOTE:  
 This measurement allows for mortar in  
 perpends and in horizontal joints.

No. of Bricks	Length	Opening	Height	No. of Bricks	Length	Opening	Height
1	305	325	172	26	8180	8200	
1 $\frac{1}{3}$	405	425		26 $\frac{1}{3}$	8280	8300	
1 $\frac{2}{3}$	505	525		26 $\frac{2}{3}$	8380	8400	
2	620	640	343	27	8495		
2 $\frac{1}{3}$	720	740		27 $\frac{1}{3}$	8595		
2 $\frac{2}{3}$	820	840		27 $\frac{2}{3}$	8695		
3	935	955	514	28	8810		
3 $\frac{1}{3}$	1035	1055		28 $\frac{1}{3}$	8910		
3 $\frac{2}{3}$	1135	1155		28 $\frac{2}{3}$	9010		
4	1250	1270	686	29	9125		
4 $\frac{1}{3}$	1350	1370		29 $\frac{1}{3}$	9225		
4 $\frac{2}{3}$	1450	1470		29 $\frac{2}{3}$	9325		
5	1565	1585	857	30	9440		
5 $\frac{1}{3}$	1665	1685		30 $\frac{1}{3}$	9540		
5 $\frac{2}{3}$	1765	1785		30 $\frac{2}{3}$	9640		
6	1880	1900	1029	31	9755		
6 $\frac{1}{3}$	1980	2000		31 $\frac{1}{3}$	9855		
6 $\frac{2}{3}$	2080	2100		31 $\frac{2}{3}$	9955		
7	2195	2215	1200	32	10070		
7 $\frac{1}{3}$	2295	2315		32 $\frac{1}{3}$	10170		
7 $\frac{2}{3}$	2395	2415		32 $\frac{2}{3}$	10270		
8	2510	2530	1372	33	10385		
8 $\frac{1}{3}$	2610	2630		33 $\frac{1}{3}$	10485		
8 $\frac{2}{3}$	2710	2730		33 $\frac{2}{3}$	10585		
9	2825	2845	1543	34	10700		
9 $\frac{1}{3}$	2925	2945		34 $\frac{1}{3}$	10800		
9 $\frac{2}{3}$	3025	3045		34 $\frac{2}{3}$	10900		
10	3140	3160	1714	35	11015		
10 $\frac{1}{3}$	3240	3260		35 $\frac{1}{3}$	11115		
10 $\frac{2}{3}$	3340	3360		35 $\frac{2}{3}$	11215		
11	3455	3475	1886	36	11330		
11 $\frac{1}{3}$	3555	3575		36 $\frac{1}{3}$	11430		
11 $\frac{2}{3}$	3655	3675		36 $\frac{2}{3}$	11530		
12	3770	3790	2057	37	11645		
12 $\frac{1}{3}$	3870	3890		37 $\frac{1}{3}$	11745		
12 $\frac{2}{3}$	3970	3990		37 $\frac{2}{3}$	11845		
13	4085	4105	2229	38	11960		
13 $\frac{1}{3}$	4185	4205		38 $\frac{1}{3}$	12060		
13 $\frac{2}{3}$	4285	4305		38 $\frac{2}{3}$	12160		
14	4400	4420	2400	39	12275		
14 $\frac{1}{3}$	4500	4520		39 $\frac{1}{3}$	12375		
14 $\frac{2}{3}$	4600	4620		39 $\frac{2}{3}$	12475		
15	4715	4735	2572	40	12590		
15 $\frac{1}{3}$	4815	4835		40 $\frac{1}{3}$	12690		
15 $\frac{2}{3}$	4915	4935		40 $\frac{2}{3}$	12790		
16	5030	5050	2743	41	12905		
16 $\frac{1}{3}$	5130	5150		41 $\frac{1}{3}$	13005		
16 $\frac{2}{3}$	5230	5250		41 $\frac{2}{3}$	13105		
17	5345	5365	2914	42	13220		
17 $\frac{1}{3}$	5445	5465		42 $\frac{1}{3}$	13320		
17 $\frac{2}{3}$	5545	5565		42 $\frac{2}{3}$	13420		
18	5660	5680	3086	43	13535		
18 $\frac{1}{3}$	5760	5780		43 $\frac{1}{3}$	13635		
18 $\frac{2}{3}$	5860	5880		43 $\frac{2}{3}$	13735		
19	5975	5995		44	13850		
19 $\frac{1}{3}$	6075	6095		44 $\frac{1}{3}$	13950		
19 $\frac{2}{3}$	6175	6195		44 $\frac{2}{3}$	14050		
20	6290	6310		45	14165		
20 $\frac{1}{3}$	6390	6410		45 $\frac{1}{3}$	14265		
20 $\frac{2}{3}$	6490	6510		45 $\frac{2}{3}$	14365		
21	6605	6625		46	14480		
21 $\frac{1}{3}$	6705	6725		46 $\frac{1}{3}$	14580		
21 $\frac{2}{3}$	6805	6825		46 $\frac{2}{3}$	14680		
22	6920	6940		47	14795		
22 $\frac{1}{3}$	7020	7040		47 $\frac{1}{3}$	14895		
22 $\frac{2}{3}$	7120	7140		47 $\frac{2}{3}$	14995		
23	7235	7255		48	15110		
23 $\frac{1}{3}$	7335	7355		48 $\frac{1}{3}$	15210		
23 $\frac{2}{3}$	7435	7455		48 $\frac{2}{3}$	15310		
24	7550	7570		49	15425		
24 $\frac{1}{3}$	7650	7670		49 $\frac{1}{3}$	15525		
24 $\frac{2}{3}$	7750	7770		49 $\frac{2}{3}$	15625		
25	7865	7885		50	15740		
25 $\frac{1}{3}$	7965	7985		50 $\frac{1}{3}$	15840		
25 $\frac{2}{3}$	8065	8085		50 $\frac{2}{3}$	15940		

Permissible height for single leaf wall per Building Code of Australia Part 3.3.

Above permissible height, subject to structural engineer's opinion.

## BRICKWORK DIMENSIONS

NOTE: All dimensions in mm

**LONGREACH BRICK:** (Bricks per m<sup>2</sup> in wall = 37 approx.)  
**FORMAT SIZE:** 315 x 100 x 86mm  
**MANUFACTURING SIZE:** 305 x 90 x 76mm  
**VERTICAL GAUGE:** 7 Courses to 600mm

No. of Bricks	Length	Opening	Height	No. of Bricks	Length	Opening	Height
1	305	325	86	24	7550	7570	2057
1 $\frac{1}{3}$	405	425		24 $\frac{1}{3}$	7650	7670	
1 $\frac{2}{3}$	505	525		24 $\frac{2}{3}$	7750	7770	
2	620	640	172	25	7865	7885	2143
2 $\frac{1}{3}$	720	740		25 $\frac{1}{3}$	7965	7985	
2 $\frac{2}{3}$	820	840		25 $\frac{2}{3}$	8065	8085	
3	935	955	257	26	8180	8200	2229
3 $\frac{1}{3}$	1035	1055		26 $\frac{1}{3}$	8280	8300	
3 $\frac{2}{3}$	1135	1155		26 $\frac{2}{3}$	8380	8400	
4	1250	1270	343	27	8495	8515	2314
4 $\frac{1}{3}$	1350	1370		27 $\frac{1}{3}$	8595	8615	
4 $\frac{2}{3}$	1450	1470		27 $\frac{2}{3}$	8695	8715	
5	1565	1585	429	28	8810	8830	2400
5 $\frac{1}{3}$	1665	1685		28 $\frac{1}{3}$	8910	8930	
5 $\frac{2}{3}$	1765	1785		28 $\frac{2}{3}$	9010	9030	
6	1880	1900	514	29	9125	9145	2486
6 $\frac{1}{3}$	1980	2000		29 $\frac{1}{3}$	9225	9245	
6 $\frac{2}{3}$	2080	2100		29 $\frac{2}{3}$	9325	9345	
7	2195	2215	600	30	9440	9460	2572
7 $\frac{1}{3}$	2295	2315		30 $\frac{1}{3}$	9540	9560	
7 $\frac{2}{3}$	2395	2415		30 $\frac{2}{3}$	9640	9660	
8	2510	2530	686	31	9755	9775	2657
8 $\frac{1}{3}$	2610	2630		31 $\frac{1}{3}$	9855	9875	
8 $\frac{2}{3}$	2710	2730		31 $\frac{2}{3}$	9955	9975	
9	2825	2845	772	32	10070	10090	2743
9 $\frac{1}{3}$	2925	2945		32 $\frac{1}{3}$	10170	10190	
9 $\frac{2}{3}$	3025	3045		32 $\frac{2}{3}$	10270	10290	
10	3140	3160	857	33	10385	10405	2829
10 $\frac{1}{3}$	3240	3260		33 $\frac{1}{3}$	10485	10505	
10 $\frac{2}{3}$	3340	3360		33 $\frac{2}{3}$	10585	10605	
11	3455	3475	943	34	10700	10720	2914
11 $\frac{1}{3}$	3555	3575		34 $\frac{1}{3}$	10800	10820	
11 $\frac{2}{3}$	3655	3675		34 $\frac{2}{3}$	10900	10920	
12	3770	3790	1029	35	11015	11035	3000
12 $\frac{1}{3}$	3870	3890		35 $\frac{1}{3}$	11115	11135	
12 $\frac{2}{3}$	3970	3990		35 $\frac{2}{3}$	11215	11235	
13	4085	4105	1114	36	11330	11350	3086
13 $\frac{1}{3}$	4185	4205		36 $\frac{1}{3}$	11430		
13 $\frac{2}{3}$	4285	4305		36 $\frac{2}{3}$	11530		
14	4400	4420	1200	37	11645		
14 $\frac{1}{3}$	4500	4520		37 $\frac{1}{3}$	11745		
14 $\frac{2}{3}$	4600	4620		37 $\frac{2}{3}$	11845		
15	4715	4735	1286	38	11960		
15 $\frac{1}{3}$	4815	4835		38 $\frac{1}{3}$	12060		
15 $\frac{2}{3}$	4915	4935		38 $\frac{2}{3}$	12160		
16	5030	5050	1372	39	12275		
16 $\frac{1}{3}$	5130	5150		39 $\frac{1}{3}$	12375		
16 $\frac{2}{3}$	5230	5250		39 $\frac{2}{3}$	12475		
17	5345	5365	1457	40	12590		
17 $\frac{1}{3}$	5445	5465		40 $\frac{1}{3}$	12690		
17 $\frac{2}{3}$	5545	5565		40 $\frac{2}{3}$	12790		
18	5660	5680	1543	41	12905		
18 $\frac{1}{3}$	5760	5780		41 $\frac{1}{3}$	13005		
18 $\frac{2}{3}$	5860	5880		41 $\frac{2}{3}$	13105		
19	5975	5995	1629	42	13220		
19 $\frac{1}{3}$	6075	6095		42 $\frac{1}{3}$	13320		
19 $\frac{2}{3}$	6175	6195		42 $\frac{2}{3}$	13420		
20	6290	6310	1714	43	13535		
20 $\frac{1}{3}$	6390	6410		43 $\frac{1}{3}$	13635		
20 $\frac{2}{3}$	6490	6510		43 $\frac{2}{3}$	13735		
21	6605	6625	1800	44	13850		
21 $\frac{1}{3}$	6705	6725		44 $\frac{1}{3}$	13950		
21 $\frac{2}{3}$	6805	6825		44 $\frac{2}{3}$	14050		
22	6920	6940	1886	45	14165		
22 $\frac{1}{3}$	7020	7040		45 $\frac{1}{3}$	14265		
22 $\frac{2}{3}$	7120	7140		45 $\frac{2}{3}$	14365		
23	7235	7255	1972	46	14480		
23 $\frac{1}{3}$	7335	7355		46 $\frac{1}{3}$	14580		
23 $\frac{2}{3}$	7435	7455		46 $\frac{2}{3}$	14680		

# Utility Bricks and Blocks

## » Coursing Charts

### Blockwork

#### BLOCKWORK DIMENSIONS

NOTE: All dimensions in mm

FORMAT SIZE: 400 x 100, 150, 200, 300 x 200; 400 x 100, 150, 200 x 100  
MANUFACTURING SIZE: 390 x 90, 140, 190, 290 x 190; 390 x 90, 140, 190 x 90

No. of Blocks	Length	Opening	Height	
			100 Coursing	200 Coursing
1	390	410	100	200
1¼	490	510		
1½	590	610		
1¾	690	710		
2	790	810	200	400
2¼	890	910		
2½	990	1010		
2¾	1090	1110		
3	1190	1210	300	600
3¼	1290	1310		
3½	1390	1410		
3¾	1490	1510		
4	1590	1610	400	800
4¼	1690	1710		
4½	1790	1810		
4¾	1890	1910		
5	1990	2010	500	1000
5¼	2090	2110		
5½	2190	2210		
5¾	2290	2310		
6	2390	2410	600	1200
6¼	2490	2510		
6½	2590	2610		
6¾	2690	2710		
7	2790	2810	700	1400
7¼	2890	2910		
7½	2990	3010		
7¾	3090	3110		
8	3190	3210	800	1600
8¼	3290	3310		
8½	3390	3410		
8¾	3490	3510		
9	3590	3610	900	1800
9¼	3690	3710		
9½	3790	3810		
9¾	3890	3910		
10	3990	4010	1000	2000
10¼	4090	4110		
10½	4190	4210		
10¾	4290	4310		
11	4390	4410	1100	2200
11¼	4490	4510		
11½	4590	4610		
11¾	4690	4710		
12	4790	4810	1200	2400
12¼	4890	4910		
12½	4990	5010		
12¾	5090	5110		
13	5190	5210	1300	2600
13¼	5290	5310		
13½	5390	5410		
13¾	5490	5510		
14	5590	5610	1400	2800
14¼	5690	5710		
14½	5790	5810		
14¾	5890	5910		
15	5990	6010	1500	3000

No. of Blocks	Length	Opening	Height	
			100 Coursing	200 Coursing
15¼	6090	6110		
15½	6190	6210		
15¾	6290	6310		
16	6390	6410	1600	3200
16¼	6490	6510		
16½	6590	6610		
16¾	6690	6710		
17	6790	6810	1700	3400
17¼	6890	6910		
17½	6990	7010		
17¾	7090	7110		
18	7190	7210	1800	3600
18¼	7290	7310		
18½	7390	7410		
18¾	7490	7510		
19	7590	7610	1900	3800
19¼	7690	7710		
19½	7790	7810		
19¾	7890	7910		
20	7990	8010	2000	4000
20¼	8090	8110		
20½	8190	8210		
20¾	8290	8310		
21	8390	8410	2100	4200
21¼	8490	8510		
21½	8590	8610		
21¾	8690	8710		
22	8790	8810	2200	4400
22¼	8890	8910		
22½	8990	9010		
22¾	9090	9110		
23	9190	9210	2300	4600
23¼	9290	9310		
23½	9390	9410		
23¾	9490	9510		
24	9590	9610	2400	4800
24¼	9690	9710		
24½	9790	9810		
24¾	9890	9910		
25	9990	10010	2500	5000
25¼	10090	10110		
25½	10190	10210		
25¾	10290	10310		
26	10390	10410	2600	5200
26¼	10490	10510		
26½	10590	10610		
26¾	10690	10710		
27	10790	10810	2700	5400
27¼	10890	10910		
27½	10990	11010		
27¾	11090	11110		
28	11190	11210	2800	5600
28¼	11290	11310		
28½	11390	11410		
28¾	11490	11510		
29	11590	11610	2900	5800

## Building Procedures

### Fastwall, Maxibrick, Acoustic Maxibrick, Maxi-Lite and Maxi-One

#### Bond

Generally laid in 3rd bond.

#### Joints

Fastwall is generally laid with the perpend joints open. Perpend joints should not exceed 12mm. Joints at intersections, corners and top and bottom courses should be filled. All joints above openings should be filled and extend to 200mm either side of the span of the opening. Perpend joints are required to be filled for all bricks, other than Fastwall.

#### Party Walls and Gable Ends

All joints must be filled to achieve the best possible performance for both fire resistance and sound transmission.

#### Wall Ties

Ties must meet Australian Standard AS3700 and AS4773.1 and 2 requirements. Ties are laid in every third course and spaced 600mm apart. Extra ties are required around openings such as doors and windows. The Building Code of Australia (BCA) outlines typical tie spacings.

#### Bonding

At the junctions of internal and cavity walls use alternative course bonding or bedded approved ties in every course. At the junction of internal walls use alternative course bonding or approved ties in every second course.

#### Heights/Two Storey Construction

The height limits of all masonry walls are stated in AS3700 and AS4773. The Australian Standards limits 90mm internal non-loadbearing masonry walls, laterally supported at the top to a height of 2.4 metres. However it is possible to achieve heights greater than 2.4 metres by consulting a suitably qualified structural engineer.

It is also recommended consulting a suitably qualified structural engineer when using MaxiLite and Maxibrick for multi-storey construction.

#### Chasing into Brickwork

Chasing should not be deeper than 25mm. Where a wall is chased on both sides, the chases should not be made into the same level of the brick. Guidance is provided in AS3700 for allowable chase depth and lengths.

#### External use

The external use of Maxibrick without a rendered finish is not recommended. For external use of Fastwall, consult a suitably qualified structural engineer.

#### Benefits

Excellent thermal and sound insulation properties and durability compared to standard sized bricks and to most other forms of lightweight construction.

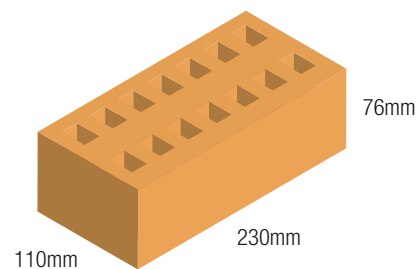
To complement your choice of Fastwall, Ultramax, Maxibrick, Acoustic Maxibrick, Maxilite and Maxione on your project, consider using the 'Reinforced Fired Clay Lintel' system with the benefits of speed and efficiency and the added strength of clay brick.





B | Bricks  
**Commons 110mm Wide**

## Common



### Specification

Product Information	Cored	Solid
Work Size (mm)	230 x 110 x 76	230 x 110 x 76
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	2.8	3.8
Approximate No. per m <sup>2</sup>	48.5	48.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	170	215
No. per pack	264	264
Pack Weight (kg)	739	1004
Pack Dimensions (mm)	940 x 700 x 890	940 x 700 x 890
Characteristic Unconfined Compressive Strength (MPa)	>12	>18
Cold Water Absorption (%)	<11	<11
Dry Density (kg/m <sup>3</sup> )	1,460	1,980
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)	<1.4
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	<30	<30

### Fire Resistance

Fire Resistance Level	Cored	Solid
Insulation (minutes)	90	90
Insulation - Rendered 20mm both sides (minutes)	120	120

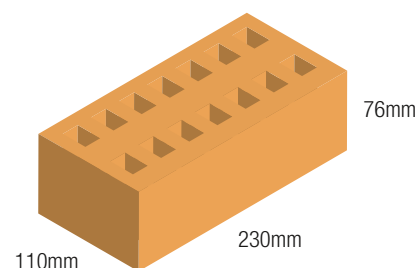
### Weighted Sound reduction index $R_w$ for 110mm walls – see pages 44 and 45

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.



## Common Paint Grade



### Specification

Product Information	Cored	Solid
Work Size (mm)	230 x 110 x 76	230 x 110 x 76
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	2.8	3.8
Approximate No. per m <sup>2</sup>	48.5	48.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	170	215
No. per pack	264	264
Pack Weight (kg)	739	1004
Pack Dimensions (mm)	940 x 700 x 890	940 x 700 x 890
Characteristic Unconfined Compressive Strength (MPa)	>12	>18
Cold Water Absorption (%)	<11	<11
Dry Density (kg/m <sup>3</sup> )	1,460	1,980
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)	<1.4
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	<30	<30

### Fire Resistance

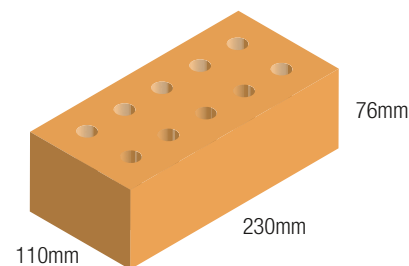
Fire Resistance Level	Cored	Solid
Insulation (minutes)	90	90
Insulation - Rendered 20mm both sides (minutes)	120	120

### Weighted Sound reduction index $R_w$ for 110mm walls – see pages 44 and 45

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Common Load Bearing



Specification		
Product Information	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Work Size (mm)	230 x 110 x 76	230 x 110 x 76
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	2.8 (range 2.8 - 3.5)	3.5
Approximate No per m <sup>2</sup>	48.5	48.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	170 (range 170 - 200)	200
No per pack	264	264
Pack Weight (kg)	739 (range 739 - 924)	924
Pack Dimensions (mm)	940 x 700 x 890	940 x 700 x 890
Characteristic Unconfined Compressive Strength (MPa)	>15	>20
Cold Water Absorption (%)	<9	<9
Dry Density (kg/m <sup>3</sup> )	1,460 (range 1460 - 1820)	1,820
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.3 (gross bed area)	<1.3 (gross bed area)
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	<30	<30

Fire Resistance		
Fire Resistance Level	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Insulation (minutes)	90	90
Insulation - Rendered 20mm both sides (minutes)	120	120

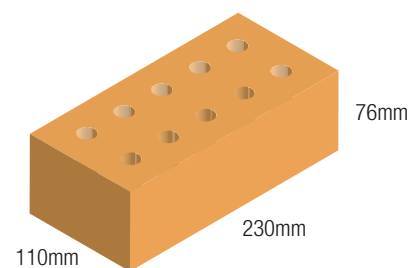
### Weighted Sound reduction index $R_w$ for 110mm walls – see pages 44 and 45

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Common

### Coastal Exposure Grade



#### Specification

Product Information	Cored
Work Size (mm)	230 x 110 x 76
Dimensional Category	DW1
Approximate Unit Weight (kg)	3.5
Approximate No. per m <sup>2</sup>	48.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	200
No. per pack	264
Pack Weight (kg)	924
Pack Dimensions (mm)	940 x 700 x 890
Characteristic Unconfined Compressive Strength (MPa)	>15
Cold Water Absorption (%)	<9
Dry Density (kg/m <sup>3</sup> )	1,820
Coefficient of Expansion (mm/m)	<0.6
Durability Class	Exposure
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.3 (gross bed area)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	<30

#### Fire Resistance

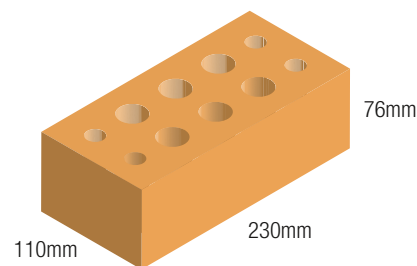
Fire Resistance Level	Cored
Insulation (minutes)	90
Insulation - Rendered 20mm both sides (minutes)	120

#### Weighted Sound reduction index $R_w$ for 110mm walls – see pages 44 and 45

##### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Common Fire Resistant 2 Hour



Specification	
Product Information	Cored
Work Size (mm)	230 x 110 x 76
Dimensional Category	DW1
Approximate Unit Weight (kg)	2.9
Approximate No per m <sup>2</sup>	48.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	172
No per pack	264
Pack Weight (kg)	766
Pack Dimensions (mm)	940 x 700 x 890
Characteristic Unconfined Compressive Strength (MPa)	>8
Cold Water Absorption (%)	<15
Dry Density (kg/m <sup>3</sup> )	1,508
Coefficient of Expansion (mm/m)	<0.5
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)
Potential to Effloresce	Slight to Moderate
Core Percentage (%)	<30

Fire Resistance (as per Midland Brick test results*)	
Fire Resistance Level	Cored
Insulation (minutes)	120

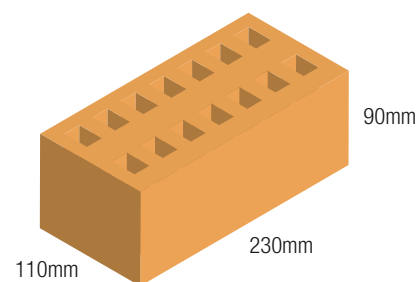
### Weighted Sound reduction index $R_w$ for 110mm walls – see pages 44 and 45

#### Notes:

- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply.  
Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted.  
Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

\* Test results available on request.

## Common Modular Height



### Specification

Product Information	Cored
Work Size (mm)	230 x 110 x 90
Dimensional Category	DW1
Approximate Unit Weight (kg)	3.4
Approximate No. per m <sup>2</sup>	42
Nominal Wall Surface Density (kg/m <sup>2</sup> )	170
No. per pack	224
Pack Weight (kg)	760
Pack Dimensions (mm)	940 x 700 x 890
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<11
Dry Density (kg/m <sup>3</sup> )	1,500
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.5 (gross bed area)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	<30

### Fire Resistance

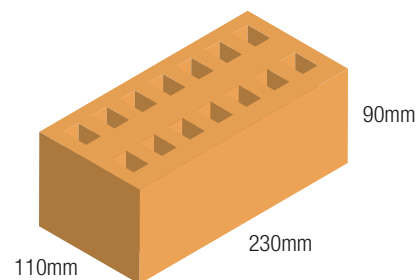
Fire Resistance Level	Cored
Insulation (minutes)	90
Insulation - Rendered 20mm both sides (minutes)	120

### Weighted Sound reduction index $R_w$ for 110mm walls – see pages 44 and 45

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Common Modular Height Load Bearing



Specification		
Product Information	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Work Size (mm)	230 x 110 x 90	230 x 110 x 90
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	3.4	4.2
Approximate No per m <sup>2</sup>	42	42
Nominal Wall Surface Density (kg/m <sup>2</sup> )	170	200
No per pack	224	224
Pack Weight (kg)	760	940
Pack Dimensions (mm)	940 x 740 x 890	940 x 740 x 890
Characteristic Unconfined Compressive Strength (MPa)	>15	>20
Cold Water Absorption (%)	<11	<11
Dry Density (kg/m <sup>3</sup> )	1,500	1,840
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	Exposure
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.5 (gross bed area)	<1.5 (gross bed area)
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage	<30	<30

Fire Resistance		
Fire Resistance Level	15 MPa $f'_{uc}$	25 MPa $f'_{uc}$
Insulation (minutes)	90	90
Insulation - Rendered 20mm both sides (minutes)	120	120

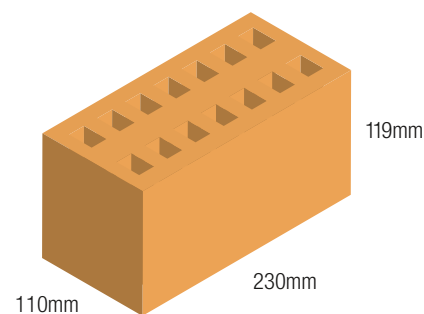
### Weighted Sound reduction index $R_w$ for 110mm walls – see pages 44 and 45

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

# Common

## 1½ Course (Stubbie)



### Specification

Product Information	Cored
Work Size (mm)	230 x 110 x 119
Dimensional Category	DW1
Approximate Unit Weight (kg)	4.4
Approximate No. per m <sup>2</sup>	32.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	165
No. per pack	168
Pack Weight (kg)	739
Pack Dimensions (mm)	940 x 720 x 890
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<11
Dry Density (kg/m <sup>3</sup> )	1,460
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)
Potential to Effloresce	Slight
Core Percentage	<30

### Fire Resistance

Fire Resistance Level	Cored
Insulation (minutes)	90
Insulation - Rendered 20mm both sides (minutes)	120

**Weighted Sound reduction index  $R_w$  for 110mm walls – see pages 44 and 45**

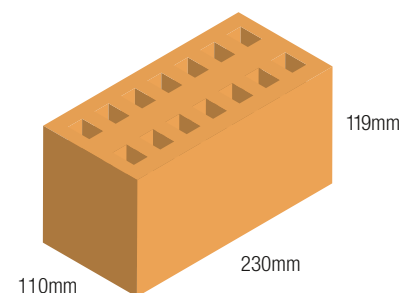
### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.



## Common

### 1½ Course Load Bearing (Stubbie)



#### Specification

Product Information	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Work Size (mm)	230 x 110 x 119	230 x 110 x 119
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	4.5	4.8
Approximate No per m <sup>2</sup>	32.5	32.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	170	178
No per pack	168	168
Pack Weight (kg)	756	807
Pack Dimensions (mm)	940 x 720 x 890	940 x 720 x 890
Characteristic Unconfined Compressive Strength (MPa)	>15	>20
Cold Water Absorption (%)	<11	<11
Dry Density (kg/m <sup>3</sup> )	1,490	1,590
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	Exposure
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)	<1.4 (gross bed area)
Potential to Effloresce	Slight	Slight
Core Percentage (%)	<30	<30

#### Fire Resistance

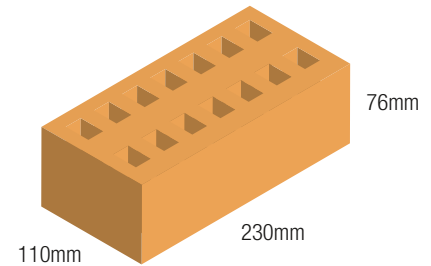
Fire Resistance Level	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Insulation (minutes)	90	90
Insulation - Rendered 20mm both sides (minutes)	120	120

#### Weighted Sound reduction index $R_w$ for 110mm walls – see pages 44 and 45

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Common Manhole



### Specification

Product Information	Cored
Work Size (mm)	230 x 110 x 76
Dimensional Category	DW1
Approximate Unit Weight (kg)	2.9
Approximate No. per m <sup>2</sup>	48.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	175
No. per pack	264
Pack Weight (kg)	766
Pack Dimensions (mm)	940 x 700 x 890
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<8
Dry Density (kg/m <sup>3</sup> )	1,510
Coefficient of Expansion (mm/m)	<0.4
Durability Class	Exposure
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.0
Potential to Effloresce	Nil to Slight
Core Percentage (%)	<30

### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Fire Resistance and $R_w$ For Common (110mm Wide) Walls

### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function.

#### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases.

#### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation. Information on how to calculate these is provided in the Think Brick Australia publication manual 5: Fire Resistance Levels for Clay Brick Walls available at [www.thinkbrick.com.au](http://www.thinkbrick.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

### Weighted Sound Reduction Index $R_w$

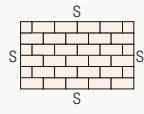
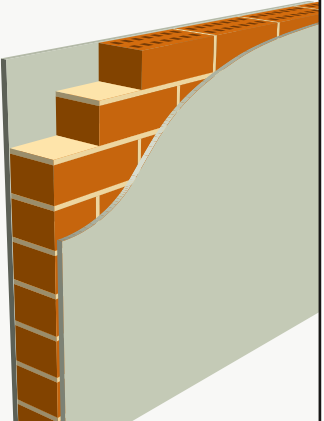
The  $R_w$  has two spectrum adaptation terms to account for medium to high frequency noise (C) and low frequency noise ( $C_{tr}$ ). The reduction figures are added to the  $R_w$  and are written  $R_w(C, C_{tr})$ .

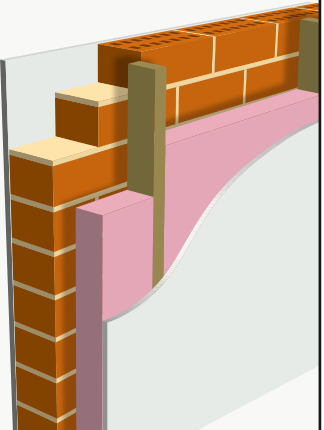
To achieve impact sound insulation, the BCA requires that walls consist of two leaves with at least a 20mm cavity between them and if ties are needed in masonry walls they must be of the resilient type. Except for the resilient ties in masonry walls there are to be no mechanical linkages between the walls, except at the periphery (ie through walls, floors and ceilings).

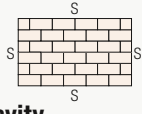
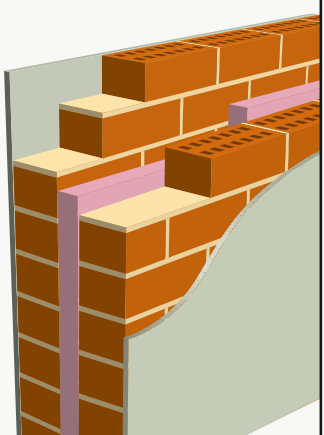
More detailed information is readily available from:

- Australian Standards relating to Masonry AS3700-2001, AS4773.1 and 2
- The Building Code of Australia

- » Fire Resistance and  $R_w$
- » For Common (110mm wide) Walls

FRL for bare wall, height up to 2.9m	120/90/90	 
FRL for bare wall, height up to 3.0m	90/90/90	
<b>Sound reduction of wall consisting of single leaf of 110mm brick with 13mm render on both sides</b>	<b><math>R_w \geq 45</math></b>	

<b>Sound reduction of wall consisting of single leaf of 110mm clay brick masonry with:</b>		
a.	a row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced 20mm from the masonry wall; and	
b.	50mm thick mineral insulation or glass wool insulation with a density of 11kg/m <sup>3</sup> positioned between studs; and	
c.	one layer of 13mm plasterboard fixed to outside face of studs and outside face of masonry.	
		<b><math>R_w + C_{tr} \geq 50</math> and impact sound insulation</b>

FRL for bare wall, height up to 3.5m	180/180/240	 
<b>Sound reduction of wall consisting of two leaves 110mm brick with a 50mm cavity</b>		
<ul style="list-style-type: none"><li>• Rendered 13mm on both sides</li></ul>	<b><math>R_w + C_{tr} \geq 50</math> and impact sound insulation</b>	
<ul style="list-style-type: none"><li>• Unrendered with 50mm glass wool insulation with a density of 11kg/m3</li></ul>	<b><math>R_w + C_{tr} \geq 50</math> and impact sound insulation</b>	
<ul style="list-style-type: none"><li>• Unrendered with 50mm polyester insulation with a density of 20kg/m3</li></ul>	<b><math>R_w + C_{tr} \geq 50</math> and impact sound insulation</b>	
<small>- If ties are needed in masonry walls they must be of the resilient type.</small>		

- S = Simply Supported i.e. timber truss on tied brickwork

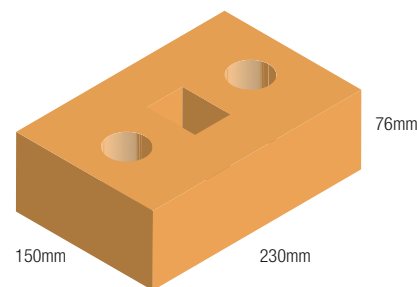
- F = Free

-  $R_w$  based in BCA "deemed to comply" provisions.

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C | Bricks  
**Special Performance 150mm Wide**

## Special Performance



Specification	
Product Information	Cored
Work Size (mm)	230 x 150 x 76
Dimensional Category	DW1
Approximate Unit Weight (kg)	4.4
Approximate No. per m <sup>2</sup>	48.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	255
No. per pack	204
Pack Weight (kg)	897
Pack Dimensions (mm)	940 x 700 x 900
Characteristic Unconfined Compressive Strength (MPa)	>14
Cold Water Absorption (%)	<11
Dry Density (kg/m <sup>3</sup> )	1,675
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.3 (gross bed area)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	<30

Fire Resistance	
Fire Resistance Level	Cored
Insulation (minutes)	120
Insulation - Rendered 10mm both sides (minutes)	180

### Weighted Sound reduction index $R_w$ for 150mm walls – see page 51

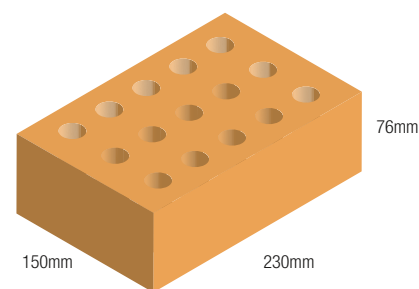
#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.



# Special Performance

## Load Bearing



### Specification

Product Information	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$	25 MPa $f'_{uc}$
Work Size (mm)	230 x 150 x 76	230 x 150 x 76	230 x 150 x 76
Dimensional Category	DW1	DW1	DW1
Approximate Unit Weight (kg)	4.7	4.7	4.7
Approximate No per m <sup>2</sup>	48.5	48.5	48.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	270	270	270
No per pack	204	204	204
Pack Weight (kg)	959	959	959
Pack Dimensions (mm)	940 x 700 x 900	940 x 700 x 900	940 x 700 x 900
Characteristic Unconfined Compressive Strength (MPa)	>15	>20	>25
Cold Water Absorption (%)	<11	<11	<11
Dry Density (kg/m <sup>3</sup> )	1,790	1,790	1,790
Coefficient of Expansion (mm/m)	<0.6	<0.6	<0.6
Durability Class	General Purpose	General Purpose	Exposure
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4	<1.4	<1.4
Potential to Effloresce	Nil to Slight	Nil to Slight	Nil to Slight
Core Percentage (%)	<30	<30	<30

### Fire Resistance

Fire Resistance Level	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$	25 MPa $f'_{uc}$
Insulation (minutes)	120	120	120
Insulation - Rendered 10mm both sides (minutes)	180	180	180

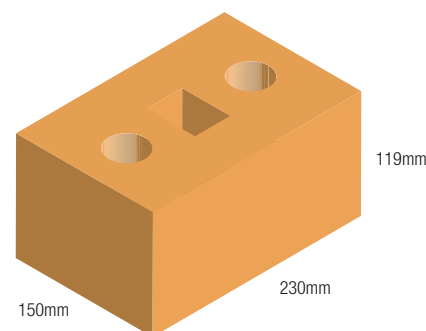
### Weighted Sound reduction index $R_w$ for 150mm walls – see page 51

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Special Performance

### 1½ Course



#### Specification

Product Information	Cored
Work Size (mm)	230 x 150 x 119
Dimensional Category	DW1
Approximate Unit Weight (kg)	6.9
Approximate No. per m <sup>2</sup>	32.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	255
No. per pack	132
Pack Weight (kg)	910
Pack Dimensions (mm)	940 x 715 x 900
Characteristic Unconfined Compressive Strength (MPa)	>14
Cold Water Absorption (%)	<11.0
Dry Density (kg/m <sup>3</sup> )	1,680
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	<30

#### Fire Resistance

Fire Resistance Level	Cored
Insulation (minutes)	120
Insulation - Rendered 10mm both sides (minutes)	180

#### Weighted Sound reduction index $R_w$ for 150mm walls – see page 51

##### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

# Fire Resistance and $R_w$

## For Special Performance (150mm wide) Walls

### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function.

#### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases.

#### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation. Information on how to calculate these is provided in the Clay Brick and Paver Institute (CBPI) publication Manual 5: Fire Resistance Levels for Clay Brick Walls available at [www.thinkbrick.com.au](http://www.thinkbrick.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

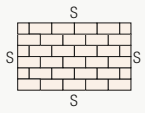
### Weighted Sound Reduction Index ( $R_w$ )

The  $R_w$  has two spectrum adaptation terms to account for medium to high frequency noise (C) and low frequency noise ( $C_{tr}$ ). The reduction figures are added to the  $R_w$  and are written  $R_w(C, C_{tr})$ .

To achieve impact sound insulation, the BCA requires that walls consist of two leaves with at least a 20mm cavity between them and if ties are needed in masonry walls they must be of the resilient type. Except for the resilient ties in masonry walls there are to be no mechanical linkages between the walls, except at the periphery (ie through walls, floors and ceilings).

More detailed information is readily available from:

- Australian Standards relating to Masonry AS3700-2001
- The Building Code of Australia

FRL for bare wall, height up to 3.9m	120/120/120	
FRL for wall, with 13mm render on both sides, height up to 3.9m	120/120/180	
FRL for bare wall, height up to 4.2m	90/90/120	
<b>Sound reduction of wall consisting of single leaf of 150mm brick with 13mm render on both sides</b>	<b><math>R_w \geq 50</math></b>	

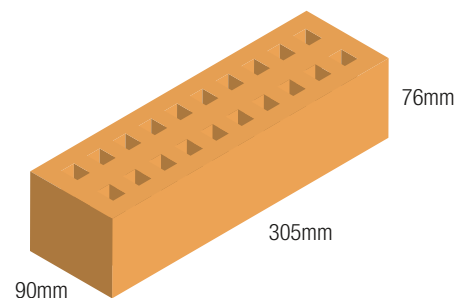
- S = Simply Supported ie timber truss on tied brickwork  
- F = Free





D | Bricks  
**305 Series 90mm Wide**

## Longreach Acoustic Fire-Rated



### Specification

Product Information	Cored	Solid
Work Size (mm)	305 x 90 x 76	305 x 90 x 76
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	3.1	4.2
Approximate No. per m <sup>2</sup>	37	37
Nominal Wall Surface Density (kg/m <sup>2</sup> )	140	180
No. per pack	252	252
Pack Weight (kg)	781	1058
Pack Dimensions (mm)	920 x 700 x 910	920 x 700 x 910
Characteristic Unconfined Compressive Strength (MPa)	>12	>16
Cold Water Absorption (%)	<11	<11
Dry Density (kg/m <sup>3</sup> )	1,480	2,010
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)	<1.4 (gross bed area)
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	<30	<30

### Fire Resistance

Fire Resistance Level	Cored	Solid
Insulation (minutes)	60	60
Insulation - Rendered 20mm both sides (minutes)	90	90

### Weighted Sound reduction index $R_w$ for 90mm walls – see page 58

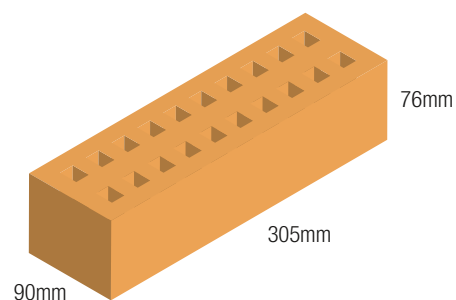
#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.



# Longreach

## Load Bearing



### Specification

Product Information	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Work Size (mm)	305 x 90 x 76	305 x 90 x 76
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	3.1	3.5
Approximate No per m <sup>2</sup>	37	37
Nominal Wall Surface Density (kg/m <sup>2</sup> )	140	153
No per pack	252	252
Pack Weight (kg)	781	882
Pack Dimensions (mm)	920 x 700 x 910	920 x 700 x 910
Characteristic Unconfined Compressive Strength (MPa)	>15	>20
Cold Water Absorption (%)	<11	<11
Dry Density (kg/m <sup>3</sup> )	1,480	1,680
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)	<1.4 (gross bed area)
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	<30	<30

### Fire Resistance

Fire Resistance Level	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Insulation (minutes)	60	60
Insulation - Rendered 20mm both sides (minutes)	90	90

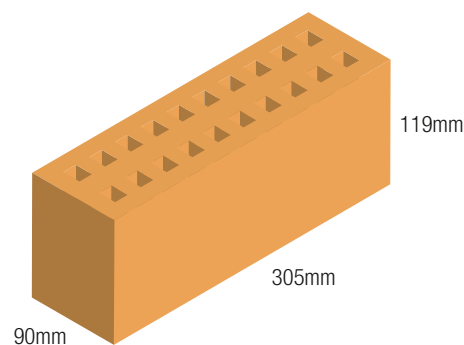
### Weighted Sound reduction index $R_w$ for 90mm walls – see page 58

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Highreach

### 1½ Course



#### Specification

Product Information	Cored
Work Size (mm)	305 x 90 x 119
Dimensional Category	DW1
Approximate Unit Weight (kg)	4.7
Approximate No. per m <sup>2</sup>	24.6
Nominal Wall Surface Density (kg/m <sup>2</sup> )	133
No. per pack	162
Pack Weight (kg)	761
Pack Dimensions (mm)	920 x 715 x 910
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<11
Dry Density (kg/m <sup>3</sup> )	1,440
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	<30

#### Fire Resistance

Fire Resistance Level	Cored
Insulation (minutes)	60
Insulation - Rendered 20mm both sides (minutes)	90

#### Weighted Sound reduction index $R_w$ for 90mm walls – see page 58

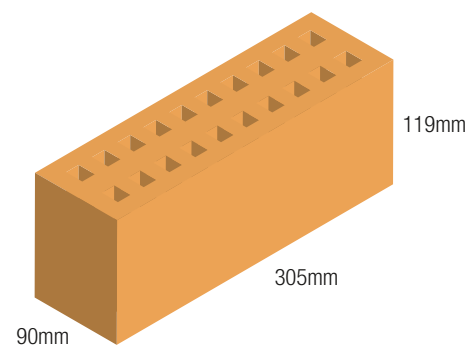
##### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.



# Highreach

## Load Bearing 1½ Course



### Specification

Product Information	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Work Size (mm)	305 x 90 x 119	305 x 90 x 119
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	4.7	5.0
Approximate No per m <sup>2</sup>	24.6	24.6
Nominal Wall Surface Density (kg/m <sup>2</sup> )	133	141
No per pack	162	162
Pack Weight (kg)	761	810
Pack Dimensions (mm)	920 x 715 x 910	920 x 715 x 910
Characteristic Unconfined Compressive Strength (MPa)	>15	>20
Cold Water Absorption (%)	<11	<11
Dry Density (kg/m <sup>3</sup> )	1,440	1,530
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)	<1.4 (gross bed area)
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	<30	<30

### Fire Resistance

Fire Resistance Level	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Insulation (minutes)	60	60
Insulation - Rendered 20mm both sides (minutes)	90	90

### Weighted Sound reduction index $R_w$ for 90mm walls – see page 58

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply.  
Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted.  
Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Fire Resistance and $R_w$

### For Longreach and Highreach (90mm wide) Walls

#### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function.

#### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases.

#### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of

structural adequacy, integrity and insulation. Information on how to calculate these is provided in the Clay Brick and Paver Institute (CBPI) publication Manual 5: Fire Resistance Levels for Clay Brick Walls available at [www.thinkbrick.com.au](http://www.thinkbrick.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

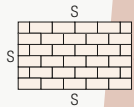
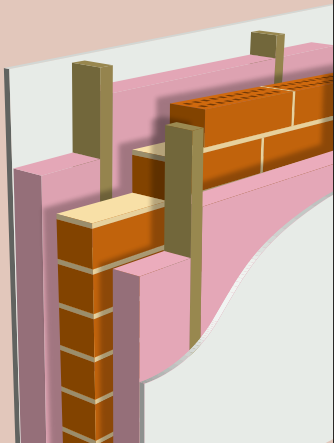
#### Weighted Sound Reduction Index ( $R_w$ )

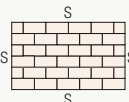
The  $R_w$  has two spectrum adaptation terms to account for medium to high frequency noise (C) and low frequency noise ( $C_{tr}$ ). The reduction figures are added to the  $R_w$  and are written  $R_w (C, C_{tr})$ .

To achieve impact sound insulation, the BCA requires that walls consist of two leaves with at least a 20mm cavity between them and if ties are needed in masonry walls they must be of the resilient type. Except for the resilient ties in masonry walls there are to be no mechanical linkages between the walls, except at the periphery (ie through walls, floors and ceilings).

More detailed information is readily available from:

- Australian Standards relating to Masonry AS3700-2001
- The Building Code of Australia

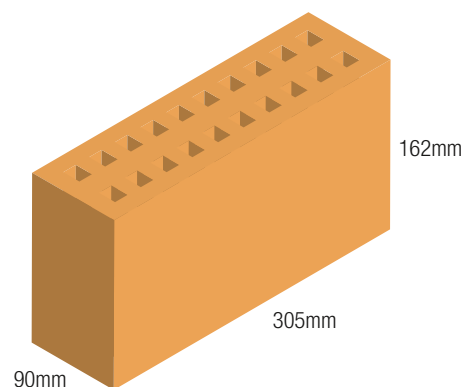
FRL for bare wall, height up to 2.5m	90/60/60	
FRL for wall with 20mm render on both sides, height up to 2.7m	60/60/90	
<b>Sound reduction of wall consisting of single leaf of 90mm clay brick masonry with:</b>		
a.	a row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced 20mm from each face of the masonry wall; and	
b.	50mm thick mineral insulation or glass wool insulation with a density of 11kg/m <sup>3</sup> positioned between studs in each row; and	
c.	one layer of 13mm plasterboard fixed to studs on each outside face.	
		<b><math>R_w + C_{tr} \geq 50</math> and impact sound insulation</b>
Heights above 2.4m should be referred to a suitably qualified engineer.		

FRL for bare wall consisting of single leaf of 90mm clay brick masonry and single leaf of 110mm clay brick masonry with 40mm cavity (minimum), height up to 3.3m	90/90/180	
Heights above 2.4m should be referred to a suitably qualified engineer.		

- S = Simply Supported ie timber truss on tied brickwork

- F = Free

# Maxibrick



## Specification

Product Information	Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	5.6 (range 5.1 - 5.9)
Approximate No. per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	120 (rendered 13mm one side - 140)
No. per pack	132
Pack Weight (kg)	740
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<12
Dry Density (kg/m <sup>3</sup> )	1,260
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

## Fire Resistance

Fire Resistance Level	Cored
Insulation (minutes)	60
Insulation - Rendered 20mm both sides (minutes)	90

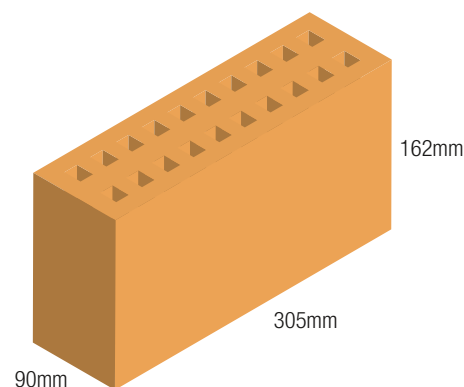
**For further information on FRL see page 68.**

### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Maxibrick

### Paint Grade



#### Specification

Product Information	Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	5.6 (range 5.1 - 5.9)
Approximate No. per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	120 (rendered 13mm one side - 140)
No. per pack	132
Pack Weight (kg)	740
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<12
Dry Density (kg/m <sup>3</sup> )	1,260
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

#### Fire Resistance

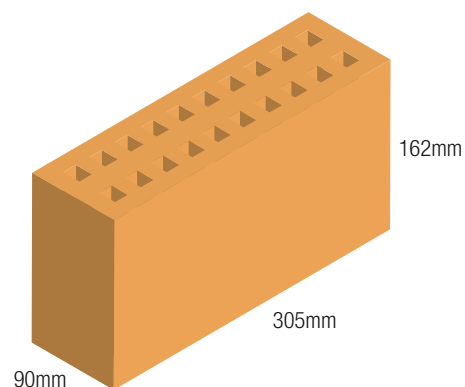
Fire Resistance Level	Cored
Insulation (minutes)	60
Insulation - Rendered 20mm both sides (minutes)	90

**For further information on FRL see page 68.**

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

# Ultramax



## Specification

Product Information	Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	5.0 (range 5 - 5.3)
Approximate No per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	105 (rendered 13mm one side - 130)
No per pack	132
Pack Weight (kg)	660
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<12
Dry Density (kg/m <sup>3</sup> )	1,125
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage	>30

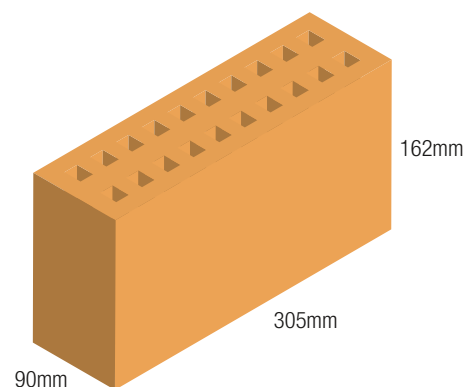
## Fire Resistance

Fire Resistance Level	Cored
Insulation (minutes)	30
Insulation - Rendered 20mm both sides (minutes)	90

## Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply.  
Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Maxi-One



### Specification

Product Information	Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	5.6 (range 5.1 - 5.9)
Approximate No. per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	120 (rendered 13mm one side - 140)
No. per pack	132
Pack Weight (kg)	740
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>10
Cold Water Absorption (%)	<12
Dry Density (kg/m <sup>3</sup> )	1,260
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

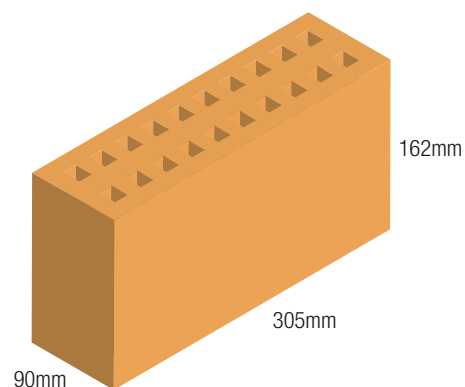
### Fire Resistance

Fire Resistance Level	Cored
Insulation (minutes)	30
Insulation - Rendered 20mm both sides (minutes)	90

### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

# Maxi-Lite



## Specification

Product Information	Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	4.9 (range 4.7 - 5.2)
Approximate No. per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	105 (rendered 13mm one side - 130)
No. per pack	132
Pack Weight (kg)	647
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<12
Dry Density (kg/m <sup>3</sup> )	>1,100
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

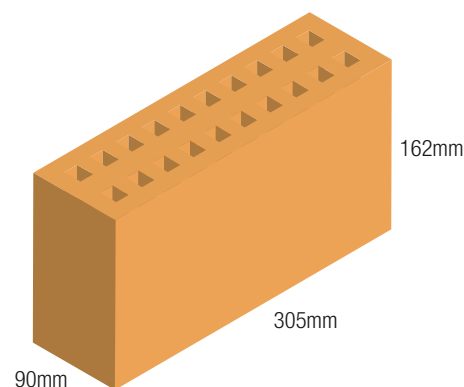
## Fire Resistance

Fire Resistance Level	Cored
Insulation (minutes)	30
Insulation - Rendered 20mm both sides (minutes)	90

## Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Maxi-Lite One



### Specification

Product Information	Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	4.9 (range 4.7 - 5.2)
Approximate No. per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	105 (rendered 13mm one side - 130)
No. per pack	132
Pack Weight (kg)	647
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>9
Cold Water Absorption (%)	<12
Dry Density (kg/m <sup>3</sup> )	>1,100
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

### Fire Resistance

Fire Resistance Level	Cored
Insulation (minutes)	30
Insulation - Rendered 20mm both sides (minutes)	90

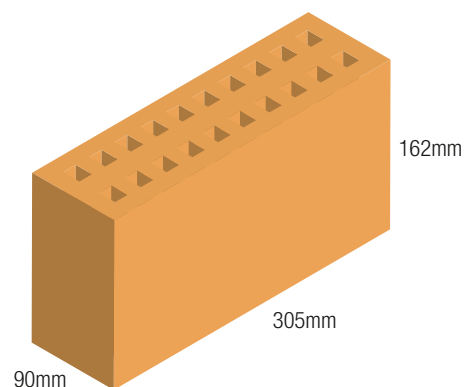
### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.



# Maxibrick

## Load Bearing



### Specification

Product Information	15 MPa $f'_{uc}$	18 MPa $f'_{uc}$
Work Size (mm)	305 x 90 x 162	305 x 90 x 162
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	5.6 (range 5.1 - 5.9)	5.9 (range 5.4 - 6.4)
Approximate No per m <sup>2</sup>	18.5	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	120 (rendered 13mm one side - 140)	124 (rendered 13mm one side - 145)
No per pack	132	132
Pack Weight (kg)	740	778
Pack Dimensions (mm)	920 x 715 x 980	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>15	>18
Cold Water Absorption (%)	<12	<12
Dry Density (kg/m <sup>3</sup> )	1,260	1,330
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	>30	<>30

### Fire Resistance

Fire Resistance Level	15 MPa $f'_{uc}$	18 MPa $f'_{uc}$
Insulation (minutes)	60	60
Insulation - Rendered 20mm both sides (minutes)	90	90

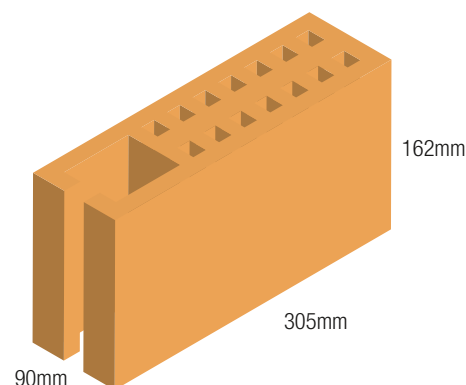
For further information on FRL see page 68.

### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Maxibrick

### Tie Down



#### Specification

Product Information	Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	5.2 (range 5.0 - 5.4)
Approximate No. per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	111 (rendered 13mm one side - 135)
No. per pack	132
Pack Weight (kg)	690
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<12
Dry Density (kg/m <sup>3</sup> )	1,170
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

#### Fire Resistance

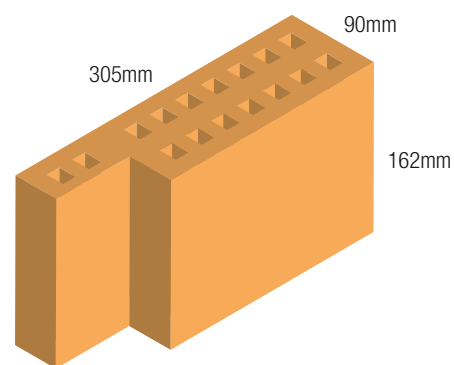
Fire Resistance Level	Cored
Insulation (minutes)	60
Insulation - Rendered 20mm both sides (minutes)	90

#### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

# Maxibrick

## Downpipe



### Specification

Product Information	Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	5.2 (range 5.0 - 5.4)
Approximate No. per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	111 (rendered 13mm one side - 135)
No. per pack	132
Pack Weight (kg)	690
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<12
Dry Density (kg/m <sup>3</sup> )	1,170
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

### Notes:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Fire Resistance

### For MaxiBrick (90mm wide) Walls

#### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function.

#### 2. Integrity

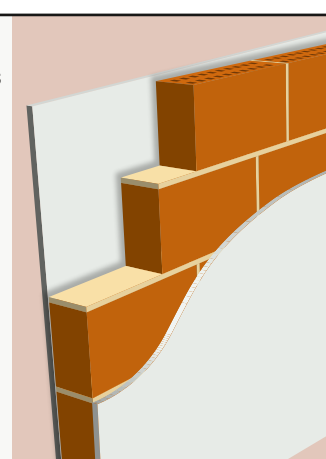
The ability of a wall to prevent the passage of flames and hot gases.

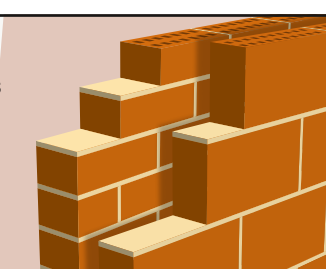
#### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation. Information on how to calculate these is provided in the Clay Brick and Paver Institute (CBPI) publication *Manual 5: Fire Resistance Levels for Clay Brick Walls* available at [www.thinkbrick.com.au](http://www.thinkbrick.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

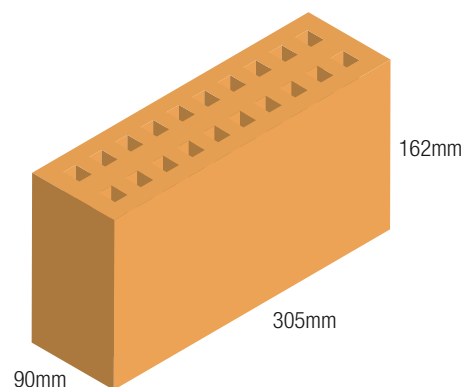
<p>FRL for bare wall, height up to 2.4m</p> <p>FRL for wall with 20mm render on both sides, height up to 2.4m</p> <p>- Heights above 2.4m should be referred to a suitably qualified engineer.</p>	
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<p>FRL for bare wall consisting of single leaf of 90mm clay brick masonry and single leaf of 110mm clay brick masonry with 40mm cavity (minimum), height up to 3.3m</p> <p>- Heights above 2.4m should be referred to a suitably qualified engineer.</p>	
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- S = Simply Supported ie timber truss on tied brickwork  
- F = Free

# Maxibrick

## Acoustic Fire-Rated



### Specification

Product Information	Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	6.3 (range 6.0 - 6.6)
Approximate No per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	139 (rendered 13mm one side - 159)
No. per pack	132
Pack Weight (kg)	832
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<12
Dry Density (kg/m <sup>3</sup> )	1,417
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	<30

### Fire Resistance

Fire Resistance Level	Cored
Insulation (minutes)	60
Insulation - Rendered 20mm both sides (minutes)	90

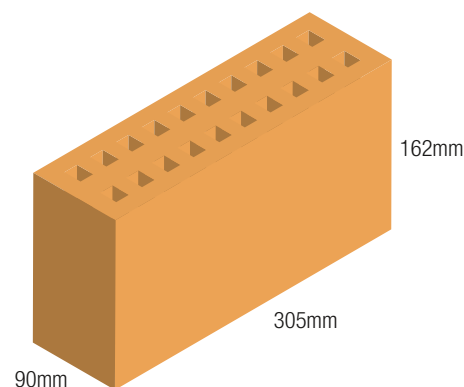
### Weighted Sound reduction index $R_w$ – see page 71 and 72

#### Note:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Maxibrick

### Acoustic Load Bearing Fire-Rated



#### Specification

Product Information	15 MPa $f'_{uc}$	18 MPa $f'_{uc}$
Work Size (mm)	305 x 90 x 162	305 x 90 x 162
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	6.3 (range 6.2 - 6.6)	6.3 (range 6.2 - 6.6)
Approximate No per m <sup>2</sup>	18.5	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	139 (rendered 13mm one side - 159)	139 (rendered 13mm one side - 159)
No. per pack	132	132
Pack Weight (kg)	832	832
Pack Dimensions (mm)	920 x 715 x 980	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>15	>18
Cold Water Absorption (%)	<12	<12
Dry Density (kg/m <sup>3</sup> )	1,417	1,417
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.8 (on face shell)	<1.8 (on face shell)
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage	<30	<30

#### Fire Resistance

Fire Resistance Level	15 MPa $f'_{uc}$	18 MPa $f'_{uc}$
Insulation (minutes)	60	60
Insulation - Rendered 20mm both sides (minutes)	90	90

#### Weighted Sound reduction index $R_w$ – see page 71 and 72

##### Note:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

# Fire Resistance and $R_w$

## For Maxibrick Acoustic (90mm wide) Walls

### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function.

#### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases.

#### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation. Information on how to calculate these is provided in the Clay Brick and Paver Institute (CBPI) publication *Manual 5: Fire Resistance Levels for Clay Brick Walls* available at [www.thinkbrick.com.au](http://www.thinkbrick.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

### Weighted Sound Reduction Index ( $R_w$ )

The  $R_w$  has two spectrum adaptation terms to account for medium to high frequency noise (C) and low frequency noise ( $C_w$ ). The reduction figures are added to the  $R_w$  and are written  $R_w (C, C_w)$ .

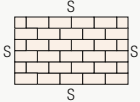
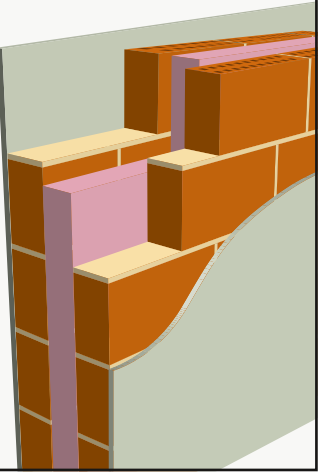
To achieve impact sound insulation, the BCA requires that walls consist of two leaves with at least a 20mm cavity between them and if ties are needed in masonry walls they must be of the resilient type. Except for the resilient ties in masonry walls there are to be no mechanical linkages between the walls, except at the periphery (ie through walls, floors and ceilings).

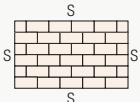
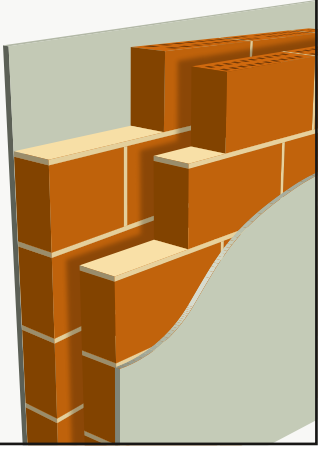
More detailed information is readily available from:

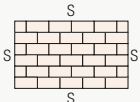
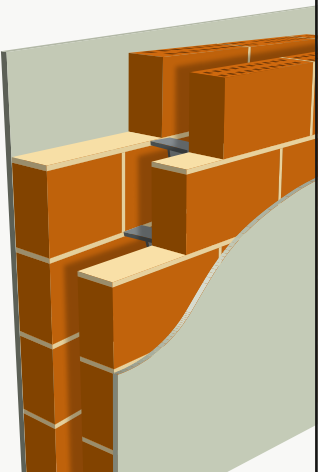
- Australian Standards relating to Masonry AS3700-2001
- The Building Code of Australia

## » Fire Resistance and $R_w$ » For Maxibrick Acoustic (90mm wide) Walls

- Midland Brick specific results
- Tests comply with AS1191-2002
- Conducted by Acoustic Laboratories Australia.

<p>FRL for bare wall height up to 3.3m</p> <p><b>Sound reduction of wall consisting of two leaves of 90mm Acoustic Maxibrick with:</b></p> <ol style="list-style-type: none"> <li>all joints filled solid with mortar; and</li> <li>a cavity of not less than 70mm between leaves; and</li> <li>75mm thick glass wool insulation with a density of 11kg/m<sup>3</sup> in the cavity; and</li> <li>no wall ties; and</li> <li>13mm render with 2mm plaster set coat on each outside face.</li> </ol> <p>Test No. ALA-05-082-1</p> <p><small>Heights above 2.4m should be referred to a suitably qualified engineer.</small></p>		<p>90/90/180</p> <p><b><math>R_w</math> 67 (-2,-6) and impact sound insulation</b></p> 
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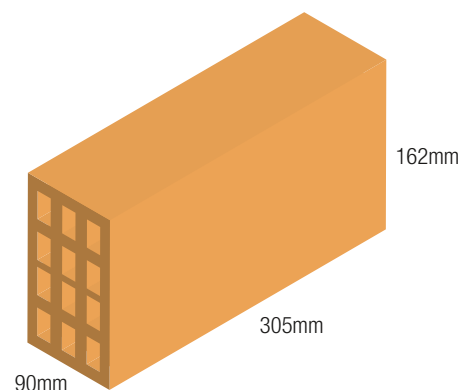
<p>FRL for bare wall height up to 3.3m</p> <p><b>Sound reduction of wall consisting of two leaves of 90mm Acoustic Maxibrick with:</b></p> <ol style="list-style-type: none"> <li>all joints filled solid with mortar; and</li> <li>a cavity of not less than 70mm between leaves; and</li> <li>no wall ties; and</li> <li>13mm render with 2mm plaster set coat on each outside face.</li> </ol> <p>Test No. ALA-05-082-2</p> <p><small>Heights above 2.4m should be referred to a suitably qualified engineer.</small></p>		<p>90/90/180</p> <p><b><math>R_w</math> 60 (-1,-5) and impact sound insulation</b></p> 
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<p>FRL for bare wall height up to 3.3m</p> <p><b>Sound reduction of wall consisting of two leaves of 90mm Acoustic Maxibrick with:</b></p> <ol style="list-style-type: none"> <li>all joints filled solid with mortar; and</li> <li>a cavity of not less than 70mm between leaves; and</li> <li>Matrix resilient wall ties; and</li> <li>13mm render with 2mm plaster set coat on each outside face.</li> </ol> <p>Test No. ALA-05-082-3</p> <p><small>Heights above 2.4m should be referred to a suitably qualified engineer.</small></p>		<p>90/90/180</p> <p><b><math>R_w</math> 59 (-2,-6) and impact sound insulation</b></p> 
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- S = Simply Supported ie timber truss on tied brickwork  
- F = Free



# Fastwall



## Specification

Product Information	Horizontally Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	4.9 (range 4.7 - 5.2kg)
Approximate No per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	100 (rendered 13mm one side - 124)
No per pack	132
Pack Weight (kg)	647
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>3.5
Cold Water Absorption (%)	<11
Dry Density (kg/m <sup>3</sup> )	1,100
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.3 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

## Fire Resistance

Fire Resistance Level	Horizontally Cored
Insulation - Rendered 20mm both sides (minutes)	90

Fire Rating by BRANZ Test Report 1126-1986.

**For further information on FRL see page 74.**

### Note:

- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply.  
Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted.  
Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.
- The external use of Fastwall without a rendered finish is not recommended. For further information on external use of Fastwall, please refer to BRANZ Appraisal Certificate No 06/033 ([www.branz.com.au](http://www.branz.com.au)). Refer to page 31 for building procedure.

## Fire Resistance

### For Fastwall (90mm wide) Walls

#### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function.

#### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases.

#### 3. Insulation

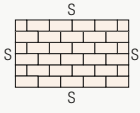
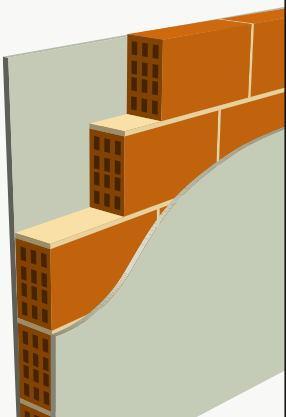
The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

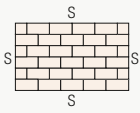
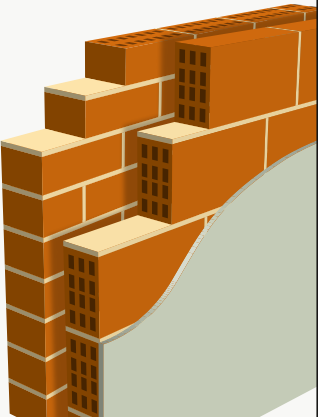
A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation. Information on how to calculate these is provided in the Clay Brick and Paver Institute (CBPI) publication *Manual 5: Fire Resistance Levels for Clay Brick Walls* available at [www.thinkbrick.com.au](http://www.thinkbrick.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

More detailed information is readily available from:

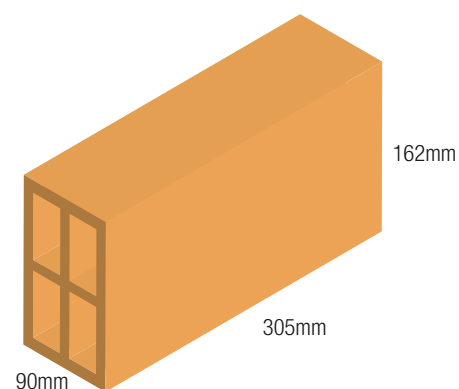
- Australian Standards relating to Masonry AS3700-2001
- The Building Code of Australia

<p>FRL for wall consisting of single leaf of 90mm clay brick masonry with 20mm render on both sides, height up to 2.4m</p> <p>Heights above 2.4m should be referred to a suitably qualified engineer.</p>	<p>60/60/90</p>		
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<p>FRL for wall consisting of single leaf of 90mm clay brick masonry with 20mm render and single leaf of 110mm clay brick masonry with 40mm cavity (minimum), height up to 3.3m</p> <p>Heights above 2.4m should be referred to a suitably qualified engineer.</p>	<p>90/90/120</p>		
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- S = Simply Supported ie timber truss on tied brickwork  
- F = Free

# Ultralite



## Specification

Product Information	Horizontally Cored
Work Size (mm)	305 x 90 x 162
Dimensional Category	DW1
Approximate Unit Weight (kg)	4.0 (range 3.8 - 4.3kg)
Approximate No per m <sup>2</sup>	18.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	86 (rendered 13mm one side - 110)
No per pack	132
Pack Weight (kg)	530
Pack Dimensions (mm)	920 x 715 x 980
Characteristic Unconfined Compressive Strength (MPa)	>3.0
Cold Water Absorption (%)	<11
Dry Density (kg/m <sup>3</sup> )	900
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.3 (on face shell)
Potential to Effloresce	Nil to Slight
Core Percentage	>30

*Product manufactured to order.*

### Note:

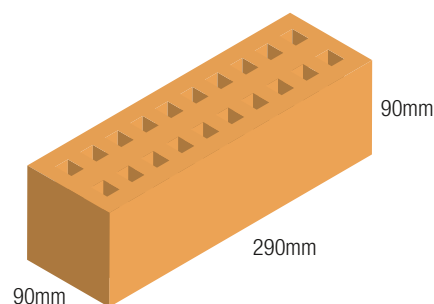
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.
- Not to be used externally.

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# E | Bricks

## Modular 90mm Wide

## Modular Common



Specification		
Product Information	Cored	Solid
Work Size (mm)	290 x 90 x 90	290 x 90 x 90
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	3.6	4.7
Approximate No per m <sup>2</sup>	33.3	33.3
Nominal Wall Surface Density (kg/m <sup>2</sup> )	141	177
No. per pack	216	216
Pack Weight (kg)	778	1,015
Pack Dimensions (mm)	890 x 740 x 920	890 x 740 x 920
Characteristic Unconfined Compressive Strength (MPa)	>12	>18
Cold Water Absorption (%)	<12	<12
Dry Density (kg/m <sup>3</sup> )	1,530	2,000
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)	<1.4 (gross bed area)
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	<30	<30

Fire Resistance		
Fire Resistance Level	Cored	Solid
Insulation (minutes)	60	60
Insulation - Rendered 20mm both sides (minutes)	90	90

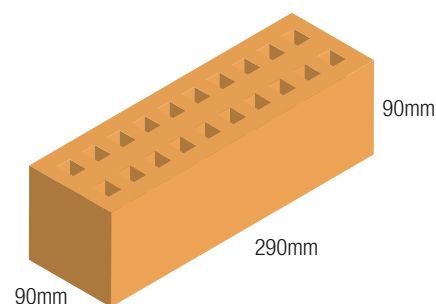
### Weighted Sound reduction index $R_w$ – see page 80

#### Note:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

# Modular

## Common Load Bearing



### Specification

Product Information	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Work Size (mm)	290 x 90 x 90	290 x 90 x 90
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	4.0	4.0
Approximate No per m <sup>2</sup>	33.3	33.3
Nominal Wall Surface Density (kg/m <sup>2</sup> )	155	155
No per pack	216	216
Pack Weight (kg)	864	864
Pack Dimensions (mm)	890 x 740 x 920	890 x 740 x 920
Characteristic Unconfined Compressive Strength (MPa)	>15	>20
Cold Water Absorption (%)	<12	<12
Dry Density (kg/m <sup>3</sup> )	1,700	1,700
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)	<1.4 (gross bed area)
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage	<30	<30

### Fire Resistance

Fire Resistance Level	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Insulation (minutes)	60	60
Insulation - Rendered 20mm both sides (minutes)	90	90

### Weighted Sound reduction index $R_w$ – see page 80

#### Note:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Fire Resistance and $R_w$ For Modular Common (90mm wide) Walls

### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function.

#### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases.

#### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of

structural adequacy, integrity and insulation. Information on how to calculate these is provided in the Clay Brick and Paver Institute (CBPI) publication *Manual 5: Fire Resistance Levels for Clay Brick Walls* available at [www.thinkbrick.com.au](http://www.thinkbrick.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

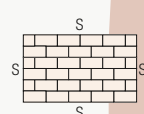
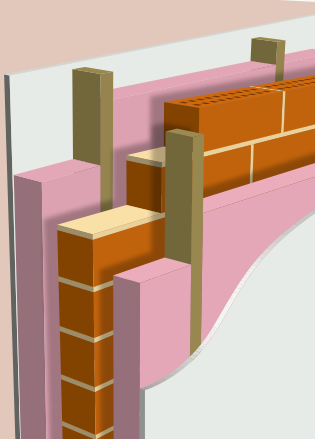
### Weighted Sound Reduction Index ( $R_w$ )

The  $R_w$  has two spectrum adaptation terms to account for medium to high frequency noise (C) and low frequency noise ( $C_{tr}$ ). The reduction figures are added to the  $R_w$  and are written  $R_w (C, C_{tr})$ .

To achieve impact sound insulation, the BCA requires that walls consist of two leaves with at least a 20mm cavity between them and if ties are needed in masonry walls they must be of the resilient type. Except for the resilient ties in masonry walls there are to be no mechanical linkages between the walls, except at the periphery (ie through walls, floors and ceilings).

More detailed information is readily available from:

- Australian Standards relating to Masonry AS3700-2001
- The Building Code of Australia

FRL for bare wall height up to 2.4m	90/60/60		
FRL for wall with 20mm render on both sides, height up to 2.4m	60/60/90		
<b>Sound reduction of wall consisting of single leaf of 90mm clay brick masonry, with:</b>			
a. a row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced 20mm from each face of the masonry wall; and			
b. 50mm thick mineral insulation or glass wool insulation with a density of 11kg/m³ positioned between studs in each row; and			
c. one layer of 13mm plasterboard fixed to studs on each outside face.			
		<b><math>R_w + C_{tr} \geq 50</math></b> <b>and impact sound insulation</b>	
Heights above 2.4m should be referred to a suitably qualified engineer.			

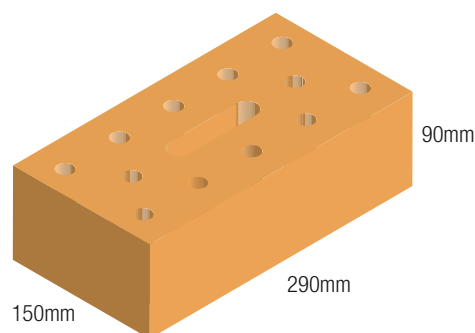
FRL for bare wall consisting of single leaf of 90mm clay brick masonry and single leaf of 110mm clay brick masonry with 40mm cavity (minimum), height up to 3.3m	90/90/180		
Heights above 2.4m should be referred to a suitably qualified engineer.			

- S = Simply Supported i.e. timber truss on tied brickwork  
 - F = Free



F | Bricks  
**Modular Special Performance**  
**150mm Wide**

## Modular Special Performance



### Specification

Product Information	Cored
Work Size (mm)	290 x 150 x 90
Dimensional Category	DW1
Approximate Unit Weight (kg)	6.6
Approximate No per m <sup>2</sup>	33.3
Nominal Wall Surface Density (kg/m <sup>2</sup> )	256
No per pack	132
Pack Weight (kg)	871
Pack Dimensions (mm)	890 x 740 x 920
Characteristic Unconfined Compressive Strength (MPa)	>12
Cold Water Absorption (%)	<11
Dry Density (kg/m <sup>3</sup> )	1,685
Coefficient of Expansion (mm/m)	<0.6
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)
Potential to Effloresce	Nil to Slight
Core Percentage (%)	<30

### Fire Resistance

Fire Resistance Level	Cored
Insulation (minutes)	120
Insulation - Rendered 10mm both sides (minutes)	180

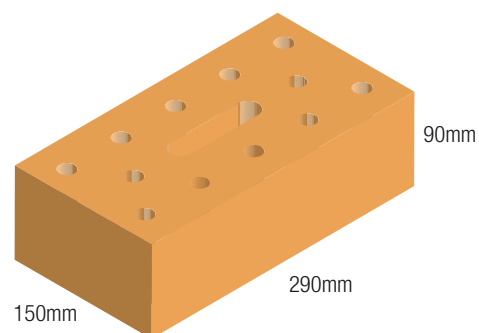
### Weighted Sound reduction index $R_w$ – see page 84

#### Note:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

# Modular

## Special Performance Load Bearing



### Specification

Product Information	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Work Size (mm)	290 x 150 x 90	290 x 150 x 90
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	6.6	6.75
Approximate No per m <sup>2</sup>	33.3	33.3
Nominal Wall Surface Density (kg/m <sup>2</sup> )	256	261
No per pack	132	132
Pack Weight (kg)	871	891
Pack Dimensions (mm)	890 x 740 x 920	890 x 740 x 920
Characteristic Unconfined Compressive Strength (MPa)	>15	>20
Cold Water Absorption (%)	<11	<11
Dry Density (kg/m <sup>3</sup> )	1,685	1,724
Coefficient of Expansion (mm/m)	<0.6	<0.6
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<1.4 (gross bed area)	<1.4 (gross bed area)
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	<30	<30

### Fire Resistance

Fire Resistance Level	15 MPa $f'_{uc}$	20 MPa $f'_{uc}$
Insulation (minutes)	120	120
Insulation - Rendered 10mm both sides (minutes)	180	180

### Weighted Sound reduction index $R_w$ – see page 84

#### Note:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## Fire Resistance and $R_w$

### For Modular Special Performance (150mm wide) Walls

#### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

##### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function

##### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases

##### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation. Information on how to calculate these is provided in the Clay Brick and Paver Institute (CBPI) publication *Manual 5: Fire Resistance Levels for Clay Brick Walls* available at [www.thinkbrick.com.au](http://www.thinkbrick.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

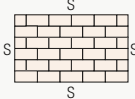
#### Weighted Sound Reduction Index ( $R_w$ )

The  $R_w$  has two spectrum adaptation terms to account for medium to high frequency noise (C) and low frequency noise ( $C_{tr}$ ). The reduction figures are added to the  $R_w$  and are written  $R_w (C, C_{tr})$ .

To achieve impact sound insulation, the BCA requires that walls consist of two leaves with at least a 20mm cavity between them and if ties are needed in masonry walls they must be of the resilient type. Except for the resilient ties in masonry walls there are to be no mechanical linkages between the walls, except at the periphery (ie through walls, floors and ceilings).

More detailed information is readily available from:

- Australian Standards relating to Masonry AS3700-2001
- The Building Code of Australia

FRL for bare wall, height up to 3.9m	120/120/120	
FRL for wall with 13mm render on both sides, height up to 4.2m	90/90/180	
Sound reduction of wall consisting of single leaf of 150mm brick, with 13mm render on both sides	$R_w \geq 50$	

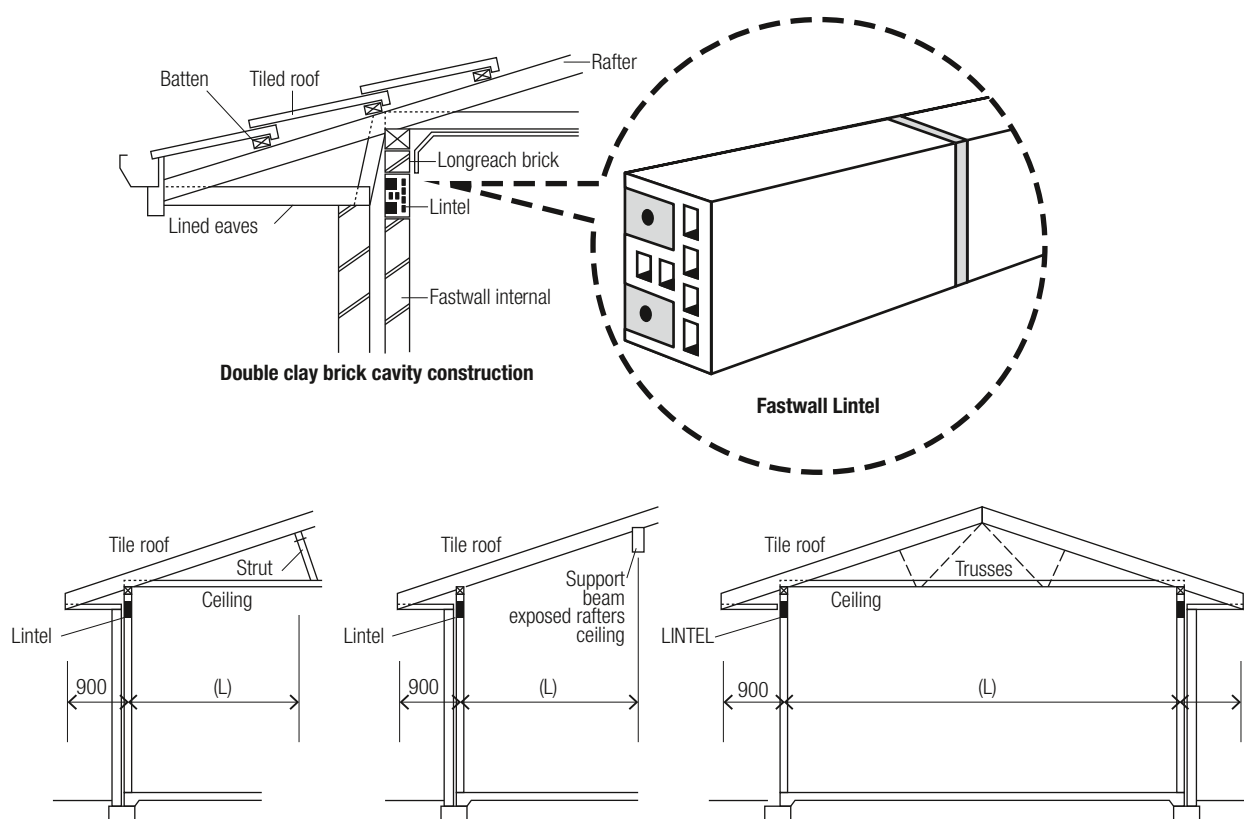
- S = Simply Supported ie timber truss on tied brickwork  
- F = Free

G | Bricks  
**Fastwall Lintel**

## Fastwall/Maxibrick Lintel

### Galvanised – Reinforced Fired Clay

#### Typical Domestic Construction



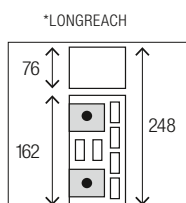
#### Allowable Roof Span

Calculations are based on a tiled roof at 22.5° pitch and 900mm eaves with timber rafters or trusses and battens and a suspended plasterboard ceiling giving a total load of 1.00kPa at a maximum opening of 2410mm. Allowable total load 4.5kN per metre run.

Table below gives allowable roof spans (L) over various openings for different types of roof construction as shown.

\*One course of Midland Brick Longreach (305 x 90 x 76mm) must be laid above the Lintel.

The Midland Brick Reinforced Fired Clay Lintel is designed for internal use.



#### Fastwall/Maxibrick Lintel

##### Allowable Roof Span

Window Opening (mm)	1500	1800	2100	2410
Roof Span (L) (mm)	17500	12000	8300	6000

## Typical Domestic Construction

**Standard Lintel Lengths**

No of Clay Bricks in Lintel	Overall Lintel Length (m)	Approx Lintel Weight (kg)
3	0.935	27
4	1.250	36
5	1.565	45
6	1.880	55
7	2.195	64
8	2.510	72
9	2.825	80
10	3.140	92

### Placing the Lintels

After the correct bearing (230mm) is allowed, make sure these points are followed:

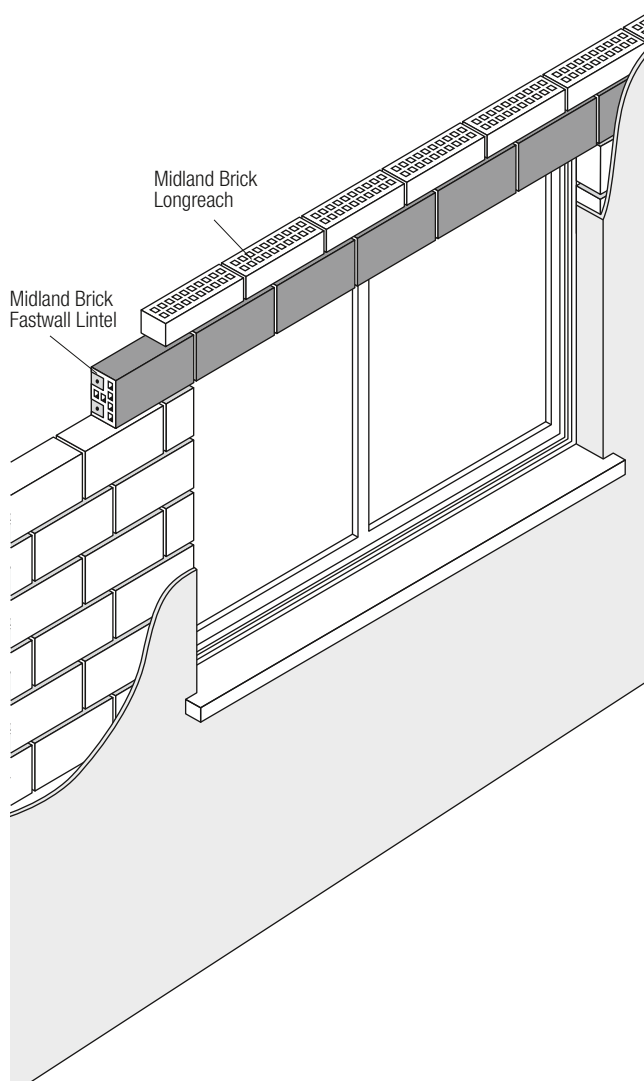
1. Bed the Lintel on a mortar joint.
2. Make sure the clay face of the Lintel faces into the room as this allows a better plastering key and stops problems with fixing into steel reinforcing bars.
3. Ensure the window doesn't take the weight of the Lintel. Up to 5mm clearance above the window head is adequate.
4. Make sure the window head ties are bedded into the bed joint above the Lintel.

### Features

- Specially designed for use with Midland Brick' 90mm wide utility bricks.
- Greater compatibility with clay brickwork than steel or concrete Lintel because it is made with the same material.
- Span opening sizes to 2410mm.
- Minimal deflection at maximum design loads.
- Lintels are made with galvanised steel for extended life.

### Benefits

- Less maintenance and improved plaster finish - as there is no difference in material movement, as would be, between the steel lintel and clay brick, cracking is minimised.
- Improves key for plastering - render adheres to clay brick much better than it adheres to steel, in turn minimising cracking.
- Superior detail plaster finish to under window head.
- Eliminates the need to prime and paint metal lintels.





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# H | Blocks

## General Information

## Reinforced Core-Fill Masonry

### Walls

Concrete blocks (140, 190 and 290mm) have large cores which facilitate the placement of steel reinforcing rods and the pouring/pumping of grout (grout is highly workable concrete).

If a wall is reinforced with bars spaced 800mm centres or less and fully grouted, the wall is referred to as 'reinforced masonry'. These walls can have similar strength and 'flexure' characteristics to reinforced insitu concrete walls. Partially reinforced block walls are only grout filled where the reinforcement is placed, usually in bond beams and vertically in cores.

All reinforced walls must be designed by a Structural Engineer.

### Grout Filling

#### Grout Specification

The correct grout specification (mix design) is critical to achieving the structural design of a reinforced wall - it is advised to consult with a Structural Engineer for specifications.

The approximate number of blocks filled per cubic metre of grout is shown below (based on 10mm rounded aggregate and 300kg/m<sup>3</sup> cement).

Blocks Filled per Cubic Metre of Grout	
Block Type	Blocks Filled per m <sup>3</sup> of Grout (approx)
15.42 Notch	190
15.01 Full	190
15.142 Split Face	200
15.48 H-blocks (Single Web)	175
20.01 Full	120
20.42 Notch	120
20.142 Split Face	125
20.48 H-block (Single Web)	100
30.05 Trough-Block	65

### Grouting

Grout may be mixed on site and poured from buckets into hoppers placed on top of a wall. Alternatively, for large jobs, the grout may be delivered by transit mixer and pumped into the cores, using a small nozzle on the hose.

Before commencing placement of the grout, it is important that the cores should be clean and free of mortar 'dags' projecting into the core. A steel rod is pushed down the core to knock off these 'dags' and to break up any mortar that has dropped onto the footing. The cores are then hosed or swept out from the bottom of each core through the 'clean-out' space. The vertical steel rods are tied to the starter bars, and then the clean-out blocks are covered with formwork, ready for grouting. An alternative method, which may be used in low height walls, is to leave a gap in the mortar bed at the bottom of each core and to hose out the dropped mortar and dags before the mortar has set.

In hot weather it may be necessary to hose the cores out with water in order to cool the blocks and so prevent 'flash-setting' of the grout. If so, this hosing should be completed at least 30 minutes before the grout is placed.

Because of the high pressure developed at the bottom of the cores when they are filled, grouting in lifts of no more than 1.2 metres should not be attempted in one pour. Where the lift is more than 1.2 metres, it is preferable to fill the cores in two stages at least 30 minutes apart.

When grouting Series 150 blocks, lifts should be reduced to 800mm (4 courses) to ensure no voids are left in the wall.



## » Reinforced Core-Fill Masonry

### **Joint Reinforcement** (commonly known as Tram Track)

Masonry Mesh Joint Reinforcement is recommended for non-loadbearing and load-bearing wall applications.

The mesh should be laid between courses at height intervals of 600mm. This equates to every three courses using 190mm high standard unit.

At all openings, mesh should be included in the two courses above and below the opening.

- 50mm wide mesh to be used for 90mm blockwork.
- 100mm wide mesh to be used for 190mm wide blockwork.
- 150mm wide mesh to be used for 190mm wide blockwork.

### **Block Sizes**

Blocks 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 m<sup>2</sup>.

Most blocks are available in three thicknesses of 90mm (series 100), 140mm (Series 150) and 190mm (Series 200).

### **Blocklaying**

Blocks should be laid dry except in extremely dry, hot weather when a light spray on the bonding surfaces prior to laying may be necessary to slow the absorption of moisture out of the mortar. Unfinished masonry must be covered with plastic to keep rainwater out of the cores, because this can cause efflorescence.

For every 800 blocks or 64m<sup>2</sup> of wall, about 1m<sup>3</sup> of mortar mix is required, allowing for wastage.

### **Cleaning Concrete Masonry**

#### **Good Building Practice**

Block layers must exercise extra care when laying face concrete masonry to minimise mortar staining.

Block layers must:

- Keep face blocks as clean as possible while laying and tooling.
- Keep unused pallets of blocks and tops of unfinished walls covered during rain to prevent water penetration and excessive efflorescence.
- Clean any dags and mortar smears before they set hard.

For further information on cleaning concrete masonry please refer to CMAA publication DS2 - Cleaning Concrete Masonry ([www.cmaa.com.au](http://www.cmaa.com.au)).

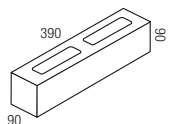
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# I | Blocks

## 100mm Series

## 100mm Series

### Full and Half Height



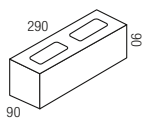
#### 10.71

Full Length

5.4kg

288 per pallet

1555kg pallet weight



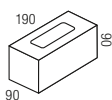
#### 10.72

Three Quarter

3.9kg

384 per pallet

1498kg pallet weight



#### 10.73

Half

2.5kg

576 per pallet

1440kg pallet weight



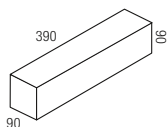
#### 10.74

Quarter

1.6kg

624 per pallet

998kg pallet weight



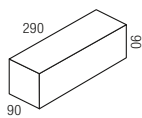
#### 10.83

Full Length

6.9kg

252 per pallet

1739kg pallet weight



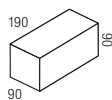
#### 10.84

Three Quarter

5.5kg

364 per pallet

2002kg pallet weight



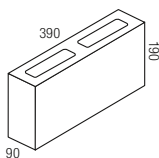
#### 10.85/10.04

Half

3.6kg

532 per pallet

1915kg pallet weight



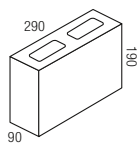
#### 10.01

Full Length

11kg

180 per pallet

1980kg pallet weight



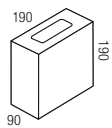
#### 10.02

Three Quarter

8.3kg

240 per pallet

1992kg pallet weight



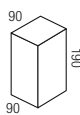
#### 10.03

Half

6.4kg

288 per pallet

1844kg pallet weight



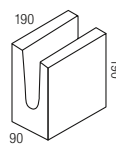
#### 10.04/10.85

Quarter

3.6kg

532 per pallet

1915kg pallet weight



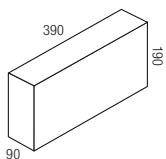
#### 10.12

Lintel

5.0kg

360 per pallet

1800kg pallet weight



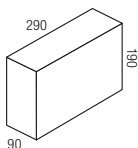
#### 10.31/20.83

Full Length

15kg

108 per pallet

1620kg pallet weight



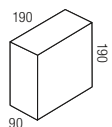
#### 10.32/30.04

Three Quarter

11.3kg

168 per pallet

1898kg pallet weight



#### 10.33/20.04

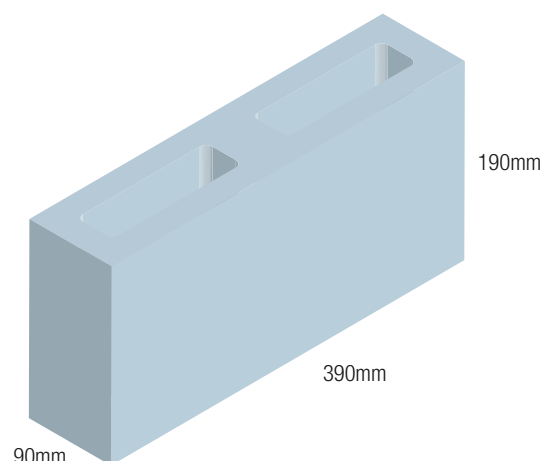
Half

7.0kg

216 per pallet

1512kg pallet weight

## » 100mm Series

**10.01 Concrete Block****Specification**

Product Information	Cored
Work Size (mm)	390 x 90 x 190
Dimensional Category	DW1
Approximate Unit Weight (kg)	11 (range 10.8-11.2kg)
Approximate No per m <sup>2</sup>	12.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	150
No per pallet	180
Pallet Weight (kg)	1980
Pallet Dimensions (mm)	1000 x 1200 x 1100
Characteristic Unconfined Compressive Strength (MPa)	>12 (Face Shell)
Cold Water Absorption (%)	<7.0
Material Density (kg/m <sup>3</sup> )	2,100 - 2,300
Coefficient of Contraction (mm/m)	<0.4
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<3.0
Potential to Effloresce	Nil to Slight
Core Percentage (%)	<30

**Fire Resistance**

Fire Resistance Level	Cored
Insulation (minutes)	60
Insulation - Rendered 13mm both sides (minutes)	90

**For further information on FRL see page 96.**

**Note:**

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.



## » 100mm Series

### 10.01 Concrete Block Fire Resistance

#### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function.

#### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases.

#### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation. For further information on concrete masonry fire resistance levels please refer to Concrete Masonry Association of Australia website – [www.cmaa.com.au](http://www.cmaa.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

More detailed information is readily available from:

- Australian Standards relating to Masonry AS3700-2001
- The Building Code of Australia
- Concrete Masonry Association of Australia (CMAA).

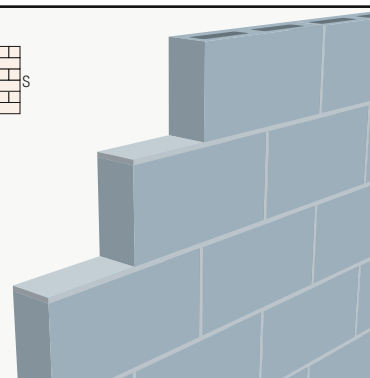
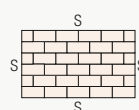
FRL for bare wall consisting of single leaf of 90mm brick masonry, height up to 2.0m

90/60/60

FRL for wall for wall consisting of single leaf of 90mm brick masonry, with 13mm render on both sides, height up to 2.1m

60/60/90

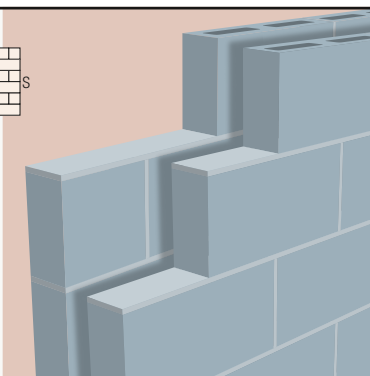
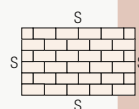
Heights above 2.4m should be referred to a suitably qualified engineer.



FRL for bare wall consisting of two leaves of 90mm brick masonry with 50mm cavity (minimum), height up to 2.7m

90/90/240

Heights above 2.4m should be referred to a suitably qualified engineer.



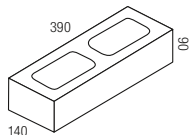
- S = Simply Supported ie timber truss or tied brickwork  
- F = Free

# J | Blocks

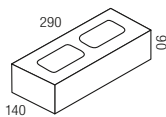
## **150mm Series**

## 150mm Series

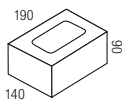
### Full and Half Height



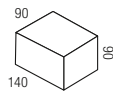
**15.71**  
Full Length  
6.7kg  
240 per pallet  
1608kg pallet weight



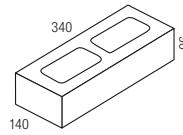
**15.72**  
Three Quarter  
5.3kg  
280 per pallet  
1484kg pallet weight



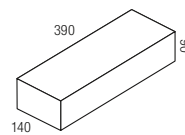
**15.73**  
Half  
3.7kg  
480 per pallet  
1776kg pallet weight



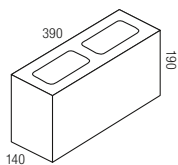
**15.74**  
Quarter  
3.0kg  
400 per pallet  
1200kg pallet weight



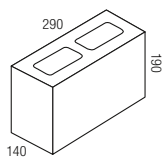
**15.97**  
Corner  
6.0kg  
210 per pallet  
1260kg pallet weight



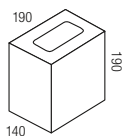
**15.83**  
Full Length  
11.3kg  
168 per pallet  
1899kg pallet weight



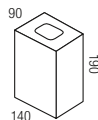
**15.01**  
Full Length  
13.6kg  
120 per pallet  
1632kg pallet weight



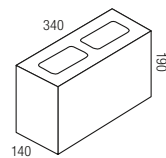
**15.02**  
Three Quarter  
10.4kg  
160 per pallet  
1664kg pallet weight



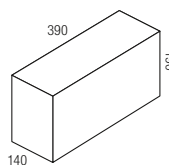
**15.03**  
Half  
6.8kg  
240 per pallet  
1632kg pallet weight



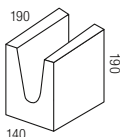
**15.04**  
Quarter  
6.0kg  
336 per pallet  
2016kg pallet weight



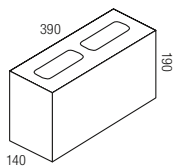
**15.22**  
Corner  
12.0kg  
105 per pallet  
1260kg pallet weight



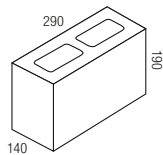
**15.31**  
Full Length  
22.0kg  
72 per pallet  
1584kg pallet weight



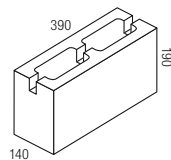
**15.12**  
Lintel  
7.0kg  
240 per pallet  
1680kg pallet weight



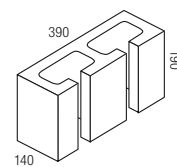
**15.705**  
Full Length  
17.4kg  
96 per pallet  
1671kg pallet weight



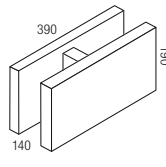
**15.702**  
Three Quarter  
13.3kg  
128 per pallet  
1703kg pallet weight



**15.42**  
Trough Block  
13.1kg  
120 per pallet  
1572kg pallet weight

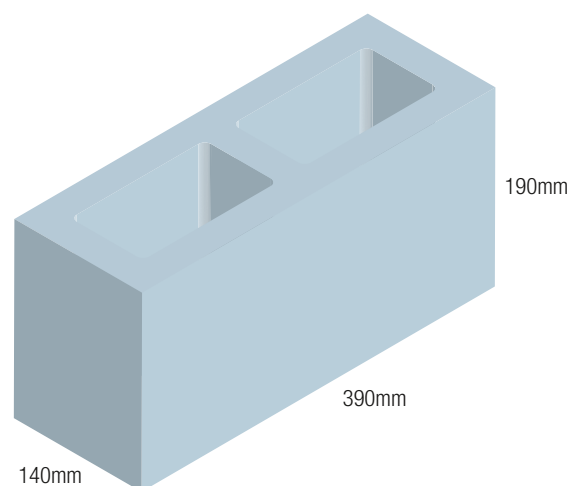


**15.45**  
Clean Out  
10.7kg  
120 per pallet  
1284kg pallet weight



**15.48**  
H Block  
13.5kg  
120 per pallet  
1620kg pallet weight

## » 150mm Series

**15.01 Concrete Block****Specification**

Product Information	Cored
Work Size (mm)	390 x 140 x 190
Dimensional Category	DW1
Approximate Unit Weight (kg)	13.6 (range 13.3 - 13.9kg)
Approximate No per m <sup>2</sup>	12.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	189
No per pallet	120
Pallet Weight (kg)	1632
Pallet Dimensions (mm)	1000 x 1200 x 1300
Characteristic Unconfined Compressive Strength (MPa)	>12 (Face Shell)
Cold Water Absorption (%)	<7.0
Material Density (kg/m <sup>3</sup> )	2,100 - 2,300
Coefficient of Contraction (mm/m)	<0.4
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<3.0
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

**Fire Resistance**

Fire Resistance Level	Cored
Insulation (minutes)	60
Insulation - fully grouted	120

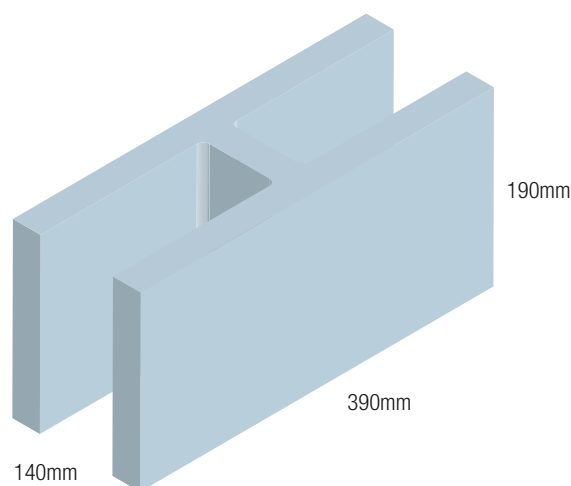
**For further information on FRL see page 101.**

**Note:**

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## » 150mm Series

### H Block 15.48 Concrete Block



#### Specification

Product Information	15.48
Work Size (mm)	390 x 140 x 190
Dimensional Category	DW1
Approximate Unit Weight (kg)	13.5 (range 13.3 - 13.9kg)
Approximate No per m <sup>2</sup>	12.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	188
No per pallet	120
Pallet Weight (kg)	1620
Pallet Dimensions (mm)	1000 x 1200 x 1300
Characteristic Unconfined Compressive Strength (MPa)	>12 (Face Shell)
Cold Water Absorption (%)	<7.0
Material Density (kg/m <sup>3</sup> )	2,100 - 2,300
Coefficient of Contraction (mm/m)	<0.4
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<3.0
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

#### Fire Resistance

Fire Resistance Level	15.48
Insulation (minutes)	60
Insulation - fully grouted	120

#### Note:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## » 150mm Series

### 15.01 Concrete Block Fire Resistance

#### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function

#### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases

#### 3. Insulation

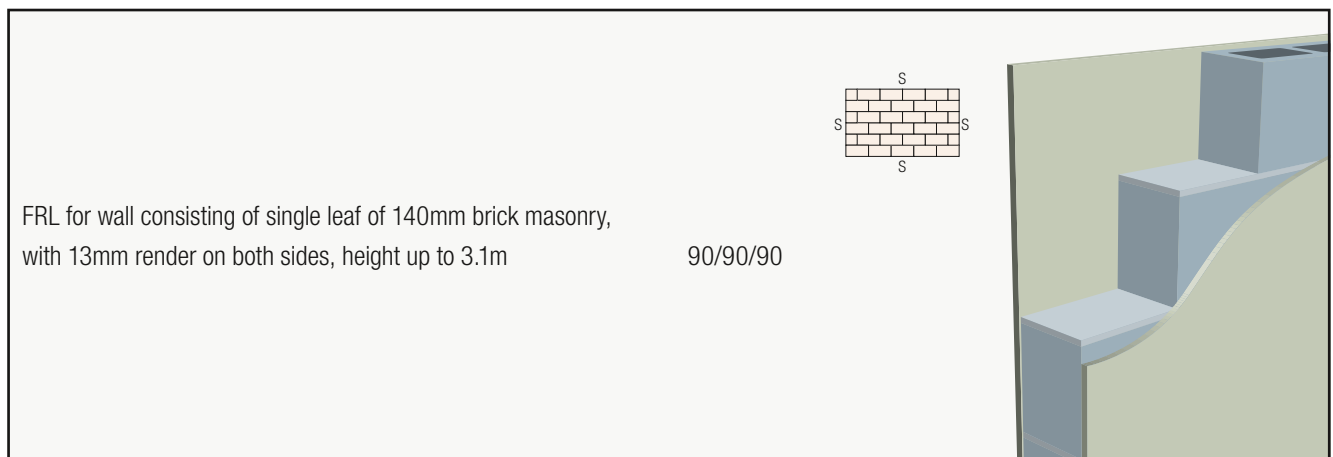
The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation. For further information on concrete masonry fire resistance levels please refer to Concrete Masonry Association of Australia website – [www.cmaa.com.au](http://www.cmaa.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

More detailed information is readily available from:

- Australian Standards relating to Masonry AS3700-2001
- The Building Code of Australia
- Concrete Masonry Association of Australia (CMAA).

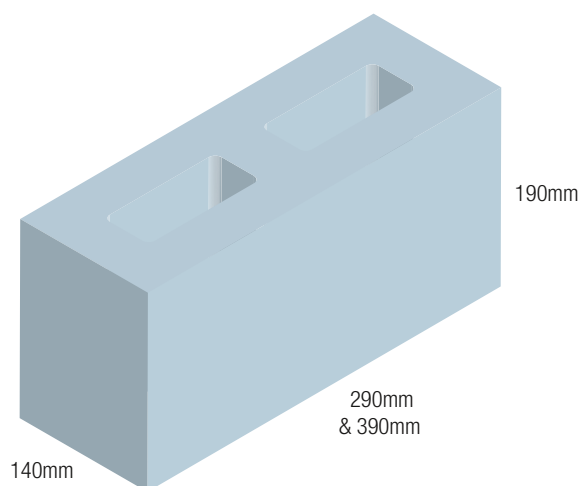


- S = Simply Supported ie timber truss on tied brickwork  
- F = Free

## » 150mm Series

### Reduced Core 120 Minute

### Fire Resistant Concrete Block



#### Specification

Product Information	15.705	15.702
Work Size (mm)	390 x 140 x 190	290 x 140 x 190
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	17.4	13.3 (range 12.9 - 13.8kg)
Approximate No per m <sup>2</sup>	12.5	16.7
Nominal Wall Surface Density (kg/m <sup>2</sup> )	235	243
No per pallet	96	128
Pallet Weight (kg)	1671	1703
Pallet Dimensions (mm)	1000 x 1200 x 1100	1000 x 1200 x 950
Characteristic Unconfined Compressive Strength (MPa)	>12 (Face Shell)	>12- (Face Shell)
Cold Water Absorption (%)	<7.0	<7.0
Material Density (kg/m <sup>3</sup> )	2,100 - 2,300	2,100 - 2,300
Coefficient of Contraction (mm/m)	<0.4	<0.4
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<3.0	<3.0
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	<30	<30

#### Fire Resistance

Fire Resistance Level	15.705	15.702
Insulation (minutes)	120	120

**Weighted Sound reduction index  $R_w$  – see next page.**

#### Note:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## » 150mm Series

### Fire Resistance and $R_w$ 120 Minute Fire Resistant Concrete Block

#### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function

#### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases.

#### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation. For further information

on concrete masonry fire resistance levels please refer to Concrete Masonry Association of Australia website – [www.cmaa.com.au](http://www.cmaa.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

#### Weighted Sound Reduction Index ( $R_w$ )

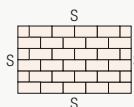
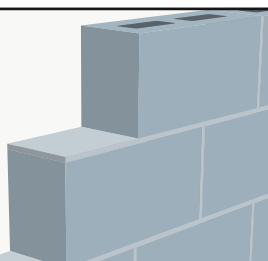
The  $R_w$  has two spectrum adaptation terms to account for medium to high frequency noise (C) and low frequency noise ( $C_w$ ). The reduction figures are added to the  $R_w$  and are written  $R_w (C, C_w)$ .

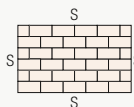
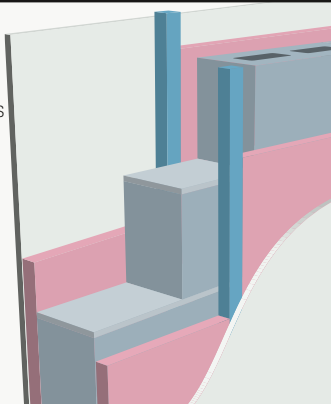
To achieve impact sound insulation, the BCA requires that walls consist of two leaves with at least a 20mm cavity between them and if ties are needed in masonry walls they must be of the resilient type. Except for the resilient ties in masonry walls there are to be no mechanical linkages between the walls, except at the periphery (ie through walls, floors and ceilings).

More detailed information is readily available from:

- Australian Standards relating to Masonry AS3700-2001
- The Building Code of Australia
- Concrete Masonry Association of Australia (CMAA).

Tests comply with AS1191-2002. Conducted by Acoustic Laboratories Australia.

FRL for bare wall, height up to 2.9m	120/120/120		
FRL for bare wall, height up to 3.1m	90/90/120		
<b>Sound reduction of wall consisting of single leaf of 140mm reduced core hollow concrete block (15.705) – bare wall.</b>		<b><math>R_w</math> 52 (-2,-6)</b>	
Test No ALA-05-083-1			

FRL for bare wall, height up to 2.9m	120/120/120		
FRL for bare wall, height up to 3.1m	90/90/120		
<b>Sound reduction of wall consisting of single leaf of 140mm reduced core hollow concrete block (15.705) with the following on both sides:</b>			
a. 13mm Boral plasterboard mounted on 28mm furring channels held to wall with Rondo STSC adjustable furring channel anchors; and		<b><math>R_w</math> 62 (-4,-11)</b>	
b. Insulation Solution 50mm Noise Control Batts with a density of 14kg/m³ placed in both 50mm cavities.			
Test No ALA-05-083-2			

- S = Simply Supported ie timber truss on tied brickwork

- F = Free



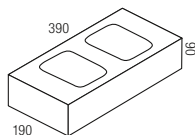
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# K | Blocks

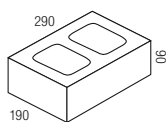
## **200mm Series**

## 200mm Series

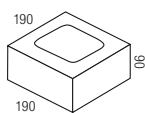
### Full and Half Height



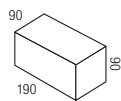
**20.71**  
Full Length  
7.3kg  
180 per pallet  
1314kg pallet weight



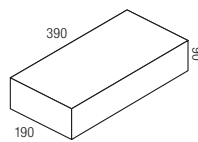
**20.72**  
Three Quarter  
6.3kg  
240 per pallet  
1512kg pallet weight



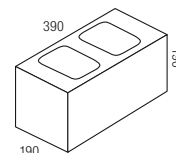
**20.73**  
Half  
4.1kg  
360 per pallet  
1476kg pallet weight



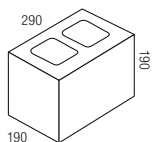
**20.74/10.04**  
Quarter  
3.6kg  
532 per pallet  
1915kg pallet weight



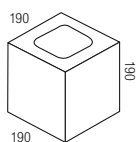
**20.83/10.31**  
Full Length  
15kg  
108 per pallet  
1620kg pallet weight



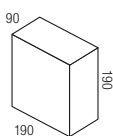
**20.01**  
Full Length  
15.3kg  
90 per pallet  
1377kg pallet weight



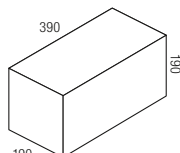
**20.02/30.03**  
Three Quarter  
12.7kg  
120 per pallet  
1524kg pallet weight



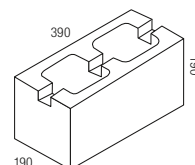
**20.03**  
Half  
8.3kg  
180 per pallet  
1494kg pallet weight



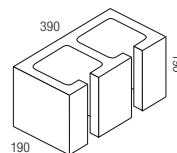
**20.04/10.33**  
Quarter  
7.0kg  
216 per pallet  
1512kg pallet weight



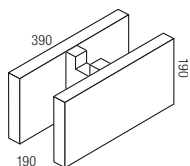
**20.31**  
Full Length  
30.5kg  
54 per pallet  
1647kg pallet weight



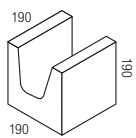
**20.42**  
Trough Block  
15.1kg  
90 per pallet  
1359kg pallet weight



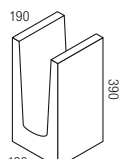
**20.45**  
Clean Out  
14.5kg  
90 per pallet  
1305kg pallet weight



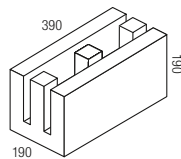
**20.48**  
H Block  
13.8kg  
90 per pallet  
1242kg pallet weight



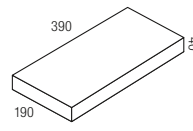
**20.15**  
Lintel  
9.5kg  
180 per pallet  
1710kg pallet weight



**20.18**  
Lintel  
15.4kg  
90 per pallet  
1386kg pallet weight



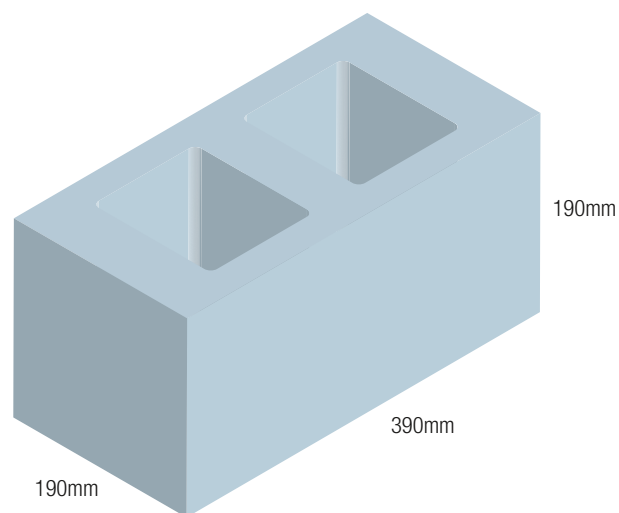
**20.20**  
Bond Beam  
15.0kg  
90 per pallet  
1350kg pallet weight



**50.31**  
Capping Block  
6.8kg  
180 per pallet  
1224kg pallet weight

## » 200mm Series

### 20.01 Concrete Block



#### Specification

Product Information	20.01
Work Size (mm)	390 x 190 x 190
Dimensional Category	DW1
Approximate Unit Weight (kg)	15.3 (range 15 - 15.8kg)
Approximate No per m <sup>2</sup>	12.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	218
No per pallet	90
Pallet Weight (kg)	1377
Pallet Dimensions (mm)	1000 x 1200 x 1300
Characteristic Unconfined Compressive Strength (MPa)	>12 (Face Shell)
Cold Water Absorption (%)	<7.0
Material Density (kg/m <sup>3</sup> )	2,100 - 2,300
Coefficient of Contraction (mm/m)	<0.4
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<3.0
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

#### Fire Resistance

Fire Resistance Level	20.01
Insulation (minutes)	60
Insulation - fully grouted (minutes)	240

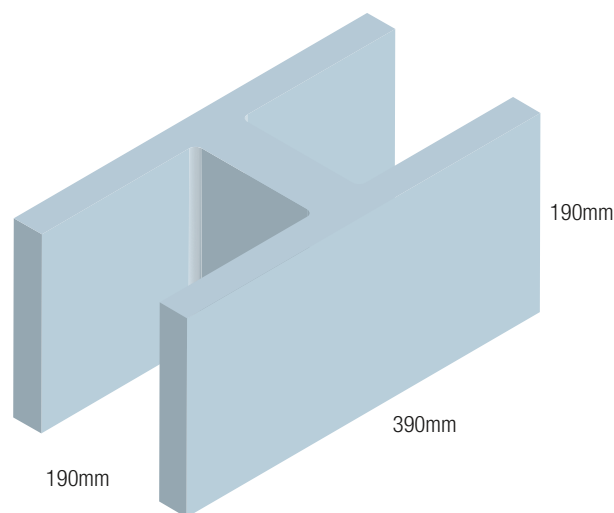
#### Weighted Sound reduction index $R_w$ – see page 109

##### Note:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## » 200mm Series

### H Block 20.48 Concrete Block



#### Specification

Product Information	20.48
Work Size (mm)	390 x 190 x 190
Dimensional Category	DW1
Approximate Unit Weight (kg)	13.8 (range 13.3 - 14.1kg)
Approximate No per m <sup>2</sup>	12.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	200
No per pallet	90
Pallet Weight (kg)	1242
Pallet Dimensions (mm)	1000 x 1200 x 1300
Characteristic Unconfined Compressive Strength (MPa)	>12 (Face Shell)
Cold Water Absorption (%)	<7.0
Material Density (kg/m <sup>3</sup> )	2,100 - 2,300
Coefficient of Contraction (mm/m)	0.4
Durability Class	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<3.0
Potential to Effloresce	Nil to Slight
Core Percentage (%)	>30

#### Fire Resistance

Fire Resistance Level	20.48
Insulation (minutes)	60
Insulation - fully grouted (minutes)	240

**Weighted Sound reduction index  $R_w$  – see next page.**

#### Note:

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

## » 200mm Series

### 20.01 Concrete Block Fire Resistance and $R_w$

#### Fire Resistance Level (FRL)

The FRL of a wall depends not only on the thickness of the wall but also on the height, length and how the top, bottom and ends of the wall are connected to the other building elements.

For this reason it is impossible to give a standard FRL for a particular brick – it will always depend on the construction details of the wall being built.

Walls are required to be given a fire resistance level which has three components:

#### 1. Structural Adequacy

The ability of a wall to continue to perform its structural function.

#### 2. Integrity

The ability of a wall to prevent the passage of flames and hot gases.

#### 3. Insulation

The ability of a wall to provide sufficient insulation such that the side of the wall away from the fire does not exceed a predefined temperature.

A typical fire resistance level for a wall could be 'FRL 90/90/90', that is 90 minutes for each of the three FRL components of structural adequacy, integrity and insulation. For further information on concrete masonry fire resistance levels please refer to Concrete Masonry Association of Australia website – [www.cmaa.com.au](http://www.cmaa.com.au)

Midland Brick recommends that the design of any fire-rated wall should be checked by a suitably qualified engineer.

#### Weighted Sound Reduction Index ( $R_w$ )

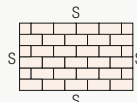
The  $R_w$  has two spectrum adaptation terms to account for medium to high frequency noise (C) and low frequency noise ( $C_{tr}$ ). The reduction figures are added to the  $R_w$  and are written  $R_w (C, C_{tr})$ .

To achieve impact sound insulation, the BCA requires that walls consist of two leaves with at least a 20mm cavity between them and if ties are needed in masonry walls they must be of the resilient type. Except for the resilient ties in masonry walls there are to be no mechanical linkages between the walls, except at the periphery (ie through walls, floors and ceilings).

More detailed information is readily available from:

- Australian Standards relating to Masonry AS3700-2001
- The Building Code of Australia
- Concrete Masonry Association of Australia (CMAA).

Tests comply with AS1191-2002. Conducted by Acoustic Laboratories Australia.

FRL for wall consisting of 190mm hollow concrete block, 13mm render on both sides, height up to 4.3m	90/90/90	
Sound reduction of bare wall consisting of single leaf of 190mm hollow concrete block, core filled.	$R_w$ 54 (-1,-5)	
Test No. ALA-05-083-4		

- S = Simply Supported ie timber truss on tied brickwork  
- F = Free

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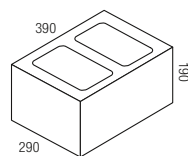
# L | Blocks

## 300mm Series

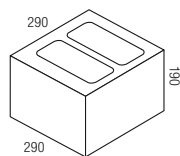


## 300mm Series

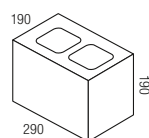
### Full Height



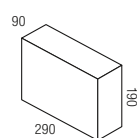
**30.01**  
Full Length  
20.1kg  
60 per pallet  
1206kg pallet weight



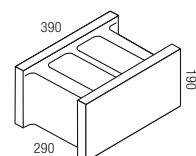
**30.02**  
Three Quarter  
18kg  
80 per pallet  
1440kg pallet weight



**30.03/20.02**  
Half  
12.7kg  
120 per pallet  
1524kg pallet weight

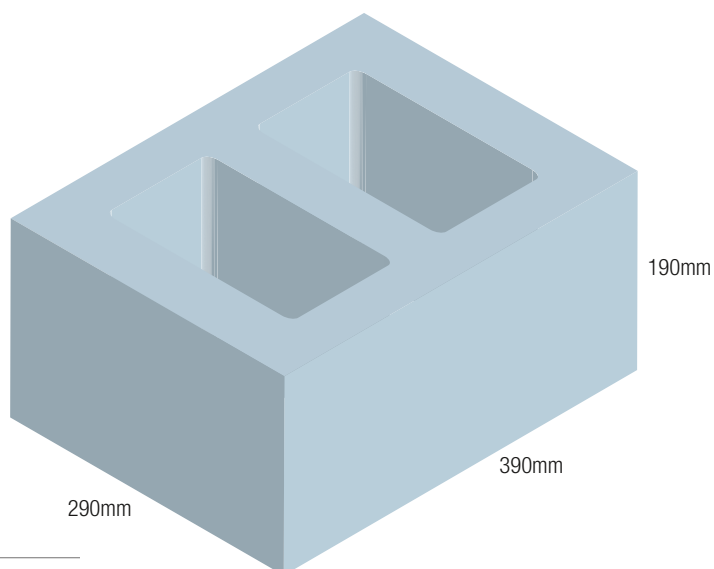


**30.04/10.32**  
Quarter  
11.3kg  
168 per pallet  
1898kg pallet weight



**30.05TB**  
Trough Block  
20.1kg  
60 per pallet  
1206kg pallet weight

## » 300mm Series

**30.01 Concrete Block****Specification**

Product Information	30.01	30.05TB
Work Size (mm)	390 x 290 x 190	390 x 290 x 190
Dimensional Category	DW1	DW1
Approximate Unit Weight (kg)	20.1 (range 18 - 23kg)	20.1 (range 18 - 23kg)
Approximate No per m <sup>2</sup>	12.5	12.5
Nominal Wall Surface Density (kg/m <sup>2</sup> )	291	291
No per pallet	60	60
Pallet Weight (kg)	1206	1206
Pallet Dimensions (mm)	1000 x 1200 x 1300	1000 x 1200 x 1300
Characteristic Unconfined Compressive Strength (MPa)	>12 (Face Shell)	>12 (Face Shell)
Cold Water Absorption (%)	<7.0	<7.0
Material Density (kg/m <sup>3</sup> )	2,100 - 2,300	2,100 - 2,300
Coefficient of Contraction (mm/m)	0.4	0.4
Durability Class	General Purpose	General Purpose
Initial Rate of Absorption (kg/m <sup>2</sup> /min)	<3.0	<3.0
Potential to Effloresce	Nil to Slight	Nil to Slight
Core Percentage (%)	>30	>30

**Fire Resistance**

Product Information	30.01	30.05TB
Insulation (minutes)	60	60
Insulation - fully grouted (minutes)	240	240

**Note:**

- Products with increased compressive strength can be manufactured to order. Contact your Midland Brick Sales Advisor for further information.
- Constant quality testing is carried out in Midland Brick NATA registered laboratory (Reg No 1637).
- All physical testing is carried out in accordance with Australian Standards AS/NZS4455 and AS/NZS4456.
- Fire Rating by test or deemed to comply. Design of fire-rated walls should be checked by a suitably qualified engineer.
- $R_w$  by test, opinion, or deemed to comply with the BCA.
- Variations may occur in the physical properties quoted. Should particular specifications be required please contact Midland Brick for further information.
- Durability classification based on product knowledge under local (Perth, Western Australia) climatic conditions.
- Unit weight and dry density quoted are approximate values and can vary.
- This technical information is subject to change without notice.

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## For more information about Midland Brick



Call us on 13 15 40



Visit our website at [www.midlandbrick.com.au](http://www.midlandbrick.com.au)



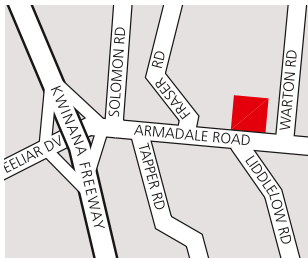
Drop into a Midland Brick Selection Centre or Reseller at the following locations

## Selection Centres

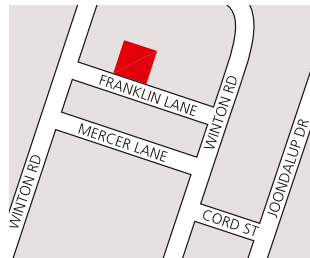
■ Selection Centre

■ Selection Centre & Yard

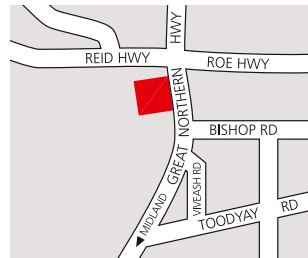
■ Brick & Paver Recycling Yard



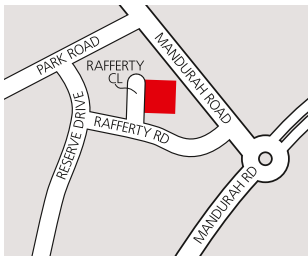
**Jandakot**  
4 Armadale Road



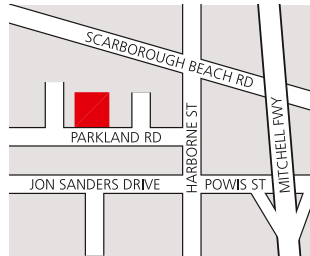
**Joondalup**  
16 Franklin Lane



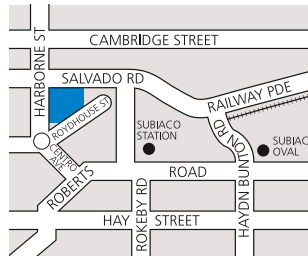
**Middle Swan**  
102 Great Northern Highway



**Mandurah**  
4 Rafferty Close



**Osborne Park**  
8 Parkland Road



**Subiaco**  
Home Base, 55 Salvado Road

## Regional Resellers



**Bunbury**  
**Beyond Bricks**  
11 Denning Road  
(08) 9721 9777



**Geraldton**  
**Goldings Paving Centre**  
680 Chapman Road  
(08) 9938 1061



**Kalgoorlie – McBride's**  
**Garden Centre & Landscaping**  
13-15 Coventry Street  
(08) 9022 7770

## Regional Distributors

**Adelaide (SA)** Boral Montoro  
Pooraka (08) 8262 3529

**Albany** CamTrans Pty Ltd  
(08) 9841 7409

**Busselton** KD Power & Co.  
(08) 9752 1177

**Carnarvon** Carnarvon Timber  
& Hardware (08) 9941 1009  
Tropics Hardware (08) 9941 2884

**Cervantes** Hunters Cervantes  
Transport Service (08) 9652 7013

**Collie**  
G&L Saunders (08) 9734 1383

**Dongara** Marsden Transport  
(08) 9927 1145

**Esperance**  
Star Transport (08) 9071 2345

**Exmouth** Exmouth Hardware &  
Building Supplies (08) 9949 1837

**Greenhead** Len Smith  
0409 913 149

**Jurien Bay** RDI Transport  
(08) 9652 1241

**Kalbarri** Kalbarri Carriers  
(08) 9937 1550

**Karratha** Versatile Building  
Products (08) 9249 2324

**Katanning** Katanning Hardware  
(08) 9821 1411

**Lake Grace** Nambec Nominees  
(08) 9865 1151, 0427 652 151

**Lancelin** Lancelin Transport  
(08) 9655 1827, 0407 386 548

**Manjimup** Cutts Transport Pty Ltd  
(08) 9777 0888

**Margaret River** Podmore Holdings  
(08) 9757 2422

**Narrogin** Narrogin Freightlines  
0418 924 591

**Northam** Lloyd's Contracting  
(08) 9622 7660

**Shark Bay** Shark Bay Marine  
& Hardware (08) 9948 1001

**Southern Cross** W. Metzke & Son  
(08) 9049 1014

**Wagin** Alexander Galt & Co  
(08) 9861 1087

**Wongan Hills** Overland Freight  
(08) 9671 1457, 0427 711 821

**York** York Landscape Supplies  
(08) 9641 2300