

LIGHTWEIGHT BUILDING BLOCKS



LIGHTWEIGHT BLOCKS by Island Block & Paving offer a reduced carbon footprint and deliver genuine sustainability benefits. Manufactured with over 70% recycled content, they support a circular economy while providing a strong, durable building solution. Their 30% lighter weight makes projects safer, easier and more cost-effective to construct, without compromising on strength.



INTRODUCTION

Island Block and Paving have available a unique “Lightweight” Block range. The lightweight blocks are manufactured using an aggregate which has been exposed to intense heat in its nature. This results in a much lighter block that has excellent Fire and Thermal properties while importantly still maintaining a minimum 15 MPa unconfined compressive strength and similar costs to Standard Concrete Blocks.

A lightweight aggregate is used as part of the manufacturing process, this is the byproduct of boiler ash, an inert, environmentally friendly recycled material which is created when the material is exposed to intense heat. Additionally, granulated blast furnace aggregate from the manufacture of steel is ground to a suitable fineness, to provide additional cementitious material complying with AS 3582.2. Benefits include enhanced durability, strength and fire resistance capabilities.

Because the lightweight blocks aggregate composition has already been subjected to intense heat, the blocks perform extremely well when subjected to Fire Conditions, as proven by extensive testing at various CSIRO and BHP Laboratories. The results of these tests have been formulated into Design Tables by Jim Gandy – BE Hons, MIE Aust. of Gandy & Roberts Consulting Engineers. The lightweight blocks have the following benefits: much lighter block weight; lower transportation costs; excellent fire resistance levels; similar load bearing capacity of standard concrete blocks; less weight on foundations and much lighter for bricklaying therefore reducing WHS risks. Lightweight blocks meet the requirements of the B.C.A., A.S. 3700 Masonry Code and AS/NZS 4455.

WHY ARE LIGHTWEIGHT BLOCKS SUPERIOR?



SUSTAINABLE

A minimum of 70% recycled aggregates is used in manufacturing. These Industrial byproducts result in a much lower carbon footprint creating a circular economy product with an eye on the future. Mining emissions and the use of natural minerals is reduced by 70%.



FIRE RESISTANT

Lightweight Blocks have been tested under 90KN/M of load at the CSIRO Laboratories complying with A.S. 1530.4 and have proved to be the ultimate Fire Block in either loadbearing or non-loadbearing walls



STRONG

Lightweight Blocks are exceptionally strong, possessing a compressive strength of 15 MPa and density of >1800 kg.



ENERGY EFFICIENT

Lightweight saves energy costs. The air bubbles in the Ash aggregate give it Thermal Insulation Properties much higher than standard concrete blocks and brickwork.



SOUND INSULATION

Lightweight Blocks have excellent Sound Absorption Qualities and will meet Building Code Requirements. Low Air Porosity is achieved by the aerated nature of Lightweight Blocks.

The following information has been put together to assist Designers with the selection of either Lightweight or Standard Concrete Blocks for walls exposed to fire conditions in either load bearing or non load bearing circumstances.

DESIGN GUIDE FOR FIRE LOADS

With the Introduction of the B.C.A. a masonry wall now has three Fire Resistance Levels (F.R.L.) expressed in minutes E.G. 180/180/180.

The figures represent:

Structural Adequacy

The Ability of the wall to remain stable and resist collapse when subjected to Fire Conditions (Structural Adequacy can be calculated in accordance with design charts attached).

Integrity

The Integrity of a wall is a measure of its ability to resist the passage of flames or hot gases through cracks and fissures. The F.R.L. for integrity is accepted if the F.R.L. for insulation and structural adequacy has been met.

Insulation

The Insulation of a particular wall is a measure of its ability to resist the passage of the heat through the wall. The F.R.L. requirement for insulation determines the material thickness designed into the wall. The structural adequacy, integrity and insulation Fire Resistance Levels are strongly influenced by the type of material used in the construction of the Fire Wall.



"The Lightweight Blocks are our favourite building blocks to work with. 30% lighter and dimensionally accurate means my team loves laying lightweights. From an employer of brickys point of view, Safe Work Australia's Hazardous Manual Tasks Code of Practice requires me to minimise lifting risks and keep manual handling to a minimum. Lightweight blocks from Island Block & Paving tick all the boxes, great products."

Greg Longmore - Longmore Bricklaying Team (20 years' experience)

MAXIMUM WALL HEIGHTS AND LENGTHS FOR GIVEN FIRE RESISTANCE LEVELS

| REQUIRED FIRE RESISTANCE LEVELS | BLOCK TYPE | MAXIMUM WALL HEIGHT | | MAXIMUM WALL LENGTH | | |
|---------------------------------|---------------------------|---|--|--|--|------|
| | | Partial Restraint at top Av = 0.85 (See notes 1, 3 & 4) | Full Restraint at top Av = 0.75 (See notes 2, 3 & 4) | Apply only if wall height limit exceeded. (See notes 3, 4, & 5) | | |
| | | | | Length between supports Ah=1.0 | Length from support to free end Ah=2.0 | |
| 60/60/60 | 1001 Standard | 2382 | 2700 | 2025 | 1013 | |
| | 1031 Standard | 2382 | 2700 | 2025 | 1013 | |
| | 1001 Lightweight | 2647 | 3000 | 2250 | 1125 | |
| | 1031 Lightweight | 2647 | 3000 | 2250 | 1125 | |
| | 120715 Lightweight | 3235 | 3666 | 2750 | 1375 | |
| | 120715 Standard | 2911 | 3300 | 2475 | 1238 | |
| | 1501 Standard | 3706 | 4200 | 3150 | 1575 | |
| | 1531 Standard | 3706 | 4200 | 3150 | 1575 | |
| | 1501 Lightweight | 4118 | 4667 | 3500 | 1750 | |
| | 1531 Lightweight | 4118 | 4667 | 3500 | 1750 | |
| | 2001 Standard | 5029 | 5700 | 4275 | 2138 | |
| | 2031 Standard | 5029 | 5700 | 4275 | 2138 | |
| | 2001 Lightweight | 5588 | 6333 | 4750 | 2375 | |
| | 2031s Lightweight | 5588 | 6333 | 4750 | 2375 | |
| 90/90/90 | 1001 Lightweight | 2647 | 3000 | 2250 | 1125 | |
| | 1031 Lightweight | 2647 | 3000 | 2250 | 1125 | |
| | 120715 Lightweight | 3235 | 3666 | 2750 | 1375 | |
| | 120715 Standard | 2717 | 3080 | 2310 | 1155 | |
| | 1531 Standard | 3459 | 3920 | 2940 | 1470 | |
| | 1501 Lightweight | 4118 | 4667 | 3500 | 1750 | |
| | 1531 Lightweight | 4118 | 4667 | 3500 | 1750 | |
| | 2001 Standard | 4694 | 5320 | 3990 | 1995 | |
| | 2031 Standard | 4694 | 5320 | 3990 | 1995 | |
| | 2001 Lightweight | 5588 | 6333 | 4750 | 2375 | |
| | 2031s Lightweight | 5588 | 6333 | 4750 | 2375 | |
| | 120/120/120 | 1001 Lightweight | 2647 | 3000 | 2250 | 1125 |
| | | 1031 Lightweight | 2647 | 3000 | 2250 | 1125 |
| | | 120715 Lightweight | 3235 | 3666 | 2750 | 1375 |
| 1531 Standard | | 3294 | 3733 | 2800 | 1400 | |
| 1501 Lightweight | | 4118 | 4667 | 3500 | 1750 | |
| 1531 Lightweight | | 4118 | 4667 | 3500 | 1750 | |
| 2031 Standard | | 4471 | 5067 | 3800 | 1900 | |
| 2001 Lightweight | | 5588 | 6333 | 4750 | 2375 | |
| 2031s Lightweight | | 5588 | 6333 | 4750 | 2375 | |
| 1501 Reinforced* | | 4447 (5929) | 5040 (N/A) | 3780 (5040) | 1890 (2520) | |
| 180/180/180 | | 120715 Lightweight | 3235 | 3666 | 2750 | 1375 |
| | | 1531 Lightweight | 4118 | 4667 | 3500 | 1750 |
| | | 2001 Lightweight | 5588 | 6333 | 4750 | 2375 |
| | | 2031s Lightweight | 5588 | 6333 | 4750 | 2375 |
| | 1531 Lightweight | 4118 | 4667 | 3500 | 1750 | |
| 240/240/240 | 2031s Lightweight | 5588 | 6333 | 4750 | 2375 | |
| | 2001 Reinforced* | 6035 (8047) | 6840 (N/A) | 5130 (6840) | 2565 (3420) | |

TECHNICAL INFORMATION

Working Dimensions: AS 4455.1 2008: + or - 2mm Dimensional Tolerance
 Recommended Mortar per AS 3700: 1GP Cement + 1 Lime + 6 Clean Sand
 Unconfined Compressive Strength: > 15 MPa
 Material Density: < 1800 Kg/m³
 CWA - Cold Water Absorption < 7%

NOTES

Note: 1 Partial restraint means lateral support only (eg roof framing).

Note: 2 Full restraint means lateral and torsional restraint (eg concrete slab poured on top of wall).

Note: 3 For Walls carrying significant load, loadbearing capacity requirements may reduce the tabulated values. Loadbearing walls should be checked by an engineer.

Note: 4 Walls exposed to wind loads need to be checked for wind load capacity by an engineer.

Note: 5 A wall length limit applies only if the wall height limit is exceeded and additional lateral support is required. This may be provided by cross walls, mullions or columns. If the wall length between supports is less than or equal to the tabulated values, there is no limit to the height of the walls. If the wall length between supports is greater than the tabulated values, there may be some increase in permissible height of the wall. This should be determined by an engineer using AS 3700 Clause 4.8.2 (b) (iii) and the robustness provisions of Clause 4.10.

Note: 6 This Table is based on the following criteria: Standard Blocks: Slenderness ratios from Table 7.1 A.S. 3700 (basalt aggregate at least 45%)
Lightweight Blocks: Slenderness ratio of 25 as proven by tests.

Note: 7 Cavity wall ratings are calculated as follows: Load bearing skin exposed to fire, other skin not exposed: use rating of exposed skin. Otherwise, the equivalent thickness of the wall is taken as 2/3 the sum of the two leaves.

***Note: 8** For grouted and reinforced walls, the second figure (in brackets) applies if the load is less than 5% of capacity.

Comparison of the tabulated values for lightweight and standard blocks illustrate the advantages of Lightweight building blocks over standard concrete blocks with regard to the B.C.A.

e.g. A 15.01 Lightweight wall provides a 120/120/120 up to a height of 4667 (with full restraint at the top). In standard blockwork 15.31 blocks provide for a 120/120/120 rating and have a maximum wall height of 3733. The lightweight blocks weigh only 10.0 kg each compared with 24.7 kg for the standard concrete blocks. Use of lightweight blocks in this situation will provide a weight saving of 60% plus a possible increase in wall height of 25%.



J.R. Gandy - BE Hons, MIE Aust.

PROPERTIES OF LIGHTWEIGHT BLOCKS

| Unit Code | Dimensions (mm) | Unit Type | Equivalent Thickness (mm) | Blocks Weights | F.R.I. for Insulation & Integrity | Maximum Slenderness Ratio F.R.I for Structural Adequacy | | | | |
|-----------|-----------------|-----------|---------------------------|----------------|-----------------------------------|---|----|-----|-----|-----|
| | | | | | | 60 | 90 | 120 | 180 | 240 |
| 10.01 | 390x90x190 | Cored | 68mm | 8.3kg | 120 minutes | | | | | |
| 10.31 | 390x90x190 | Solid | 90mm | 11.4kg | 120 minutes | | | | | |
| 120.715 | 230x110x76 | Solid | 110mm | 2.33kg | 180 minutes | | | | | |
| 15.01 | 390x140x190 | Hollow | 92mm | 10kg | 120 minutes | 25 | 25 | 25 | 25 | 25 |
| 15.31 | 390x140x190 | Cored | 127mm | 14.9kg | 240 minutes | | | | | |
| 20.01 | 390x190x190 | Hollow | 107mm | 10.4kg | 180 minutes | | | | | |
| 20.31s | 390x190x190 | Cored | 142mm | 22.5kg | 240 minutes | | | | | |

NOTE: Lightweight Building Blocks are available in all Standard Concrete Block sizes and accessories

THERMAL INSULATION

The Closed Air Cells of the lightweight blocks give far better Thermal Insulation Qualities than Standard Blocks, causing the buildings energy use to being lower. Buildings as a result will be warmer in winter and cooler in summer.

DEFINITIONS

Thermal Resistance @ 0. The Measure of the resistance to heat flow of a material of a given thickness.

Thermal Transmittance (U) - The amount of heat which will flow through one square metre of wall of a structure for every degree of temperature difference between the inside and outside environment.

| BLOCK TYPE | THERMAL RESISTANCE (R) | THERMAL TRANSMITTANCE (U) |
|------------|------------------------|---------------------------|
| 10.01 | 0.51 | 1.96 |
| 10.31 | 0.57 | 1.75 |
| 120.715 | 0.68 | 1.40 |
| 15.01 | 0.63 | 1.59 |
| 15.31 | 0.75 | 1.33 |
| 20.01 | 0.81 | 1.27 |
| 20.31s | 0.75 | 1.33 |

INTERNAL/EXTERNAL FINISHING AND FIXINGS

- Relatively even texture means they can be left as a face finished block if required.
- Suitable as a face block with paint finish.
- Suitable finish for render or texture coat.

No special fixing instructions are required.



View the Fire & Acoustic Manual at islandblock.com.au

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