

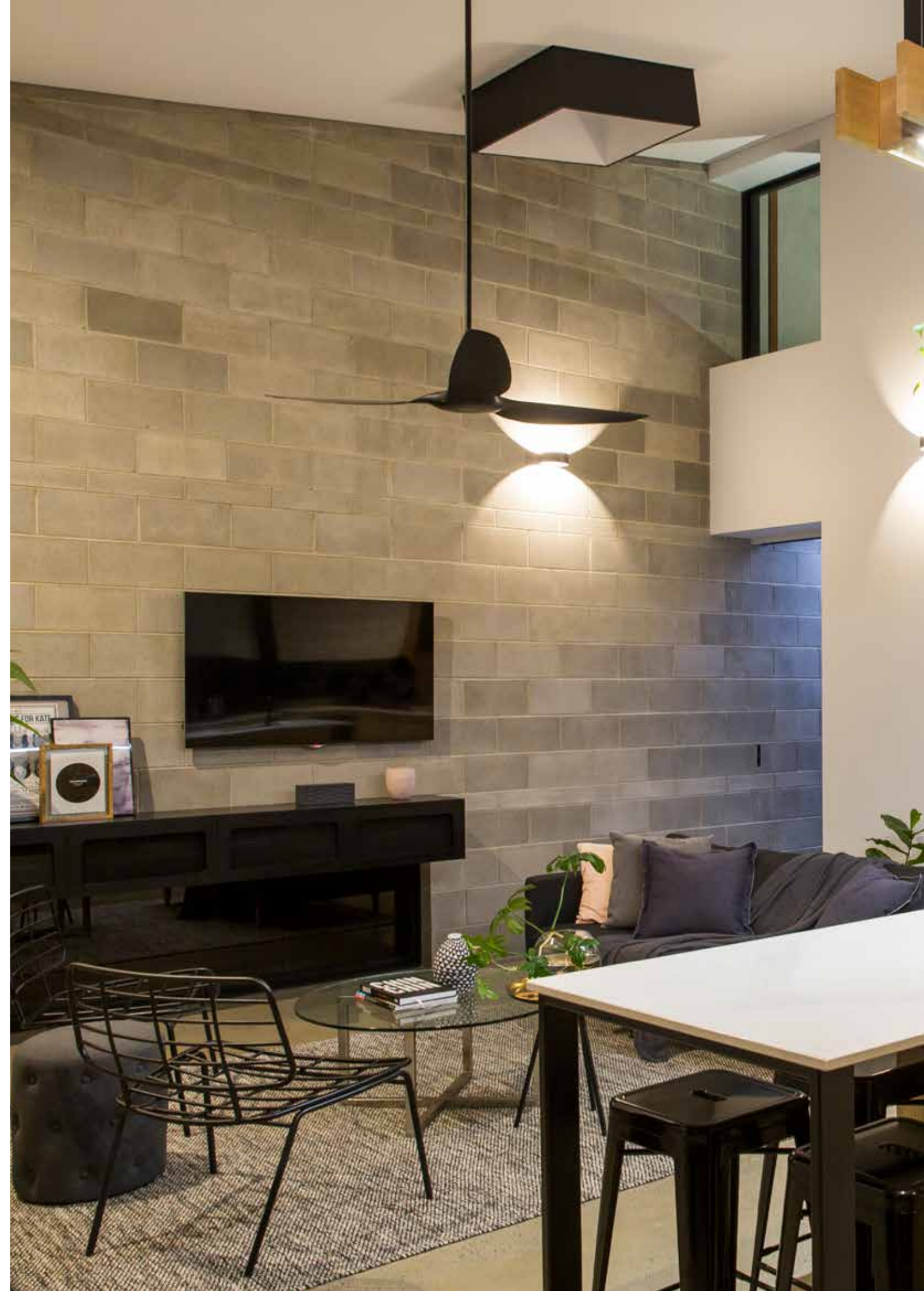
Alphalite Grey Blocks Fire and Sound Manual

Updated 09.2021



What's inside

- 1 – Masonry for fire Resistance p⁰³
- 2 – Structural Adequacy p⁰⁶
- 3 – Insulation FRLs p⁰⁹
- 4 – Acoustic Ratings p¹³
- 5 – Get in Touch p²⁸



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Masonry for Fire Resistance



1

Masonry for Fire Resistance

Overview

When a masonry wall is subjected to fire, which is usually only on one side, a thermal gradient is created through the thickness of the wall and the expansion of the material causes bowing towards the fire source. If this bowing extends far enough it can cause collapse of the wall. Even if the wall does not collapse, it can crack because of internal stresses caused by restraint of the thermal expansion, or it can heat up sufficiently to allow flammable material on the side away from the fire to ignite.

Both these consequences can cause the fire to spread.

Tests for Fire Resistance Level on Austral Masonry Alphalite lightweight concrete masonry were reviewed by Exova Warrington Australia Pty Ltd. The following fire resistance levels (FRLs) have been calculated using these test results and the relevant clauses from AS 3700 Australian Standard for Masonry Structures: Section 6 Fire Design.

The calculated fire resistance levels are equal to or superior to the deemed to satisfy provisions of the standard for concrete masonry units.

Structural Adequacy

Structural adequacy is the ability of a wall to continue to perform its structural function for the fire resistance period.

The fire resistance period for structural adequacy is a function of the slenderness ratio for the wall. It relates to the height of the wall, the thickness of the wall and the restraint at the perimeter. The maximum slenderness ratio for fire (Srf) for Alphalite is 26.32 for non-loadbearing walls and 20.63 for loadbearing walls for a fire resistance level of 120 minutes. This compares with a Srf for standard masonry of 16.

Integrity

Integrity is the ability of a wall to maintain its continuity and prevent the passage of flames and hot gases through cracks in the wall for the fire resistance period.

The test result for 90 mm thick Alphalite was 240 minutes. The Exova opinion uses this test result and the relevant clauses of AS3700 and the Srf to determine the maximum dimensions of wall members for Integrity.

Insulation

Insulation is 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 during the fire resistance period. However, it should be noted that at this temperature – a rise of 140°C over the ambient temperature or a maximum of 180 °C – surface finishes and furnishings in contact with or near the wall may combust.

Alphalite achieved a fire resistance period for insulation of 120 minutes for a material thickness of 80 mm. This compares with a deemed to satisfy thickness of 120 mm for standard concrete masonry.

Using this manual to satisfy the required FRL

Insulation

Insulation is the easiest of the fire resistance levels to determine. It is governed by the material thickness of the masonry unit.

The 12-01 block, with two cores, has a material thickness of 76mm which gives it a 90 minute FRL for insulation.

All other Alphalite masonry units have a material thickness greater than 80mm, which gives them a minimum 120 minute FRL for insulation, calculated as per AS3700:2018, Clause 6.5.4(b) (ii).

The highest FRL requirement is 240 minutes. Austral Masonry achieves this by reducing the core size of the 15-01 block to give it a material thickness greater than 120mm as per AS3700:2018, Clause 6.5.2. To distinguish these from the 120 minute rated blocks, the code number is 15-801.

Insulation FRL (minutes)				Code Nos.
60	90	120	180	
				12-01 (2-core)
				10-01; 10-31 & 15-01
				12-801 & 20-01
				15-801

Integrity

Integrity is determined by calculating the slenderness ratio for fire for the wall member. This is calculated using the height and width of the wall, the thickness of the block and the method of restraint around the wall.

The integrity FRL of 120 minutes is satisfied when the wall's slenderness ratio for fire (Srf) is within the 120 minute limit of 26.32 for non-loadbearing and 20.63 for loadbearing blocks. At 240 minutes, the Srf is 21.17 for non-loadbearing and 15 for loadbearing blocks.

Structural Adequacy

The structural adequacy FRL is the most complicated. It is governed by three formulae in AS3700:2018, Clause 6.3.2.2 which use the masonry panel's height, length, thickness and restraint conditions around the perimeter to calculate the panel's Srf.

The relevant Srf's for Alphalite masonry blocks are:

	Loadbearing	Non-loadbearing
120 minute	20.63	26.32
240 minute	15.00	21.17

The following charts can be used to determine Structural Adequacy FRLs for a variety of wall sizes and restraint methods.

Structural Adequacy

2

Alphalite Grey Masonry Blocks

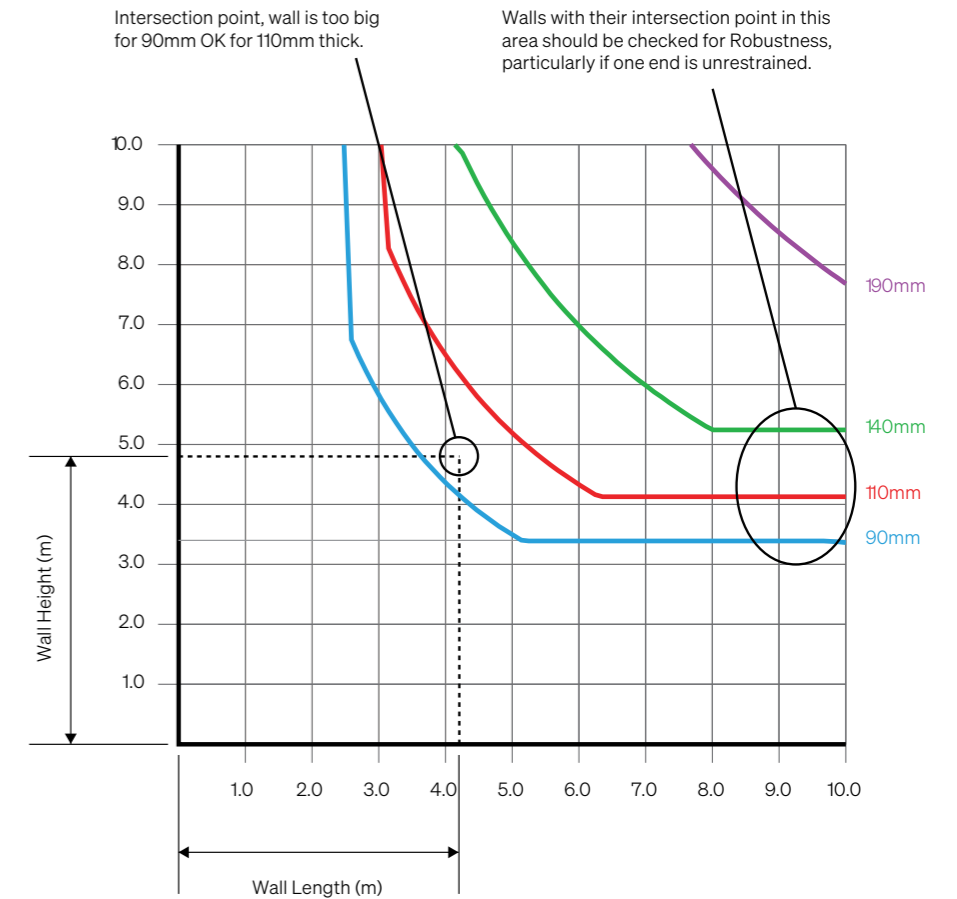
Structural Adequacy

How to Use the Charts

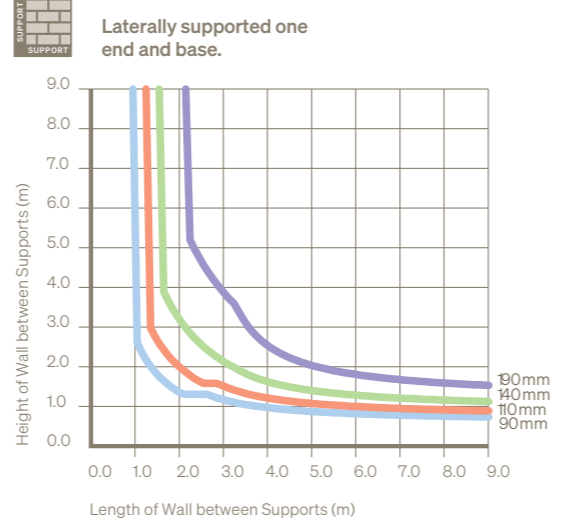
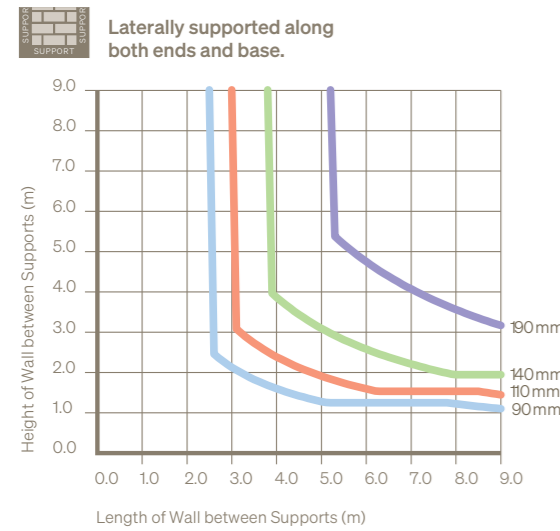
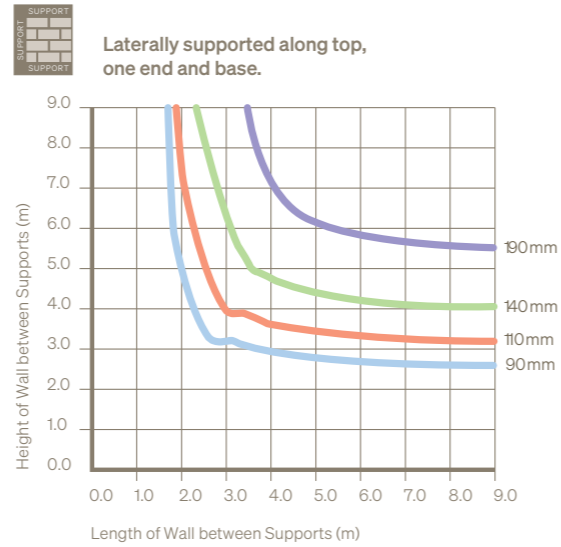
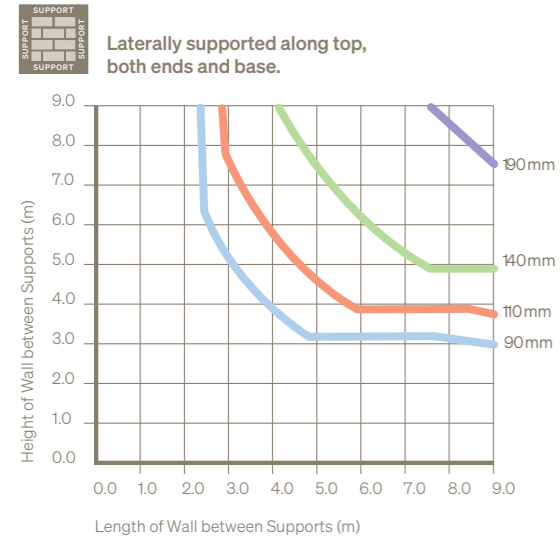
First, find the page with the required FRL: 60, 90, 120, 180 or 240 minutes. Next, find the graph with the restraint conditions of your proposed wall. Finally, plot the intersection of your wall's height and length on the appropriate graph.

The thickness required is represented by those lines clear of the intersection point. Alphalite masonry that is designed for other loads (vertical, bending, earthquake, etc.) can be checked for its FRL structural adequacy by using the following graphs.

The three formulae are graphed, with a line for each wall thickness: 90, 110, 140 and 190mm.



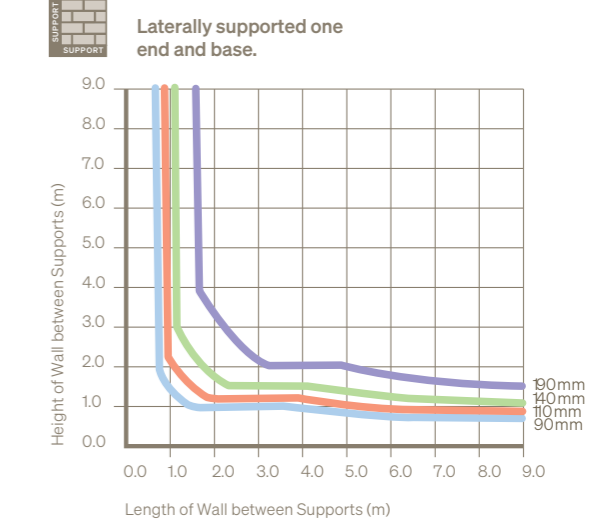
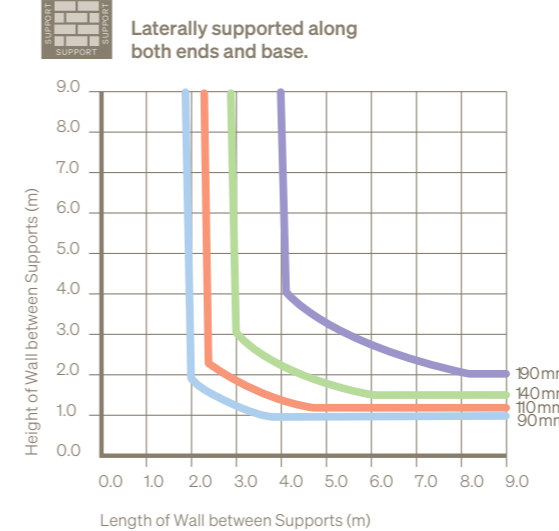
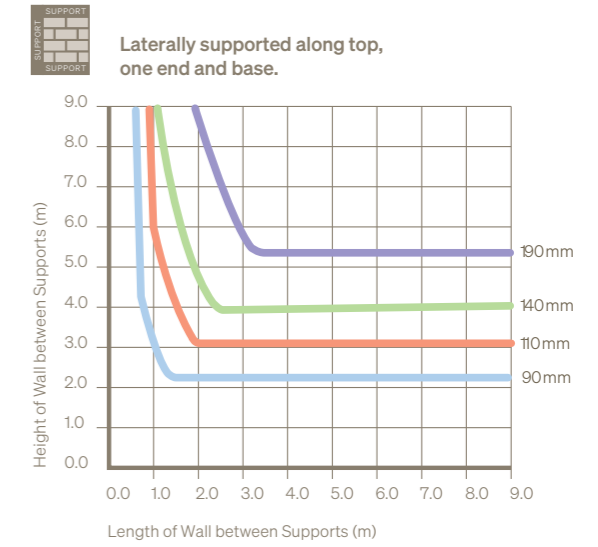
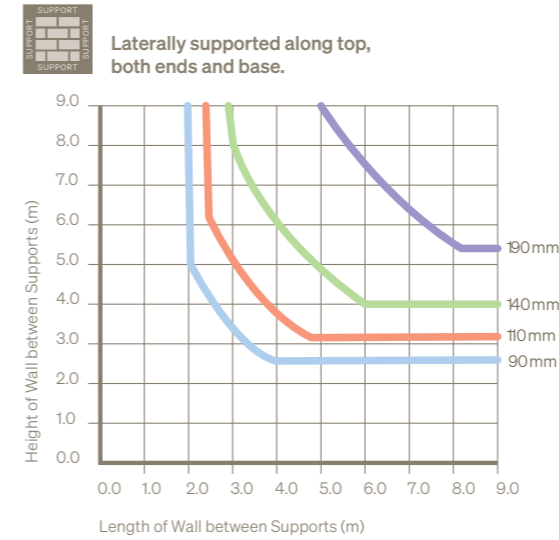
Structural Adequacy Non-Load Bearing 120 Minute FRL (Srf <26.32)



Supported along top and base only.	Wall thickness	Max height with lateral top restraint (L/t > 5)
190mm	190mm	6.665m
140mm	140mm	4.910m
110mm	110mm	3.860m
90mm	90mm	3.157m

Note: These heights may be reduced due to other loads such as Earthquake, Wind, Robustness etc.

Structural Adequacy Non-Load Bearing 240 Minute FRL (Srf <21.17)



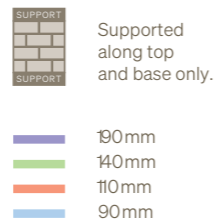
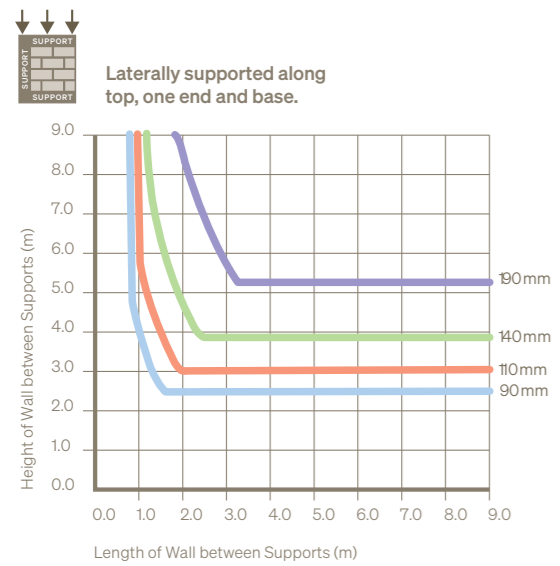
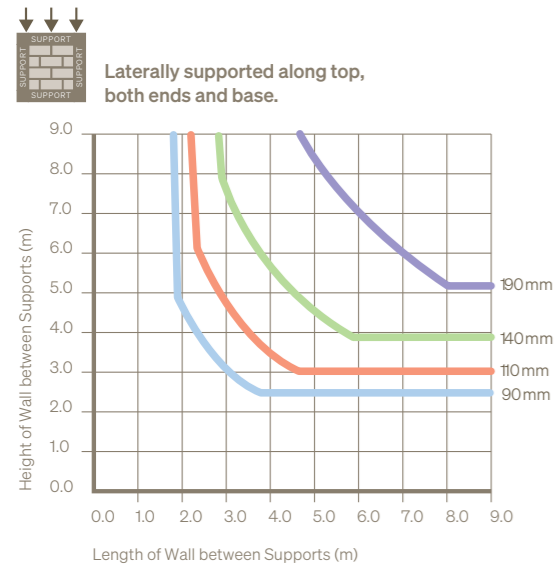
Supported along top and base only.	Wall thickness	Max height with lateral top restraint (L/t > 5)
190mm	190mm	5.360m
140mm	140mm	3.950m
110mm	110mm	3.100m
90mm	90mm	2.540m

Note: These heights may be reduced due to other loads such as Earthquake, Wind, Robustness etc.

Structural Adequacy

Load Bearing 120 Minute FRL

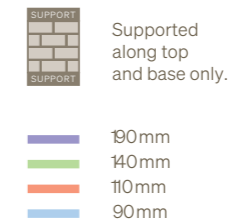
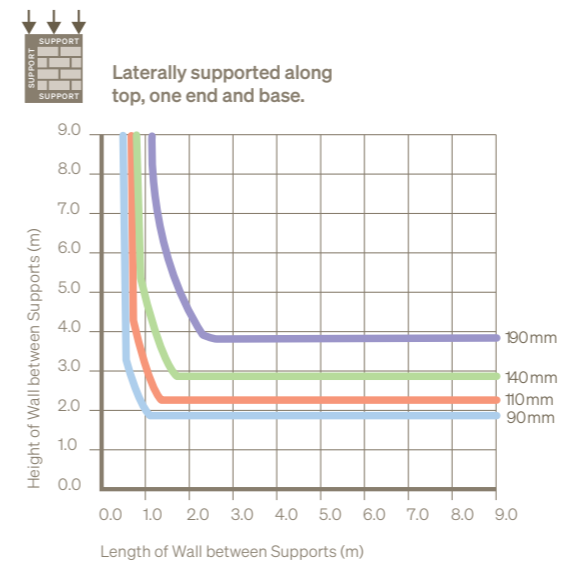
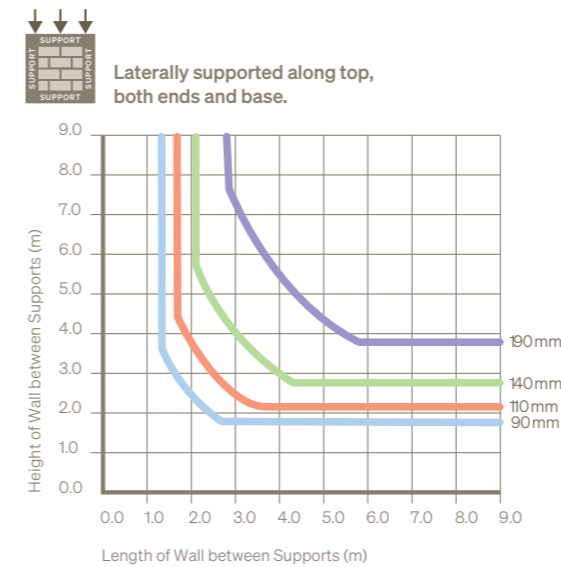
(Srf <20.63)



Structural Adequacy

Load Bearing 240 Minute FRL

(Srf <15.0)



Acoustic Ratings



3

Acoustic Ratings

Overview

This brochure provides guidance on the measurement of acoustic ratings, the BCA requirements for residential buildings and details of testing and development of successful wall systems for Denseweight™ and GB Masonry™.

The BCA requires that building elements have certain levels of insulation from airborne noise and impact sound. Rw is the weighted sound reduction index, which is used to measure the acoustic performance of a construction system.

It is a single number quantity for the airborne sound insulation rating of building elements. As the acoustic performance of a material or construction improves, the higher the Rw value will be.

The Rw rating system has two correction factors (C and Ctr) which take into account different spectra of noise sources. C relates mainly to high frequency noise while Ctr relates to lower frequency noises. These correction factors are used to indicate the performance drop of the wall in the corresponding frequency range.

Rw + Ctr is the value of the index when the low frequency correction factor (Ctr) is applied. For example, if a wall is measured as Rw (C;Ctr) of 55 (-1;-4) the Rw rating is 55 and Rw + Ctr is 55 + (-4) = 51.

This brochure is designed to provide you with up to date data and information on the acoustic performances of Austral's masonry wall systems.

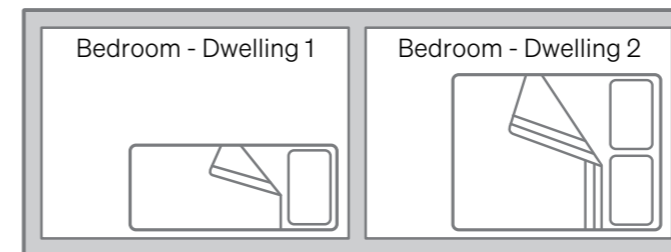
Building Code of Australia Acoustic Requirements

The NCC requires that walls separating sole-occupancy units in Class 1, 2 and 3 buildings are required to have an

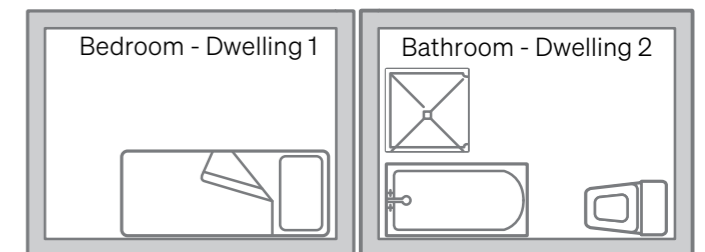
Rw + Ctr of not less than 50. In addition, the construction must be discontinuous if the wall separates a habitable room (living room, dining room, bedroom, study and the like) from a wet room (kitchen, bathroom, sanitary compartment or laundry). Walls in Class 2 or 3 buildings that separate a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like must have an Rw of not less than 50. If this wall separates a sole-occupancy unit from a plant room or a lift shaft, the construction must be discontinuous.

Discontinuous construction requires a minimum 20mm cavity between two separate leaves. If wall ties are to be used they must be resilient wall ties.

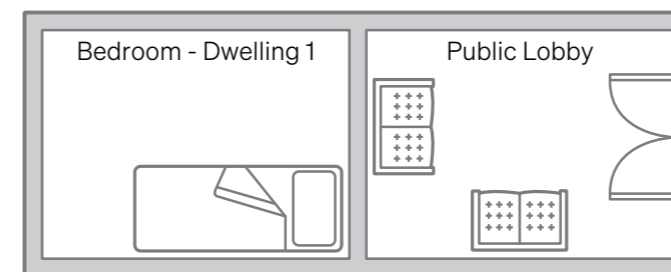
Construction: Habitable to habitable and wet to wet.
Requirements: $R_w + C_{tr} \geq 50$.



Construction: Habitable to wet.
Requirements: $R_w + C_{tr} \geq 50$ with discontinuous construction.

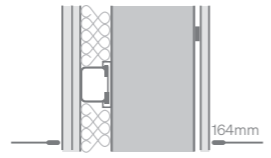




Construction: Sole occupancy to corridor or public area.
Requirements: $R_w + > 50$ with discontinuous construction (if lift shaft or plant room).

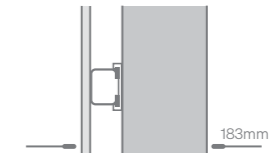
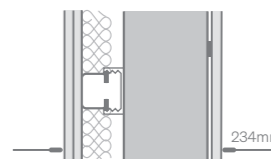
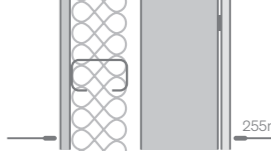


Acoustic Ratings Performance of Masonry Walls

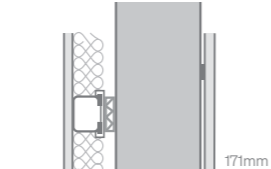
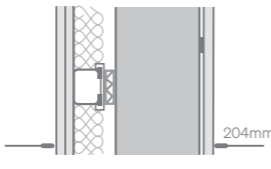
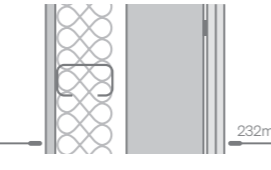
90mm Masonry Systems Code: Alphalite 10.01 & 10.31

<p>Corridor Wall: $R_w \geq 50$ Including unit to stairs, unit to foyer Bare Wall: R_w 40</p>	<ul style="list-style-type: none"> 2 layers of 13mm standard-core plasterboard on 28mm furring channel on standard clips. Minimum cavity: 30mm with 25 mm Glasswool or 30mm Polyester in cavity. 		<p>13mm standard-core plasterboard, daub-fixed</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ NB: Wall ties must be resilient, to comply with discontinuous construction.</p>	<ul style="list-style-type: none"> 1 layer of 13 mm Sound Rated plasterboard on 70mm timber stud, 20mm clear of masonry with R1.5 Glasswool or Polyester in cavity. 		<p>10mm cement render</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ NB: Wall ties must be resilient, to comply with discontinuous construction.</p>	<ul style="list-style-type: none"> 2 layers of 10mm standard-core plasterboard on 70mm timber stud, 20mm clear of masonry with R1.5 Glasswool or Polyester in cavity. 		<p>Bare Wall</p>


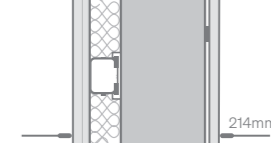
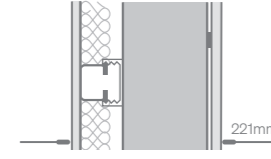

140mm Masonry Systems Code: Alphalite 15.01

<p>Corridor Wall: $R_w \geq 50$ Including unit to stairs, unit to foyer Bare Wall: R_w 43 (15-01)</p>	<p>13mm standard-core plasterboard on 28mm furring channel on standard clips Minimum cavity: 30mm.</p>		<p>Bare Wall</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ NB: Not suitable for wet-to-dry areas. See Discontinuous detail below.</p>	<p>2 layers of 13 mm standard-core plasterboard on 28mm furring channel on standard clips Minimum cavity: 50mm with 50mm Glasswool or 50mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ Discontinuous Construction. Suitable for all Party Walls. If wall ties are required, they must be resilient type.</p>	<p>13 mm standard-core plasterboard on 64mm steel studs, 20mm clear of masonry with 75mm Glasswool or 65mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>

110mm Masonry Systems Code: Alphalite 12.01

<p>Corridor Wall: $R_w \geq 50$ Including unit to stairs, unit to foyer Bare Wall: R_w 42 (12-01)</p>	<p>13mm standard-core plasterboard on 28mm furring channel on resilient clips Minimum cavity: 30mm with 25 mm Glasswool or 30mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ NB: Not suitable for wet-to-dry areas. See Discontinuous detail below.</p>	<p>2 layers of 13mm standard-core plasterboard on 28mm furring channel on resilient clips Minimum cavity: 50mm with 50mm Glasswool or 50mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ Discontinuous Construction. Suitable for all Party Walls. If wall ties are required, they must be resilient type.</p>	<p>13mm sound rated plasterboard on 64mm steel studs, 20mm clear of masonry with 75 mm Glasswool or 65mm Polyester in cavity.</p>		<p>2 layers of 10mm standard-core plasterboard</p>

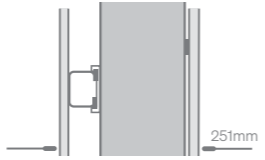


140mm Grouted Systems Code: Alphalite 15.48

<p>Corridor Wall: $R_w \geq 50$ Including unit to stairs, unit to foyer Bare Wall: R_w 50</p>	<p>Bare Wall</p>		<p>No lining required</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ (both options) NB: Not suitable for wet-to-dry areas. See Discontinuous detail below.</p>	<p>2 layers of 13 mm standard-core plasterboard on 28mm furring channel on standard clips Minimum cavity: 30mm with 25mm Glasswool or 30mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>
	<p>13 mm standard-core plasterboard on 28mm furring channel on standard clips Minimum cavity: 50mm with 50mm Glasswool or 50mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ Discontinuous Construction. Suitable for all Party Walls. If wall ties are required, they must be resilient type. (No ties are better)</p>	<p>13mm sound rated plasterboard on 64mm steel studs, 20mm clear of masonry with 75 mm Glasswool or 65mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>

Acoustic Ratings Performance of Masonry Walls

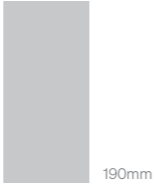
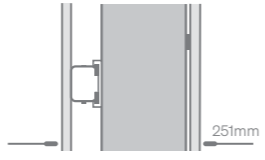
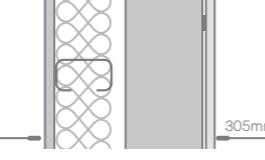
190mm Masonry Systems

Code: Alphalite 20.01

<p>Corridor Wall: $R_w \geq 50$ Bare Wall: R_w 45 Including unit to stairs, unit to foyer</p>	<p>13 mm standard-core plasterboard on 28mm furring channel on standard clips. Minimum cavity: 30mm</p>		<p>13mm standard-core plasterboard, daub-fixed</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ NB: Not suitable for wet-to-dry areas. See Discontinuous detail below.</p>	<p>2 layers of 13 mm standard-core plasterboard on 28mm furring channel on standard clips. Minimum cavity: 30mm with 25mm Glasswool or 30mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ Discontinuous Construction. Suitable for all Party Walls. If wall ties are required, they must be resilient type.</p>	<p>13 mm standard-core plasterboard on 64mm steel studs, 20mm clear of masonry with 75mm Glasswool or 65mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>

190mm Grouted Systems

Code: Alphalite 20.48

<p>Corridor Wall: $R_w \geq 50$ Bare Wall: R_w 50 Including unit to stairs, unit to foyer.</p>	<p>Bare Wall</p>		<p>Bare Wall</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ NB: Not suitable for wet-to-dry areas. See Discontinuous detail below.</p>	<p>13 mm standard-core plasterboard on 28mm furring channel on standard clips. Minimum cavity: 30mm with 25mm Glasswool or 30mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>
<p>Party Wall: $R_w + C_{tr} \geq 50$ Discontinuous Construction. Suitable for all Party Walls. If wall ties are required, they must be resilient type. (No ties are better)</p>	<p>13 mm standard-core plasterboard on 64mm steel studs, 20mm clear of masonry with 75mm Glasswool or 65mm Polyester in cavity.</p>		<p>13mm standard-core plasterboard, daub-fixed</p>

Research and Development

In 2011, the National Acoustic Laboratory tested Austral Masonry's 140mm thick 15-01 masonry block. Test Report 2538-2, for a 140mm masonry block with a 64mm independent stud wall system, achieved $R_w + C_{tr} \geq 50$ which satisfies the minimum BCA requirement for walls separating sole-occupancy units.

This wall also meets the BCA requirement to resist the transmission of impact-generated sound wherever an inter-tenancy wall separates a wet area (bathroom / laundry / kitchen etc) from a habitable room.

This test and other previous tests provided data for Day Design Pty Ltd Acoustic Engineers to provide opinions on the performance of other masonry wall systems.

The 15-01 masonry units achieve the BCA fire rating requirements for low to high-rise home unit walls before adding any lining system.

Backed by Brickworks

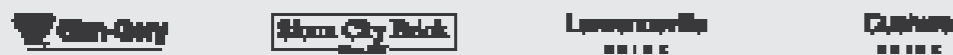
Local expertise. Global quality. Brickworks Building Products is one of Australia's biggest building material manufacturers. With heritage going all the way back to one of Australia's founding brick producers, we're proud of our reputation for design, innovation and sustainability.

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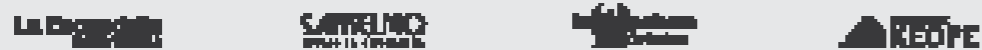
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