

adbri MASONRY
working together



FIRE RESISTANCE AND
SOUND INSULATION

NEW SOUTH WALES

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Note: LB - Load Bearing
NLB - Non-Load Bearing

PREFACE

The wall systems shown in this brochure, are in accordance with the requirements of the National Construction Code - Building Code of Australia (NCC-BCA) Volumes 1 and 2, and meet Australian Standards AS 3700:2018.

Adbri Masonry acknowledges the Concrete Masonry Association of Australia's (CMAA) 'Design of Concrete Masonry Building's Manual' MA55 in the development of the wall systems.

The NCC-BCA and Australian Standards are updated regularly and when this occurs, Adbri Masonry will update its technical brochures. For the most up-to-date brochures, please visit adbri.com.au.

It is the responsibility of customers to ensure that they are using the current version of AS3700 and corresponding Adbri literature.

Adbri Masonry acknowledges CSR Gyprock® and CSR Bradford® for providing technical information on their respective Fire and Sound products. CSR 'The Red Book™' February 2017 - Masonry Section 'F' was also used in the development of this brochure

INTRODUCTION

This brochure is intended as a guide for the design of walls requiring fire resistance using Adbri Masonry products in New South Wales.

THE PROPERTIES IN THIS BROCHURE ARE SPECIFIC TO ADBRI MASONRY PRODUCTS AND DO NOT APPLY TO PRODUCTS OF OTHER MANUFACTURERS.

All definitions can be found in the Glossary, Section 2.0.

NCC-BCA requirements

The National Construction Code - Building Code of Australia (NCC-BCA) requires that walls be designed in accordance with AS3700, Masonry structures code to provide the required Fire Resistance in buildings. The Fire Resistance Levels (FRLs) required by the NCC-BCA for walls is summarised in Table A.

They are given in the form of three numbers e.g., 180/120/90, which represent in turn, the required FRL (in minutes) for structural adequacy/integrity/insulation.

Reference should be made to the NCC-BCA for detailed information and concessions and for such matters as Compartmentation and Separation, Protection of Openings, Fire Fighting Equipment and Smoke Control.

This brochure has been prepared by Adbri Masonry. All designs in this brochure have been checked and approved by Arlene Nardone RPEQ, RBPV, NER.

Disclaimer: It is the responsibility of the customer to ensure that the version of AS3700 listed in the preface above is current. Adbri Masonry accepts no liability for any walls outside the scope of this document.

1.0 Fire

1.1 Design of walls for fire resistance

Structural adequacy - (ability to remain stable)

To achieve the required FRL for structural adequacy the height of the wall is limited. This limit varies according to the type of support given to the wall and whether the wall is reinforced.

The slenderness ratios given in the Masonry Code do not take into account any effect of applied finishes or the filling of cores with grout.

Integrity - (ability to resist the passage of flames and hot gases)

Design for integrity in this brochure is based on Clause 6.4 of AS3700 which deems that the FRL for integrity will be met if the wall meets that value for insulation or from test results.

Insulation - (ability to limit the passage of heat)

To achieve the required FRL for insulation a minimum "material thickness" must be provided by the wall.

For units with less than or equal to 30% coring and where cores are filled with grout, the "material thickness" is taken as the actual thickness.

For units with over 30% coring the "material thickness" is the net volume of the unit divided by the face area, commonly referred to as the "equivalent thickness". If the wall is cement rendered on both sides, the thickness of the thinner coating up to a maximum value of 20mm may be added to the material thickness of the wall.

Robustness

The height limits of walls when determined by design for robustness are in some cases less than those determined by design for fire resistance. These cases are accounted for in the following design charts.

Step 1 - Establish requirements

Establish the required Fire Resistance Level (FRL) for the wall. Refer to Table A.

Where the required FRL does not include a value for structural adequacy e.g., -/60/30, the wall must have a FRL for structural adequacy equal to that required for integrity i.e., to achieve a FRL of -/60/30, the wall must be designed for 60/60/30.

Step 2 - Check FRL for integrity and insulation

Establish the minimum wall type to satisfy the required FRL for integrity and insulation i.e., the last two values of the FRL.

As the required FRL for insulation is never required to be greater than the FRL for integrity, both insulation and integrity are checked for the integrity requirement e.g., for an FRL 180/120/90 both integrity and insulation would be checked for 120 minutes.

Table B provides values of integrity and insulation for single leaf walls.

Notes:

1) All cavity walls achieve 240 minutes for integrity and insulation.

2) For walls which are chased, the thickness must be reduced by the depth of the chase to establish integrity and insulation. The effects may only be ignored only if the following criteria are met:

- The wall is grouted
- Depth of the chase is not greater than 30mm
- The area of the chase is not greater than 1,000mm²
- The total face of the chase is not greater than 100,000mm² total on both faces of the wall on any 5m² area.

Step 3 - Design wall for FRL for structural adequacy

Check the following graphs that the proportions of the wall together with the various support conditions and/or reinforcements are such that the required FRL for structural adequacy is achieved.

If the actual wall height does not exceed the permissible heights, then the chosen wall type will be satisfactory and no further steps need to be taken. If the wall is still higher than permissible and no additional supports can be provided, then the wall will need to be either reinforced or made thicker.

Notes:

- 1) For walls with openings it is regarded as being divided into two sub-panels with a free edge at the centre of the opening.
- 2) Where walls are chased they can be dealt with as follow:

For vertically spanning walls:

- Where the chase is vertical - ignore
- Where the chase is horizontal and of length not greater than four times the wall thickness - ignore
- Where the chase is horizontal and of length greater than four times the wall thickness - consider using the slenderness ratio of the wall based on the wall thickness at the bottom of the chase.

For walls spanning vertically and horizontally:

- Where the length of chase is not greater than half the height for a vertical chase or half the length for a horizontal chase - ignore
- Where the length of chase is greater than half the height or half the length take into account using the slenderness ratio of the wall based on the wall thickness at the bottom of the chase.

Step 3a - The permissible height and length of a wall increases when either reinforced vertically or with horizontally reinforced bond beams. For reinforced walls the permissible dimensions can be obtained from the following:

Section 1.5.4 - Vertical Reinforced Walls

Section 1.5.5 - Horizontal Reinforced Walls

Section 1.5.6 - Steel Mullions

Step 3b - If the permissible dimensions are still not sufficient, then choose a thicker wall and recalculate.

Building Classes

Class 1: one or more buildings which in association constitute:

(a) Class 1a – single dwelling house

- (i) a detached house; or
- (ii) one or more attached dwellings, each being a building, separated by a fire-resisting wall, including a row house, terrace house, town house or villa unit; or

(b) Class 1b - boarding house, guest house, hostel or the like with a total floor area not exceeding 300m² and in which not more than 12 persons would ordinarily be resident, which is not located above or below another dwelling or another Class of building other than a private garage.

Class 2: a building containing two or more sole-occupancy units each being a separate dwelling.

Class 3: a residential building, other than a building of Class 1 or 2 which is a common place of long term or transient living for a number of unrelated persons, including:

- (a) A boarding house, guest house, hostel, lodging-house or backpackers accommodation; or
- (b) A residential part of a hotel or motel; or
- (c) A residential part of a school; or
- (d) Accommodation for the aged, disabled or children; or
- (e) A residential part of a health-care building which accommodates members of staff; or
- (f) A residential part of a Detention Centre for the accommodation of the inmates of the centre.

Class 4: a dwelling in a building that is Class 5, 6, 7, 8 or 9 if it is the only dwelling in the building.

Table A - NCC-BCA requirements for FRL (Type of fire construction required is indicated in brackets)

Class of Building			Number of stories				
Class 1			ANY				
Classes 2, 3 & 4 Part				1 (C)	2 (B)	3 or more (A)	
Class 5							
Class 6							
Class 7 (Except Car Parks) and 8							
Class 7 Car Parks							1 or 2 (C)
Class 9							
Type of Construction (NCC-BCA Vol 1 C1.1)				C	B	A	C
External Load Bearing Walls	Distance from fire source feature	Less than 1.5m	60/60/60**	90/90/90	90/90/90	90/90/90	60/60/60
		1.5m to less than 3m	60/60/60**	-/-/-	90/60/30	90/60/60	-/-/-
		3m to less than 9m	60/60/60**	-/-/-	90/30/30	90/60/30	-/-/-
		9m to less than 18m	60/60/60**	-/-/-	90/30/-	90/60/30	-/-/-
		18m or more	60/60/60**	-/-/-	-/-/-	90/60/30	-/-/-
External Non	Distance from fire source feature	Less than 1.5m	60/60/60**	90/90/90	-/90/90	-/90/90	-/60/60
		1.5m to less than 3m	60/60/60**	90/90/90	-/60/30	-/60/60	-/-/-
		3m or more	60/60/60**	-/-/-	-/-/-	-/-/-	-/-/-
Common Walls and Fire Walls (and separating walls in Class 1)			60/60/60	90/90/90	90/90/90	90/90/90	90/90/90
Internal Walls	Fire-resisting lift shafts	LB			90/90/90	90/90/90	
		NLB				-/90/90	
	Fire-resisting stair shafts	LB		60/60/60**	90/90/90	90/90/90	
		NLB		60/60/60**	-/90/90	-/90/90	
	Between, or bounding sole-occupancy units, bounding public corridors, public hallways or the like	LB		60/60/60	60/60/60	90/90/90	
		NLB		60/60/60	-/60/60	-/60/60	
	Ventilating pipe, garage or the like shafts not used for the discharge of hot products of combustion	LB				90/90/90	
		NLB				-/90/90	
Other load bearing walls, internal walls, internal beams, trusses and columns					60/-/-	90/-/-	
External Column (Not incorporated in external wall)	Distance from fire source feature	Less than 3m		90/-/-	90/-/-	90/-/-	60/-/-
		3m or more		-/-/-	-/-/-	-/-/-	60/-/-

Class 5: an office building used for professional or commercial purposes, excluding buildings of Class 6, 7, 8, or 9.

Class 6: a shop or other building for the sale of goods by retail or the supply of services direct to the public, including:

- (a) An eating room, cafe, restaurant, milk or soft-drink bar; or
- (b) A dining room, bar, shop or kiosk part of a hotel or motel; or
- (c) A hairdresser's or barber's shop, public laundry, or undertaker's establishment; or
- (d) Market or sale room, showroom, or service station.

Class 7: a building which is:

- (a) A public carpark*; or
- (b) For storage, or display of goods or produce for sale by wholesale.

* for a list of conditions required to be met to use the nominated values for car parks, please refer to Table C1.1 in NCC-BCA Volume 1 to determine type of fire construction required, then refer to clause 3.9a for Type A, 4.2a for Type B and 5.2a for Type C.

Class 8: a laboratory, or a building in which a handicraft or process for the production, assembling, altering, repairing, packing, finishing, or cleaning of goods or produce is carried out for trade, sale or gain.

Class 9: a building of a public nature:

- (a) Class 9a – a health-care building; including those parts of the building set aside as a laboratory; or
- (b) Class 9b – an assembly building, including a trade workshop, laboratory or the like in a primary or secondary school, but excluding any other parts of the building that are of another Class; or
- (c) Class 9c – an aged care building.

Class 10: a non-habitable building or structure:

- (a) Class 10a – a non-habitable building being a private garage, carport, shed, or the like; or
- (b) Class 10b – a structure being a fence, mast, antenna, retaining or free-standing wall, swimming pool, or the like.
- (c) Class 10c – a private bushfire shelter

B	A	C	B	A	B	A	B	A
60/60/60	60/60/60	90/90/90	120/120/120	120/120/120	180/180/180	180/180/180	240/240/240	240/240/240
60/60/60	60/60/60	60/60/60	120/90/60	120/90/90	180/120/90	180/180/120	240/180/120	240/240/180
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-/-/-	60/60/60			-/120/120		-/120/120		-/120/120
60/60/60**	60/60/60	60/60/60**	120/120/120	120/120/120	180/120/120	180/120/120	240/120/120	240/120/120
60/60/60**	60/60/60	60/60/60**	-/120/120	-/120/120	-/120/120	-/120/120	-/120/120	-/120/120
			120/-/-	120/-/-	180/-/-	180/-/-	240/-/-	240/-/-
			-/-/-	-/-/-	-/-/-	-/-/-	-/-/-	-/-/-
				120/90/90		180/120/120		240/120/120
				-/90/90		-/120/120		-/120/120
			120/-/-	120/-/-	180/-/-	180/-/-	240/-/-	240/-/-
60/-/-	60/-/-	90/-/-	120/-/-	120/-/-	180/-/-	180/-/-	240/-/-	240/-/-
60/-/-	60/-/-	-/-/-	-/-/-	-/-/-	-/-/-	-/-/-	-/-/-	-/-/-

** Minimum value required if designated as being required by designer

1.2 General design/construction considerations

To achieve the required fire performance of a wall, it is essential that installation is in accordance with the masonry manufacturer's details and relevant installation standards. This should include fire sealing at the wall head and perimeters, and filling of mortar joints. All gaps and penetrations should be effectively fire sealed.

Recesses for services

The effect of recesses for services on the fire-resistance periods for structural adequacy, integrity and insulation of a wall, shall be ignored provided that the thickness of wall remaining is not less than half the wall thickness and the total area of recesses is not more than 10,000mm² total on both faces within any 5m² area.

Note: where the wall is constructed of cored or hollow units, the recess can extend into the cores.

If these limits are exceeded, the thickness of the wall shall be taken as the overall thickness of the wall less than the depth of recess.

Control joints in fire resistant walls

Clause C3.16 of the NCC-BCA Volume One states:

Construction joints, spaces and the like in and between building elements required to be fire resisting with respect to integrity and insulation must be protected in a manner identical with a prototype tested in accordance with AS1530.4 to achieve the required FRL.

There are many companies producing a range of sealing products suitable. Two systems currently available in the market are listed below. Adbri Masonry advise you check with the relevant companies to ensure these products are still available

1) FyreBake is a polyurethane construction sealant. It is fire and acoustic rated with concrete block for residential and office partitions. Suitable for interior and exterior environments, the product has been tested in accordance with AS1530.4 and found to achieve an FRL of up to four hours for integrity and three hours for insulation. This product is distributed by Ramset.

2) Promaseal® FyreStrip is a compressible, flexible, fire resistant strip which has been tested in accordance with AS1530.4 and can achieve up to four hours for integrity depending on the application.

It should be noted that Adbri Masonry do not recommend the use of any particular sealant. The two nominated above are systems listed on the internet who provide fire test certificates. You should ensure AS1530.4 compliance for any product you propose to use.

Design of cavity walls for fire resistance

For the design of cavity walls some specific rules are given in AS3700:

For integrity and insulation the material thickness of both leaves is added together and the cavity ignored to give the "material thickness". However, for structural adequacy where only one leaf is loadbearing, then the FRL for structural adequacy is based on the loaded leaf alone and the non-loaded leaf is ignored. If both leaves are equally loaded (to within 10% of one another) or both leaves are non-load bearing, then the thickness for structural adequacy is based on two-thirds of the sum of the thickness of the two leaves.

1.3 FRL for Integrity and Insulation

Table B - Integrity and Insulation

Product Type	Block Code	Coring (%)	Material Thickness (mm)	Dimensions (mm)	FRL for Integrity and Insulation (mins)		Structural Adequacy Chart to Use
					Cores Filled with Grout		
					None	All	
Litec® NLB ¹ (Test) ³ (≤1800 kg/m ³)	L11.162	< 30	110		180	n/a	Litec
	L1001	< 30	90		120	n/a	Litec
	L1031	< 30	90		120	n/a	Litec
	L1501	> 30	85		120	120	Litec
	L1501.4	< 30	140		240	n/a	Litec
	L1583	< 30	140		240	n/a	Litec
	L2001.2	> 30	90		120	240	Litec
	L2001.3	> 30	108		180	240	Litec
	L2001.4	> 30	133		240	240	Litec
	L2083	< 30	190		240	n/a	Litec
Litec® LB ² DTS ⁴ (≤1800 kg/m ³)	L11.076	< 30	110		120	n/a	≥ 45% Basalt
	L15412	> 30	80		60	120	≥ 45% Basalt
	L20412	> 30	86		60	240	≥ 45% Basalt
	L3042	> 30	108		90	240	≥ 45% Basalt
	L1001	< 30	90		90	n/a	< 45% Basalt
	L1031	< 30	90		90	n/a	< 45% Basalt
	L1501	< 30	85		60	n/a	< 45% Basalt
	L1501.3	< 30	140		180	n/a	< 45% Basalt

Notes:

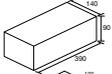
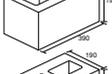
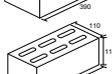
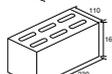
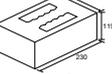
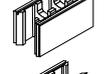
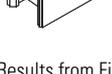
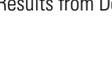
1) Non Load Bearing (NLB) - see definitions glossary

2) Load Bearing (LB) - see definitions glossary

3) Results from Fire Tests

4) Results from Deemed-to-Satisfy tables in AS3700.2018

Table B - Integrity and Insulation cont.

Product Type	Block Code	Coring (%)	Material Thickness (mm)	Dimensions (mm)	FRL for Integrity and Insulation (mins)		Structural Adequacy Chart to Use
					Cores Filled with Grout		
					None	All	
Litec® LB² DTS⁴ (≤1800 kg/m³)	L1583	< 30	140		180	n/a	< 45% Basalt
	L2001	> 30	90		90	240	< 45% Basalt
	L2001.3	> 30	108		90	240	< 45% Basalt
	L2001.4	> 30	133		120	240	< 45% Basalt
	L2083	< 30	190		240	n/a	< 45% Basalt
Standard Dense LB² DTS⁴ (>1800 kg/m³)	D11.119	< 30	110		90	n/a	≥ 45% Basalt
	D11.162	< 30	110		90	n/a	≥ 45% Basalt
	D14.119	< 30	140		120	n/a	≥ 45% Basalt
	Versaloc 150**	> 30	150		n/a	120	n/a
	Versaloc 200**	> 30	190		n/a	240	n/a
	Versaloc 300**	> 30	290		n/a	240	n/a

Notes:

1) Non Load Bearing (NLB) - see definitions glossary

3) Results from Fire Tests

2) Load Bearing (LB) - see definitions glossary

4) Results from Deemed-to-Satisfy tables in AS3700.2018

** Denotes values provided for fully corefilled units only

1.4 FRL for structural adequacy

Table C - Slenderness ratios for structural adequacy used in following charts

Aggregate Type	Maximum Slenderness Ratio				
	FRL (minutes)				
	60	90	120	180	240
Standard Dense¹ DTS³ >45% Basalt	22.5	21.0	20.0	18.0	17.0
Litec¹ DTS³ >45% Basalt	22.5	21.0	20.0	18.0	17.0
Litec¹ DTS³ <45% Basalt	18.0	17.0	16.0	15.5	15.0
Litec² Test⁴	29.6 (NLB)	29.6 (NLB)	29.6 (NLB)	29.6 (NLB)	29.6 (NLB)
Litec² Test⁵	29.6 (NLB)	29.6 (NLB)	29.6 (NLB)	22.6 (NLB)	20.6 (NLB)

Notes:

1) Load Bearing (LB) applications - see definitions glossary

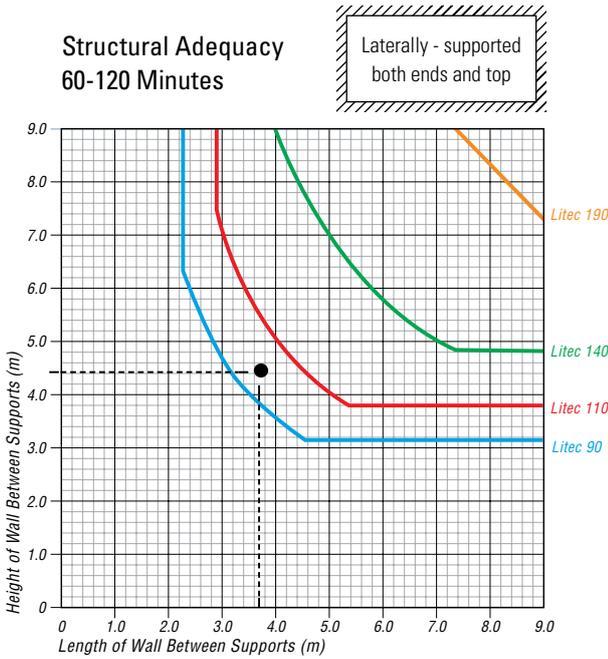
2) Non Load Bearing (NLB) applications - see definitions glossary

3) Results from Deemed-to-Satisfy tables in AS3700.2018

4) Results from Fire Test (Single Test 76mm product which tested to 240 minutes)

5) Results from Fire Tests (Extrapolation from 2 test results)

1.4.1 How to use the Fire Resistance Level Charts (for Structural Adequacy) in the following charts



Step 1 - Select the appropriate chart for the required block leaf thickness, aggregate type and support conditions

Step 2 - If wall height and length between supports are known, plot this point on the chart to determine the appropriate masonry unit thickness. The appropriate unit thickness is represented by the curve lying ABOVE the intersecting point (In this example the 110mm unit is the appropriate thickness).

Step 3 - If only the wall height is known, the maximum length of wall between supports will be determined by the area immediately below the leaf thickness curves. (In this example a 4.5m wall height would require a maximum of 3.1m wall lengths in 90mm or 4.5m wall lengths in 110mm)

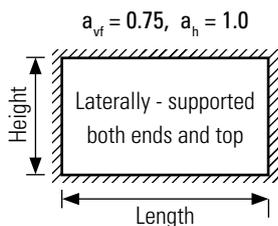
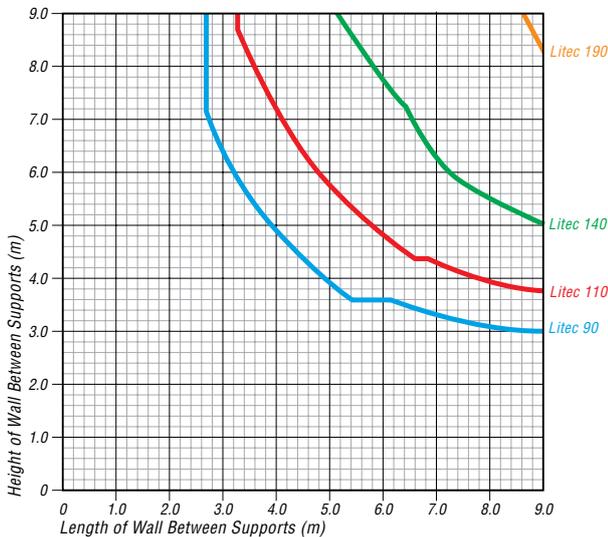
Note: Following charts based on top lateral support co-efficients $a_{vf} = 0.75$ and $a_{vr} = 2.0$ and vertical edge lateral support co-efficients $a_h = 1.0$ and $a_n = 2.5$.

1.4.2 Un-reinforced Masonry

Chart 1 Litec 90mm, 110mm, 140mm and 190mm Leaf

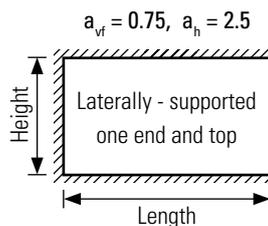
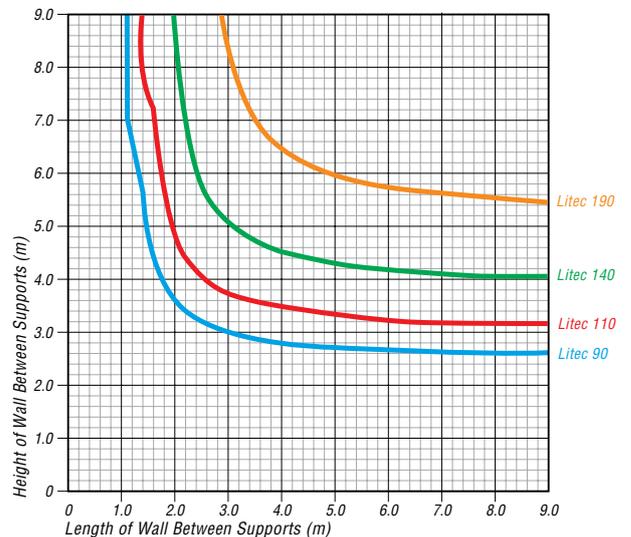
Wall not supporting any other load than it's self weight
Non Load Bearing, From Test, Un-reinforced Masonry

60-240 Minutes FRL



Fire-resistance level, FRL (minutes), for Structural Adequacy

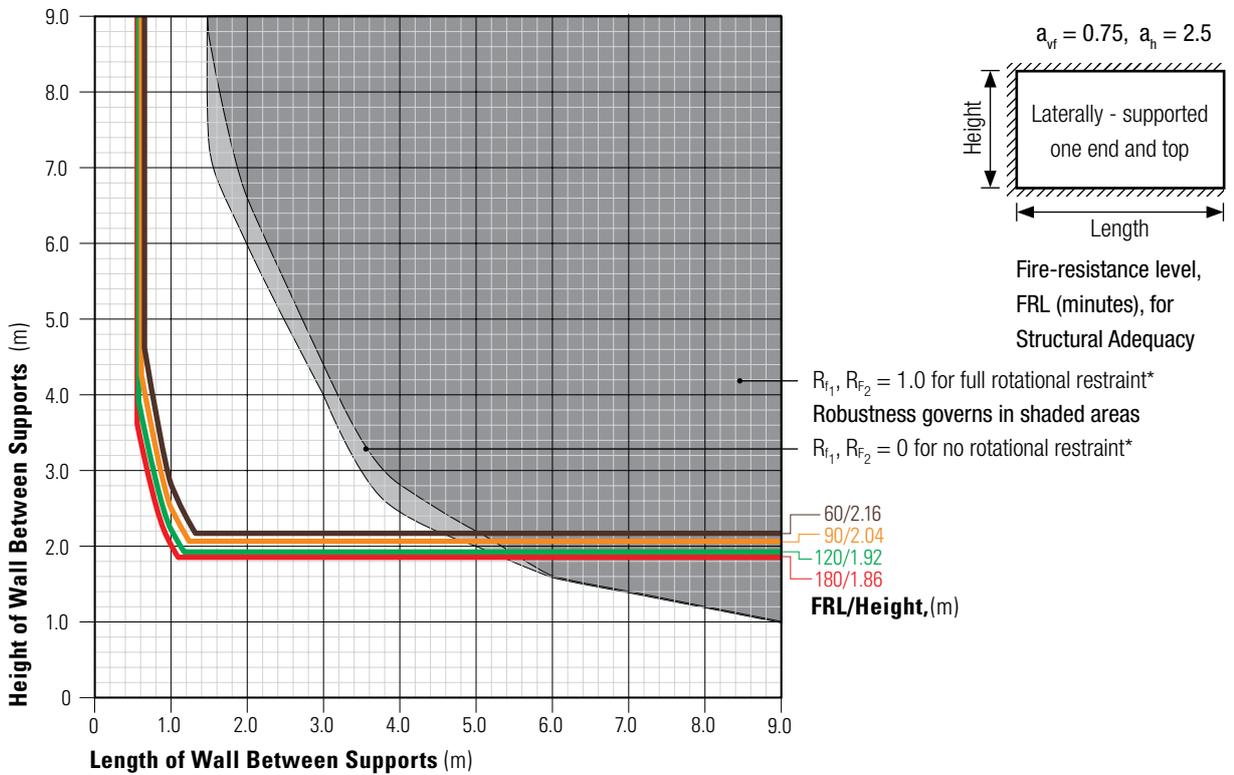
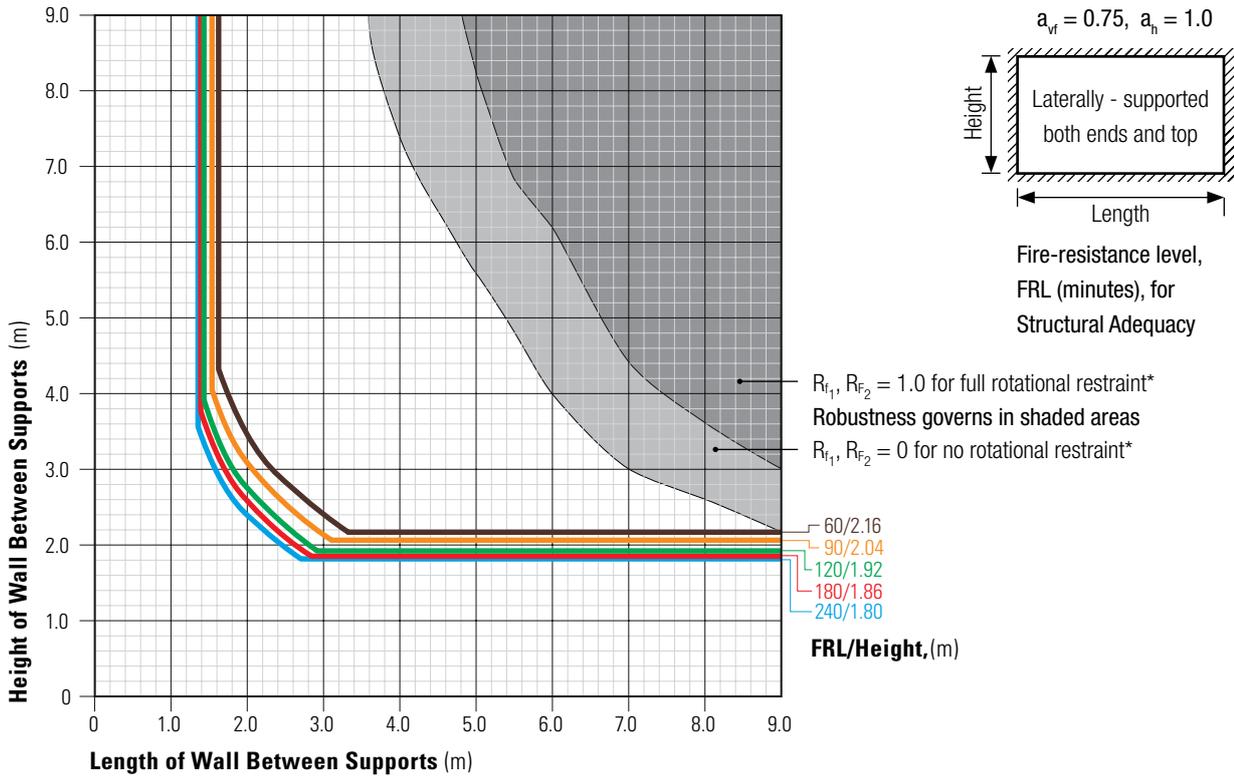
60-240 Minutes FRL



Fire-resistance level, FRL (minutes), for Structural Adequacy

Notes - It is the designer's responsibility to allow for the effects of control joints, chases, openings, strength and stiffness of ties connectors, and strength and stiffness of supports, in addition to normal considerations of loads and masonry properties

90-mm leaf < 45% Basalt



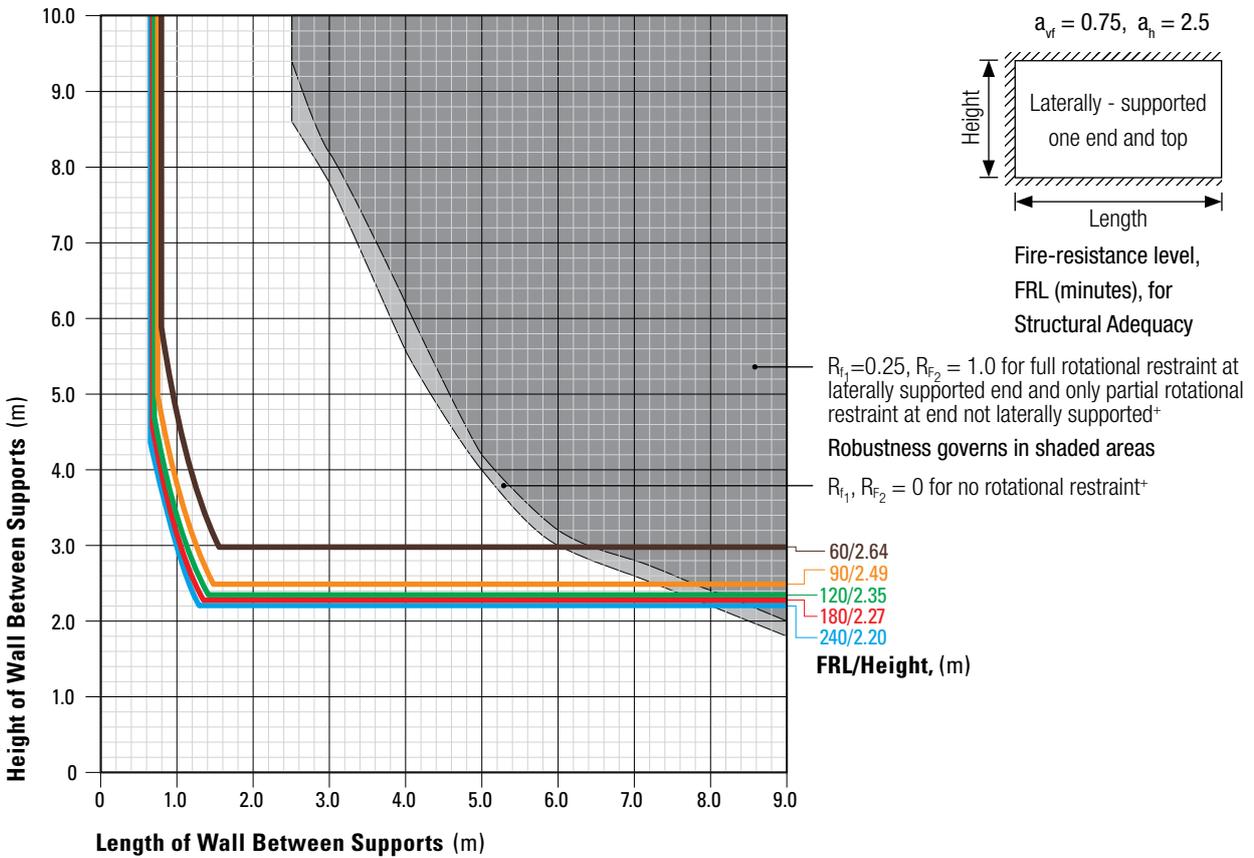
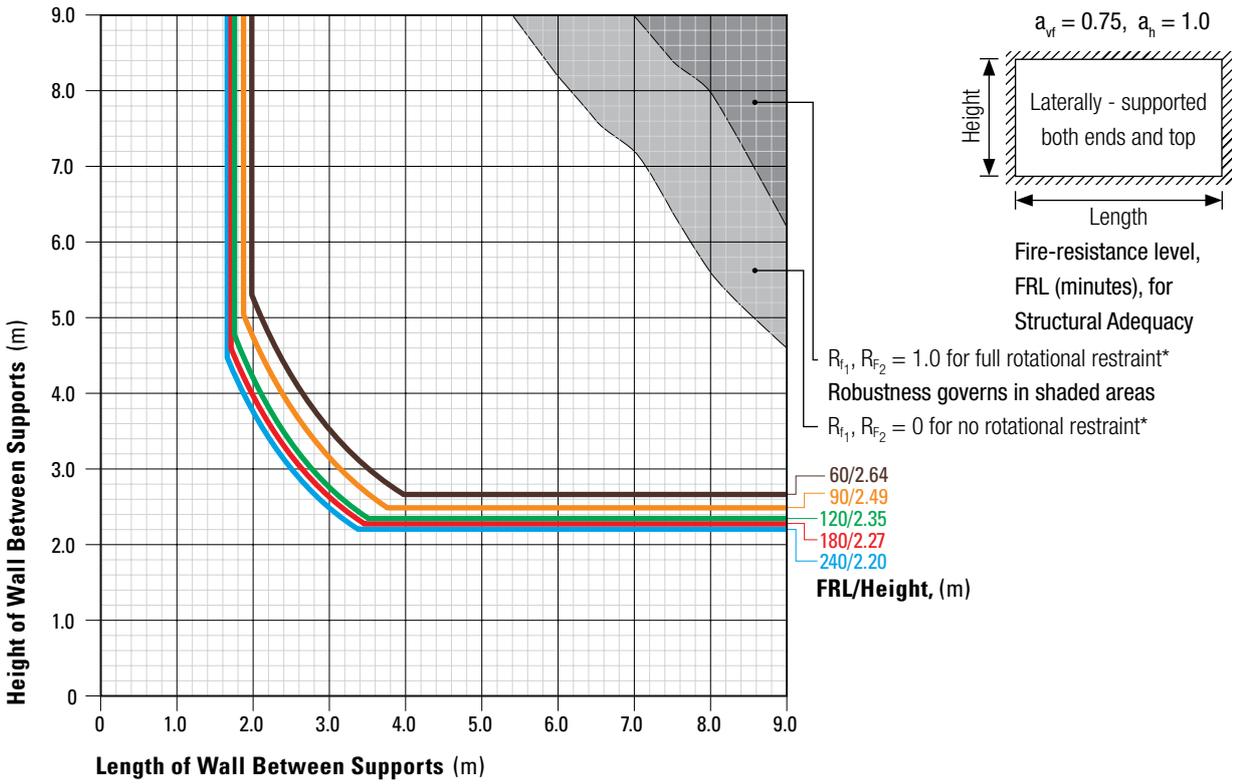
Notes - It is the designer's responsibility to allow for the effects of control joints, chases, openings, strength and stiffness of ties connectors, and strength and stiffness of supports, in addition to normal considerations of loads and masonry properties

* - Robustness curves have been provided for the best case scenario of full rotational restraint at each end, and the worst case scenario of no rotational restraint at each end. This will allow the designer to extrapolate for partial restraint conditions suited to their project.

+ - Robustness curves have been provided for worst case scenario of no rotational restraint at each end of panel, and best case scenario of full rotational restraint at laterally supported end and partial rotational restraint (0.25) at end with no lateral restraint. This position has been adopted to allow the designer to extrapolate between these lines for conditions suited to their project.

Data per 90mm leaf is based on 10:31 solid units

110-mm leaf < 45% Basalt

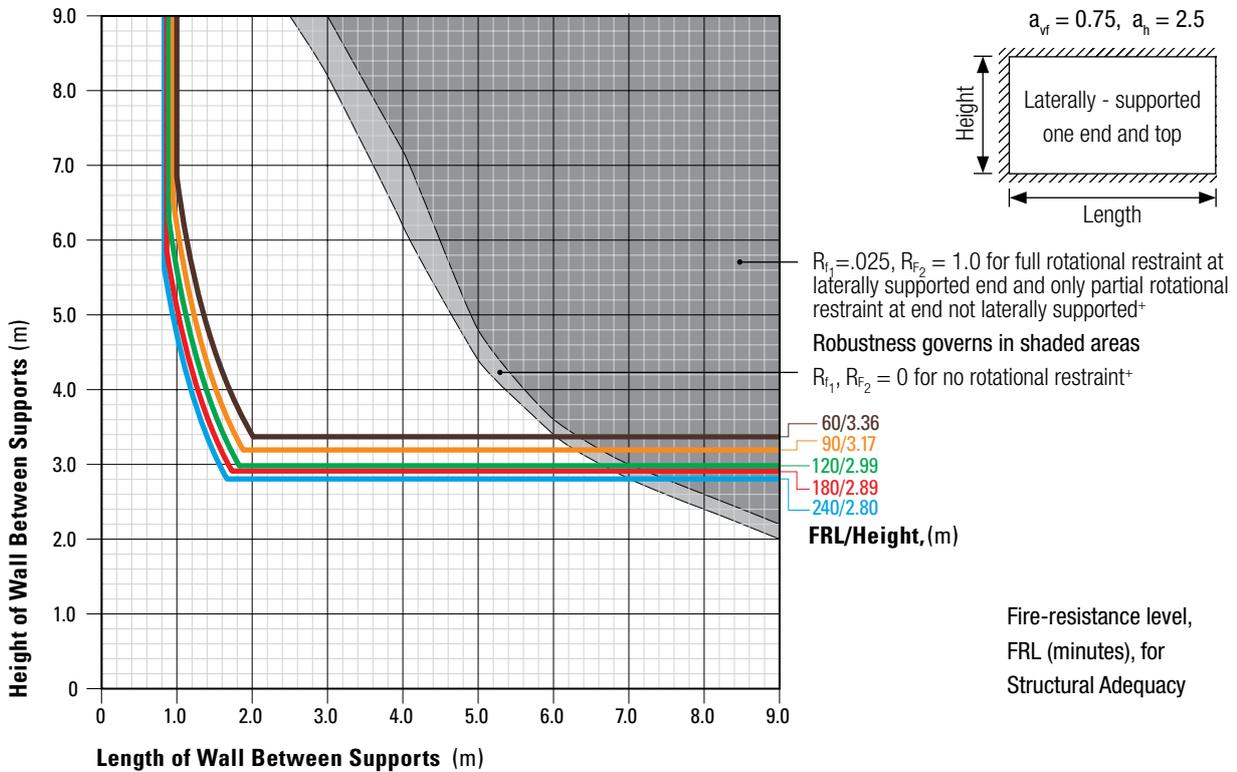
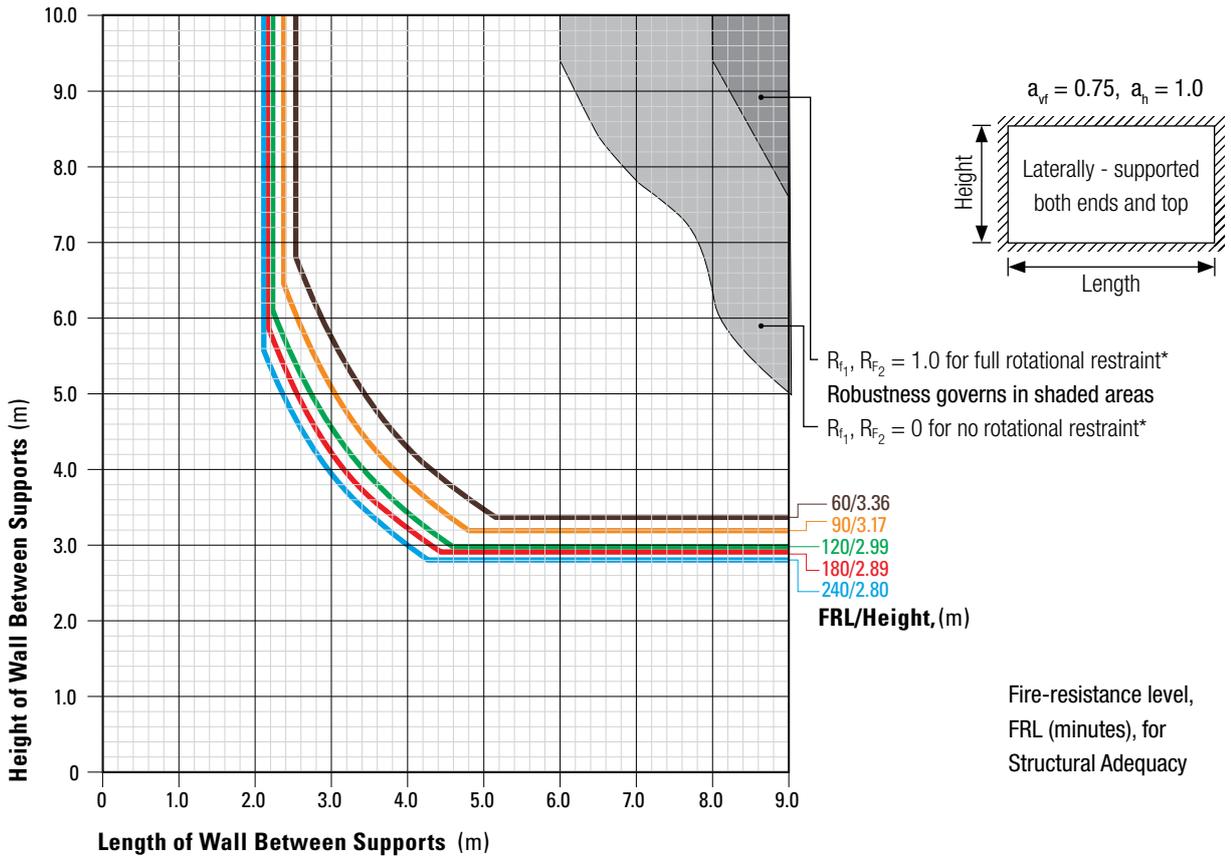


Notes - It is the designer's responsibility to allow for the effects of control joints, chases, openings, strength and stiffness of ties connectors, and strength and stiffness of supports, in addition to normal considerations of loads and masonry properties

* - Robustness curves have been provided for the best case scenario of full rotational restraint at each end, and the worst case scenario of no rotational restraint at each end. This will allow the designer to extrapolate for partial restraint conditions suited to their project.

+ - Robustness curves have been provided for worst case scenario of no rotational restraint at each end of panel, and best case scenario of full rotational restraint at laterally supported end and partial rotational restraint (0.25) at end with no lateral restraint. This position has been adopted to allow the designer to extrapolate between these lines for conditions suited to their project.

140-mm leaf < 45% Basalt



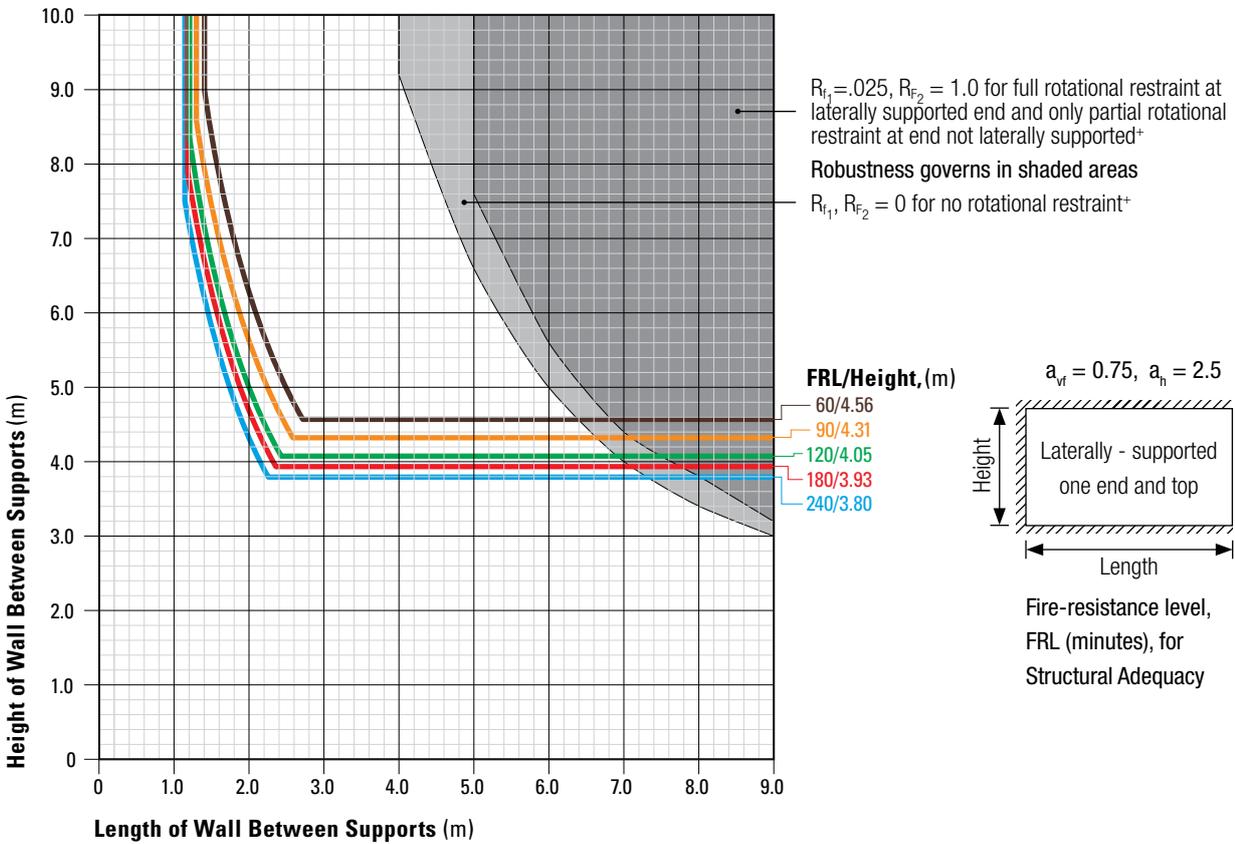
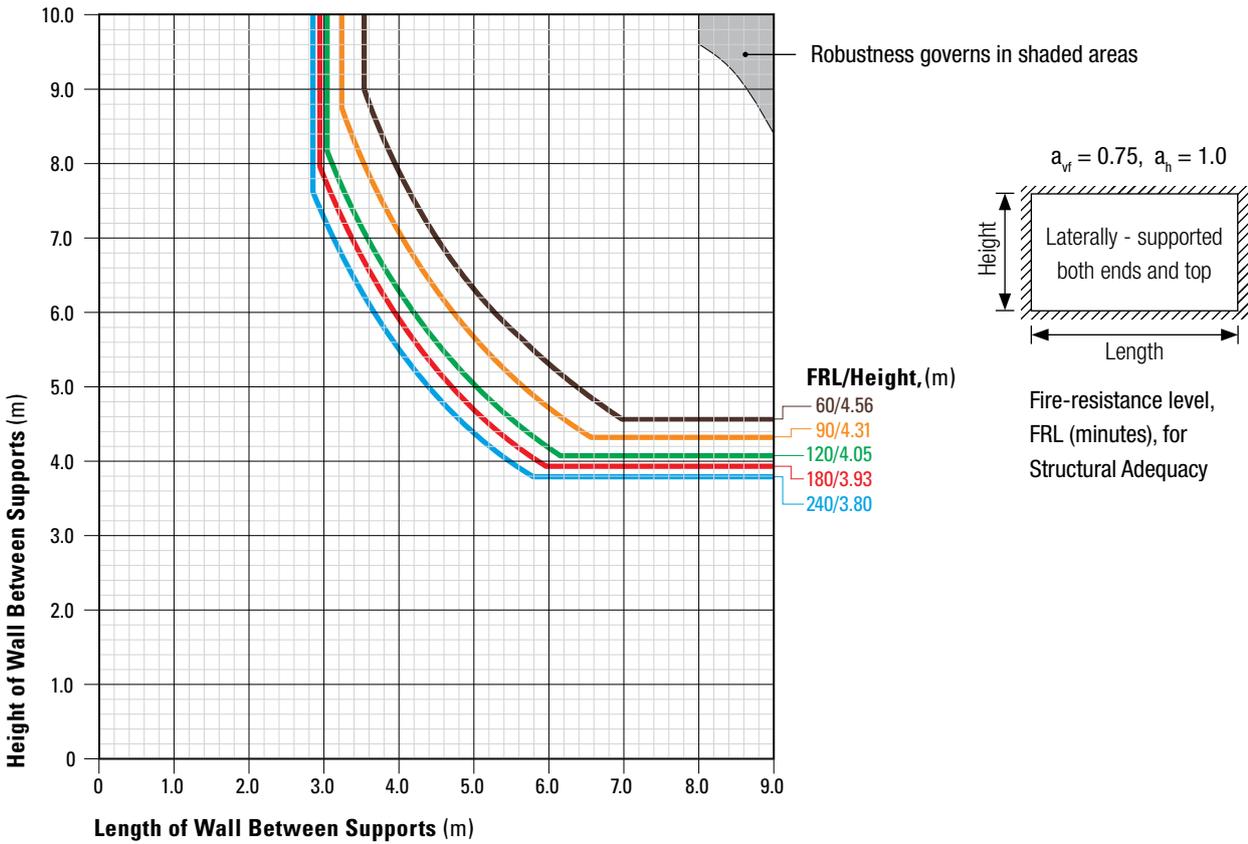
Notes - It is the designer's responsibility to allow for the effects of control joints, chases, openings, strength and stiffness of ties connectors, and strength and stiffness of supports, in addition to normal considerations of loads and masonry properties

* - Robustness curves have been provided for the best case scenario of full rotational restraint at each end, and the worst case scenario of no rotational restraint at each end. This will allow the designer to extrapolate for partial restraint conditions suited to their project.

+ - Robustness curves have been provided for worst case scenario of no rotational restraint at each end of panel, and best case scenario of full rotational restraint at laterally supported end and partial rotational restraint (0.25) at end with no lateral restraint. This position has been adopted to allow the designer to extrapolate between these lines for conditions suited to their project.

Data per 90mm leaf is based on 10:31 solid units

190-mm leaf < 45% Basalt

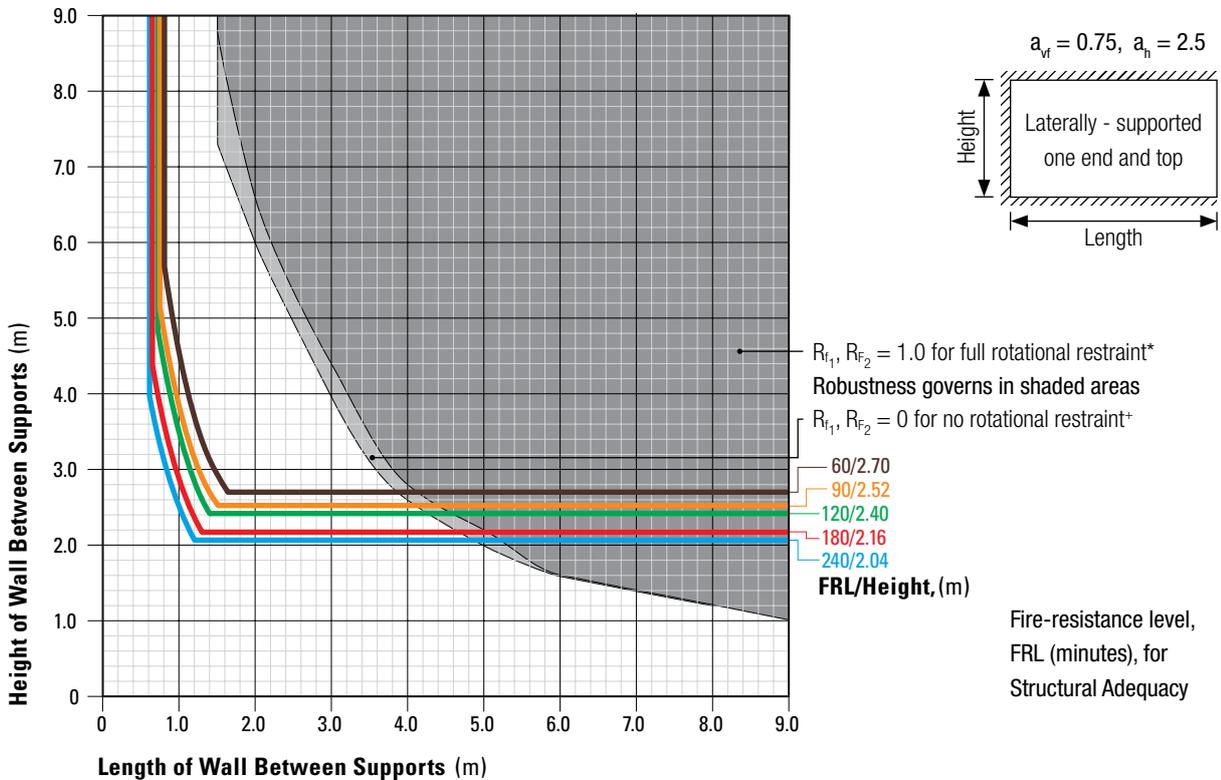
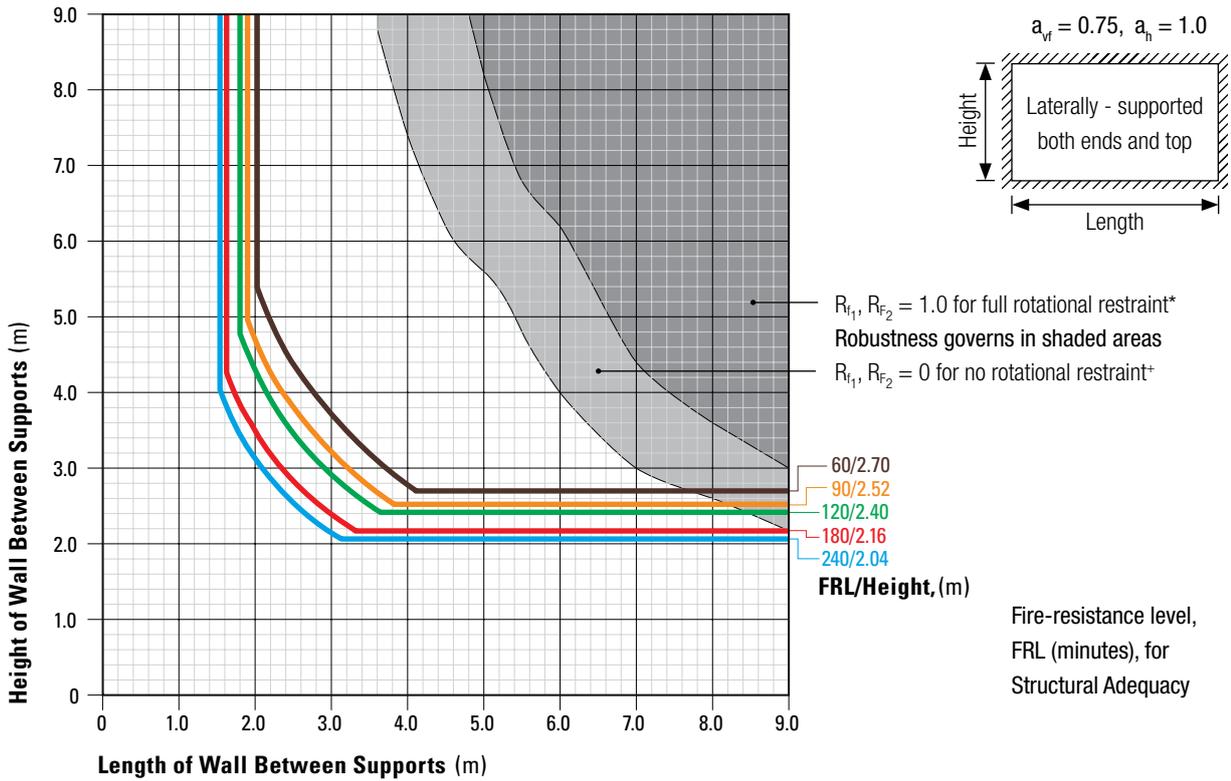


Notes - It is the designer's responsibility to allow for the effects of control joints, chases, openings, strength and stiffness of ties connectors, and strength and stiffness of supports, in addition to normal considerations of loads and masonry properties

* - Robustness curves have been provided for the best case scenario of full rotational restraint at each end, and the worst case scenario of no rotational restraint at each end. This will allow the designer to extrapolate for partial restraint conditions suited to their project.

+ - Robustness curves have been provided for worst case scenario of no rotational restraint at each end of panel, and best case scenario of full rotational restraint at laterally supported end and partial rotational restraint (0.25) at end with no lateral restraint. This position has been adopted to allow the designer to extrapolate between these lines for conditions suited to their project.

90-mm leaf \geq 45% Basalt



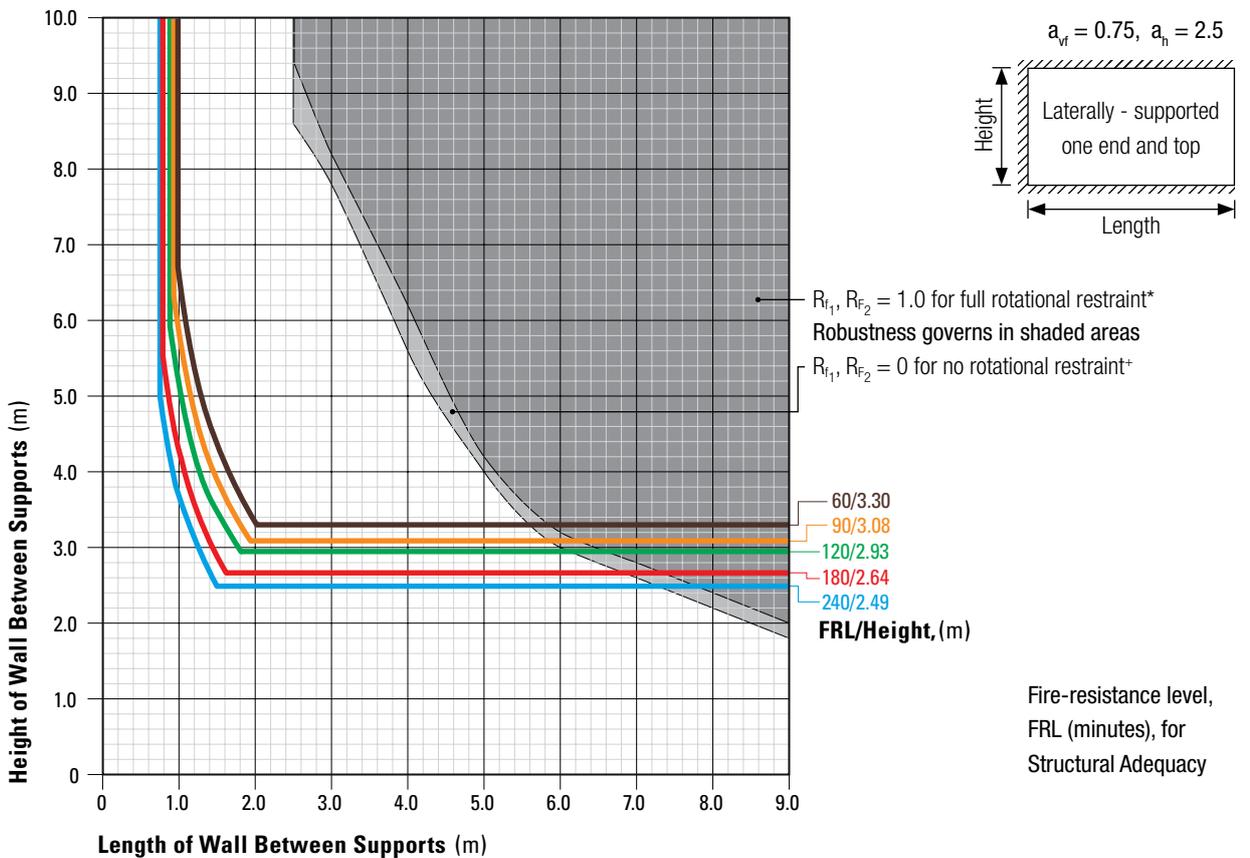
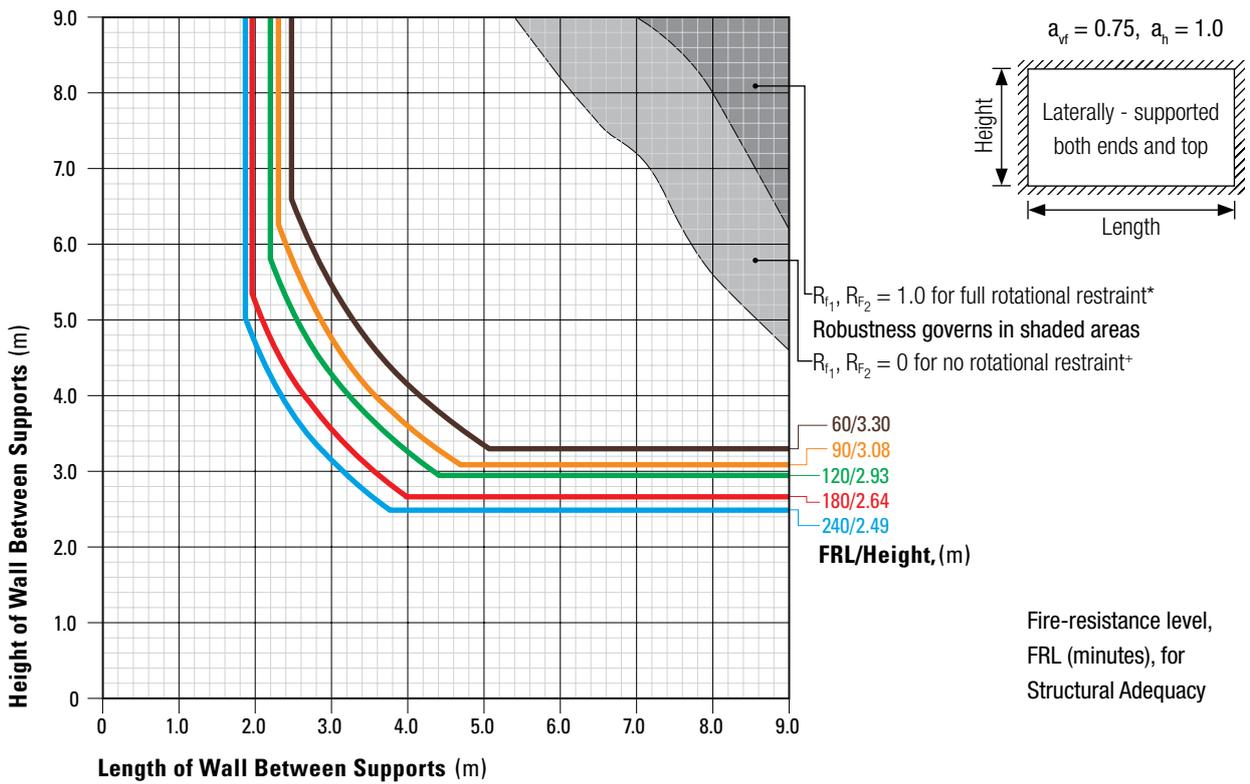
Notes - It is the designer's responsibility to allow for the effects of control joints, chases, openings, strength and stiffness of ties connectors, and strength and stiffness of supports, in addition to normal considerations of loads and masonry properties

* - Robustness curves have been provided for the best case scenario of full rotational restraint at each end, and the worst case scenario of no rotational restraint at each end. This will allow the designer to extrapolate for partial restraint conditions suited to their project.

+ - Robustness curves have been provided for worst case scenario of no rotational restraint at each end of panel, and best case scenario of full rotational restraint at laterally supported end and partial rotational restraint (0.25) at end with no lateral restraint. This position has been adopted to allow the designer to extrapolate between these lines for conditions suited to their project.

Data per 90mm leaf is based on 10:31 solid units

110-mm leaf \geq 45% Basalt

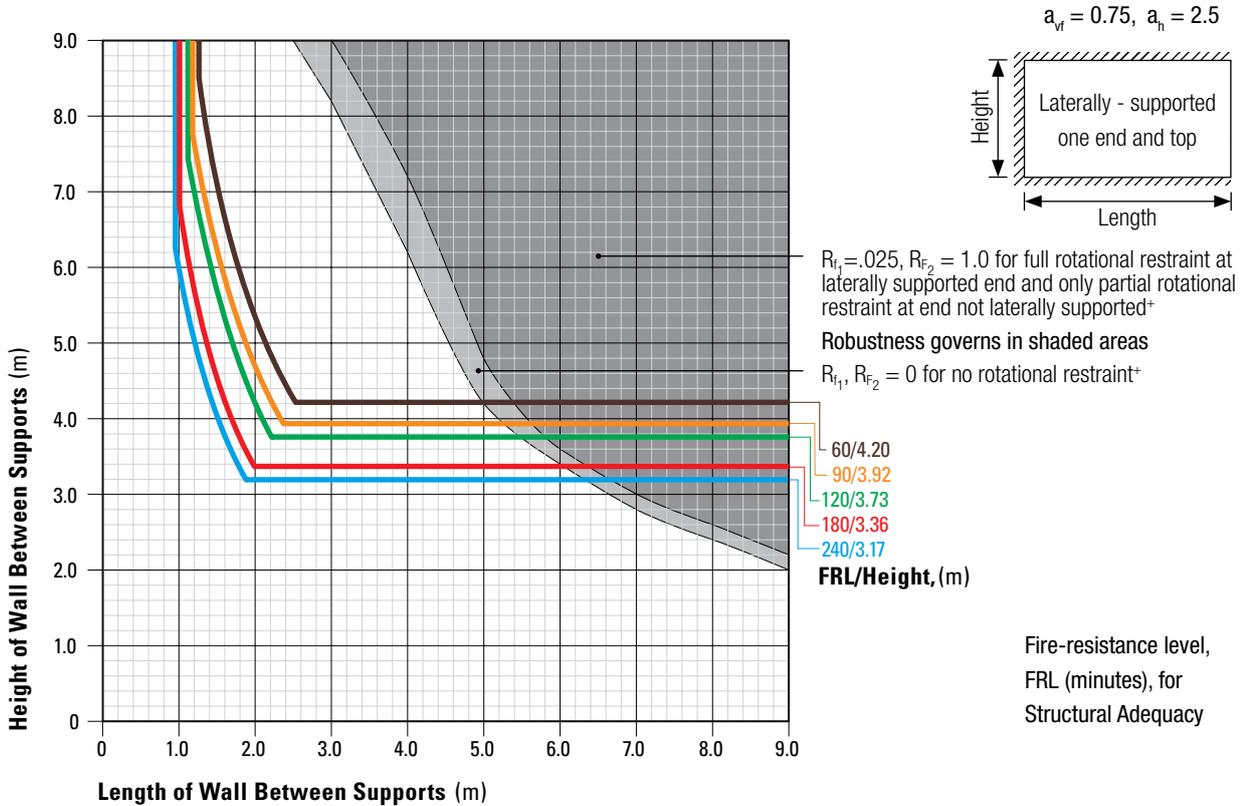
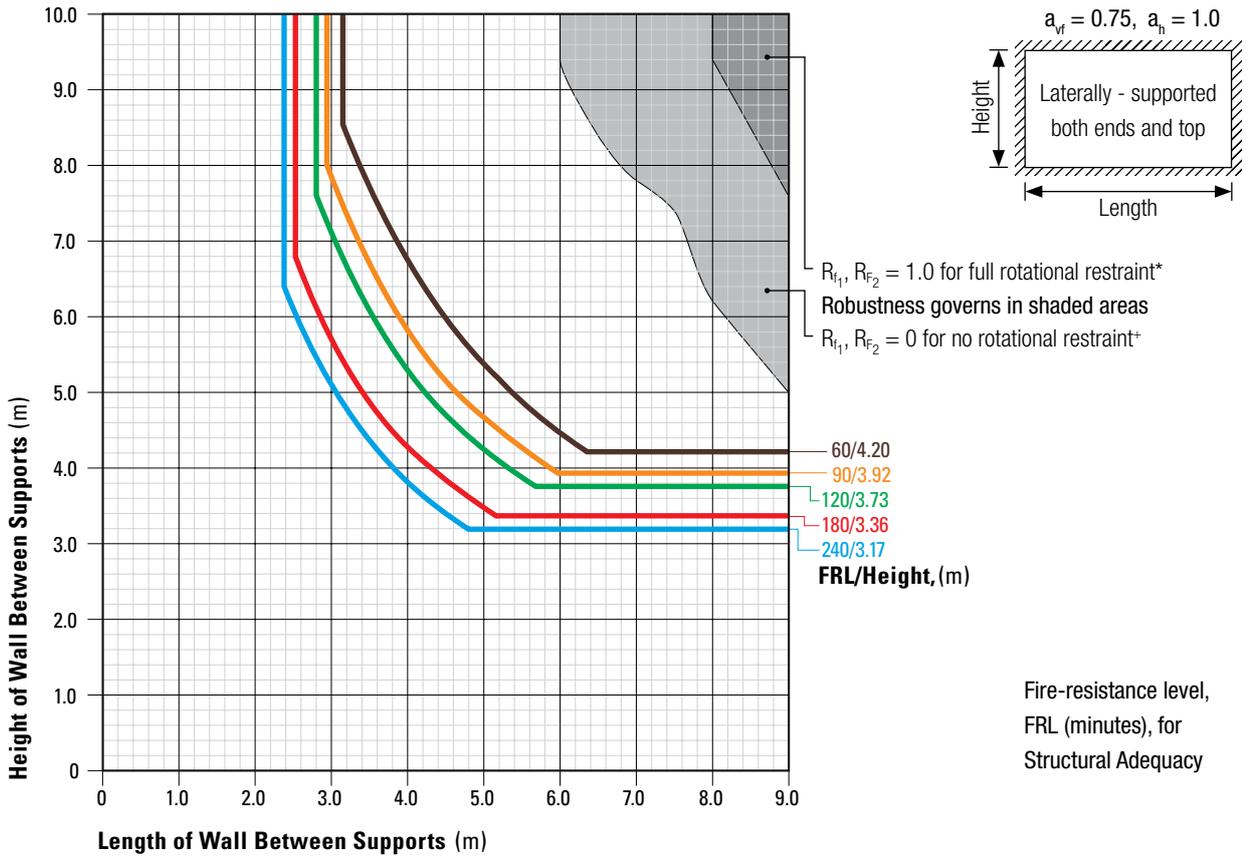


Notes - It is the designer's responsibility to allow for the effects of control joints, chases, openings, strength and stiffness of ties connectors, and strength and stiffness of supports, in addition to normal considerations of loads and masonry properties

* - Robustness curves have been provided for the best case scenario of full rotational restraint at each end, and the worst case scenario of no rotational restraint at each end. This will allow the designer to extrapolate for partial restraint conditions suited to their project.

+ - Robustness curves have been provided for worst case scenario of no rotational restraint at each end of panel, and best case scenario of full rotational restraint at laterally supported end and partial rotational restraint (0.25) at end with no lateral restraint. This position has been adopted to allow the designer to extrapolate between these lines for conditions suited to their project.

140-mm leaf \geq 45% Basalt



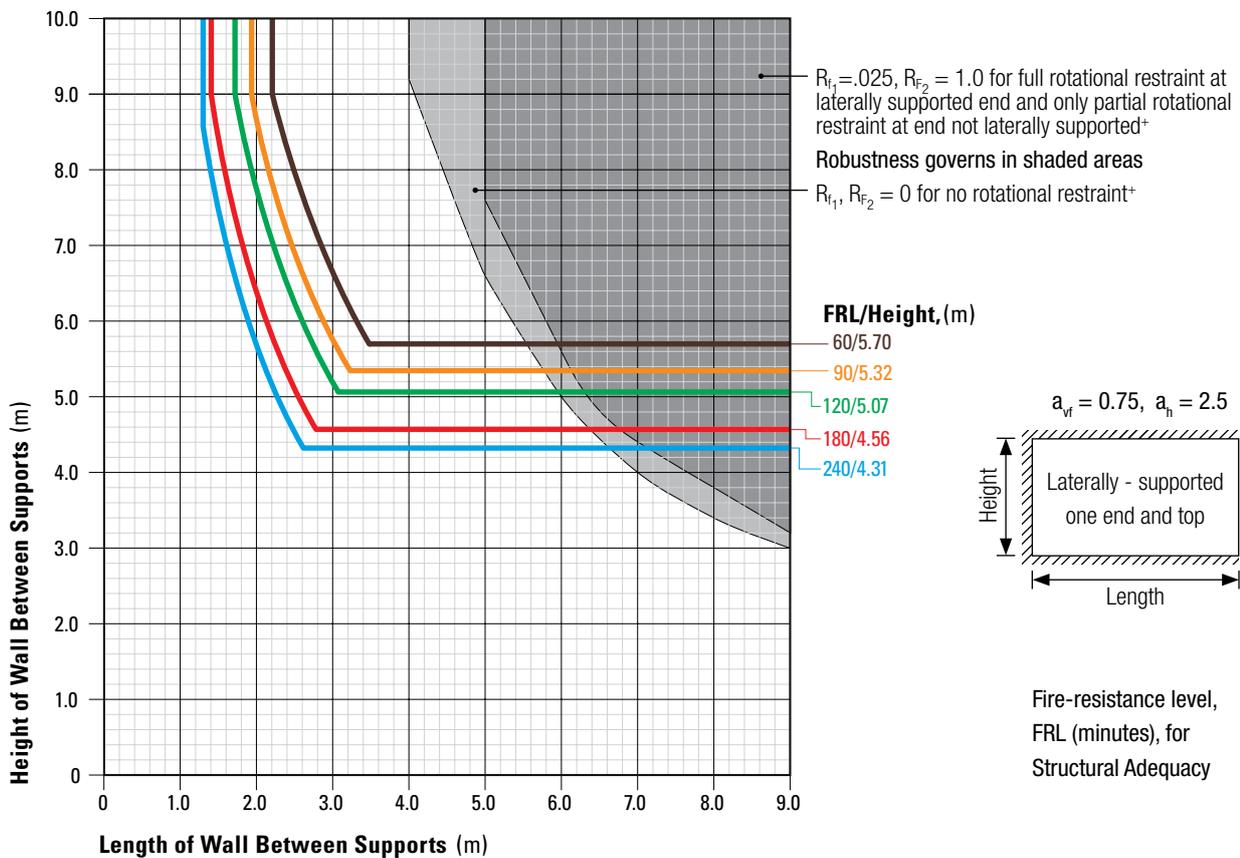
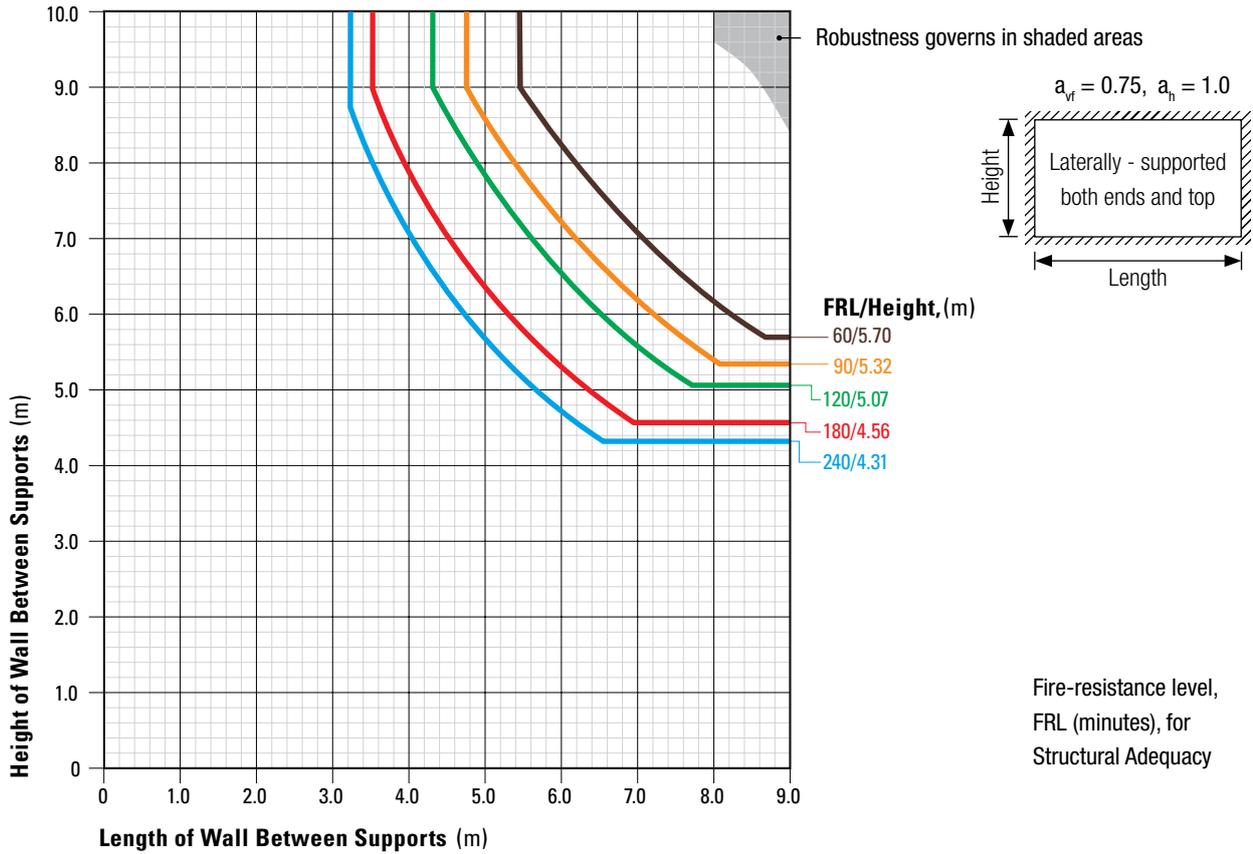
Notes - It is the designer's responsibility to allow for the effects of control joints, chases, openings, strength and stiffness of ties connectors, and strength and stiffness of supports, in addition to normal considerations of loads and masonry properties

* - Robustness curves have been provided for the best case scenario of full rotational restraint at each end, and the worst case scenario of no rotational restraint at each end. This will allow the designer to extrapolate for partial restraint conditions suited to their project.

+ - Robustness curves have been provided for worst case scenario of no rotational restraint at each end of panel, and best case scenario of full rotational restraint at laterally supported end and partial rotational restraint (0.25) at end with no lateral restraint. This position has been adopted to allow the designer to extrapolate between these lines for conditions suited to their project.

Data per 90mm leaf is based on 10:31 solid units

190-mm leaf \geq 45% Basalt



Notes - It is the designer's responsibility to allow for the effects of control joints, chases, openings, strength and stiffness of ties connectors, and strength and stiffness of supports, in addition to normal considerations of loads and masonry properties

* - Robustness curves have been provided for the best case scenario of full rotational restraint at each end, and the worst case scenario of no rotational restraint at each end. This will allow the designer to extrapolate for partial restraint conditions suited to their project.

+ - Robustness curves have been provided for worst case scenario of no rotational restraint at each end of panel, and best case scenario of full rotational restraint at laterally supported end and partial rotational restraint (0.25) at end with no lateral restraint. This position has been adopted to allow the designer to extrapolate between these lines for conditions suited to their project.

1.4.3 Reinforced Masonry

Panel Sizes for Mixed Construction

The following charts cover mixed construction where partial reinforcement by bond beams and stiffeners have been incorporated into the masonry wall. The charts have been calculated on:

Characteristic Masonry Strength	15MPa
Steel Reinforcement of N20, N16, N12	500MPa
Characteristic Grout Strength	20MPa

The following mixed construction charts provide an FRL for Structural Adequacy of 240 minutes in accordance with AS3700 Clause 6.3.5 and 6.3.6. For Integrity and Insulation FRL's refer to Section 1.4 Table B.

1.4.4 Vertically Reinforced Cores

Chart 10 140mm Leaf

140mm Beam, 1 Bar, 1 Tensile, 1 Block, Centre

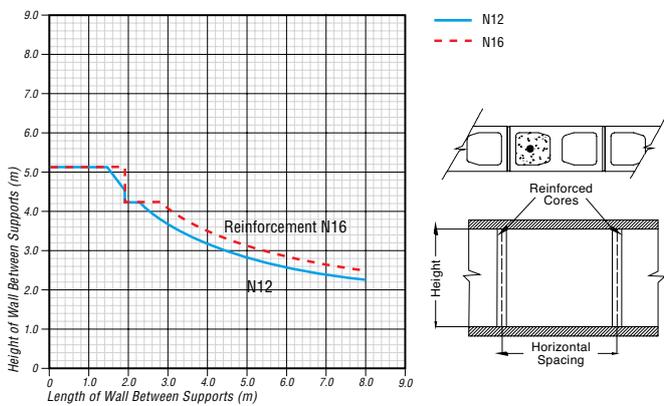
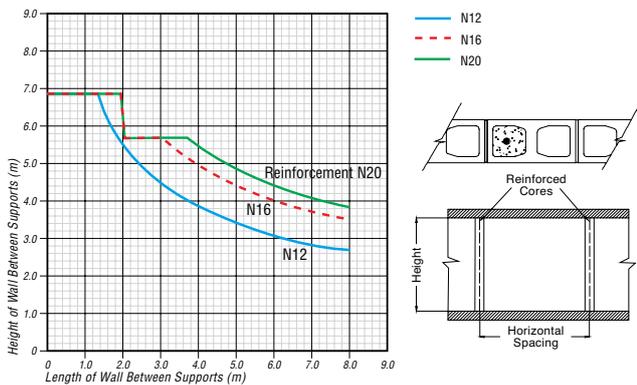
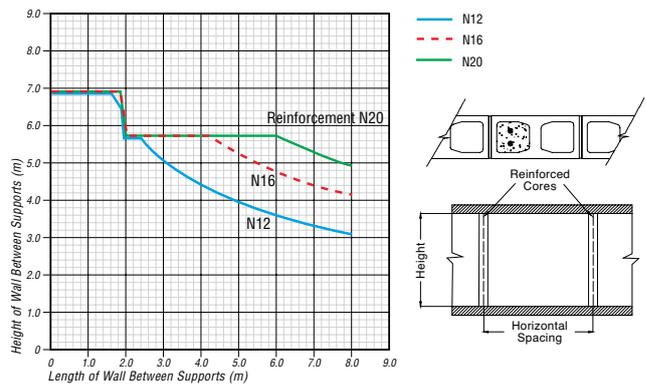


Chart 11 190mm Leaf

190mm Column, 1 Bar, 1 Tensile, 1 Block, Centre



190mm Column, 2 Bars, 1 Tensile, Edge, 1 Block



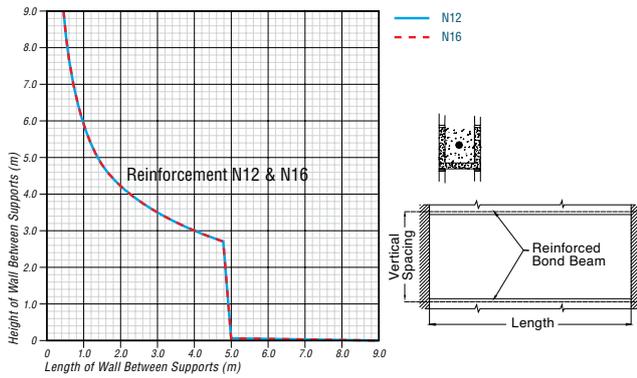
Reinforcement* required to achieve a Fire Resistance Level (FRL) for Structural Adequacy of up to 240 minutes.

*(Minimum reinforcement to resist 0.5kPa lateral load in accordance with AS3700, Clause 6.3.5)

1.4.5 Horizontally Reinforced Bond Beam

Chart 12 140mm Leaf

140mm Beam, 1 Bar, 1 Block



140mm Beam, 2 Bars, 1 Tensile, 2 Blocks, Centre

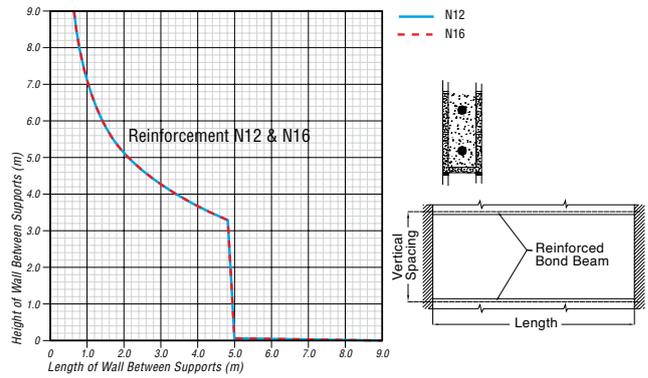
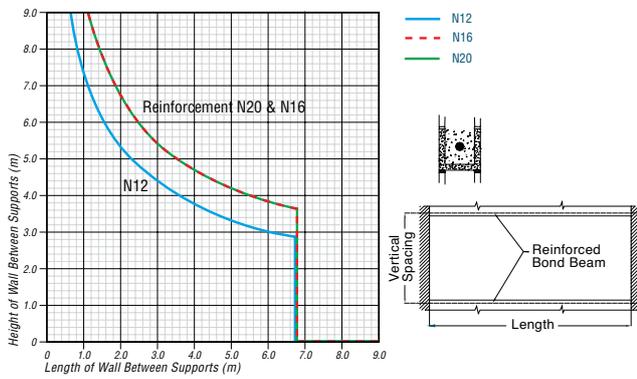
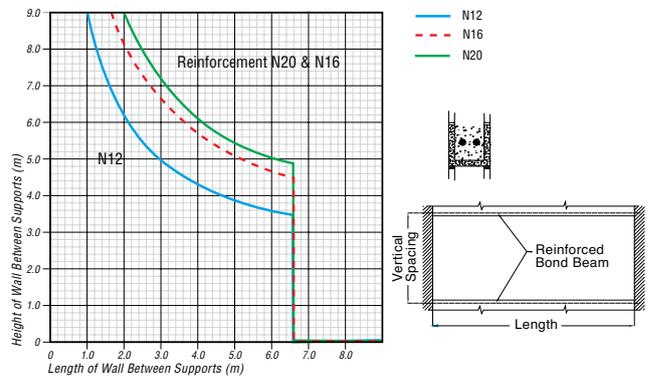


Chart 13 190mm Leaf

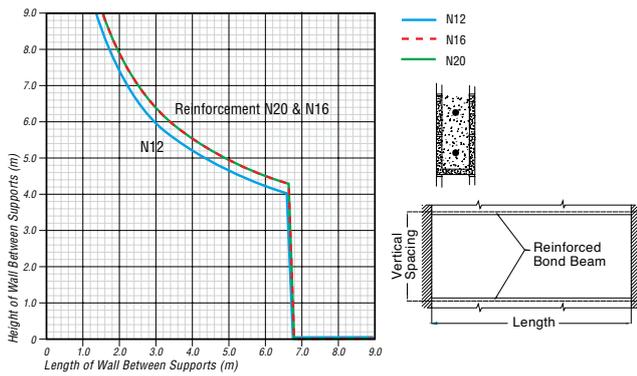
190mm Beam, 1 Bar, 1 Block, Centre



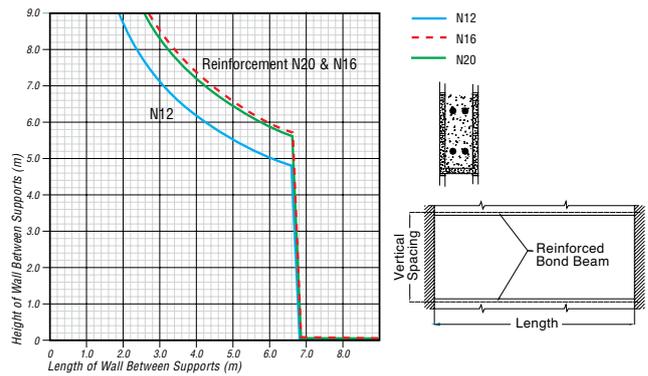
190mm Beam, 2 Bars, 1 Tensile, 1 Block



190mm Beam, 2 Bars, 1 Tensile, 2 Blocks, Centre



190mm Beam, 4 Bars, 2 Tensile, 2 Blocks, Edge



Reinforcement* required to achieve a Fire Resistance Level (FRL) for Structural Adequacy of up to 240 minutes.

*(Minimum reinforcement to resist 0.5kPa lateral load in accordance with AS3700, Clause 6.3.5)

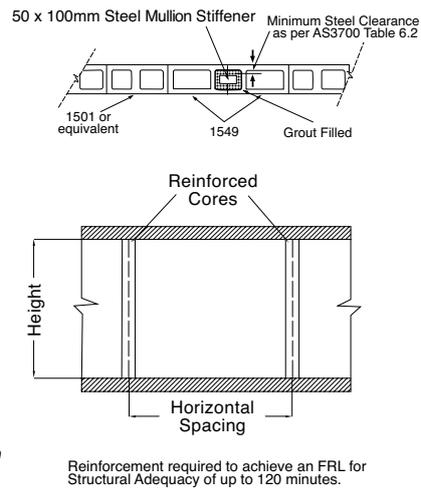
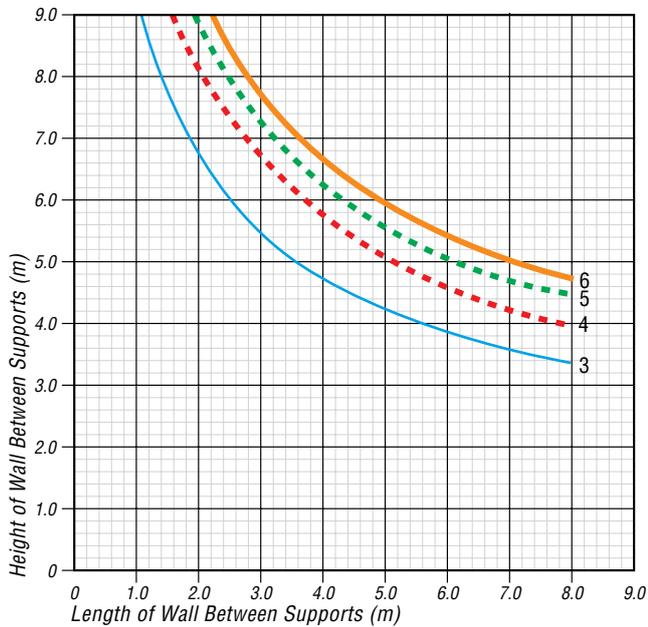
1.4.6 Wall Stiffeners using Steel Mullions

Lateral support can be provided to unreinforced masonry subject to lateral earthquake, wind or fire loads by building in galvanised steel mullions.

Steel mullions must be placed into open-ended masonry units, such as 'H' or 'A' shaped blocks, during construction of the masonry wall.

Chart 14 140mm Leaf

50 x 100mm Steel Section (wall thickness of steel tube in mm)



140mm Leaf

65 x 65mm Steel Section (wall thickness of steel tube in mm)

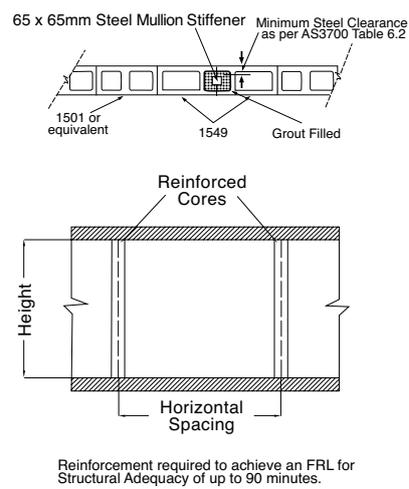
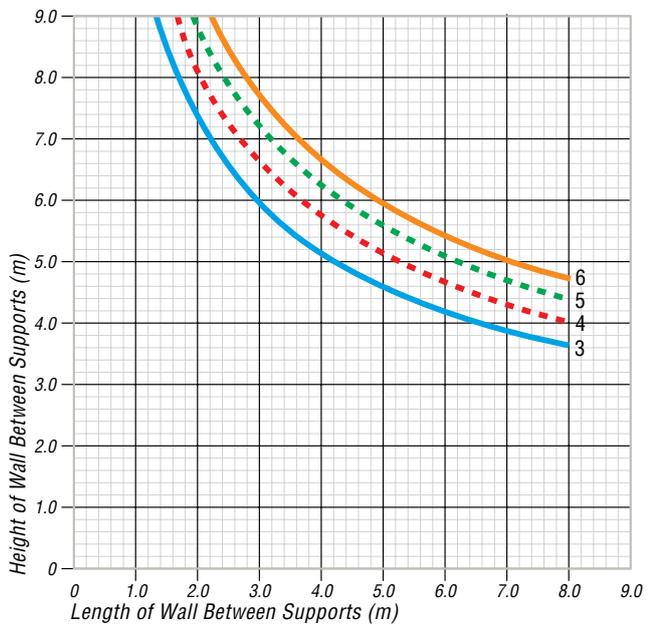
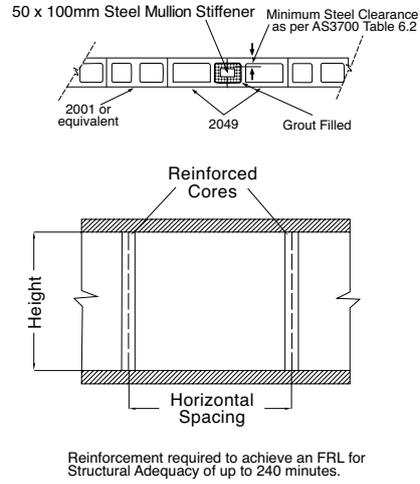
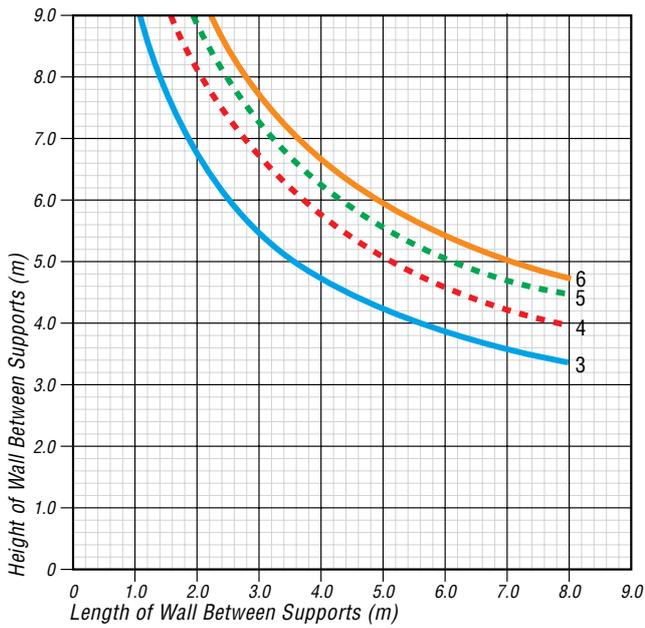


Chart 15 190mm Leaf

50 x 100mm Steel Section (wall thickness of steel tube in mm)



190mm Leaf

65 x 65mm Steel Section (wall thickness of steel tube in mm)

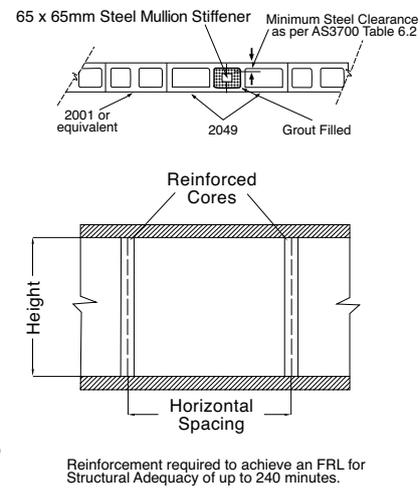
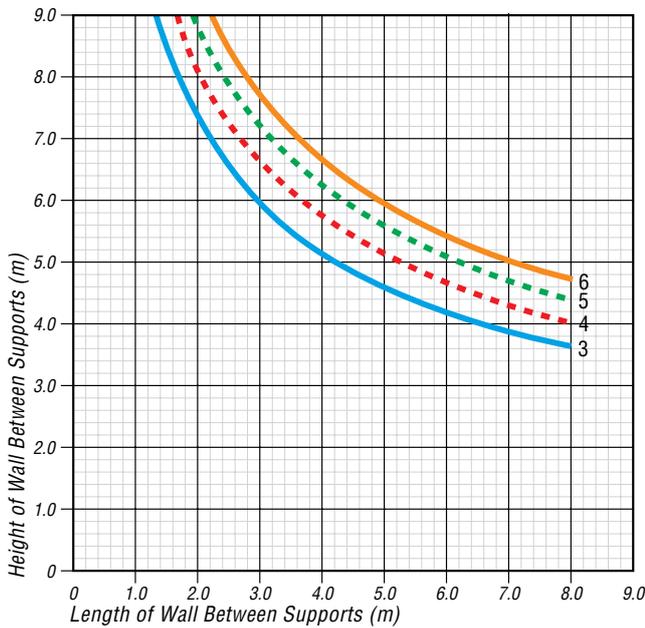
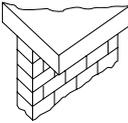
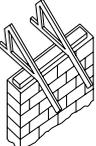
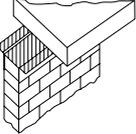


Table D - Permissible height for walls supported at top

(relates to unreinforced masonry, please refer to pages 14 to 16 for reinforced masonry)

Aggregate Type	Wall Width (mm)	Block Type	Height to Top Support / Top of Wall H (mm)														
			 Supporting a concrete slab (Load Bearing Application)					 Supporting a light roof or light floor (Load Bearing Application)					 Not supporting any load but is laterally supported by some means				
			Required FRL for Structural Adequacy (minutes)					Required FRL for Structural Adequacy (minutes)					Required FRL for Structural Adequacy (minutes)				
			60	90	120	180	240	60	90	120	180	240	60	90	120	180	240
Standard Dense / Scoria	190	20.42	4560	4300	4050	3920	3800	4240	4240	4050	3920	3800	3530	3530	3530	3530	3530
	140	15.801	3360	3170	2980	2890	2800	3250	3170	2980	2890	2800	2620	2620	2620	2620	2620
		15.42	3360	3170	2980	2890	2800	3250	3170	2980	2890	2800	2620	2620	2620	2620	2620
	110	12.801	2640	2490	2340	2270	2200	2640	2490	2340	2270	2200	2090	2090	2090	2090	2090
90	10.01	2160	2040	1920	1860	1800	2160	2040	1920	1860	1800	1700	1700	1700	1700	1700	

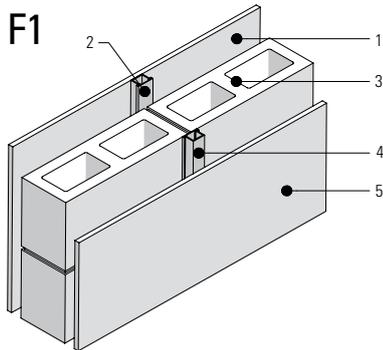
Notes:

- 1) Values shaded are limited by robustness requirements.
- 2) LB means Load Bearing wall
- 3) NLB means Non Load Bearing wall
- 4) For reinforced masonry please refer to sections 1.6, 1.7 and 1.8

1.9 Additional FRL Upgrade

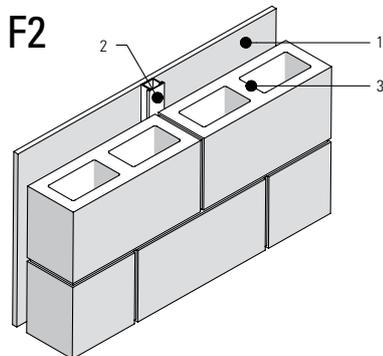
Table E - FRL Upgrade

Typical Layout and System Specifications



- Plasterboard lining as per table, fixed to furring channels on both sides.
- Rondo furring channel or studs at 600mm maximum centres.
- Bare masonry walls with FRL X/Y/Z.

Wall ID Version	CSR System Number	Wall Components					Additional FRL (minutes)
		1 Wall Lining	2 Frame	3 Block	4 Frame	5 Wall Lining	
F1 v1	730	1 x 16mm Gyprock Fyrchek plasterboard	28mm furring channel of studs	Bare masonry wall with FRL X/Y/Z	28mm furring channel or studs	1 x 16mm Gyprock Fyrchek plasterboard	X+30 / Y+60 / Z+60
F1 v2	731	2 x 13mm Gyprock Fyrchek plasterboard	28mm furring channel of studs	Bare masonry wall with FRL X/Y/Z	28mm furring channel or studs	2 x 13mm Gyprock Fyrchek plasterboard	X+60 / Y+120 / Z+120
F1 v3	732	2 x 16mm Gyprock Fyrchek plasterboard	28mm furring channel of studs	Bare masonry wall with FRL X/Y/Z	28mm furring channel or studs	2 x 16mm Gyprock Fyrchek plasterboard	X+90 / Y+180 / Z+180



- Plasterboard lining as per table, fixed to furring channels one side only
- Rondo furring channel or studs at 600mm maximum centres.
- Bare masonry walls with FRL X/Y/Z.

Wall ID Version	CSR System Number	Wall Components					Additional FRL (minutes)	
		1 Wall Lining	2 Frame	3 Block	4 Frame	5 Wall Lining	Lining on fire side	Lining on non-fire side
F2 v1	722	1 x 16mm Gyprock Fyrchek plasterboard	28mm furring channel of studs	Bare masonry wall with FRL X/Y/Z	n/a	n/a	X+30 / Y+30 / Z+30	X+0 / Y+20 / Z+30
F2 v2	723	2 x 13mm Gyprock Fyrchek plasterboard	28mm furring channel of studs	Bare masonry wall with FRL X/Y/Z	n/a	n/a	X+60 / Y+60 / Z+60	X+0 / Y+40 / Z+60
F2 v3	724	2 x 16mm Gyprock Fyrchek plasterboard	28mm furring channel of studs	Bare masonry wall with FRL X/Y/Z	n/a	n/a	X+90 / Y+90 / Z+90	X+0 / Y+60 / Z+90

2.0 Sound

2.1 The NCC-BCA requirements

All wall systems in this brochure satisfy the performance requirement of the NCC-BCA and demonstrate compliance through one of the following means:

- Laboratory testing of an exact construction or
- The deemed-to-satisfy (DTS) provisions, these walls are considered to be acceptable forms of construction. The DTS walls consider the overall R_w value of a particular wall type, which must meet the NCC-BCA requirement to comply.

These provisions also take into account the building class and state or territory. The NCC-BCA requirements for internal walls are summarised in Table D.

Note - Reference should be made to the NCC-BCA for detailed information and concessions.

Adbri Masonry has developed and tested a range of high performance wall systems to accommodate the requirements of the NCC-BCA for Class 2 and 3 buildings. This information is included in Tables F, G, H, I and J.

The systems in Tables G and H are best for load bearing masonry walls up to 3 storeys maximum.

2.2 Design of walls for sound insulation

These wall systems are usually used in internal applications in commercial, industrial, institutional, domestic and high-rise domestic construction, or in the renovation of older buildings. Wall systems generally incorporate single leaf concrete masonry, CSR Bradford® Insulation products, CSR Gyprock® and Tontine. All individual masonry R_w values have been derived using Adbri, Renzo Tonin and Associates, CMAA and CSIRO test reports, and opinions by Ron Rumble Pty Ltd and Renzo Tonin and Associates, and Arup Pty Ltd.

Systems which require CSR product are based on the CSR 'The Red Book™' February 2017 Section 'F' Masonry Wall Systems.

The R_w and $R_w + C_{tr}$ values shown in the wall systems are only applicable when using Adbri Masonry, Tontine and CSR products (or equivalent).

Step 1: Establish requirements

Determine the building class and wall separating conditions between the sole occupancy units (SOU's) using Table D

Step 2: Select your Adbri Masonry wall system

Use Table E, and the relevant NCC-BCA requirement as chosen in Step 1, to view the Adbri Wall systems available. Table E categorises the requirements of the NCC-BCA and allocates the available Adbri Masonry wall system to meet the requirement. There are several systems available to achieve NCC-BCA compliance.

Step 3: Details of your Adbri Masonry wall system

Tables F, G, H, I and J provide a range of systems based around a range of Adbri Masonry products. Each table is formatted to provide:

- 1) Typical layout
- 2) Wall schematic
- 3) Adbri block type/series
- 4) Wall details
- 5) Overall wall thickness
- 6) Test report/Opinion number
- 7) Further information (if applicable).

Table F - NCC-BCA Requirements

NCC-BCA	Building Class	Walls that separate	$R_w + C_{tr}$	R_w	Discontinuous Construction
Vol One	2, 3	Habitable rooms (other than kitchens) of one SOU from a bathroom, sanitary compartment, laundry or kitchen in an adjoining SOU	50	-	Yes
		Rooms between SOU's other than above	50	-	No
		SOU's from a stairway, public corridor, public lobby or the like	-	50	No
		SOU's from a plant room or lift shaft	-	50	Yes
	9c, Aged Care	SOU's from a kitchen or laundry	-	45	Yes
		SOU's from other SOU's (other than above), or from a sanitary compartment, bathroom, plant room etc	-	45	No
Vol Two	1	Habitable rooms (other than kitchens) of one building from a bathroom, laundry, kitchen, etc in another Class 1 building	50	-	Yes
		Rooms between Class 1 buildings other than above	50	-	No

Notes

1 - Refer to glossary for Building Class definitions.

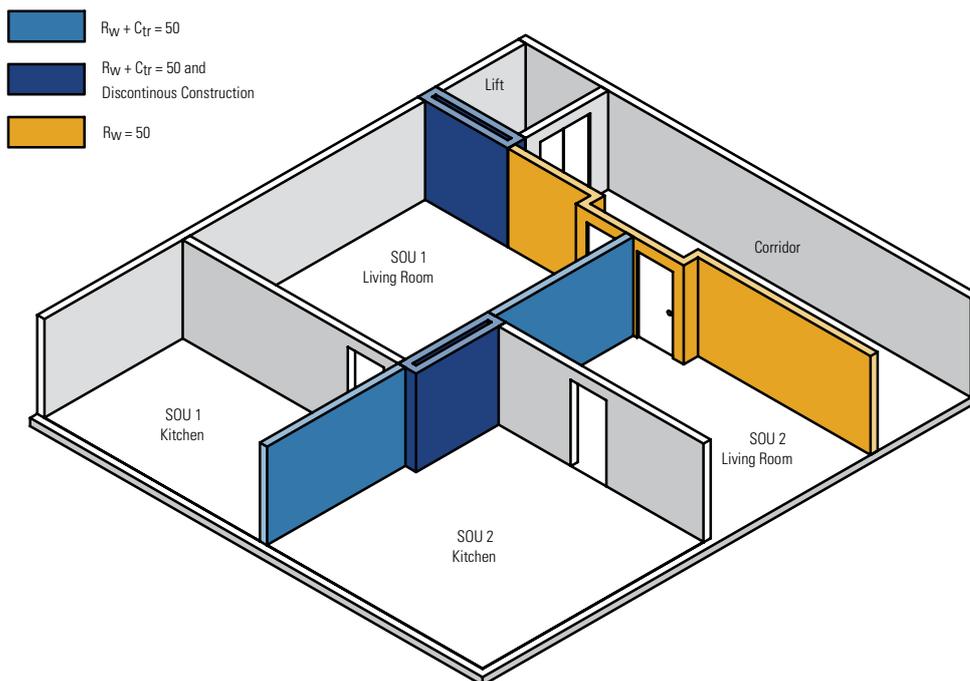


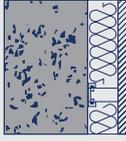
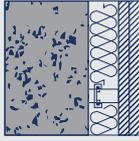
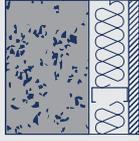
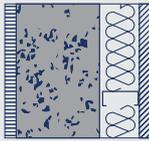
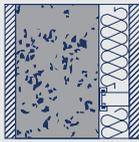
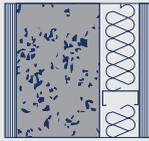
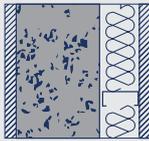
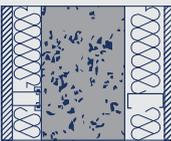
Table G - Adbri Masonry wall systems for New South Wales

NCC-BCA Requirement	Refer Table	Wall System Name
R _w 45	I	150 series Litec block hollow with 13mm render both sides
	J	200 series Litec block hollow with 13mm render both sides
	J	200 series Four hour Litec block
	G	Dense Quickbrick, Schooner and Renderbrick
R _w 50	J	200 series Litec block core filled
	I	150 series Litec block core filled
	I	150 series Litec block core filled with minimum 13mm render or minimum 10mm gyprock both sides
	ALL	All cavity walls
R _w + C _v = 50	ALL	Various units with Resilient Mount, Furring Channel and Insulation one side
R _w + C _v = 50 + Discontinuous Construction	ALL	Various units (some walls corefilled) with Stud and Insulation one side, Discontinuous Construction for impact sound and insulation

2.3 General design/construction considerations

- Gyprock® plasterboard may be directly applied to the masonry substrate, screw fixed to metal furring channels that are fixed to the masonry, or alternatively fixed to a separate stud frame.
- Refer to manufacturer for all related load bearing and non-load bearing stud design information.
- All block wall elements are to be designed in accordance with AS3700:2018 Masonry Structures.
- Wall systems can incorporate an insulated cavity to provide improved acoustic performance. The provision of a cavity also allows the inclusion of services such as water pipes.
- Systems that meet the NCC-BCA requirements for discontinuous construction. These wall systems have studs that are separated from the masonry by at least 10mm. The plasterboard lining on the studs (the wall leaf) therefore has a separation of at least 10mm plus the depth of the stud, which exceeds the NCC-BCA minimum of 20mm.
- Masonry units must be laid with all joints filled solid, except for adequately sound insulated articulation joints, including those between the masonry and any adjoining construction.
- To achieve the specified sound performance, ties from masonry to the stud framing must not be used.
- For energy efficiency wall systems refer to 'Adbri Block Energy Efficiency Compliance Guide'.

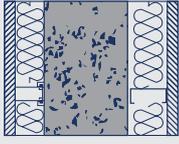
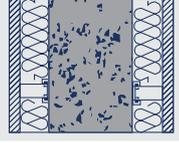
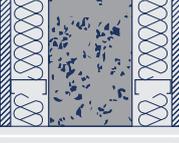
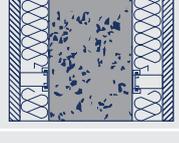
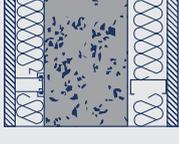
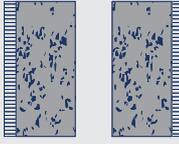
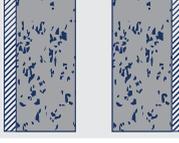
Table H - 110mm Acoustic Quickbrick

$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	System Detail	Wall Lining	Test/Opinion Number	System Width
N/A	41	No	None		None	RR/05/39 43.Rpt6	110mm
46	55	No	None		13mm Soundchek plasterboard screw fixed to 28mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs	424m A0221832	165mm
51	58	No	None		2x13mm Soundchek plasterboard screw fixed to 28mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs	424n A0221834	178mm
49	57	Yes	None		13mm Soundchek plasterboard screw fixed to 64mm studs (10mm off masonry) with Tontine label TSB5 insulation between studs	424b A0221834	197mm
50	56	No	13mm Render		13mm Soundchek plasterboard screw fixed to 64mm studs (10mm off masonry) with Tontine label TSB5 insulation between studs	424u A0221834	210mm
43	47	No	13mm Soundchek plasterboard daub fixed @ 500mm centres		13mm Soundchek plasterboard daub fixed @ 500mm centres	424q A0221834	136mm
50	59	No	13mm Soundchek plasterboard daub fixed @ 500mm centres		13mm Soundchek plasterboard screw fixed to 16mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs	424o A0221834	178mm
51	59	Yes	13mm plasterboard daub fixed @ 500mm centres		13mm plasterboard screw fixed to 64mm studs (20mm off masonry) with Tontine label TSB5 insulation between studs	465a	220mm
53	61	Yes	13mm Soundchek plasterboard daub fixed @ 500mm centres		13mm Soundchek plasterboard screw fixed to 64mm studs (10mm off masonry) with Tontine label TSB5 insulation between studs	424d A0221834	210mm
54	65	Yes	13mm Soundchek plasterboard screw fixed to 16mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs		13mm Soundchek plasterboard screw fixed to 64mm studs (10mm off masonry) with Tontine label TSB5 insulation between studs	424f A0221834	240mm

Notes

- Soundchek plasterboard or approved equivalent can be used
- Systems with furring channels on resilient mounts allow 14mm for width of resilient mount

Table H - 110mm Acoustic Quickbrick (cont.)

$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	System Detail	Wall Lining	Test/Opinion Number	System Width
55	67	Yes	13mm Soundchek plasterboard screw fixed to 16mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs		9mm wet area fibre cement board (14kg/m ²) screw fixed to 64mm metal stud (10mm off masonry) with Tontine label TSB5 insulation between studs	424h A0221834	236mm
51	65	No	13mm Soundchek plasterboard screw fixed to 28mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs		13mm Soundchek plasterboard screw fixed to 28mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs	424i A0221834	220mm
59	69	Yes	13mm Soundchek plasterboard screw fixed to 64mm studs (10mm off masonry) with Tontine label TSB5 insulation between studs		13mm Soundchek plasterboard screw fixed to 64mm studs (10mm off masonry) with Tontine label TSB5 insulation between studs	424c A0221834	284mm
50	64	No	9mm wet area fibre cement board (14kg/m ²) screw fixed to 16mm furring channels on resilient acoustic with Tontine label TSB3 insulation (20mm)		13mm Soundchek plasterboard screw fixed to 28mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs	424k A0221834	204mm
56	67	Yes	9mm wet area fibre cement board (14kg/m ²) screw fixed to 16mm furring channels on resilient acoustic with Tontine label TSB3 insulation (20mm)		9mm wet area fibre cement board (14kg/m ²) screw fixed to 64mm metal stud (10mm off masonry) with Tontine label TSB5 insulation between studs	424j A0221834	232mm
54	58	Yes	13mm render		13mm render 50mm cavity between leaves	465b	296mm
56	62	Yes	13mm Soundchek plasterboard daub fixed @ 500mm centres		13mm Soundchek plasterboard daub fixed @ 500mm centres 50mm between cavity leaves	424w A0221834	296mm

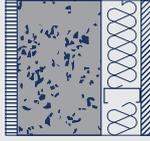
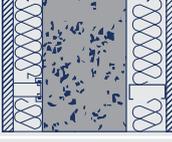
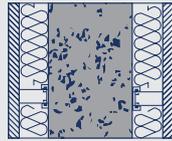
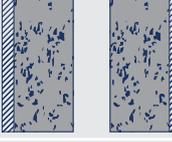
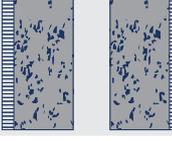
Notes

- Soundchek plasterboard or approved equivalent can be used
- Systems with furring channels on resilient mounts allow 14mm for width of resilient mount

Table I - 110mm Quickbrick, Schooner and Renderbrick

$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	System Detail	Wall Lining	Test/Opinion Number	System Width
NA	46	No	None	Quickbrick 	None	RR/05/39 43.Rpt6	110mm
NA	45	No	None	Schooner 	None	RR/05/39 43.Rpt6	110mm
NA	47	No	None	Renderbrick 	None	RR/05/39 43.Rpt6	110mm

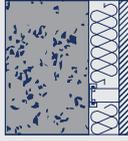
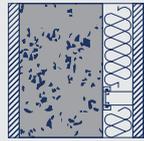
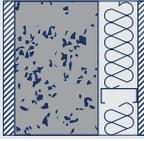
Table I - 110mm Quickbrick, Schooner and Renderbrick (cont.)

$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	System Detail	Wall Lining	Test/Opinion Number	System Width
42	47	No	13mm render		None	433h	126mm
43	48	No	13mm render		13mm render	433l	139mm
53	59	Yes	13mm render		13mm Soundchek plasterboard screw fixed to 64mm studs (20mm off masonry) with Tontine label TSB5 insulation between studs	433j	220mm
43	49	No	13mm Soundchek plasterboard daub fixed @ 500mm centres		13mm Soundchek plasterboard daub fixed @ 500mm centres	433e	136mm
53	59	Yes	13mm Soundchek plasterboard daub fixed @ 500mm centres		13mm Soundchek plasterboard screw fixed to 64mm studs (20mm off masonry) with Tontine label TSB5 insulation between studs	433c	220mm
52	59	Yes	13mm Soundchek plasterboard daub fixed @ 500mm centres		9mm wet area fibre cement board (14kg/m ²) screw fixed to 64mm metal stud (20mm off masonry) with Tontine label TSB5 insulation between studs	433d	216mm
55	63	Yes	13mm Soundchek plasterboard screw fixed to 16mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs		13mm Soundchek plasterboard screw fixed to 64mm studs (20mm off masonry) with Tontine label TSB5 insulation between studs	433b	250mm
51	61	No	13mm Soundchek plasterboard screw fixed to 28mm furring channels on resilient acoustic mount with Tontine label TSB3 insulation between studs		13mm Soundchek plasterboard screw fixed to 28mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs	433a	220mm
51	56	Yes	13mm Soundchek plasterboard daub fixed @ 500mm centres		13mm Soundchek plasterboard daub fixed @ 500mm centres 30mm cavity between leaves	433f	276mm
50	55	Yes	13mm render		13mm render 30mm cavity between leaves	433g	276mm

Notes

- Soundchek plasterboard or approved equivalent can be used
- Systems with furring channels on resilient mounts allow 14mm for width of resilient mount

Table J - 140mm Ezibrick

$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	System Detail	Wall Lining	Test/Opinion Number	System Width
NA	50	No	None		None	RR/05/39 43.Rpt6	140mm
53	60	No	None		13mm Soundchek plasterboard screw fixed to 28mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs	462a	195mm
45	50	No	13mm render		None	462f	153mm
46	51	No	13mm render		13mm render	462g	166mm
51	60	No	13mm render		13mm Soundchek plasterboard screw fixed to 28mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs	462e	208mm
41	45	No	13mm Soundchek plasterboard daub fixed @ 500mm centres		13mm Soundchek plasterboard daub fixed @ 500mm centres	462d	166mm
51	59	No	13mm Soundchek plasterboard daub fixed @ 500mm centres		13mm Soundchek plasterboard screw fixed to 28mm furring channels on resilient acoustic mount with Tontine label TSB5 insulation between studs	462b	208mm
55	63	Yes	13mm Soundchek plasterboard daub fixed @ 500mm centres		13mm Soundchek plasterboard screw fixed to 64mm studs (20mm off masonry) with Tontine label TSB5 insulation between studs	462c	250mm

Notes

- Soundchek plasterboard or approved equivalent can be used
- Systems with furring channels on resilient mounts allow 14mm for width of resilient mount

Table K - 150 Series

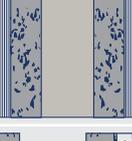
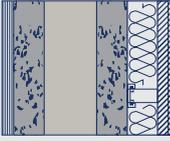
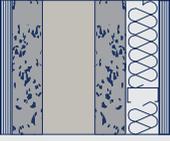
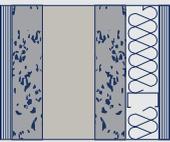
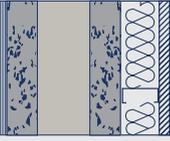
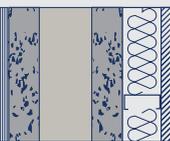
$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	Block Cores	System Detail	Wall Lining	Test /Opinion Number	System Width
38	43	No	None	L1501.2 Hollow		None	RR/05/3 943.Rpt6	140mm
NA	44	No	None	L1501.4 Hollow		None	RR/05/3 943.Rpt6	140mm
NA	50	No	None	L15412 Corefilled		None	RR/05/3 943.Rpt6	140mm
45	49			Versaloc 150 Corefilled			ALA-19-098-1	150mm
NA	45	No	13mm render	L1501.2 Hollow		13mm render	RR/05/3 943.Rpt6	166mm
NA	47	No	13mm render	L1501.4 Hollow		13mm render	RR/05/3 943.Rpt6	166mm
NA	50	No	13mm render	L15412 Corefilled		13mm render	RR/05/3 943.Rpt6	166mm
NA	43	No	13mm plasterboard	L1501.2 Hollow		13mm plasterboard	RR/05/3 943.Rpt6	166mm
NA	45	No	13mm plasterboard	L1501.4 Hollow		13mm plasterboard	RR/05/3 943.Rpt6	166mm
NA	51	No	13mm plasterboard	L15412 Corefilled		13mm plasterboard	RR/05/3 943.Rpt6	166mm
50	59	No	None	L1501.2 Hollow		13mm soundchek plasterboard screw fixed to 28mm furring channel on resilient mounts with Tontine label TSB5 insulation in cavity	TL451h	195mm

Table K - 150 Series (cont.)

$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	Block Cores	System Detail	Wall Lining	Test / Opinion Number	System Width
50	59	No	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm Soundchek plasterboard screw fixed to 28mm furring channels @ 600mm maximum centres on resilient acoustic mount with CSR Bradford 50mm Glasswool Partition Batts (11kg/m ³) between furring channels	CSR 4380	208mm
52	60	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m ³) between studs or 90 Gold Batts 2.0	CSR 4065	242mm
54	62	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90mm Gold Batts R2.0 between studs or 75GW Acoustigard (11kg/m ³)	CSR 4065	270mm
55	63	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm Soundchek plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m ³) between studs or 90 Gold Batts 2.0	CSR 4080	242mm
56	64	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm Soundchek plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m ³) between studs or 90 Gold Batts 2.0	CSR 4080	270mm

Notes

- Soundchek plasterboard or approved equivalent can be used
- Systems with furring channels on resilient mounts allow 14mm for width of resilient mount

Table L - 200 Series

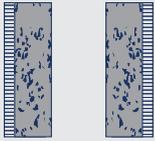
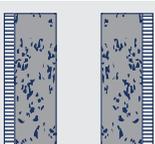
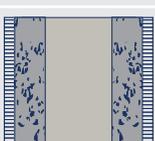
$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	Block Cores	System Detail	Wall Lining	Test / Opinion Number	System Width
NA	42	No	None	L2001.2 Hollow		None	RR/05/3 943.Rpt6	190mm
NA	44	No	None	L2001.3 Hollow		None	RR/05/3 943.Rpt6	190mm
NA	47	No	None	L2001.4 Hollow		None	RR/05/3 943.Rpt6	190mm
NA	55	No	None	L20412 Corefilled		None	RR/05/3 943.Rpt6	190mm
NA	46	No	13mm render	L2001.2 Hollow		133mm render	RR/05/3 943.Rpt6	216mm
NA	47	No	13mm render	L2001.3 Hollow		13mm render	RR/05/3 943.Rpt6	216mm
NA	50	No	13mm render	L2001.4 Hollow		13mm render	RR/05/3 943.Rpt6	216mm
NA	57	No	13mm render	L20412 Corefilled		13mm render	RR/05/3 943.Rpt6	216mm
NA	44	No	13mm plasterboard	L2001.2 Hollow		13mm plasterboard	RR/05/3 943.Rpt6	216mm
NA	45	No	13mm plasterboard	L2001.3 Hollow		13mm plasterboard	RR/05/3 943.Rpt6	216mm
NA	48	No	13mm plasterboard	L2001.4 Hollow		13mm plasterboard	RR/05/3 943.Rpt6	216mm

Table L - 200 Series (cont.)

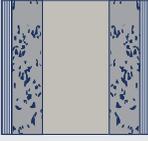
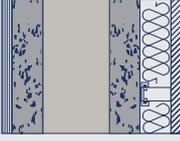
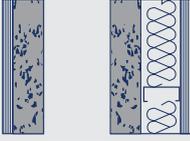
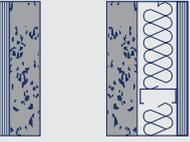
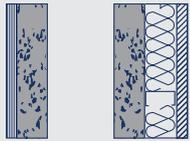
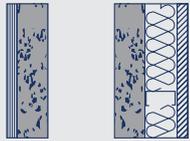
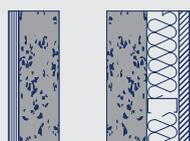
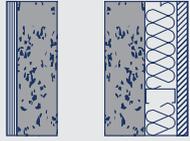
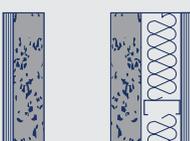
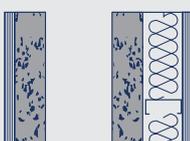
$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	Block Cores	System Detail	Wall Lining	Test / Opinion Number	System Width
NA	56	No	13mm plasterboard	L20412 Corefilled		13mm plasterboard	RR/05/3 943.Rpt6	216mm
50	59	No	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm Soundchek plasterboard screw fixed to 28mm furring channels @ 600mm maximum centres on resilient acoustic mount with CSR Bradford 50mm Glasswool Partition Batts (11kg/m³) between furring channels	CSR 4380	258mm
50	58	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.2		13mm plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90 Gold Batts R2.0 between studs	CSR 4010	320mm
47	55	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.2		13mm plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75GW Acoustigard 11kg between studs	CSR 4010	292mm
50	58	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.2		13mm Soundchek plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m³) between studs	CSR 4025	292mm
51	59	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.2		13mm Soundchek plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90mm Gold Batts R2.0 between studs	CSR 4025	292mm
51	59	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.2		13mm Soundchek plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m³) between studs	CSR 4025	320mm
52	60	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.2		13mm Soundchek plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90mm Gold Batts R2.0 between studs	CSR 4025	320mm
49	57	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.4		13mm plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m³) between studs	CSR 4035	292mm
48	58	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.4		13mm plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90mm Gold Batts R2.0 between studs	CSR 4035	292mm

Table L - 200 Series (cont.)

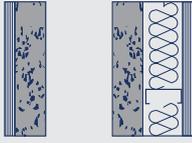
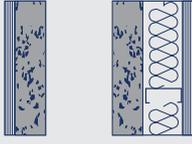
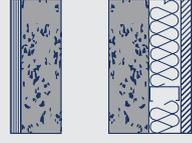
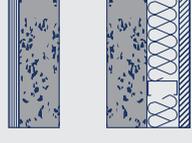
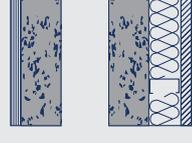
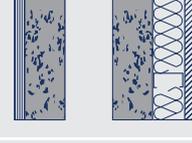
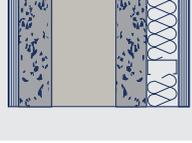
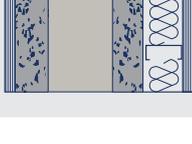
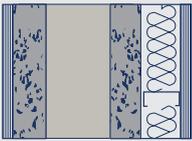
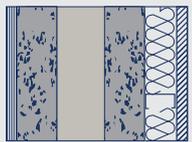
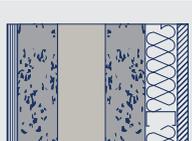
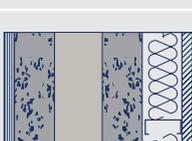
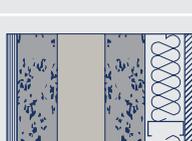
$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	Block Cores	System Detail	Wall Lining	Test / Opinion Number	System Width
48	58	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.4		13mm plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m ³) between studs	CSR 4035	320mm
49	59	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.4		13mm plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90mm Gold Batts R2.0 between studs	CSR 4035	320mm
52	60	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.4		13mm Soundchek plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m ³) between studs	CSR 4050	292mm
53	61	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.4		13mm Soundchek plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90mm Gold Batts R2.0 between studs	CSR 4050	292mm
53	61	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.4		13mm Soundchek plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m ³) between studs	CSR 4050	320mm
54	62	Yes	13mm plasterboard daub fixed @ 500mm centres	Hollow L2001.4		13mm Soundchek plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90mm Gold Batts R2.0 between studs	CSR 4050	320mm
52	60	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm Soundchek plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m ³) between studs	CSR 4065	292mm
53	61	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90mm Gold Batts R2.0 between studs	CSR 4065	292mm
54	62	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m ³) between studs	CSR 4065	320mm

Table L - 200 Series (cont.)

$R_w + C_{tr}$	R_w	Discontinuous Construction	Wall Lining	Block Cores	System Detail	Wall Lining	Test / Opinion Number	System Width
55	63	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with 90 Gold Batts R2.0 between studs	CSR 4065	320mm
55	63	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm Soundchek plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m³) between studs	CSR 4080	292mm
56	64	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm Soundchek plasterboard screw fixed to 64mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90mm Gold Batts R2.0 between studs	CSR 4080	292mm
56	64	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm Soundchek plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 75mm Glasswool Partition Batts (11kg/m³) between studs	CSR 4080	320mm
57	65	Yes	13mm plasterboard daub fixed @ 500mm centres	Corefilled		13mm Soundchek plasterboard screw fixed to 92mm studs @ 600mm maximum centres (12mm off masonry) with CSR Bradford 90mm Gold Batts R2.0 between studs	CSR 4080	320mm

Notes

- Soundchek plasterboard or approved equivalent can be used
- Systems with furring channels on resilient mounts allow 14mm for width of resilient mount

3.0 Glossary

Cavity wall a wall comprising two leaves of brick or blockwork tied together, with an air gap/insulation between.

Common wall means a wall that is common to adjoining buildings.

Deemed to satisfy provisions means provisions which are deemed to satisfy the Performance Requirements of the NCC-BCA.

Discontinuous construction means a wall system having a minimum 20mm cavity between two separate leaves, with:

- (a) For masonry, where wall ties are required to connect leaves, the ties are of the resilient type; and
- (b) For other masonry, there is no mechanical linkage between leaves except at the periphery.

A staggered stud wall is not deemed to be discontinuous construction.

Envelope means the parts of a building's fabric that separate a conditioned space or habitable room from:

- (a) The exterior of the building, or a non-conditioned space (other than a space through which conditioned air
- (b) is being exhausted such as a cleaner's room, chemical storage room or exhaust riser) including:
 - (i) The floor of a rooftop plant room, lift machine room of the like; and
 - (ii) The floor above a carpark or warehouse; and
 - (iii) The common wall with a carpark, warehouse or the like.

External wall means an outer wall of a building which is not a common wall.

Fire-resistance level (FRL) means the grading periods in minutes determined in accordance with NCA-BCA Specification A2.3, for the following criteria:

- (a) Structural adequacy; and
- (b) Integrity; and
- (c) Insulation

And expressed in that order a dash means that there is no requirement for that criterion. For example, 90/--/-- means there is no requirement for an FRL for integrity and insulation, and --/--/-- means there is no requirement for FRL.

Habitable room means a room used for normal domestic activities, and:

- (a) Includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room and sunroom; but
- (b) Excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes-drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.

Insulation, in relation to an FRL, means the ability to maintain a temperature on the surface not exposed to the furnace below the limits specified in AS 1530.4.

Integrity, in relation to an FRL, means the ability to resist the passage of flames and hot gases specified in AS 1530.4.

Internal wall excludes a common wall or party wall.

Load bearing (LB) means intended to resist vertical forces additional to those due to its own weight.

Non load bearing (NLB) means a wall not designed to be subject to an external load, other than its own weight.

Sole occupancy unit means a room or part of a building for occupation by one or joint owner, lessee, tenant, or other occupier to the exclusion of any other owner, lessee, tenant, or other occupier and includes:

- (a) A dwelling; or
- (b) A room or suite of rooms in a Class 3 building which includes sleeping facilities; or
- (c) A room or suite of associated rooms in Class 5, 6, 7, 8 or 9 building; or
- (d) A room or suite of associated rooms in a Class 9c aged care building, which includes sleeping facilities and any area for the *exclusive use of a resident*.

Sound Transmission Class (STC) is no longer used, as the requirements of the NCA-BCA have changed to comply with international regulations. The STC was based on different criteria and do not include any correction factors.

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.

R-Value means the thermal resistance ($m^2.K/W$) of a component calculated by dividing its thickness by its thermal conductivity.

R_w -Value is the Weighted Sound Reduction Index (R_w) and is a single number index used to describe the sound transmission loss characteristics of a construction and is measured in decibels (dB).

Reflective insulation means a building membrane with a reflective surface such as a reflective foil laminate, reflective barrier, foil batt or the like capable of reducing radiant heat flow.

Sarking-type material means a material such as a reflective foil or other flexible membrane of a type normally used for a purpose such as water proofing, vapour proofing or thermal reflectance.

Litec means blocks with density less than or equal to $1800kg/m^3$.

Standard Dense means blocks with density greater than $1800kg/m^3$.



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Fire and Sound Brochure

NSW - April 2018

ABM

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