

UltraMgO - Partition 20 Wall System

Acoustic Assessment

Acoustic Engineering Certificate

Fireproof Cladding Facades UltraMGO Partition 20 Wall System

FireProof Cladding Facades, 2/1 Laser Drive, Rowville VIC 3178

Certificate No.: 17070

Issued: 15/06/2017

Expiry: 30/04/2019

Technical assessment and performance solution of products for compliance under the National Construction Code of Australia. This evaluation report serves as a certificate from a professional engineer in accordance with Clause A2.2(a)(iii) of the National Construction Code 2016 Volume One Building Code of Australia and Clause 1.2.2(a)(iii) of the National Construction Code 2016 Volume Two Building Code of Australia.

1. Product

- 1.1 The Fireproof Cladding Facades UltraMGO Partition 20 Wall System is a residential intertenancy wall system comprising a central 20 mm thick, 21 kg/m² Magnesium Oxide board fire-barrier with separate timber stud framing to both sides. The stud framing is lined with 10 mm thick, 6.8 kg/m² standard plasterboard on both sides of the fire barrier, and 90 mm thick 90 kg/m³ rockwool insulation batts are installed in both wall cavities.

2. Scope of Use

- 2.1 The Fireproof Cladding Facades UltraMGO Partition 20 Wall System is permitted to be used in accordance with the manufacturer's instructions for any interior walls separating Sole Occupancy Units in Class 1, 2 and 3 buildings.
- 2.2 The Fireproof Cladding Facades UltraMGO Partition 20 Wall System is to be installed in accordance with the Fireproof Cladding Facades UltraMGO Partition 20 Wall System Construction Detail presented in Appendix B of this report.

3. National Construction Code 2016

Volume One – Building Code of Australia

- 3.1 Clause A0.2 (a) complying with the Performance Requirements FP5.2.
- 3.2 Clause A2.2 sub-clause (a)(iii) as evidence to support that the Fireproof Cladding Facades UltraMGO Partition 20 Wall System meets the nominated Performance Requirements under an Engineering Certificate.
- 3.3 Performance Requirement FP5.2 – Sound Insulation of Walls. The Fireproof Cladding Facades UltraMGO Partition 20 Wall System provides insulation against the transmission of airborne and impact sound sufficient to prevent illness or loss of amenity to the occupants.

4. State and Territory Variations

- 4.1 The Fireproof Cladding Facades UltraMGO Partition 20 Wall System can be used in all States and Territories within Australia and complies with all relevant State and Territory variations related to the products use.

5. Conditions and Limitations

- 5.1 This certificate is limited to the details within this evaluation report including the above compliance elements, product description and scope. This evaluation report is to be read, considered and used as whole document being 26 pages.
- 5.2 The Fireproof Cladding Facades UltraMGO Partition 20 Wall System is approved to be installed in accordance with the Fireproof Cladding Facades UltraMGO Partition 20 Wall System Construction Detail presented in Appendix B of this report.

Acoustic Engineering Certificate

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1. Product

- 1.1 The Fireproof Cladding Facades UltraMGO Partition 20 Wall System is a residential intertenancy wall system comprising a central 20 mm thick, 21 kg/m² Magnesium Oxide board fire-barrier with separate timber stud framing to both sides. The stud framing is lined with 10 mm thick, 6.8 kg/m² standard plasterboard on both sides of the fire barrier, and 90 mm thick 90 kg/m³ rockwool insulation batts are installed in both wall cavities.

2. Scope of Use

- 2.1 The Fireproof Cladding Facades UltraMGO Partition 20 Wall System is permitted to be used in accordance with the manufacturer's instructions for any interior walls separating Sole Occupancy Units in Class 1, 2 and 3 buildings.
- 2.2 The Fireproof Cladding Facades UltraMGO Partition 20 Wall System is to be installed in accordance with the Fireproof Cladding Facades UltraMGO Partition 20 Wall System Construction Detail presented in Appendix B of this report.

3. National Construction Code 2016

Volume Two – Building Code of Australia

- 3.1 Clause 1.0.2(a) complying with the Performance Requirements P2.4.6.
- 3.2 Clause 1.2.2 sub-clause (a)(iii) as evidence to support that the Fireproof Cladding Facades UltraMGO Partition 20 Wall System meets the nominated Performance Requirements under an Engineering Certificate.
- 3.3 Performance Requirement P2.4.6 – Sound Insulation of Walls. The Fireproof Cladding Facades UltraMGO Partition 20 Wall System provides insulation against the transmission of airborne and impact sound sufficient to prevent illness or loss of amenity to the occupants.

4. State and Territory Variations

- 4.1 The Fireproof Cladding Facades UltraMGO Partition 20 Wall System can be used in all States and Territories within Australia and complies with all relevant State and Territory variations related to the products use.

5. Conditions and Limitations

- 5.1 This certificate is limited to the details within this evaluation report including the above compliance elements, product description and scope. This evaluation report is to be read, considered and used as whole document being 26 pages.
- 5.2 The Fireproof Cladding Facades UltraMGO Partition 20 Wall System is approved to be installed in accordance with the Fireproof Cladding Facades UltraMGO Partition 20 Wall System Construction Detail presented in Appendix B of this report.

UltraMgO – Partition 20 Wall System

Acoustic Assessment

Prepared for:

Fireproof Cladding Facades
2/1 Laser Drive
Rowville VIC 3178

Prepared by:

Cogent Acoustics Pty Ltd
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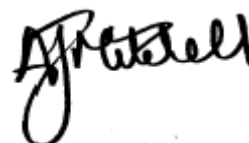
Project Number: 17070

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Signature**Revision History**

Rev.	Date	Purpose	Prepared by:	Reviewed by:
0	15/06/2017	Not for construction	Mahbub Sheikh	Andrew Mitchell
1	26/07/2017	For construction	Mahbub Sheikh	Andrew Mitchell

Executive Summary

Fireproof Cladding Facades (FCF) has appointed Cogent Acoustics Pty Ltd to undertake an acoustic assessment of the FCF UltraMgO - Partition 20 wall system.

This report evaluates the wall assembly as a proposed Performance Solution in accordance with the Building Code of Australia (BCA), as follows:

Table 1 Proposed Performance Solution and Reference Criteria

Proposed Performance Solution	Building Code of Australia	
	DTS Provision / Acceptable Construction Provision	Performance Requirement
To provide technical justification for the use of FCF UltraMgO – Partition 20 system for walls separating sole occupancy units in Class 1, 2, and 3 buildings.	3.8.6.2 (Class 1) F5.5 (Class 2 and 3)	P2.4.6 (Class 1) FP5.2 (Class 2 and 3)

The proposed Performance Solution has been assessed and it is our considered opinion that the building design meets the BCA Performance Requirements with the inclusion of the following specification of required acoustic design measures:

Table 2 Specification of Required Acoustic Design Measures

System	Performance Standard in addition to the BCA DTS Provisions / Acceptable Construction Provision
Intertenancy Walls	- The FCF UltraMgO – Partition 20 system will be used for intertenancy walls separating Sole Occupancy Units (SOUs) in Class 1, 2 or 3 buildings. - The UltraMgO – Partition 20 (20mm magnesium oxide central core. Mass 21 kg/m²) system will be installed between 90 x 45 mm timber stud frames with a minimum gap of 30mm between the UltraMgO panel and the stud frame on both sides. ‘W’ brackets between the central UltraMgO panel and the timber framing will be adjusted so that there is no rigid contact between the upper and lower halves of the clip. - All ‘W’ brackets spacers will be removed prior to installation of wall sheeting. - Rock wool batts with minimum thickness 90mm and density 90kg/m³ will be installed in the stud cavity on both sides of the UltraMgO panel; - The outside of each set of timber stud framing will be lined with a single layer of 10mm thick plasterboard with a minimum mass of 6.8 kg/m².

Other than the abovementioned requirements all other parts of the wall system and building's acoustic provisions must be installed and maintained as required by the BCA DTS / Acceptable Construction Provisions.

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1 Introduction

1.1 Purpose

Fireproof Cladding Facades (FCF)_ has appointed Cogent Acoustics Pty Ltd to undertake an acoustic assessment of the FCF UltraMgO - Partition 20 wall system.

This report evaluates the wall system as a proposed Performance Solution against the Building Code of Australia (BCA) Performance Requirements.

This report is only to be used for the FCF UltraMgO - Partition 20 wall system, with the design as described in the referenced documentation. The report is not to be used to support any other design scheme as changes to the design may affect the evaluation. Cogent Acoustics Pty Ltd takes no responsibility for any issues associated with the misuse of this report.

1.2 Relevant Legislation

The primary legislation applicable to the development is the Building Code of Australia 2015 (BCA) (ABCB, 2016). The BCA provides a set of Performance Requirements which must be complied with. The prescriptive Deemed-to-Satisfy (DTS) / Acceptable Construction Provisions are also described in the BCA. A design that complies with the Deemed-to-Satisfy (DTS) / Acceptable Construction Provisions is deemed to comply with the Performance Requirements. A Performance Solution is a design that does not comply with the DTS/ Acceptable Construction Provisions however is shown to comply with the Performance Requirements by way of an evaluation.

The evaluation of a proposed Performance Solution can be undertaken using a variety of methods. These are defined in Clause A0.5 of the BCA. One or a combination of these methods are adopted to determine whether the proposed Performance Solution complies with the Performance Requirements of the BCA. The relevant Performance Requirements are determined in accordance with Clause A0.7 of the BCA. Compliance with Performance Requirements is undertaken in accordance with A0.2 of the BCA.

1.3 Reference Documentation

The report is based on information contained in the following documents and drawings:

Table 3 Reference Documentation

Document	Prepared by	Issue
Wall Construction Detail (Final Acoustic 21.04.2017 Construction_Element_dB)	Fireproof Cladding Facades	21/04/2017
Party Wall W-Bracket Drawing	Fireproof Cladding Facades	23/2/2017
CSIRO Acoustic Measurement Report (Report No: TL602-01-1)	CSIRO Acoustics Testing Laboratory, VIC.	2/3/2017

1.4 Project Stakeholders

The project stakeholders are listed below:

Table 4 Project Stakeholders

Contact	Organisation	Role
Gary Costa	Fireproof Cladding Facades	Client
Mahbub Sheikh	Cogent Acoustics	Acoustic Engineer

1.5 Building Characteristics

The proposed FCF UltraMgO – Partition 20 wall system is intended for use as a wall separating sole-occupancy units or a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, or parts of a different classification in Class 1, 2, and 3 buildings.

Table 5 Building Parameters

BCA Parameter	Description
Occupancy	Townhouses, Apartments
BCA Classification	Class 1, Class 2, and Class 3

1.6 Report Limitations

The following limitations are applicable with respect to the acoustic advice presented in this report:

- Cogent Acoustics has prepared this document for the sole use of the Client and for the specific purpose expressly stated in the document. No other party should rely on this document without the prior written consent of Cogent Acoustics. Cogent Acoustics undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document.
- The information contained in this document provides advice in relation to acoustics and vibration only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics and vibration engineering including and not limited to structural integrity, fire rating, architectural buildability and fitness-for-purpose, waterproofing and the like. Supplementary professional advice should be sought with respect to these issues.
- The report is limited to the assessment of proposed Performance Solutions for the BCA DTS / Acceptable Construction provision variations identified in this report for compliance with relevant BCA Performance Requirements. With the exception of these proposed Performance Solutions, all other acoustic aspects of the building are to comply with the BCA DTS / Acceptable Construction Provisions or have been granted other dispensations.
- Reports marked 'Not for Construction' or 'Draft' may be subject to change and are not released as final reports. Cogent Acoustics accepts no liability pending release of the final version of the report.
- In preparing this document Cogent Acoustics may have relied upon information provided by the client and other third parties, some of which may not have been verified. Cogent Acoustics accepts no responsibility or liability for any errors or omissions which may be incorporated into this document as a result.
- The recommendations, data and methodology documented in this assessment are based on the listed reference documentation. The recommendations apply specifically to the project under consideration, and must not be utilised for any other purpose. Any modifications or changes to the project from that described in the listed reference documentation may invalidate the advice provided in this document, necessitating a revision.
- Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

2 Acoustic Evaluation

2.1 Performance Solution – Sound Insulation of Walls

2.1.1 Introduction

The following table briefly describes the proposed Performance Solution, the relevant BCA DTS / Acceptable Construction Provision Clause(s) and the BCA Performance Requirements.

Table 6 Proposed Performance Solution

Proposed Performance Solution	Building Code of Australia	
	DTS Provision/ Acceptable Construction Provision	Performance Requirement
To provide technical justification for the use of FCF UltraMgO – Partition 20 system for walls separating sole occupancy units in Class 1, 2, and 3 buildings.	3.8.6.2 (Class 1) F5.5 (Class 2 and 3)	P2.4.6 (Class 1) FP5.2 (Class 2 and 3)

The proposed Performance Solution is described in Figure 1. A higher resolution image is included in Appendix B of this report.

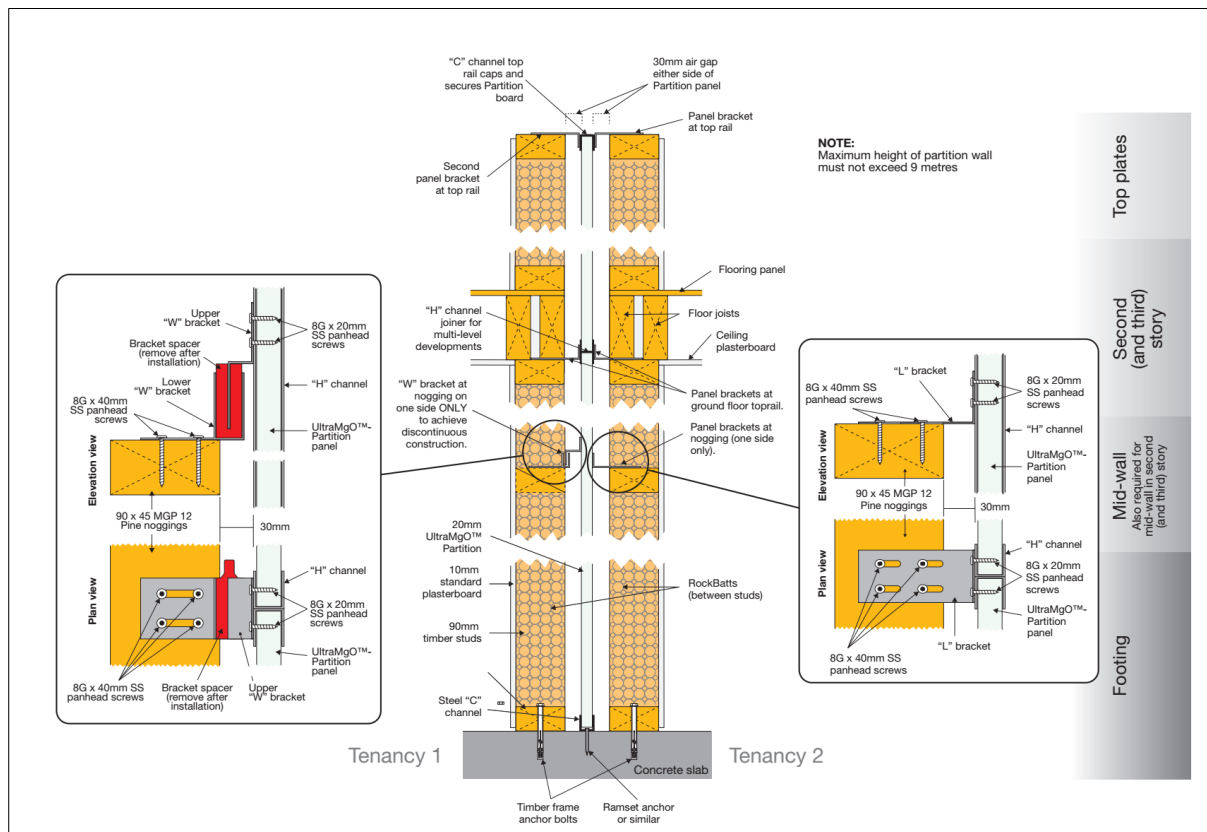


Figure 1 Proposed Part Section – Walls Between SOUs in Class 1, 2, and 3 Buildings

The proposed Performance Solution does not comply with the BCA DTS provisions / Acceptable Construction provisions for the following reasons:

- The proposed wall construction has not been laboratory tested to comply with the DTS Sound Insulation Performance requirements prescribed by BCA Clauses 3.8.6.2 (Class 1 Buildings) and F5.2 (Class 2 and 3 Buildings);
- The proposed wall construction includes a bracket which provides less clearance between wall leaves than required to strictly satisfy the DTS 'discontinuous construction' requirements for walls separating a bathroom, sanitary compartment, laundry or kitchen from a habitable room (other than a kitchen).
- It is not one of the Acceptable Forms of Construction for Walls listed in Table 3.8.6.2 of BCA Part 3.8.6 (Class 1 buildings) or Table 2 of BCA Specification F5.2 (Class 2 and 3 buildings).

2.1.2 Intent of the BCA

BCA Acceptable Construction Provision Part 3.8.6.2 requires walls separating a bathroom, sanitary compartment, laundry or kitchen and a habitable room (other than kitchen) in an adjoining Class 1 building (dwelling) to have an $R_w + C_{tr}$ not less than 50 dB and be of discontinuous construction. In all other Class 1 cases than the above, the requirement is only $R_w + C_{tr}$ 50 dB and no discontinuous construction is required.

BCA DTS Provision F5.5 requires an intertenancy wall in a Class 2 or Class 3 building to have an $R_w + C_{tr}$ (airborne) not less than 50, if it separates sole-occupancy units and comply with F5.3 (b) if it separates a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit or a sole-occupancy unit from a plant room or lift shaft.

BCA Clauses P2.4.6, FP5.2 and The Guide to the BCA (ABCB, 2016) indicate that the intent of these provisions are to minimise the transmission of sound through walls separating sole-occupancy units, and walls separating sole-occupancy units from certain other types of space, and to provide insulation against impact generated sound, sufficient to prevent illness or loss of amenity to the occupants.

2.1.3 Effects and Mitigation Measures

A review has been conducted to establish the potential undesired effects of the proposed Performance Solution in its specific proposed application. The potential effects have been identified as follows:

- Occupants in a sole occupancy unit may experience higher levels of airborne noise due to activities in the adjacent sole occupancy unit; and
- Occupants in the sole occupancy unit may experience higher levels of impact noise due to activities in the adjacent sole occupancy unit.

If included in the design, the following mitigation measures could be used to address the effects listed above. The mitigation measures listed are intended to provide a background for formulation of a design and are not listed requirements:

- Improve airborne sound attenuation properties of the separating wall.
- Improve impact sound attenuation mechanism of the separating wall.

2.1.4 Approach

The approach set out in Figure 2 will be used to assess the proposed Performance Solution.

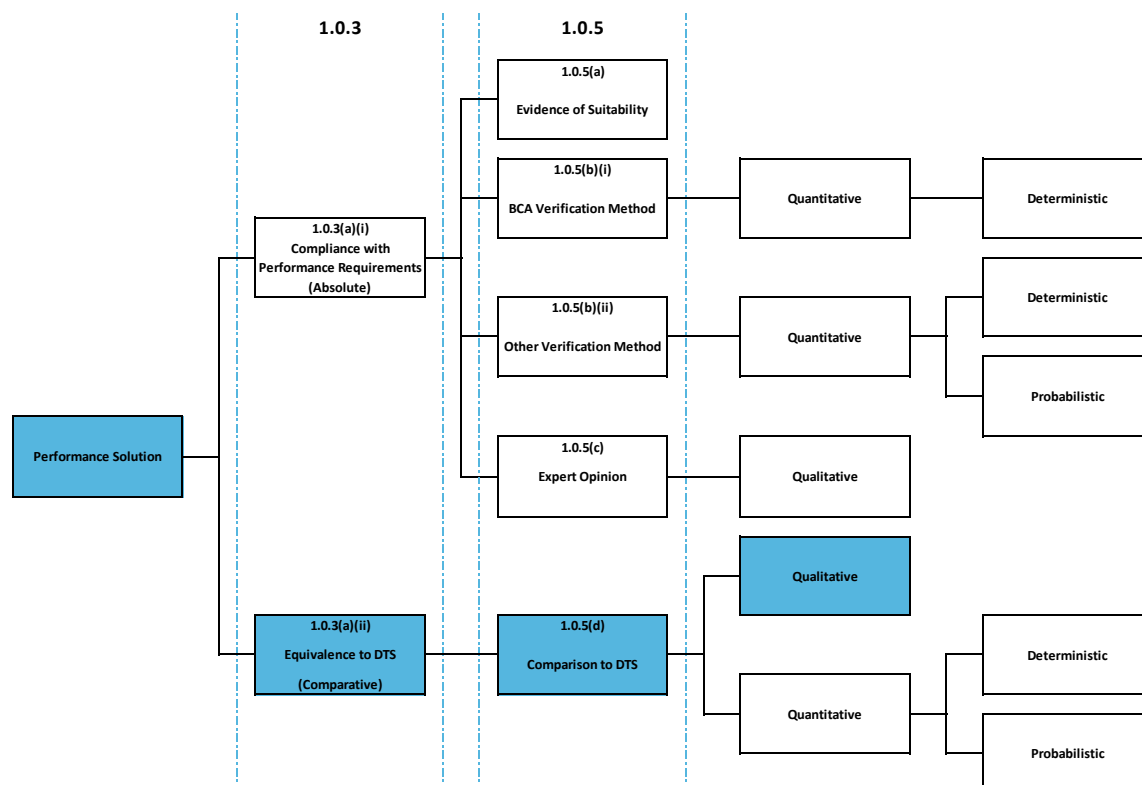


Figure 2 Method of Approach

2.1.5 Proposed Design

A section of the proposed wall assembly between the Sole Occupancy Units (SOU) is presented in Figure 3 below:

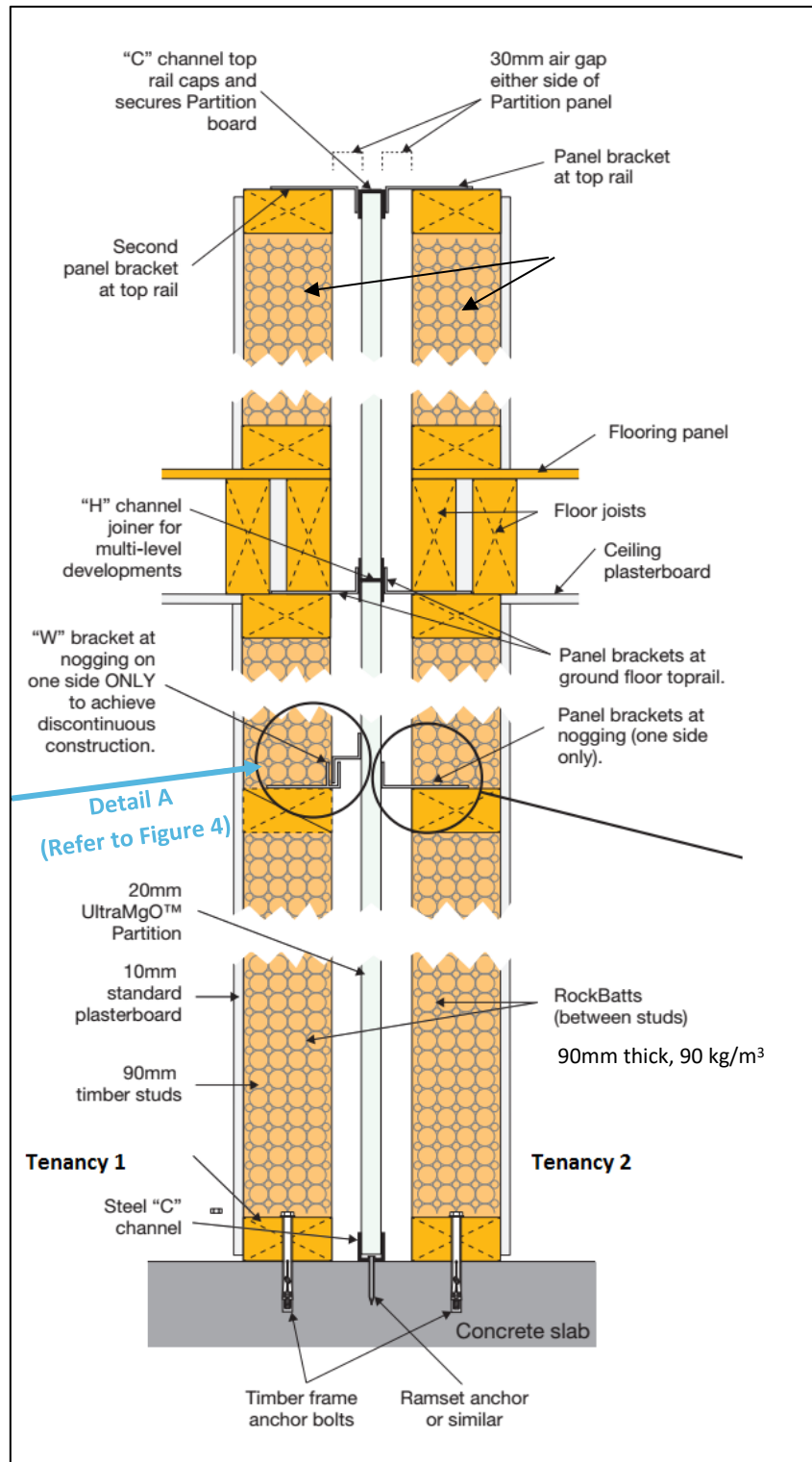


Figure 3 Proposed Part Section – Wall between SOUs

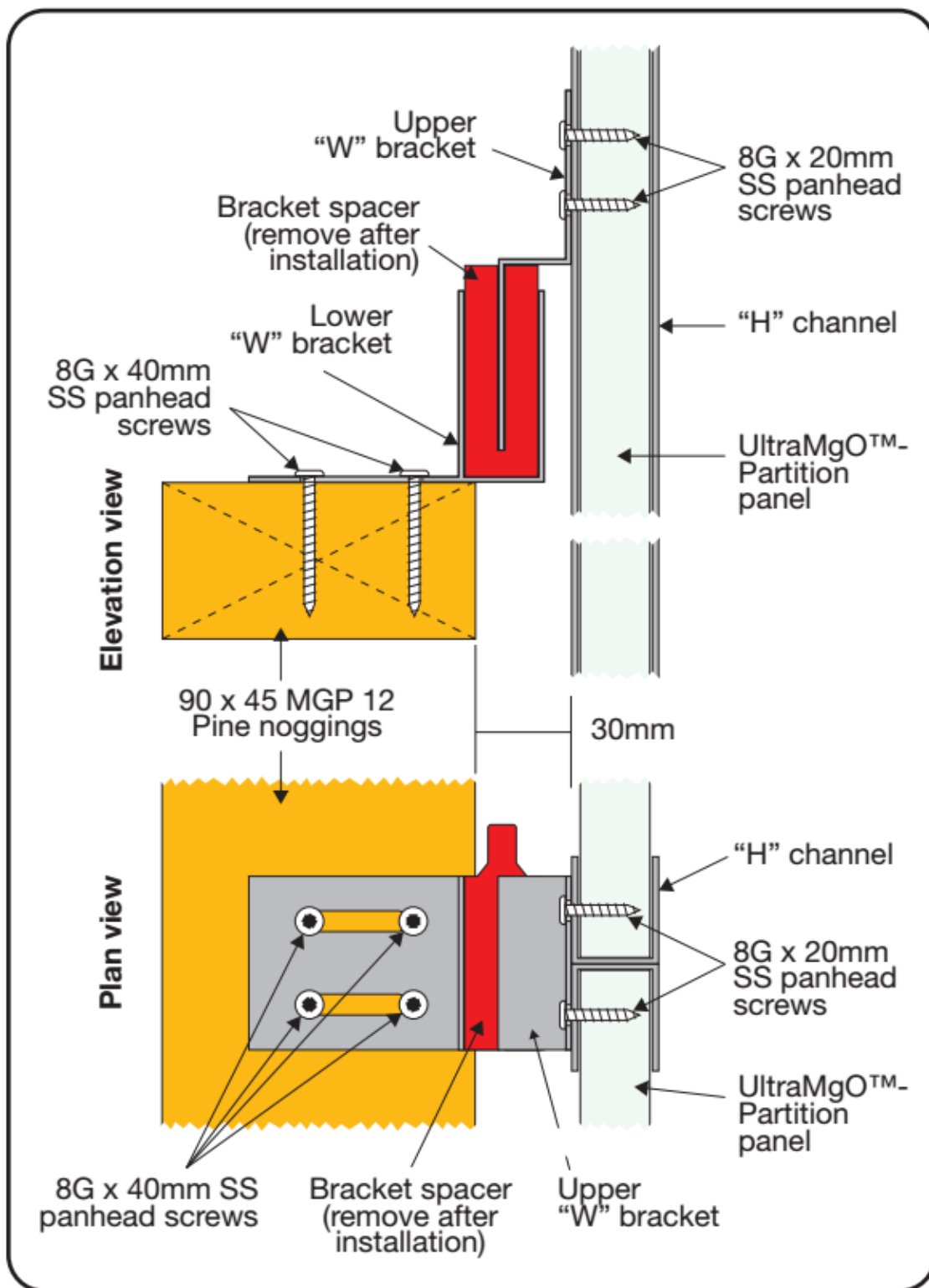


Figure 4 Illustration of Detail A (Refer to Figure 3)

As shown in Figure 3 and Figure 4, 30mm air gap is provided on both sides of the 20mm UltraMgO Partition Panel to accommodate discontinuous construction. A series of brackets are incorporated on both sides of the UltraMgO Partition Panel to provide lateral support and limit deflection in the event of a fire. These brackets are designed so that under normal conditions there is no rigid mechanical connection between one side of the wall and the other, except at the periphery. A description of the bracket arrangement is presented below:

- The 20mm UltraMgO Partition Panel at the centre of the wall system is connected to one leaf of the wall by means of an ordinary steel panel bracket;
- On the other side of the 20mm UltraMgO Partition Panel, it is connected to an “Upper W Bracket” which is sitting between the parallel panels of the “Lower W Bracket”;
- The “Lower W Bracket” is connected to the nogging;
- The “Lower W Bracket” incorporates slotted mounting holes to allow its alignment to be adjusted and is installed such that it is not physically connected to the “Upper W Bracket”. A spacer is used during the installation process to hold both elements of the “W” brackets in the correct alignment while fixing. The spacer is removed once the bracket is fixed to both nogging and H channel.

2.1.6 Method of Evaluation

A qualitative and comparative evaluation will be undertaken comparing the airborne and impact sound insulation of the proposed wall system with a comparable design that fully complies with the BCA DTS Provisions.

2.1.7 Design Scenario(s)

The proposed Performance Solution will be compared with a comparable design that fully complies with the DTS Provisions. The comparable BCA DTS compliant design is a wall assembly separating an SOU from another SOU. The proposed comparable wall assembly is as described in Figure 5.

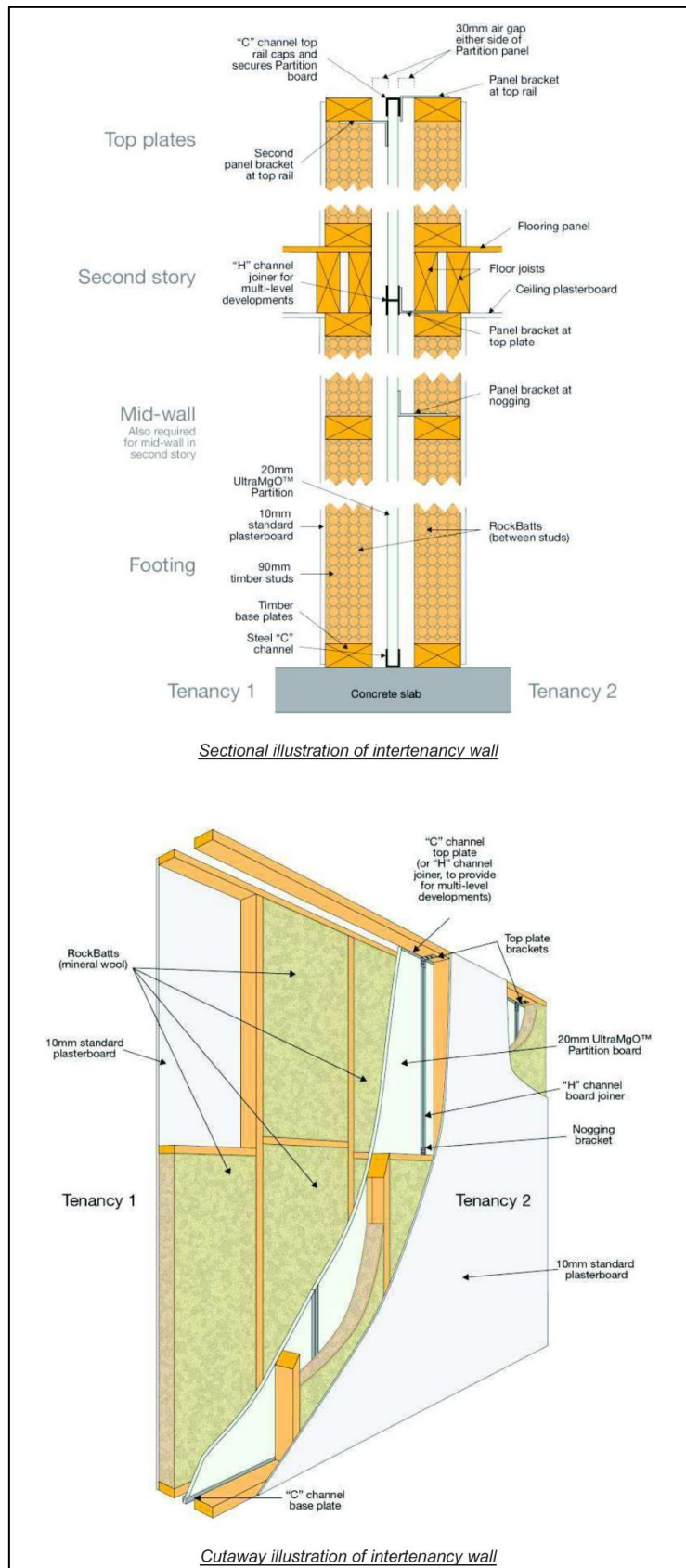


Figure 5 Comparables BCA DTS Compliant Design - Part Plan – Proposed Performance Solution Without W-Bracket (CSIRO, 2017)

The comparable design, as shown in Figure 5, has been demonstrated to achieve an airborne sound insulation rating R_w+C_{tr} 53 dB through laboratory testing by CSIRO (refer to Appendix C). It therefore satisfies the Deemed-To-Satisfy performance requirements for airborne sound insulation of walls separating SOUs.

The wall is constructed so as to have a minimum 20 mm cavity between two separate leaves, and has no mechanical linkage between the leaves except at the periphery. It therefore also satisfies the Deemed-To-Satisfy requirements for discontinuous construction.

2.1.8 Acceptance Criteria

The acceptance criteria with respect to airborne and impact sound insulation are that the airborne and impact sound insulation provided in the proposed Performance Solution is not less than the airborne and impact sound insulation in the comparable DTS compliant design.

2.1.9 Evaluation

The sound transmission loss of a wall is determined the following physical characteristics:

- Panel mass and stiffness
- Framing stiffness and configuration
- The depth of air spaces between panels / leaves
- The presence or absence of sound absorbing material in the wall cavity, the thickness and density of such material
- The degree of mechanical coupling between layers

An analysis of each of the above factors is presented in Table 7 below.

Table 7 Comparison of Proposed Performance Solution with DTS Compliant Design

Physical Characteristic	Design Comparison	Resultant Acoustical Effect
Panel Mass and Stiffness	The proposed performance solution comprises three panels. The outer panels on each side of the wall are 10 mm thick 6.8 kg/m² plasterboard. The central UltraMgO core is 20mm thick 21 kg/m² magnesium oxide board. The quantity of the panels, and their thickness and the density in the proposed performance solution is the same as the comparable design.	There is no difference between panel mass, therefore no difference in acoustic performance would be expected.

Physical Characteristic	Design Comparison	Resultant Acoustical Effect
Framing and Cavity Depth	The proposed performance solution utilises 90 x 45mm timber stud framing with 450 mm stud centres on both sides of the central UltraMgO Partition Panel. A clearance of 30 mm is provided between the UltraMgO Partition Panel and the studs. The design of the framing, the clearance between the UltraMgO Partition Panel and the framing, and the overall air cavity widths in the in the proposed performance solution, are the same as the comparable design.	There is no difference between framing configuration and the cavity depth, therefore no difference in acoustic performance would be expected.
Cavity Insulation	In the proposed performance solution, rock wool batts with minimum thickness 90mm and density 90kg/m³ will be installed in the stud cavity on both sides of the UltraMgO panel. Acoustic insulation thickness and density in the proposed performance solution is the same as the comparable design.	There is no difference in density and thickness of the acoustic insulation, therefore no difference in acoustic performance would be expected.

Physical Characteristic	Design Comparison	Resultant Acoustical Effect
Mechanical Connection between Leaves	In the proposed performance solution and the DTS compliant design, the central UltraMgO Partition Panel is connected to one leaf of the wall by means of a steel panel bracket. In the DTS compliant design there are no brackets between the central panel and the other wall leaf, except at the periphery. As such there is no mechanical connection between the central panel and the second wall leaf in the DTS compliant design. The proposed performance solution includes a 'W' bracket, as previously described, between the central panel and the other second wall leaf. There is no mechanical linkage established through the "W Bracket" mechanism between the wall panels in the proposed performance solution, unless buckling of the central panel occurs due to a fire event. Therefore, the degree of mechanical connection between the walls leaves is the same in the proposed performance solution is the same as the comparable design.	There is no difference in the degree of mechanical connection between the wall leaves, therefore no difference in acoustic performance would be expected.

Based on the above analysis, the proposed Performance Solution will provide the same airborne and impact sound transmission performance as the comparable design, and therefore satisfies the acceptance criteria.

3 Conclusion

The evaluation undertaken above has determined that:

- With respect to airborne noise, the $R_w + C_{tr}$ (airborne) in the proposed Performance Solution is not less than the $R_w + C_{tr}$ (airborne) in the comparable design that fully complies with the BCA DTS Provisions/ Acceptable Construction Provision; and
- With respect to impact noise, the proposed Performance Solution is considered a discontinuous construction and there is no mechanical linkage established between the leaves of the wall panels. Therefore, impact sound insulation for the wall is provided discontinuous construction.

It is therefore our considered opinion that the proposed Performance Solution satisfies Performance Requirements P2.4.6 (Class 1) and FP5.2 (Class 2 and Class 3).

4 References

- ABCB. (2016). *National Construction Code Series 2015 - Guide to Volume One. Building Code of Australia Class 2 to Class 9 Buildings*. Canberra: Australian Building Codes Board.
- ABCB. (2016). *National Construction Code Series Volume 1 - Building Code of Australia 2015*. Canberra: Australian Building Codes Board.
- Boral. (2009, February). Boral Selector + Plasterboard Systems. Australia.
- CSIRO. (2017). *CSIRO Acoustic Measurement Report TL 602-01-1*. Melbourne.

Appendix A Glossary of Acoustic Terms

dB / dB(A)	Decibels or 'A'-weighted Decibels, the units of Sound Pressure Level and Sound Power Level. 'A'-weighting adjusts the levels of frequencies within the sound spectrum to better reflect the sensitivity of the human ear to different frequencies. [Unit: dB / dB(A)]
C_{tr}	A spectrum adaptation term, commonly used with R_w and D_{nTW} . C_{tr} adjusts the sound insulation ratings to better describe the performance of the particular construction under consideration when subject to low frequency noise, such as noise from heavy vehicle traffic or subwoofers. [Unit: dB]
$L_{n,w}$	$L_{n,w}$ is the Weighted, Normalized Impact Sound Pressure Level. It is a single number rating of the impact sound insulation of a floor/ceiling assembly determined using a standard a standard 'tapping' machine. A lower value of $L_{n,w}$ indicates better impact sound insulation. [Unit: dB]
R_w	Weighted Sound Reduction Index. A single number rating of the airborne sound insulation performance of a specific building element in the absence of flanking transmission. A higher R_w value indicates better airborne sound insulation. [Unit: dB]

Appendix B Proposed Part Section – Walls Between SOUs in Class 1, 2, and 3 Buildings

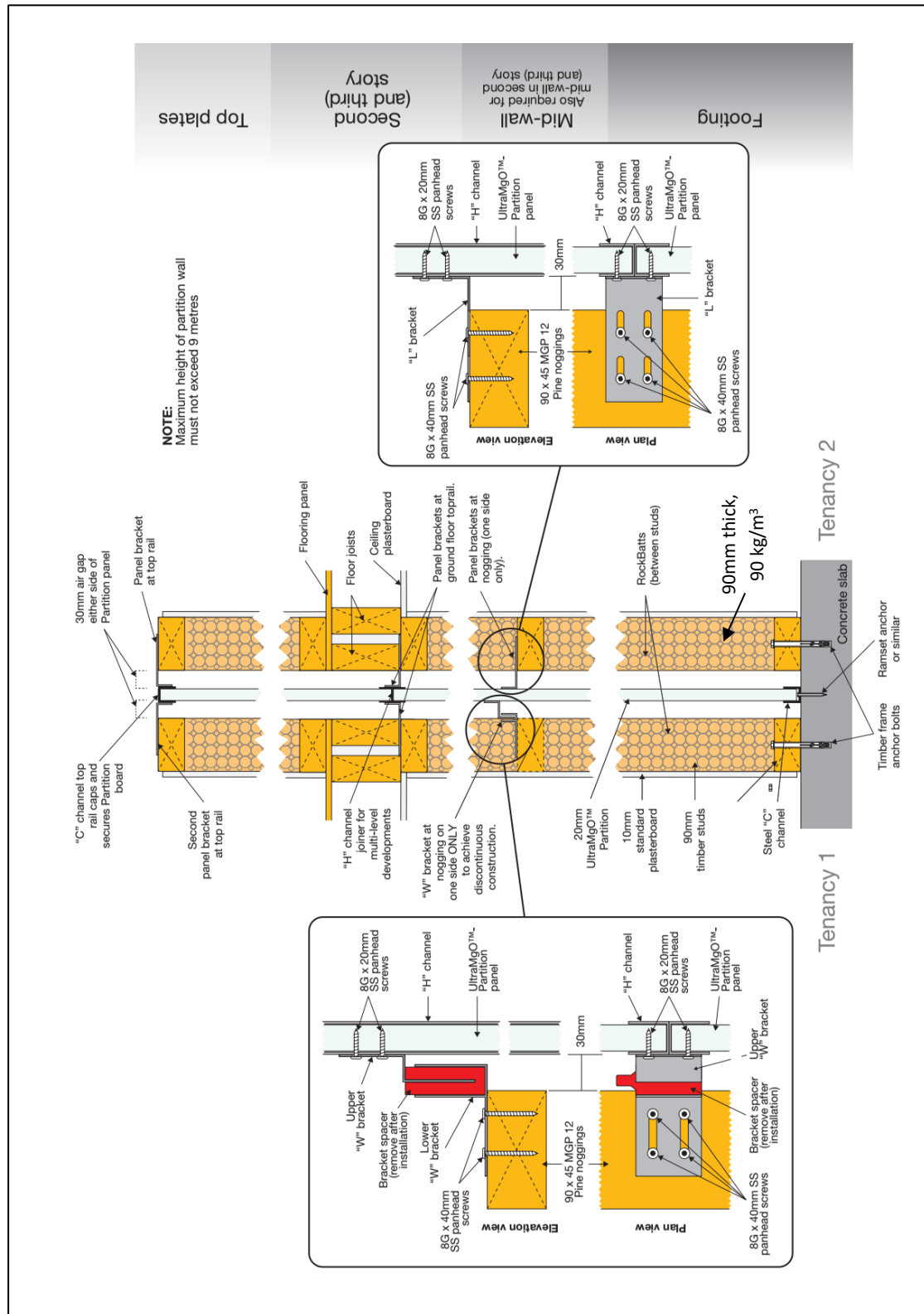
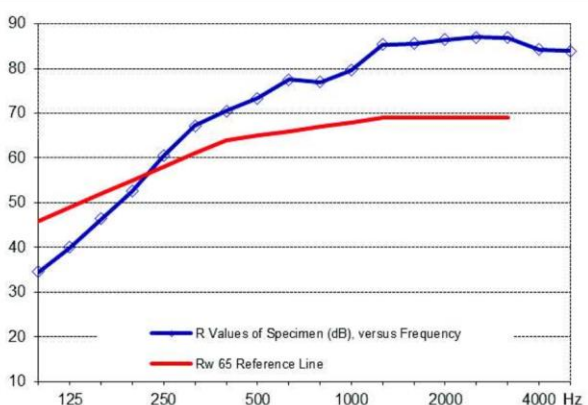


Figure 6 Construction Detail of the Proposed Wall System

Appendix C CSIRO Test Report for the Proposed Performance Solution (without W-Bracket)

	CSIRO ACOUSTIC MEASUREMENT REPORT Commonwealth Scientific and Industrial Research Organisation, Infrastructure Technologies Acoustics Testing Laboratory, Gate 5, 2 Normanby Road, Clayton, Vic 3168 Australia	Report No: TL602-01-1																																																																														
Client: Fireproof Cladding Facades Pty Ltd (FCF) 2/1 Laser Drive, Rowville, Victoria 3178																																																																																
Measurement Type: Airborne Sound Insulation AS 1191-2002 "Acoustics – Method for laboratory measurement of airborne sound insulation of building elements" AS/NZS 1276.1:1999 (ISO 717-1:1996) "Acoustics – Rating of sound insulation in buildings and of building elements. Part 1: Airborne Sound Insulation"																																																																																
Test Specimen [Specimen area: 3.60 m (w) x 3.0 m (h) = 10.8 m ² , nominal thickness overall: 280 mm] Description: Intertency wall with UltraMgO™ - Partition 20 (20 mm magnesium oxide central core), between 90 x 45 mm timber stud frames, each filled with 90 kg/m ³ rock wool batts; each side clad with a single layer of Knauf Spanshield plasterboard.																																																																																
Materials: a) FCF UltraMgO™ - Partition 20, 21 kg/m ² , 20 mm thick (2700 x 610 sheet size) b) UltraMgO™ ancillaries ("C" and "H" section tracks for top/bottom mounting and joining, panel brackets for attachment to wall framing, glass fibre mesh inserts for under panel brackets) c) FCF MW90 mineral (rock) wool batts, 90 kg/m ³ , 90 mm thick (1200 x 600 batt size) d) 90 x 45 mm MGP12 timber framing e) Knauf Spanshield plasterboard, 6.8 kg/m ² , 10 mm thick (1200 sheet width) f) Boral jointing compound and tape, and Fuller Firesound sealant																																																																																
Installation: - A timber stud frame [item d], with studs at 450 mm nominal centres and noggins at 1/3 and 2/3 wall-height was erected in one half of the laboratory specimen aperture, close to the structural break between the chambers. - UltraMgO™ - Partition 20 [item a] was installed 30 mm from the stud frame with ancillaries [item b]. - A second timber stud frame [item d] was erected in the other half of the laboratory specimen aperture (structurally independent), 30 mm from the UltraMgO™ - Partition 20. - A full complement of brackets was used to tie the UltraMgO™ - Partition 20 to the first stud frame; with the second stud frame having brackets at the top plate only, in accordance with the manufacturer's instructions. - Mineral wool batts [item c] were cut to size and inserted into both timber stud frames. The hand-cut edges of the batts left gaps to the studs in some places; such gaps were covered with mastic. - Both sides of the wall were clad with plasterboard [item e], hung horizontally and screw-fixed. - Plasterboard joints were finished with jointing compound and tape, and the perimeter of the finished wall was caulked both sides [item f], and the wall was painted immediately prior to testing.																																																																																
 <i>Test specimen under construction in laboratory</i>																																																																																
Measurement Details & Results																																																																																
<table border="1"><thead><tr><th rowspan="2">Freq (Hz)</th><th colspan="2">Specimen R Value (dB)</th><th rowspan="2">Repeatability δ (dB)</th></tr><tr><th>1/3 Octave</th><th>Whole Octave</th></tr></thead><tbody><tr><td>100</td><td>34.5</td><td></td><td>1.2</td></tr><tr><td>125</td><td>40.0</td><td>37.9</td><td>3.0</td></tr><tr><td>160</td><td>46.4</td><td></td><td>2.4</td></tr><tr><td>200</td><td>52.6</td><td></td><td>2.4</td></tr><tr><td>250</td><td>60.5</td><td>≥ 56.6</td><td>1.5</td></tr><tr><td>315</td><td>≥ 67.2</td><td></td><td>N/A</td></tr><tr><td>400</td><td>≥ 70.5</td><td></td><td>N/A</td></tr><tr><td>500</td><td>≥ 73.4</td><td>≥ 72.9</td><td>N/A</td></tr><tr><td>630</td><td>≥ 77.5</td><td></td><td>N/A</td></tr><tr><td>800</td><td>≥ 77.0</td><td></td><td>N/A</td></tr><tr><td>1000</td><td>≥ 79.6</td><td>≥ 79.5</td><td>N/A</td></tr><tr><td>1250</td><td>≥ 85.3</td><td></td><td>N/A</td></tr><tr><td>1600</td><td>≥ 85.6</td><td></td><td>N/A</td></tr><tr><td>2000</td><td>≥ 86.5</td><td>≥ 86.4</td><td>N/A</td></tr><tr><td>2500</td><td>≥ 87.0</td><td></td><td>N/A</td></tr><tr><td>3150</td><td>≥ 86.9</td><td></td><td>N/A</td></tr><tr><td>4000</td><td>≥ 84.3</td><td>≥ 84.9</td><td>N/A</td></tr><tr><td>5000</td><td>≥ 83.9</td><td></td><td>N/A</td></tr></tbody></table>	Freq (Hz)	Specimen R Value (dB)		Repeatability δ (dB)	1/3 Octave	Whole Octave	100	34.5		1.2	125	40.0	37.9	3.0	160	46.4		2.4	200	52.6		2.4	250	60.5	≥ 56.6	1.5	315	≥ 67.2		N/A	400	≥ 70.5		N/A	500	≥ 73.4	≥ 72.9	N/A	630	≥ 77.5		N/A	800	≥ 77.0		N/A	1000	≥ 79.6	≥ 79.5	N/A	1250	≥ 85.3		N/A	1600	≥ 85.6		N/A	2000	≥ 86.5	≥ 86.4	N/A	2500	≥ 87.0		N/A	3150	≥ 86.9		N/A	4000	≥ 84.3	≥ 84.9	N/A	5000	≥ 83.9		N/A		
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Performance Index Numbers R _w (C; C _{tr}) = 65 (-4; -12) dB STC = 64 R _w + C _{tr} = 53	Repeatability Estimates (AS 1191, App B, 95 % Confidence) Measurement was carried out in both directions through the test specimen, using 3 loudspeaker positions in each chamber; giving 6 spatially independent sets of R values, from which average R values and repeatability estimates have been calculated (repeatability estimates rounded up to 1 decimal place).	Measurement Conditions Date of measurement: 13 January 2017 200 m ³ chamber (north): 24 °C, 55 % R.H. 100 m ³ chamber (south): 24 °C, 60 % R.H. Atmospheric pressure: 987 mBar																																																																														
Notes, Deviations etc - Physical characteristics of materials may be suppliers' nominal figures; not necessarily verified by CSIRO. ≥ indicates R values where measurability was limited by proximity to background level. - Proximity to background level was limiting measurability in all frequency bands 315 Hz and higher, however the performance index numbers R_w and C_{tr} were governed entirely by performance in the lower frequency bands, and were not limited by proximity to background level.	4. Specimen installation was carried out by the client.	Issuing Authority  Signed: David Truett Date: 2 March 2017																																																																														
Instrumentation Real time analyser: • Brüel & Kjær PULSE LAN-XI type 3160-A-4/2 Microphones/preamps: • GRAS type 40AP microphones on B&K type 2669 preamps, rotating simultaneously in both rooms with 33 sec period (1.65 m radius in 200 m ³ room, 1.32 m radius in 100 m ³ room). Noise source: • Rola 12UX on flat 1m ² baffle (up to 1.8 KHz) • Brüel & Kjær type HP 1000 dodecahedron (from 1.8 KHz) Calibration: • Brüel & Kjær type 4228 Pistonphone: Feb 2016 (NATA cal) • Analyser: Feb 2016 (NATA cal)	Laboratory Construction Chambers: • 300 mm thick concrete • parallelepiped with dimensional proportions 1:1.3:1.6 for spectral distribution and overlap of room modes • northern room approx. 200 m ³ vol (212 m ² area); southern room 100 m ³ vol (133 m ² area). Diffusers: • 200 m ³ room: 20 diffusers (approx 40 m ²) • 100 m ³ room: none. Isolation: • ≥ R _w 75; structurally separate (60 mm air gap), vibration isolated (11 Hz). Specimen aperture: • 3.60 m wide x 3.00 m high, each chamber having 25 mm thick steel plate lining its 300 mm deep portion of the test aperture, creating a total aperture depth of 660 mm, resilient foam sealing the 60 mm air gap.																																																																															
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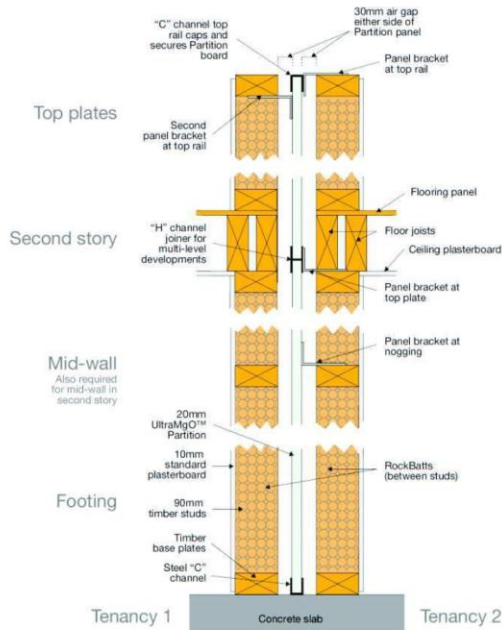


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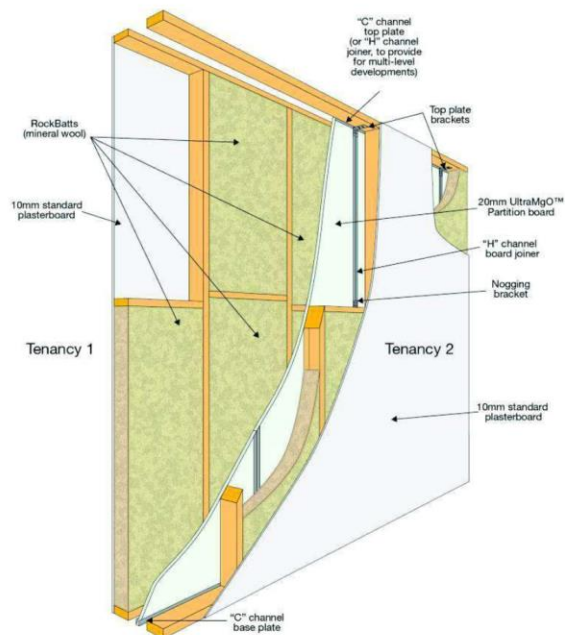
Commonwealth Scientific and Industrial Research Organisation, Infrastructure Technologies
Acoustics Testing Laboratory, Gate 5, 2 Normanby Road, Clayton, Vic 3168 Australia

Report No:
TL602-01-1

Additional Test Specimen Details (illustrations provided by client)



Sectional illustration of intertenancy wall



Cutaway illustration of intertenancy wall

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