

# **BUILDING CODE OF AUSTRALIA COMPLIANCE MANUAL AND CERTIFICATIONS**

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## **DISCLAIMER**

The information contained in this document is intended for the use of suitably qualified and experienced architects and engineers and other building professionals. This information is not intended to replace design calculations or analysis normally associated with the design and specification of buildings and their components. The information contained in this document is not project specific. Building professionals are required to assess construction site conditions and provide design/details and appropriate safe work method statements accordingly. Dincel Construction System Pty Ltd accepts no liability for any circumstances arising from the failure of a specifier or user of any part of Dincel Construction System to obtain appropriate project specific professional advice about its use and installation or from failure to adhere to the requirements of appropriate Standards, Codes of Practice, Worker Health & Safety Act and relevant Building Codes.

Revision – 12<sup>th</sup> November 2018

# BUILDING CODE OF AUSTRALIA COMPLIANCE

## DINCEL WALL/COLUMNS

**In accordance with AS3600 – 2009 the determination of the fire rating period (FRP) is no longer based on the wall or column thickness alone.**

**In particular, the structural adequacy for the fire rating period is now required to be calculated by the structural engineer giving consideration to many other factors. The following are important to understand.**

**Australian building regulations are controlled by the Building Code of Australia (BCA). The compliance with the BCA, Volume 1 (Class 2 to 9 Buildings) requires:**

- (1) Complying with the **“Deemed to Satisfy” provisions** as referred to in Part A2.3 hence Specification A2.3 (2) (d) (ii) AS3600 Concrete Structures Code, or
- (2) Formulating an **alternative solution** means a building solution that complies with the BCA performance requirements other than by reason of satisfying the “Deemed to Satisfy” provisions which:
  - (i) Complies with the assessment methods and **performance requirements** as determined by BCA, (Clauses A09 and A0.10), or
  - (ii) Is shown to be at least the equivalent of the “Deemed to Satisfy” provisions, (i.e. AS3600 – 2009, Appendix B), or
- (3) Combination of both (1) and (2).

**The “deemed to satisfy” conditions** – AS3600 Concrete Code has been written based on worldwide tests since the invention of Portland cement (circa 1800). These tested prototypes were either concrete made out of Portland cement without any steel reinforcement or steel reinforcement consisting of steel bars only.

**An Alternative Solution** – refers to conditions which vary from the “deemed to satisfy” conditions which are the use of non-Portland cement or non-conventional special concrete mixes or concrete walls consisting of metallic components without concrete cover.

**Dintel wall is not an alternative solution. It complies with the “Deemed to Satisfy” conditions of AS3600. This statement is verified by the University of New South Wales (refer below certificate from the University of New South Wales).**

**(download) Structural Engineering Certification by the University of NSW.**

Dintel Wall's only difference from conventional concrete walls is the presence of permanent polymer formwork which improves the concrete's curing performance and protects the concrete in the long term against environmental attacks. It is an obvious fact that if the Dintel polymer is removed from its concrete infill, the remaining concrete wall is identical to the prototype defined by the Eurocode/AS3600 (i.e. plain or reinforced concrete).

23<sup>rd</sup> July 2014

Our Ref: J084829

Dinzel & Associates  
Consulting Engineers  
PO Box 104  
St Clair, NSW 2759

Dear Sirs

UNSW



MARK A. BRADFORD

BSc BE PhD DSc FTSE FStructE FIEAust Dist.MASCE  
Consulting Infrastructure Engineering (i)  
and Safety

PROFESSOR OF CIVIL ENGINEERING

AUSTRALIAN LAUREATE FELLOW

SCIENTIA PROFESSOR

***Dinzel Construction System  
Structural Engineering Certification***

I have conducted an expert review of the Dinzel Construction System's Compliance Manual (Building Code of Australia Compliance Assessment and Certifications as appears in the Dinzel website), its Structural Engineering Design Manual (3S Structural Engineering Manual) and its Construction Manual for Designers and Builders.

Specifically, the *Compliance Manual* deals with principles regarding compliance with the Building Code of Australia, while the *Structural Engineering Design Manual* addresses material properties as well as the structural design of axially loaded walls subjected to vertical loading in sway prevented structures, flexural members that are subjected to bending and shear effects and shear walls. The *Construction Manual for Designers and Builders* deals with the Dinzel Wall components, architectural planning layouts, installation and detailing recommendations.

I note the introduction of a 200mm thick corner profile referred to as 200P-3. I note the reference to AS3700-2011, which supersedes AS3700-2001, and of the removal of designing DINCEL® to AS3700-2011. I note that the equation for calculating the tensile strength of concrete has been modified to  $0.36f_c^{1/2}$ . I note the limitation on shear capacity as being the lesser of  $(0.2f_c, 10 \text{ MPa})$ . Finally, I note pages 47 to 52 now provide compressive strength tables in accordance with Section 11 of AS3600-2009, since the limiting values in Clause 5.7.4 (d) (i) in AS3600-2001 have been removed in AS3600-2011.

I am satisfied that the design principles and methodologies in these manuals are appropriate and consistent with the design clauses in the relevant and frequently used international structural engineering codes of practice, such as the ACI 318 and Eurocode EC2 mentioned in the Dinzel Construction System's Engineering Manual, and in particular with AS 3600-2009 Concrete Structures.

I am satisfied that the walls and blade columns of the Dinzel Construction System, when designed in accordance with the *Structural Engineering Design Manual*, will satisfy the Building Code of Australia Volume 1 Specification A2.3 (2) (d) (ii) "deemed to satisfy" definition, being compliant with AS 3600-2009 Concrete Structures.

Based on the aforementioned evaluation and review, I certify the use of the Compliance Manual and the Structural Engineering Design Manual comply for the purposes of structural engineering design.

Yours faithfully

MARK A BRADFORD  
BSc BE PhD DSc FTSE FStructE FIEAust Dist.MASCE

Commercial-in-Confidence

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19<sup>th</sup> March 2012

Dincel Construction System Pty Ltd  
Level 3  
7K Parkes Street  
PARRAMATTA NSW 2150

**Attention: Managing Director**

Dear Sir

**RE: ENGINEERING CERTIFICATE OF CONFORMITY**

This certificate has been issued for the purposes of satisfying the Building Code of Australia (BCA) Part A2.2(a)(iii) – Evidence of Suitability for structures utilising Dincel Wall and Columns described in the Structural Engineering Manual as certified by the University of New South Wales.

The system consists of permanent polymer formwork and structural concrete. The polymer formwork has been tested by CSIRO and its fire and smoke compliance with the Building Code of Australia has been certified.

The use of structural concrete material is defined by Australian Standard for Concrete Structures Code (AS 3600).

This is to confirm that Dincel Construction System will comply with the Building Code of Australia provided that the following engineering design principles are adopted by the designer.

- (i) Loads: Current Australian Standards
  - (a) Dead and Live loads and load combinations AS 1170.1.
  - (b) Wind Loads AS 1170.2.
  - (c) Snow Loads AS 1170.3.
  - (d) Earthquake Loads AS 1170.4.
- (ii) Determination of structural resistance materials and forms of construction in accordance with:
  - (a) Concrete Construction – AS 3600.
  - (b) Concrete Construction of other appropriate standards from European, German, British, Canadian and American.

The writer further recommends that the designer be familiar with the Structural Engineering Manual and the Dincel Construction website's "Information for Design Engineers",

Yours faithfully  
DINCEL & ASSOCIATES



**Burak Dincel**, BE MEngSc MIEAust CPEng RPEQ NPER

Directors: **Burak Dincel** BE MEngSc MIEAust CPEng RPEQ RBPeng NPER  
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## **FIRE RESISTANCE PERIOD (FRP) OR FIRE RESISTANCE LEVEL (FRL)**

The current AS3600 – 2009 has changed the previous code AS3600 – 2001. The current approach is as follows:

Column = Blade Column = Wall where 4 x thickness of load bearing element is at least equal or more than its length – AS3600 – 2009, Clause 5.6.2 (b).

### **Structural Adequacy (FRP) – Dintel Wall/Blade Column**

It is no longer based on the wall thickness alone. **The FRP for structural adequacy of a wall complying with the “deemed to satisfy” conditions (including Dintel) is required to be calculated by a structural design engineer** based on the wall height/thickness ratio, applied loadings, design eccentricities, and concrete grade.

The determination of structural adequacy FRP of a wall complying with the “deemed to satisfy” conditions can be based on the following:

- (i) AS3600 – 2009, Table 5.7.2 which is the lower tier approximate method of EuroCode2 adopted by AS3600. The inadequacy of Table 5.7.2 of AS3600 – 2009 is explained in the downloadable document below.
- (ii) AS3600 – 2009, Clause 5.3 refers to the higher tier Zone Method of the EuroCode. The principles are explained in [\*\*\(download\) The Use of AS3600 – 2009/EuroCode for Dintel Wall\*\*](#)
- (iii) Fire Test Reports cannot be relied upon if the calculated load from the structure is higher than the Fire Test Laboratory’s testing equipment’s load capacity or the wall under consideration is longer in height. Refer below for explanation.

### **The Use of Fire Test Reports for The Determination of Fire Resistance Period (FRP).**

As stated above, Dintel Walls achieve the “deemed to satisfy” BCA compliance when engineered in accordance with AS3600 Concrete Structures Code provisions. This is why Dintel Walls as a “Deemed to Satisfy” solution is not required to provide a Fire Test Report. **Fire test reports are only required for an alternative solution which deals with options that are not covered by the “Deemed to Satisfy” provision, i.e. AS3600 requirements.** It is also important to note that Australian fire test facilities are limited to maximum load of 300 kN/m and maximum size of 3,000mm height wall and fire applicable for one side only. In accordance with AS3600 – 2009, Appendix B, Clause B2.3 requires that tests for an alternative solution must simulate 100% of the design loads, for the wall under consideration. The majority of most walls exceed the load and height limitation of the test facility and therefore the alternative solutions cannot be used for the majority of cases.

### **Insulation (FRP) – Wall/Blade Column**

AS3600 – 2009, Clause 5.7.1 (b) and 5.7.4.3 (b) and Table 5.7.1.

275mm Dintel = effective thickness = 270mm > 175mm **satisfies 240 min. FRP**

200mm Dintel = effective thickness = 187mm > 175mm **satisfies 240 min. FRP.**

155mm Dintel = effective thickness = 150mm = 150mm **satisfies 180 min. FRP.**

110mm Dintel = effective thickness = 105mm > 100mm **satisfies 90 min. FRP.**

**AS3600 – 2009, Clause 5.8 allows the increase of FRP by addition of insulation materials.**

### **Integrity (FRP) – Wall/Blade Column**

The guidance is if both structural adequacy and insulation are satisfied, integrity shall be deemed to be satisfied as well.

It is important for building authorities and private certifiers to require the following or similar statement from the structural design engineers where the building design loads exceed the fire test loads of the structural (concrete) wall under consideration.

***“I confirm that I have calculated the structural adequacy of the walls/blade columns of this project based on their thickness, slenderness, applied loads, including their eccentricity and concrete mix specification to be adequate for ...../...../..... minutes of FRP in compliance with the current Building Code of Australia – Volume 1 – Specification A2.3 (2) (d) (ii)”.***

## **DINCEL TEST REPORT**

The following document consists of numerous reports provided by the CSIRO.

### **(Download) Dincel Wall Fire Assessment**

Assessment covers the following issues:

- Fire Resistance Period of the 200mm Dincel Wall under 267 kN/m load (maximum load capacity of fire testing facility).
- Would fire burn the polymer links joining each face of the Dincel form to create a gap, i.e. is the insulation/integrity satisfied (refer report by CSIRO in the above downloadable document).
- Fire Hazard Properties (the “deemed to satisfy” condition of the BCA – Part A2.3 is also shown below).
- Non-Combustibility.
- Bush Fire Prone Areas.

## **BCA - A2.4 – Fire Hazard Properties**

Dincel Wall is a brand name for a concrete wall encapsulated by permanent polymer formwork. If the polymer formwork of Dincel Wall is removed for any reason, the remaining component is the concrete which is in compliance with the Concrete Structures Code AS3600/EuroCode.

The *Deemed-to-Satisfy Provision* of the BCA requires **DINCEL**®’s permanent polymer formwork to have a *Smoke-Developed Index*, *Spread-of-Flame Index*, or *Flammability Index*, or a material’s *group number* or *smoke growth rate index* (SMOGRArc) to be predicted, it must be determined in accordance with **Specification A2.4**.

## **BCA - Specification A2.4 – Fire Hazard Properties**

Fire hazard properties shall be determined in accordance with Specification C1.10 – Clause 4 for Wall Linings.

**Specification C1.10, Clause 4 (a) (ii) 3 (c) (ii) – Deemed-to-Satisfy Condition Fire Hazard Properties Applicable to Dincel Wall.**

The Dincel polymer material as per the following test results by CSIRO satisfies the BCA requirements.

**Group 1 material** (i.e. no limitation of the product use without any protection threshold as allowed by the BCA).

**Specific Extinction Area** = 90.5 kg/m<sup>2</sup> < 250 kg/m<sup>2</sup> for 1.5mm material thickness.

**Specific Extinction Area** = 143.6 kg/m<sup>2</sup> < 250 kg/m<sup>2</sup> for 2.6mm material thickness.

## BCA SPECIFICATION C1.10 – Table 3

### WALL LINING MATERIALS (Material Groups Permitted)

BCA Building Class	Fire isolated exits	Public corridors	Specific areas	Other areas
	Wall	Wall	Wall	Wall
Class 2 & 3 Excluding accommodation for the aged, people with disabilities and children				
Unsprinklered	1	1, 2	1, 2, 3	1, 2, 3
Sprinklered	1	1, 2, 3	1, 2, 3	1, 2, 3
Class 3 & 9a Accommodation for the aged, people with disabilities, children and Health-care buildings				
Unsprinklered	1	1	1, 2	1, 2, 3
Sprinklered	1	1, 2	1, 2, 3	1, 2, 3
Class 5, 6, 7, 8 & 9b Schools				
Unsprinklered	1	1, 2	1, 2, 3	1, 2, 3
Sprinklered	1	1, 2, 3	1, 2, 3	1, 2, 3
Class 9b – other than schools				
Unsprinklered	1	1	1, 2	1, 2, 3
Sprinklered	1	1, 2	1, 2, 3	1, 2, 3
Class 9c				
Sprinklered	1	1, 2	1, 2, 3	1, 2, 3
<b>Notes:</b> 1. “Sprinklered” refers to a building fitted with a sprinkler system complying with Specification E1.5. 2. “Specific areas” means within – (a) for Class 2 and 3 buildings, a sole-occupancy unit; and (b) for Class 5, open-plan offices with a minimum floor dimension/floor to ceiling height ratio > 5; and (c) for Class 6, shops with a minimum floor dimension/floor to ceiling height ratio > 5; and (d) for Class 9a health care buildings, patient care areas; and (e) for Class 9b theatres and hall etc., an auditorium; and (f) for Class 9b schools, a classroom; and (g) for Class 9c aged care buildings, resident use areas.				

CSIRO fire testing results in accordance with AS 3837 confirms that DINCEL<sup>®</sup> consists of Group 1 material and its Specific Extinction Area (SEA) is less than 250m<sup>2</sup>/kg to comply with the requirements of the Building Code of Australia specification C1.10 Clause 4 Fire Hazard Properties for walls. (Refer to following certificate by CSIRO)

Group 1 material Classification refers to compliance with the above table of Building Code of Australia that the product can be used in any location for any sprinklered or unsprinklered building and will meet the requirements of Specification C1.10 – Clause 4 of current BCA.

The following certificate by CSIRO confirms that Dincel permanent formwork product material is classified as Group 1.



# Certificate of Assessment

HF07ANK4245

No. 439

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without written authorisation from CSIRO is forbidden.

This is to certify that the specimen described below was tested by the CSIRO Division of Manufacturing and Infrastructure Technology in accordance with Australian/ New Zealand Standard 3837, Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter, 1998, at 50 kW/m<sup>2</sup>, on behalf of:

Dincol Construction System Pty Ltd  
Level 3, 7K Parkes Street  
PARRAMATTA NSW  
AUSTRALIA

A full description of the test specimen and the complete test results are detailed in the Division's sponsored investigation report numbered FNK 0065.

SAMPLE  
IDENTIFICATION: Dincol - Formwork

DESCRIPTION OF  
SAMPLE: The sponsor described the tested specimen as an extruded rigid PVC profile filled with normal density concrete. The specimen contained smoke suppressant additives.

Nominal thickness of PVC:	1.5 mm
Nominal total thickness:	50 mm
Nominal density of PVC:	1.45 g/cm <sup>3</sup>
Nominal density of concrete:	2400 kg/m <sup>3</sup>

SAMPLE  
CLASSIFICATION: Group Number: Group 1  
(In accordance with Specification A2.4 of the Building Code of Australia.)

Average specific extinction area: 90.5 m<sup>2</sup>/kg  
(Refer to Specification C1.10a section 3(c) of the Building Code of Australia.)

Testing Officer: Russell Collins Date of Test: 20 November 2003

Issued on the 8<sup>th</sup> day of February 2007 without alterations or additions. This issue supersedes issue dated 27 November 2003.

Garry E Collins  
Manager, Fire Testing and Assessments



**CSIRO Manufacturing & Infrastructure Technology**  
14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113 AUSTRALIA  
Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555



# Certificate of Assessment

Job No.: NK7381

No. 2220

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without written authorisation from CSIRO is forbidden.

This is to certify that the specimen described below was tested by the CSIRO Infrastructure Technologies in accordance with Australian/ New Zealand Standard 3837, Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter, 1998, at 50 kW/m<sup>2</sup>, on behalf of:

Dintel Construction System Pty Limited  
101 Quarry Road  
ERSKINE PARK NSW 2759  
AUSTRALIA

A full description of the test specimen and the complete test results are detailed in the Division's sponsored investigation report numbered FNK 11446.

## SAMPLE

**IDENTIFICATION:** The sponsor identified the specimen as Dintel Sample A - Current Australian Use.

## DESCRIPTION OF

**SAMPLE:** The sponsor described the tested specimen as extruded rigid polyvinyl chloride (PVC) profile used as permanent formwork for concrete walls. The rigid PVC profile formed the exposed face of the tested specimen and was attached onto the concrete block substrate using concrete fasteners at the corner edges of the exposed face.

Nominal thickness of PVC:	2.6-mm
Nominal total thickness:	50-mm
Nominal density of PVC:	1500 kg/m <sup>3</sup>
Nominal total mass:	100 kg/m <sup>2</sup>
Colour:	off-white (PVC)

## SAMPLE

**CLASSIFICATION:** Group Number: Group 1  
(In accordance with Specification A2.4 of the Building Code of Australia.)

Average specific extinction area: 143.6 m<sup>2</sup>/kg  
(Refer to Specification C1.10 section 4(c) of the Building Code of Australia.)

Testing Officer: Heherson Alarde Date of Test: 21 July 2015

Issued on the 3<sup>rd</sup> day of August 2015 without alterations or additions.



Brett Roddy  
Team Leader, Fire Testing and Assessments



NATA Accredited Laboratory  
Number: 165  
Corporate Site No 3625  
Accredited for compliance with ISO/IEC 17025.

**CSIRO INFRASTRUCTURE TECHNOLOGIES**

14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113 AUSTRALIA  
Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 [www.csiro.au](http://www.csiro.au)



## Compliance Certificate for BUSHFIRE PRONE AREAS

The Building Code of Australia requires that structures in bushfire prone areas must comply with Australian Standard AS3959 – 2009 and method of tests, AS1530 Part 8:1, and AS1530 Part 8:2.

Refer [\(Download – Dincel-Wall Fire Assessment\)](#) for Dincel-Wall bushfire prone area compliance.

## BCA - SECTION F – HEALTH AND AMENITY

### DINCEL® - WALL Relevant Parts

- Part F1 – Damp and Weather-proofing
- Limit to Volatile Organic Compounds
- Part F5 – Sound Transmission and Insulation

### BCA - Part F1 – Damp and Weather-Proofing

#### BCA - F1.0 Deemed-to-Satisfy Provisions

Performance requirement of the BCA are **FP1.4, FP1.7 (Volume 1) and P24.1 (Volume 2)** for the provision of the penetration of water and must be complied with.

The tests conducted by the CSIRO confirm:

Dincel Construction System, when installed in accordance with the Dincel Construction Manual will satisfy the performance requirements of Clauses FP1.4 and FP1.7 (Volume 1 – Class 2 to Class 9 buildings) and P2.4.1 (Volume 2 – Class 1 and Class 10 buildings Housing Provisions) of the Building Code of Australia as the Dincel-Wall meets the waterproofing requirements of AS3740 and the following test methods.

1. ASTM E 514 - 08: Standard Test Method for Water Penetration and Leakage Through Masonry.
2. AS/NZS 4347.1:1995: Damp-proof Courses and Flashings – Methods of Test – Method 1 Determination of Water Permeability.
3. ASTM E 96/M: Standard Test Method – Water Vapour Transmission of Materials.

For the CSIRO tested waterproofing certificate [\(Download – Waterproof Walls\)](#)

## LIMIT TO VOLATILE ORGANIC COMPOUNDS

The gases released by materials used in buildings are generally referred to as volatile organic compounds (VOC) or of-gassing. There are many new building products added to the construction industry. There is no VOC control limit in the current BCA. However, the industry refers to the safe threshold introduced by the Green Building Council – **Green Star Rating, Total Volatile Organic Compound (TVOC), Specific Area Emission Rate 0.5 mg/m<sup>2</sup>/hour at 30 days after material production.**

**DINCEL-POLYMER TVOC Rate < 0.01 mg/m<sup>2</sup>/hour (below detection level) at 30 days after production of Dincel-Formwork. Refer to the following certificate.**

# Emission Test Certificate

Wednesday November 14<sup>th</sup>, 2007

Supplier: Dincel Construction Systems (Level 3, 7K Parkes Street, Parramatta NSW 2150)

Product Description: Polymer Formwork

Date Tested: October 2007

Test Method: ASTM D5116-97 "Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Material/Products".

Emission Data:

Dincel Polymer Formwork	Total Volatile Organic Compound Specific Area Emission Rate mg/m <sup>2</sup> /hr
Newly Manufactured (24 hours)	0.02
Aged (ca. 30 days)	<0.01 (below detection limit)
<p>This product can be classed as low VOC-emitting. The material emissions are less than the recognised threshold of 0.5 mg/m<sup>2</sup>/hr; e.g. "Green Star".</p> <p>When this product is used in accordance with the technical specifications for a building the resulting airborne total volatile organic compound concentration can be expected to be less than 0.5 mg/m<sup>3</sup> acceptable limit specified by the scientific literature.</p>	



Dr. Vyt Garnys  
PhD, BSc(Hons) AIMM, ARACI, ISIAQ  
ACA, AIRAH, FMA  
Managing Director and Principal Consultant

CV071106

## BCA - PART F5 SOUND TRANSMISSION AND INSULATION

## Deemed-to-Satisfy Provisions

- Airborne Sound Requirements to comply with Part F5.5 (a), (c), (d) and (e).
- Impact Sound Requirements to comply with Part F5.3 (b) and (c).

**The following certificates as per Part A2.2 (a) (iii) – Evidence of Suitability confirms that DINCEL®-WALL complies with conditions of Building Code of Australia.**

**BUILDING CODE OF AUSTRALIA ACOUSTIC COMPLIANCE FOR:**

- **110 mm DINCEL WALL** ) **BASED ON THE TESTS DONE AT CSIRO'S**  
 ) **ACOUSTIC LABORATORIES**
- **155 mm DINCEL WALL** ) **BASED ON THE LABORATORY TEST DATA FOR**  
 ) **110mm DINCEL AND 200mm DINCEL**
- **200 mm DINCEL WALL** ) **BASED ON THE TESTS DONE AT THE**  
 ) **NATIONAL ACOUSTIC LABORATORIES**
- **150 mm FLOOR SLAB**



## Acoustic System Summary – 110mm Dintel Wall




System No  $R_w/R_w+C_{tr}$	WALL LINING SIDE 1	110mm DINTEL WALL CONCRETE DENSITY 2,350 kg/m <sup>3</sup>	WALL LINING SIDE 2
110-6.1 48 / 43	Nil, painted or rendered	Wall width: 110mm 	Nil, painted or rendered
110-6.2 45 / 41	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 120mm 	Nil, painted or rendered
110-6.3 45 / 41	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 130mm 	10mm Knauf MastaShield plasterboard, direct fix
110-6.4 45 / 42	13mm Knauf MastaShield plasterboard, direct fix	Wall width: 166mm 	13mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel (30mm cavity)
110-6.5 47 / 41 <sup>1</sup> 49 / 42 <sup>2</sup>	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel (30mm cavity)	Wall width: 231mm <sup>1</sup> 244mm <sup>2</sup> 	10mm Knauf MastaShield plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity)
110-6.6 53 / 46	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 160mm 	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel (30mm cavity) 25mm glasswool insulation in cavity
110-6.7 54 / 39	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel at 600mm cts (30mm cavity) 25mm glasswool in cavity	Wall width: 190mm 	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel at 600mm cts (30mm cavity) 25mm glasswool in cavity
110-6.8 51 / 43 <sup>1</sup> 52 / 44 <sup>2</sup>	Nil, painted or rendered	Wall width: 191mm <sup>1</sup> 204mm <sup>2</sup> 	10mm Knauf MastaShield plasterboard, fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity)
110-6.9 55 / 50	13mm Knauf MastaShield plasterboard, direct fix	Wall width: 189mm 	16mm Knauf FireShield plasterboard, screw fixed to 28mm furring channel (50mm cavity) 50mm Knauf Earthwool in cavity
110-6.10 63 / 50	16mm Knauf FireShield plasterboard, screw fixed to 28mm furring channel at 600mm cts (45mm cavity) 25mm glasswool in cavity	Wall width: 232mm 	16mm Knauf FireShield plasterboard, screw fixed to 28mm furring channel at 600mm cts (45mm cavity) 25mm glasswool in cavity



## Acoustic System Summary – 110mm Dintel Wall



System No  $R_w/R_w+C_{tr}$	WALL LINING SIDE 1	110mm DINCEL WALL CONCRETE DENSITY 2,350 kg/m <sup>3</sup>	WALL LINING SIDE 2
110-6.11  57 / 50 <sup>1</sup> 57 / 51 <sup>2</sup>	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 204mm <sup>1</sup> 217mm <sup>2</sup> 	13mm Knauf FireShield plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity) 50mm Knauf Earthwool in cavity
10-6.12  62 / 50 <sup>1</sup> 63 / 52 <sup>2</sup>	13mm Knauf FireShield plasterboard, screw fixed to 28mm furring channel (30mm cavity) 25mm glasswool insulation in cavity	Wall width: 237mm <sup>1</sup> 250mm <sup>2</sup> 	13mm Knauf FireShield plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity) 50mm Knauf Earthwool in cavity
10-6.13  66 / 55 <sup>1</sup> 67 / 57 <sup>2</sup>	16mm Knauf FireShield plasterboard, screw fixed to furring channel 28mm furring channel at 600mm cts (30mm cavity) 25mm glasswool insulation in cavity	Wall width: 259mm <sup>1</sup> 272mm <sup>2</sup> 	2 layers 16mm Knauf FireShield plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity) 50mm Knauf Earthwool in cavity

<sup>1</sup> 51 mm steel studs <sup>2</sup> 64 steel studs

The acoustic ratings provided are opinions based on test data of comparable laboratory tests and acoustic modelling carried out by Day Design Pty Ltd.





## Acoustic System Summary – 155 mm Dintel Wall

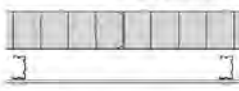


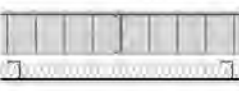
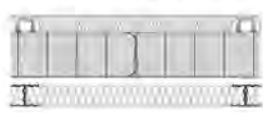


System No $R_w/R_w+C_{tr}$	WALL LINING SIDE 1	155 mm DINCEL WALL CONCRETE DENSITY 2,350 kg/m <sup>3</sup>	WALL LINING SIDE 2
<b>155-6.1</b>  51 / 45	Nil, painted or rendered	Wall width: 155mm 	Nil, painted or rendered
<b>155-6.2</b>  50 / 45	13mm Knauf MastaShield plasterboard, direct fix	Wall width: 168mm 	Nil, painted or rendered
<b>155-6.3</b>  50 / 45	13mm Knauf MastaShield plasterboard, direct fix	Wall width: 181mm 	13mm Knauf MastaShield plasterboard, direct fix
<b>155-6.4</b>  48 / 43	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 205mm 	10mm Knauf MastaShield plasterboard, direct fix screw fixed to 28mm furring channel (30mm cavity)
<b>155-6.5</b>  51 / 43 <sup>1</sup> 52 / 44 <sup>2</sup>	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel (30mm cavity)	Wall width: 276mm <sup>1</sup> 289mm <sup>2</sup> 	10mm Knauf MastaShield plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity)
<b>155-6.6</b>  58 / 50 <sup>1</sup> 58 / 51 <sup>2</sup>	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 246mm <sup>1</sup> 259mm <sup>2</sup> 	10mm Knauf MastaShield plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity) 50 mm Earthwool in cavity
<b>155-6.7</b>  55 / 48	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 205mm <sup>1</sup> 	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel (30mm cavity) 25mm glasswool in cavity
<b>155-6.8</b>  50 / 43	16mm Knauf FireShield plasterboard, direct fix	Wall width: 217mm 	16mm Knauf FireShield plasterboard, screw fixed to 28mm furring channel (30mm cavity)
<b>155-6.9</b>  51 / 38	10mm Knauf MasterShield plasterboard, screw fixed to 28mm furring channel at 600mm cts (30mm cavity)	Wall width: 235mm 	10mm Knauf MasterShield plasterboard, screw fixed to 28mm furring channel at 600mm cts (30mm cavity) 25mm glasswool in cavity



## Acoustic System Summary – 155 mm Dincel Wall



System No $R_w/R_w+C_{tr}$	WALL LINING SIDE 1	155 mm DINCEL WALL CONCRETE DENSITY 2,350 kg/m <sup>3</sup>	WALL LINING SIDE 2
<b>155-6.10</b>  54 / 45 <sup>1</sup> 56 / 48 <sup>2</sup>	Nil, painted or rendered	Wall width: 236mm <sup>1</sup> 249mm <sup>2</sup> 	10mm Knauf plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity)
<b>155-6.11</b>  56 / 50	13mm Knauf MastaShield plasterboard, direct fix	Wall width: 221mm 	13mm Knauf MastaShield plasterboard, direct fix screw fixed to 28mm furring channel (40 mm cavity) 25 mm glasswool in
<b>155-6.12</b>  66 / 52	16mm Knauf FireShield plasterboard, screw fixed to 28mm furring channels at 600mm cts (45mm cavity) 25mm glasswool in cavity	Wall width: 277mm 	16mm Knauf FireShield plasterboard, screw fixed to 28mm furring channels at 600mm cts (45mm cavity) 25mm glasswool in cavity
<b>155-6.13</b>  63 / 51 <sup>1</sup> 64 / 52 <sup>2</sup>	13mm Knauf MastaShield plasterboard, direct fix	Wall width: 252mm <sup>1</sup> 265mm <sup>2</sup> 	13mm Knauf plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>3</sup> /84 <sup>4</sup> mm cavity) 50 mm Earthwool in cavity
<b>155-6.14</b>  70 / 55 <sup>3</sup> 69 / 55 <sup>4</sup> 70 / 57 <sup>5</sup>	13/16mm Knauf FireShield plasterboard, screw fixed to 28mm furring channel (30mm cavity) 25 mm glasswool in cavity	Wall width: 295mm <sup>3</sup> 288mm <sup>4</sup> , 301mm <sup>5</sup> 	13/16mm Knauf FireShield, screw fixed to studs at 600mm cts 20mm air gap (84 <sup>3</sup> /71 <sup>4</sup> /84 <sup>5</sup> mm cavity) 50 mm Earthwool in cavity

<sup>1</sup> 51mm steel studs

<sup>2</sup> 64mm steel studs

<sup>3</sup> 64mm steel studs, 13mm plasterboard

<sup>4</sup> 51mm steel studs, 16mm plasterboard

<sup>5</sup> 64mm steel studs, 16mm plasterboard

The acoustic ratings provided above are opinions based on test data of comparable laboratory tests and acoustic modelling carried out by Day Design acoustic consultants.





## Acoustic System Summary – 200mm Dincel Wall








System No  $R_w/R_w+C_{tr}$	WALL LINING SIDE 1	200 mm DINCEL WALL CONCRETE DENSITY 2,350 kg/m <sup>3</sup>	WALL LINING SIDE 2
200-6.1  53 / 48	Nil, painted or rendered	Wall width: 200mm 	Nil, painted or rendered
200-6.2  51 / 46	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 210mm 	Nil, painted or rendered
200-6.3  51 / 46	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 220mm 	10mm Knauf MastaShield plasterboard, direct fix
200-6.4  53 / 46	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 250mm 	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel at 600mm cts 30mm cavity
200-6.5  55 / 46 <sup>1</sup> 55 / 47 <sup>2</sup>	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel at 600mm cts 30mm cavity	Wall width: 321mm <sup>1</sup> 334mm <sup>2</sup> 	10mm Knauf MastaShield plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity)
200-6.6  61 / 53 <sup>1</sup> 62 / 54 <sup>2</sup>	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 291mm <sup>1</sup> 304mm <sup>2</sup> 	10mm Knauf MasterShield plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity) 50mm Knauf Earthwool in cavity
200-6.7  51 / 46	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 220mm 	10mm Knauf MastaShield plasterboard, direct fix
200-6.8  53 / 46	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 250mm 	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel at 600mm cts 30mm cavity
200-6.9  53 / 39	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel at 600mm cts 30mm cavity	Wall width: 280mm 	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel at 600mm cts 30mm cavity 25mm glasswool in cavity



## Acoustic System Summary – 200mm Dincel Wall



System N <sup>o</sup>  R <sub>w</sub> /R <sub>w</sub> +C <sub>tr</sub>	WALL LINING SIDE 1	200 mm DINCEL WALL CONCRETE DENSITY 2,350 kg/m <sup>3</sup>	WALL LINING SIDE 2
<b>200-6.10</b>  57 / 47 <sup>1</sup> 58 / 48 <sup>2</sup>	Nil, painted or rendered	Wall width: 281mm <sup>1</sup> 294mm <sup>2</sup> 	10mm Knauf MastaShield plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity)
<b>200-6.11</b>  57 / 50	10mm Knauf MastaShield plasterboard, direct fix	Wall width: 250mm 	10mm Knauf MastaShield plasterboard, screw fixed to 28mm furring channel at 600mm cts, 30mm cavity 25mm glasswool in cavity
<b>200-6.12</b>  68 / 54	16mm Knauf Fireshield plasterboard, screw fixed to 28mm furring channel at 600mm cts, 45mm cavity 25mm glasswool in cavity	Wall width: 322mm 	16mm Knauf Fireshield plasterboard, screw fixed to 28mm furring channel at 600mm cts, 45mm cavity 25mm glasswool in cavity
<b>200-6.13</b>  65 / 56 <sup>1</sup> 66 / 57 <sup>2</sup>	13mm Knauf MastaShield plasterboard, direct fix	Wall width: 297mm <sup>1</sup> 310mm <sup>2</sup> 	13mm Knauf plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity) 50mm Knauf Earthwool in cavity
<b>200-6.14</b>  68 / 53 <sup>3</sup> 69 / 55 <sup>4</sup> 70 / 56 <sup>5</sup> 71 / 58 <sup>6</sup>	Knauf MasterShield plasterboard, screw fixed to 28mm furring channel at 600mm cts 30mm cavity 25mm glasswool in cavity	Wall width: 327mm, 340mm, 333mm, 346mm <sup>3-6</sup> 	Knauf MasterShield plasterboard, screw fixed to studs at 600mm cts 20mm air gap (71 <sup>1</sup> /84 <sup>2</sup> mm cavity) 50mm Knauf Earthwool in cavity

<sup>1</sup> 51 mm steel studs

<sup>3</sup> 51 mm steel studs, 13 mm plasterboard

<sup>5</sup> 51 mm steel studs, 16 mm plasterboard

<sup>2</sup> 64 mm steel studs

<sup>4</sup> 64 mm steel studs, 13 mm plasterboard

<sup>6</sup> 64 mm steel studs, 16 mm plasterboard

The acoustic ratings provided above are opinions based on test data of comparable laboratory tests and acoustic modelling carried out by Day Design acoustic consultants.







**DAY DESIGN PTY LTD**  
CONSULTING ACOUSTICAL ENGINEERS

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Dincel Construction Systems  
PO Box 104  
St Clair NSW 2759

26 April 2016  
Our ref: 5880-2.1L REV A

Attention: Mr Burak Dincel  
Telephone: 9670 1633

Email: [burak@dincel.com.au](mailto:burak@dincel.com.au)

Dear Burak,

### 150 mm Floor Slab - Acoustic Opinion

A 150 mm thick concrete slab covered with carpet, with either a set plaster ceiling, or with a suspended ceiling having a cavity of not less than 70 mm with insulation, will meet the airborne and impact sound insulation requirements in the current Building Code of Australia.

#### Rationale:

- The BCA specifies a 150 mm thick concrete panel as a "deemed-to-satisfy" construction to meet the airborne sound insulation requirement of no less than  $R_w+C_{tr}$  50 for walls, which is equal to the airborne sound insulation requirement of no less than  $R_w+C_{tr}$  50 for floors.
- The presence of a set plaster ceiling or a suspended ceiling having a cavity of not less than 70 mm with insulation will not reduce the airborne acoustic performance of the 150 mm thick floor slab.
- A carpet floor covering will satisfy the current impact sound insulation requirement of no greater than  $L_{n,w}+C_i$  62.

**Note:** A suitably qualified acoustical consultant should advise whether a particular design, which differs from the above design, meets the acoustic requirements of the BCA.

We therefore certify that the specification given above for 150 mm thick floor slabs used in conjunction with complying Dincel Wall systems will comply with the airborne and impact sound insulation requirements in the current Building Code of Australia.

Yours Sincerely,

Stephen Gauld **Stephen Gauld**, BE (Mech), MEngSc (Noise and Vibration), MIEAust, MAAS  
Principal Acoustical Engineer  
for and on behalf of Day Design Pty Ltd



• AIRCRAFT, ROAD TRAFFIC AND TRAIN NOISE CONTROL  
• ARCHITECTURAL ACOUSTICS - INDUSTRIAL NOISE AND VIBRATION CONTROL  
• ENVIRONMENTAL NOISE IMPACT INVESTIGATION AND CONTROL  
• OCCUPATIONAL NOISE INVESTIGATION - QUIET PRODUCT DEVELOPMENT



12 April 2013

610.12590.00000 Letter 20130412.doc

Dincel Construction System Pty Ltd  
Level 3, 7K Parkes Street  
PARRAMATTA NSW 2150

**Attention: Burak Dincel**

Dear Burak

### Floor Slab Acoustic Certification

In our opinion, the following construction meets the laboratory airborne and impact acoustic requirements of the current BCA.

A 150 mm thick concrete slab with carpet – with either a set plaster ceiling, or with a suspended ceiling having a cavity of not less than 70mm.

- a. Tiled or timber finish – with an approved acoustic underlay (to serve as the impact isolator) laid over the concrete slab and under the tiling.

#### Rationale:

- A 150 mm plain concrete member is “deemed to satisfy” the airborne party wall requirement of  $R_w + C_{tr}$  50 dB, which is also the party floor airborne requirement – even though the deemed to satisfy requirement for a floor includes a 200 mm concrete slab (with carpet).

The presence of set plaster ceiling will not reduce the airborne acoustic performance of the 150 mm thick slab.

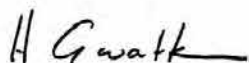
Note: A suitably qualified acoustics engineer should advise on the design where the ceiling cavity is less than 70mm.

- The current BCA impact requirement is  $L_{n,w} + C_i$  being no more than 62 dB. This will be satisfied through the use of carpet.

Note: A suitably qualified acoustics engineer should specify an appropriate acoustic underlay where a hard floor finish is required.

We hereby certify that the above specification, in association with Dincel-Wall is used, the floor slabs will comply for airborne and impact requirements of the current Building Code of Australia (BCA).

Yours sincerely

A handwritten signature in black ink, appearing to read "H Gwatk".

HOWARD GWATKIN

Principal – Building Acoustics



September 2009

**Dinzel Construction System Pty Ltd**

**Level 3, 7K Parkes Street, Parramatta NSW 2150**

**Re: FLOOR SLABS ACOUSTIC CERTIFICATIONS**

This is to confirm that as acoustic engineers we will certify the following:

A 150 mm thick concrete slab with set plaster ceiling or false ceiling will be allowed with the following floor finishes.

- (a) Tiled or timber finish – there will be an approved underlay which will serve as the impact isolator laid over concrete slab under floor tiling. The floors with tiled finishes will be subjected to both airborne and impact requirements of the current BCA 2009.
- (b) Carpet finish – approved carpet underlay to be provided. The floor slab with carpet finish will be subjected to air borne sound provision.

RSA Acoustics confirms that the above specifications comply with the current Building Code of Australia – BCA 2009 for the following reason:

- The overall minimum construction depth of 150mm is provided for the floor slab as described above. A 150mm plain concrete member provides  $D_{n,Tw} + C_{tr} > 45 \text{ dB}$  or  $R_w + C_{tr} = 50 \text{ dB}$  which are the requirements for the current BCA airborne sound. The presence of set plaster ceiling and carpet on underlay further improves the airborne acoustic performance of the 150mm thick slab. The floor slab therefore complies with the airborne sound requirements as described in the current BCA.
- The current BCA impact requirements are  $L_{nw} + C_i$  being no more than 62dB. This will be satisfied because the slab details described above with tile finish will have an approved underlay as impact isolators. The underlay has the required manufacturing testing certificate approved by an acoustic engineer.

We hereby certify that when the above specification, in association with Dinzel-Wall is used, the floor slabs will comply for airborne and impact requirements of the current Building Code of Australia (BCA) 2009.

*Rodney O. Stevens*

Rodney Stevens – MAAS  
Principal Consultant  
RSA Acoustics

A division of Heggies Pty Ltd

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Parramatta NSW 2124

## TERMITE BARRIER TO COMPLY – AS3660.1-2014 – TERMITE BARRIER

The Building Code of Australia (BCA), Volume 1, Amendment 1, Part B1.4 and Volume 2, Part 3.1.3 states that primary building elements are required to be protected against termite damages.

Termites are wood eating insects. The most dangerous of these kinds are sub-terrain termite. The prevention of termites entering into buildings can be done either by chemical or soil treatment or by having an impermeable barrier. The environmentally preferred method is not to use chemicals. It is known that termites do not eat polymers, such as rigid polyvinyl chloride. The tightness of interlocking wall modules and monolithic concrete construction of Dincel Wall leave no space for termites to enter into building environments.

In accordance with Australian Standard AS3660-1-2014 Dincel Construction System adopts a termite barrier system which consists of monolithic wall-slab construction to deter the termites gaining concealed access to a building

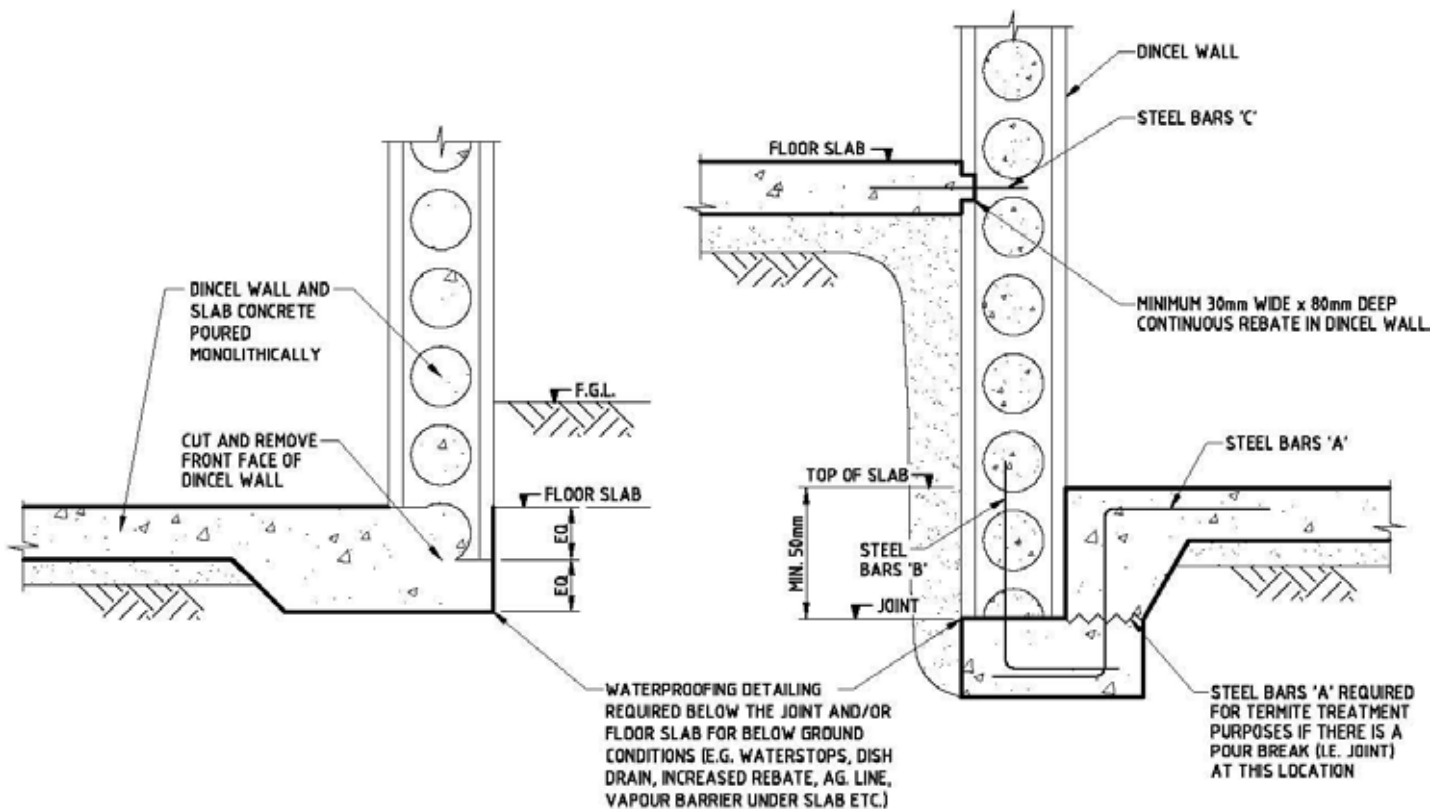
Termites can enter the building's interior through wall cracks and wall joints. The wall joints associated with masonry brick, block, in-situ concrete and precast concrete are required to minimise wall cracking. If joints are provided, all walls in below ground conditions must have termite treatment in addition to conventional waterproofing requirements. Dincel Wall is a joint free wall system which has been used successfully in a 140 metre long wall without joints at the Cochlear Building in Macquarie University, Sydney.

The majority of concrete floor slabs, especially for housing, are small enough to build without joints. This eliminates the majority of the termite treatment (except at the service penetrations) provided that a monolithic connection between Dincel Wall floor slab is achieved.

Dincel Wall provides imperviousness even for 6m of head of water pressure as tested by the CSIRO, Australia ([Download – Waterproof Walls](#)) let alone termites.

Therefore, when Dincel-wall is built around the building's periphery an impervious termite barrier is established provided the joint between Dincel Wall and the footing slab is treated in accordance with the detail shown below.

The following detail complies with AS3660.1 – 2014 Termite Barrier.



### AS 3660.1 COMPLIANT DETAIL TO AVOID TERMITE TREATMENT AT SLAB EDGES AND RETAINING WALLS

NOTE: REFER DESIGN ENGINEER FOR BARS 'A', 'B', 'C',  
FOOTING AND SLAB REINFORCEMENT SPECIFICATION

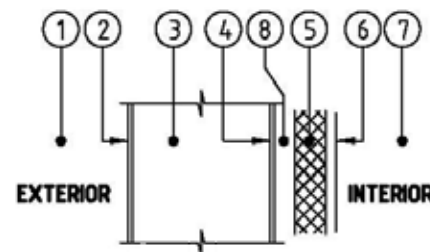
**No additional termite treatment is required when the detail shown above is adopted. It is therefore in compliance with AS3660.1 – 2014 Termite Barrier is achieved.**

**(Download – AS3660 Termite Barrier)** to read the relevant Clause 4.3.2.2 which outlines the conditions where footing/slab joints can be considered as monolithic as shown on the above detail and therefore no requirement for termite treatment.

## ENERGY EFFICIENCY/THERMAL INSULATION WITH **200mm** DINCEL® - WALL

The calculation of thermal resistance (R value).

	OPTION 1	OPTION 2
1. Exterior air film.....	0.04.....	0.04
2. Exterior polymer skin.....	0.0174.....	0.0174
3. 200mm thick concrete wall (min. 2300kg/m <sup>3</sup> density) for Option 1.....	0.138.....	NIL
700kg/m <sup>3</sup> density concrete for Option 2.....	NIL.....	1.7
4. Interior polymer skin.....	0.0174.....	0.0174
5. 75mm thick extruded polystyrene sheet *.....	2.595.....	NIL
6. 10mm thick interior plasterboard.....	0.06.....	0.06
7. Indoor air film (still air).....	0.12.....	0.12
Total	R = 2.989m <sup>2</sup> k/W	R = 1.95m <sup>2</sup> k/W



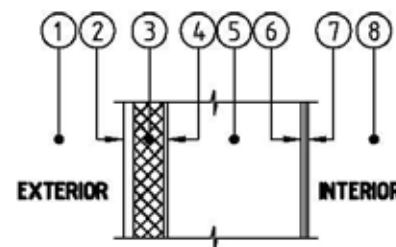
DINCEL®

**FAÇADE WALLS**

8. Minimum 25mm air gap between 4 & 5 or 6 if used additional R=0.16m<sup>2</sup> k/W can be added to the values shown above to achieve a higher rating, i.e. 28mm furring channels for internal plasterboard fixing achieves R = 1.95 + 0.16 = 2.11m<sup>2</sup> k/W for Option 2.

### HIGH THERMAL MASS CONSTRUCTION (HOT HUMID CLIMATE)

1. Exterior air film.....	0.04.....	0.04
2. Optional 6mm thick fibre-cement board.....	0.06.....	0.06
or cement render		
3. 75mm thick extruded polystyrene sheet *.....	2.595.....	NIL
4. Exterior polymer skin.....	0.0174.....	0.0174
5. 200mm thick concrete wall (min 2300kg/m <sup>3</sup> density).....	0.138.....	NIL
700kg/m <sup>3</sup> density lightweight.....	NIL.....	1.7
6. Interior polymer skin.....	0.0174.....	0.0174
7. 10mm thick interior plasterboard.....	0.06.....	0.06
8. Indoor air film (still air).....	0.12.....	0.12
Total	R = 3.05m <sup>2</sup> k/W	R = 2.01m <sup>2</sup> k/W



DINCEL®

**FAÇADE WALLS**

9. Minimum 25mm air gap between 6 & 7 if used additional R=0.16m<sup>2</sup> k/W can be added to the values shown above to achieve a higher rating. R = 2.01 + 0.16 = 2.17m<sup>2</sup> k/W for Option 2.

\* XPS with thermal conductivity 0.0289 W/m.k (Total R value can be changed to suit varying XPS thicknesses and air gaps)

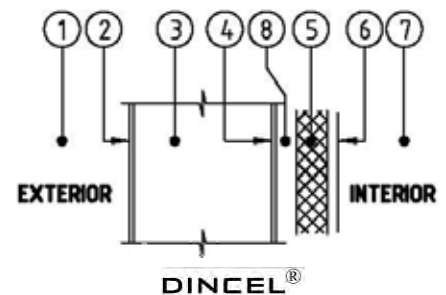
**NOTE:** The above information needs to be read together with [\(Download – Finishes\)](#) and [\(Download - Indoor Air Quality, Condensation, Mould, Mildew\).](#)



## ENERGY EFFICIENCY/THERMAL INSULATION WITH 110mm DINCEL®-WALL

The calculation of thermal resistance (R value).

1. Exterior air film.....	0.04
2. Exterior polymer skin.....	0.0174
3. 110mm thick concrete wall (min. 2300kg/m <sup>3</sup> density) for Option 1.....	0.076
4. Interior polymer skin.....	0.0174
5. 75mm thick extruded polystyrene sheet *.....	2.595
6. 10mm thick interior plasterboard.....	0.06
7. Indoor air film (still air).....	<u>0.12</u>
Total	R = 2.92m <sup>2</sup> k/W

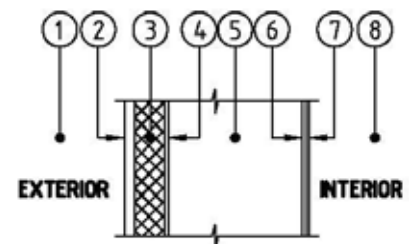


**FAÇADE WALLS**

8. Minimum 25mm air gap between 4 & 5 or 6 if used additional R=0.16m<sup>2</sup> k/W can be added to the values shown above to achieve a higher rating.

### HIGH THERMAL MASS CONSTRUCTION (HOT HUMID CLIMATE)

1. Exterior air film.....	0.04
2. Optional 6mm thick fibre-cement board.....	0.06
or cement render	
3. 75mm thick extruded polystyrene sheet *.....	2.595
4. Exterior polymer skin.....	0.0174
5. 110mm thick concrete wall (min 2300kg/m <sup>3</sup> density).....	0.076
6. Interior polymer skin.....	0.0174
7. 10mm thick interior plasterboard.....	0.06
8. Indoor air film (still air).....	<u>0.12</u>
Total	R = 2.979m <sup>2</sup> k/W



**FAÇADE WALLS**

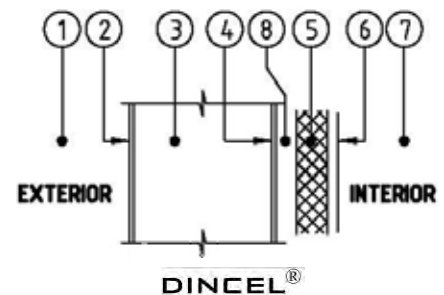
9. Minimum 25mm air gap between 6 & 7 if used additional R=0.16m<sup>2</sup> k/W can be added to the values shown above to achieve a higher rating.

\* XPS with thermal conductivity 0.0289 W/m.k (Total R value can be changed to suit varying XPS thicknesses and air gaps)

## ENERGY EFFICIENCY/THERMAL INSULATION WITH **155mm** DINCEL®-WALL

The calculation of thermal resistance (R value).

1. Exterior air film.....	0.04
2. Exterior polymer skin.....	0.0174
3. 155mm thick concrete wall (min. 2300kg/m <sup>3</sup> density) for Option 1.....	0.108
4. Interior polymer skin.....	0.0174
5. 75mm thick extruded polystyrene sheet *.....	2.595
6. 10mm thick interior plasterboard.....	0.06
7. Indoor air film (still air).....	<u>0.12</u>
Total	R = 2.95m <sup>2</sup> k/W

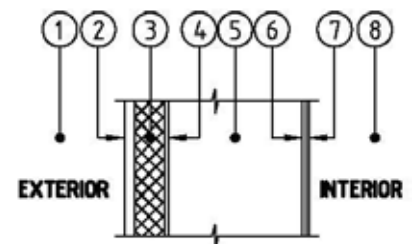


**FAÇADE WALLS**

8. Minimum 25mm air gap between 4 & 5 or 6 if used additional R=0.16m<sup>2</sup> k/W can be added to the values shown above to achieve a higher rating.

### HIGH THERMAL MASS CONSTRUCTION (HOT HUMID CLIMATE)

1. Exterior air film.....	0.04
2. Optional 6mm thick fibre-cement board.....	0.06
or cement render	
3. 75mm thick extruded polystyrene sheet *.....	2.595
4. Exterior polymer skin.....	0.0174
5. 155mm thick concrete wall (min 2300kg/m <sup>3</sup> density).....	0.108
6. Interior polymer skin.....	0.0174
7. 10mm thick interior plasterboard.....	0.06
8. Indoor air film (still air).....	<u>0.12</u>
Total	R = 3.011m <sup>2</sup> k/W



**FAÇADE WALLS**

9. Minimum 25mm air gap between 6 & 7 if used additional R=0.16m<sup>2</sup> k/W can be added to the values shown above to achieve a higher rating.

\* XPS with thermal conductivity 0.0289 W/m.k (Total R value can be changed to suit varying XPS thicknesses and air gaps)