DINCEL
STRUCTURAL WALLING

Garage, Carport & Fire Shelter

NCC Class 10 Applications

The Original & Internationally Patented

PVC PERMANENT FORMWORK SYSTEM

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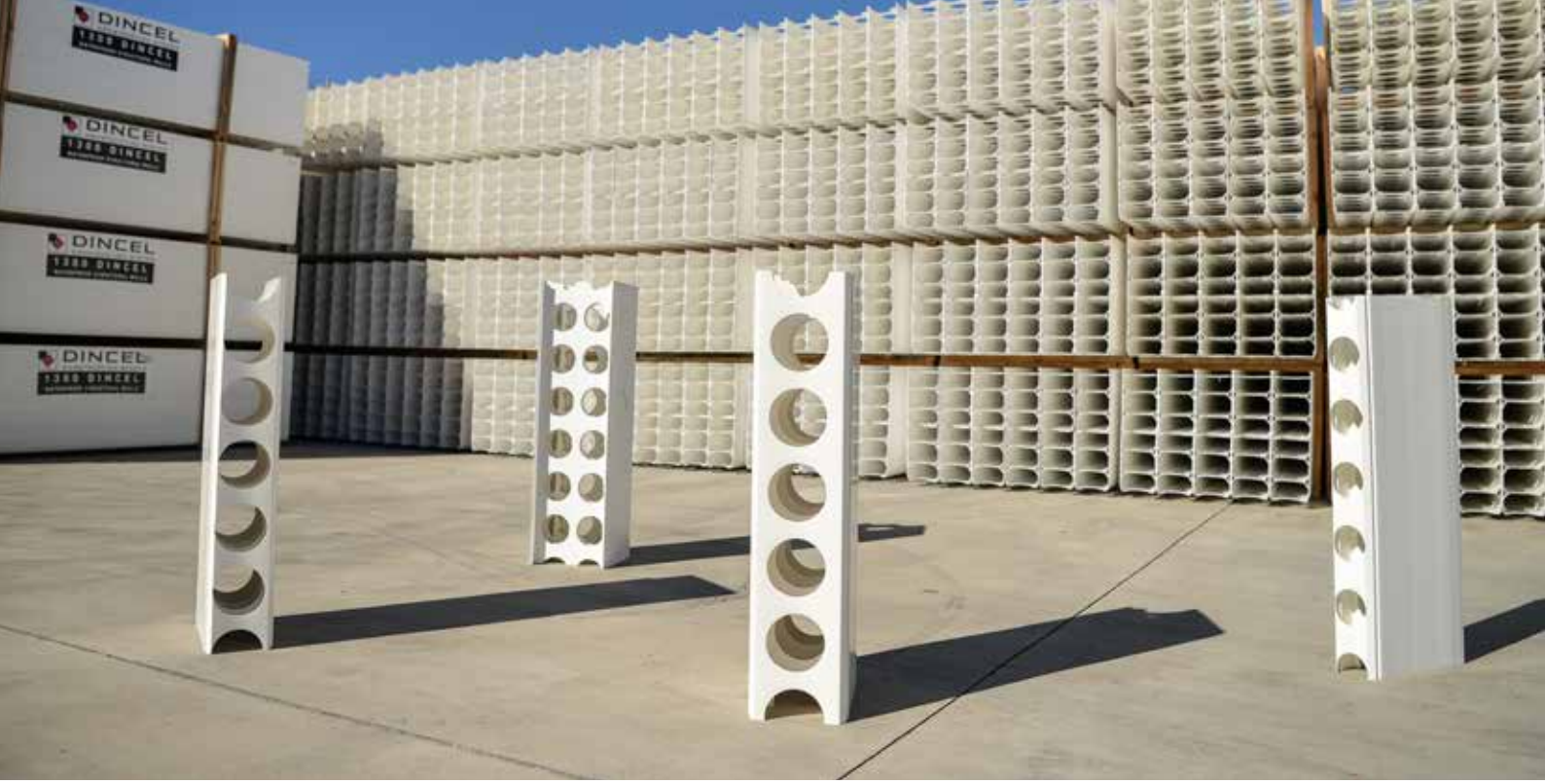
1300 DINCEL



DINCEL
CONSTRUCTION SYSTEM

DINCEL&ASSOCIATES
Engineering Consultants

DINCEL
STRUCTURAL WALLING

DINCEL
CIVIL
SOLUTIONS

The Dincel Construction System Group consists of 3 business divisions.
Dincel Structural Walling (manufacturing and supply), Dincel & Associates Consulting Engineers (structural engineering and design services) and Dincel Civil Solutions (design, supply and install for civil and infrastructure projects).

The Dincel Group was founded in 1989 as Dincel & Associates Consulting Engineers. The group originally specialised in structural and design engineering work, across both commercial and residential markets.

In 2006 Dincel Structural Walling went to market.

The years preceding 2006 were spent researching and developing the original PVC based permanent formwork system, proving the initial concept, demonstrating compliance with Australian NCC and finally internationally patenting what is now Dincel Structural Walling.

As a qualified and registered structural engineer Burak Dincel knew all too well the challenges facing the construction industry. To combat these he founded and still owns the Dincel Construction System Group. This group, using modern engineering methods and practices, develops construction solutions that boost construction speeds, prevent concrete cancer, improve onsite material handleability and durability. These solutions are applicable across the entire spectrum of the construction industry from multi-storey high superstructures to low rise commercial buildings and residential homes.

Today, use and acceptance of Dincel products in the marketplace both locally and internationally is growing rapidly, with Dincel being used in over 7,000 projects across commercial, residential and civil markets in Australia, New Zealand, New Caledonia and Fiji.

SUSTAINABILITY & ENVIRONMENTAL

Dincel Structural Walling is a PVC based permanent formwork system. Dincel's PVC polymer is phthalate free, consists of heavy metal free stabilisers and is free from plasticisers. Dincel is manufactured to the requirements of Best Environmental Practice and certified as per the relevant Australian or International Standard and Section 7 as specified by the Green Building Council of Australia.

Dincel permanent formwork is classed as a low VOC emitting product. It has been tested for volatile organic compound (VOC) emissions and results were found to be less than the recognised threshold as a newly manufactured product and below detection limit 30 days after manufacture.

Both the cement and steel industries are highly energy and emissions intensive industries due to the extreme heat required for production of those products. Dincel permanent formwork can provide significant benefits around reducing the use of Portland cement by up to 50% and reinforcing steel by up to 30%, which results in a significant decrease in embodied energy and carbon footprint for your building. This can be achieved by structurally designing your project with the use of Dincel as structural load bearing walls. Dincel & Associates Consulting Engineers can provide you and your project with expert structural engineering and design advice on how to maximise cost, time and embodied energy savings with the use of Dincel.

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SAVINGS IN CONSTRUCTION TIME, LABOUR AND RAW MATERIALS

Conventional multi-storey construction dictates that the floor cycle starts with vertical elements. The Dincel system allows floor formwork placement to take place on Day 1, which removes the vertical elements from the critical path and reduces the floor cycle time.

Dincel Structural Walling can provide significant benefits to builders, designers, installers and end users. These benefits can be easily translated to real financial savings around construction time, labour, cost of raw materials and increase in available floor space.

A summary of Dincel's features and benefits include:

Handleability and manoeuvrability onsite.

- Each panel can be carried by a single person (3m long panels weigh up to only 13kg), minimising the need for cranage.
- Use of scaffolding can be kept to a minimum, if not eliminated.

Speed of construction.
A two-person team can install up to 25m^2 of Dincel wall per hour.

Less trades onsite.
Dincel does not require skilled labour to assemble nor an extra trade onsite. One trade can install Dincel panels, steel reinforcement and pour the concrete.

No requirement for shop drawings.
Dincel permanent formwork panels are installed onsite and compliant to AS 3600.

Dincel panels' internationally patented **"snap lock"** joint is what gives it its weatherproof and waterproofing ability. Dincel can be used for applications such as swimming pools, water tanks and basement walls located below the water table. For waterproofing capability Dincel panels must be installed as per the Dincel construction manuals.

When designing a project with Dincel in mind, Dincel & Associates Consulting Engineers are able to maximise our customers' savings benefits around:

- Construction time – up to 50% savings
- Materials – up to 50% savings in Portland cement, up to 30% savings in reinforcing steel, waterproofing membranes
- Labour costs

Green Star and sustainability.

- Dincel can help reduce the use of Portland cement by up to 50% for a potential 2 Green Star points
- Can help reduce reinforcing steel by up to 30% for a potential 1 Green Star point.
- Dincel panels use Best Environmental Practices PVC and VOC emissions that are below detectable levels or below the acceptable threshold.

DINCEL'S FEATURES & HOW TO MAXIMISE BENEFITS

Garage, carport and fire shelter buildings should be designed with load bearing walls such as Dincel in mind. For example, typical intertenancy party walls which consist
of columns and lightweight 'infill' materials could be replaced with Dincel load bearing walls in order to achieve the following benefits:

- **Reduced slab thicknesses**
  Slabs that were 200-250mm thick could be reduced to as thin as 150mm thick (or 175mm thick with a 25mm set down for wet areas). Transfer slab thickness can also be reduced by utilising Dincel walls on the level above as deep beams.
- **Reduction in slab steel reinforcement**
  Post tensioning (PT) or standard rebar can be substituted with mesh reinforcement which is economical and incredibly quick to lay.

To achieve this, it is important that architects ensure that in a garage, carport and fire shelter design, wet areas and party walls are placed on top of each other. This is a fundamental requirement to achieve cost and time efficient apartment construction. By using Dincel as your choice for load bearing walls, the following benefits can also be attained within the walls themselves:

Reduction or even elimination of wall reinforcing steel.
This is possible through Dincel's unique crack inducing technology as certified by the University of New South Wales (UNSW), which removes the need for crack control steel.

Reduction of Portland cement content in concrete mix wall concrete.
Dincel's protective polymer skin allows for:

- Enhanced wall durability and therefore enables for replacement of Portland cement with materials such as fly ash, making for more environmentally friendly concrete mixes.
- Ongoing hydration achieving denser concrete, which in turn can result in 50% less cement use.

A structural engineer who is experienced with the Dincel system can turn the above into a reality for your project. Please speak to us early on in your project for more information.

DINCEL
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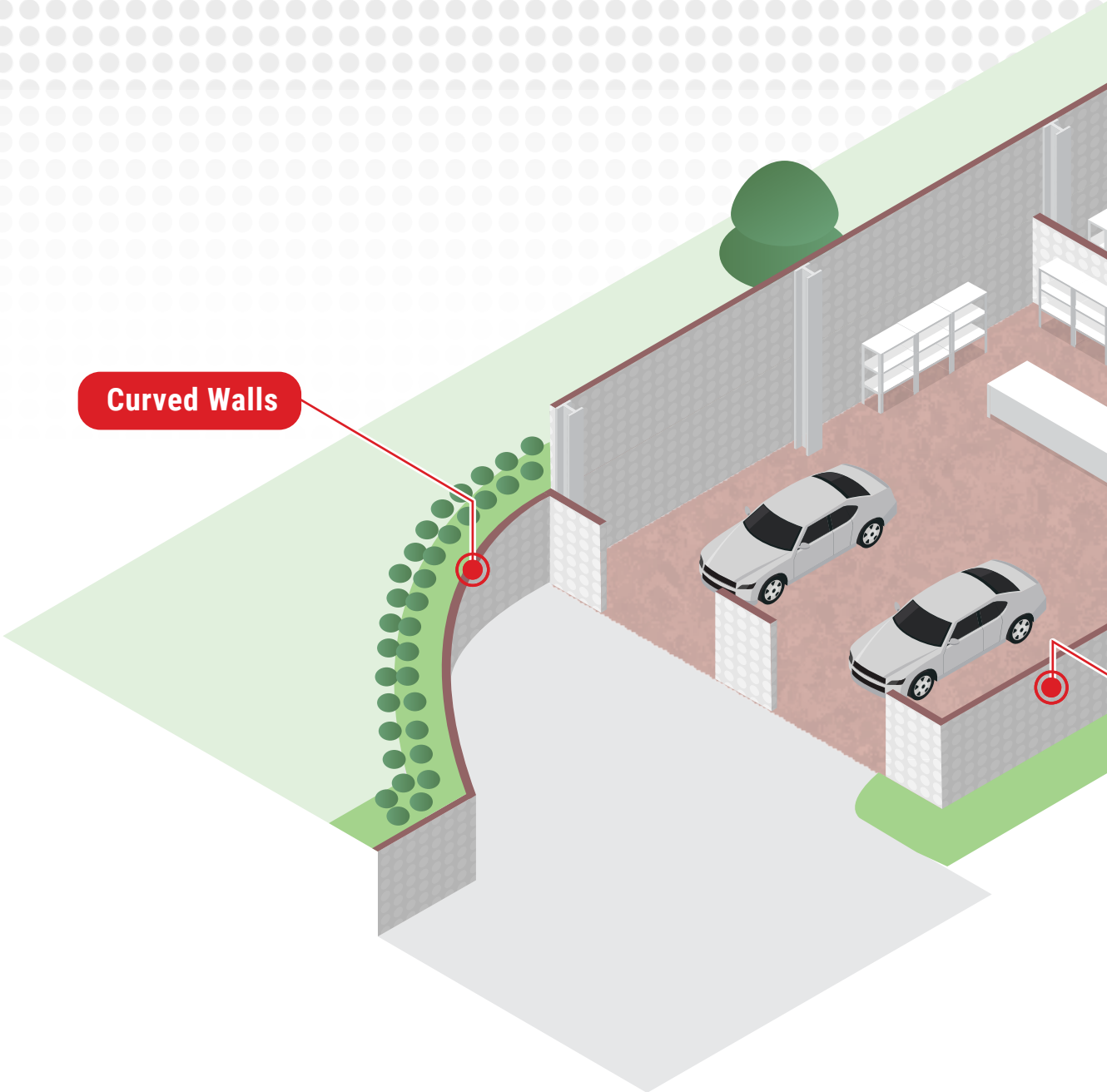
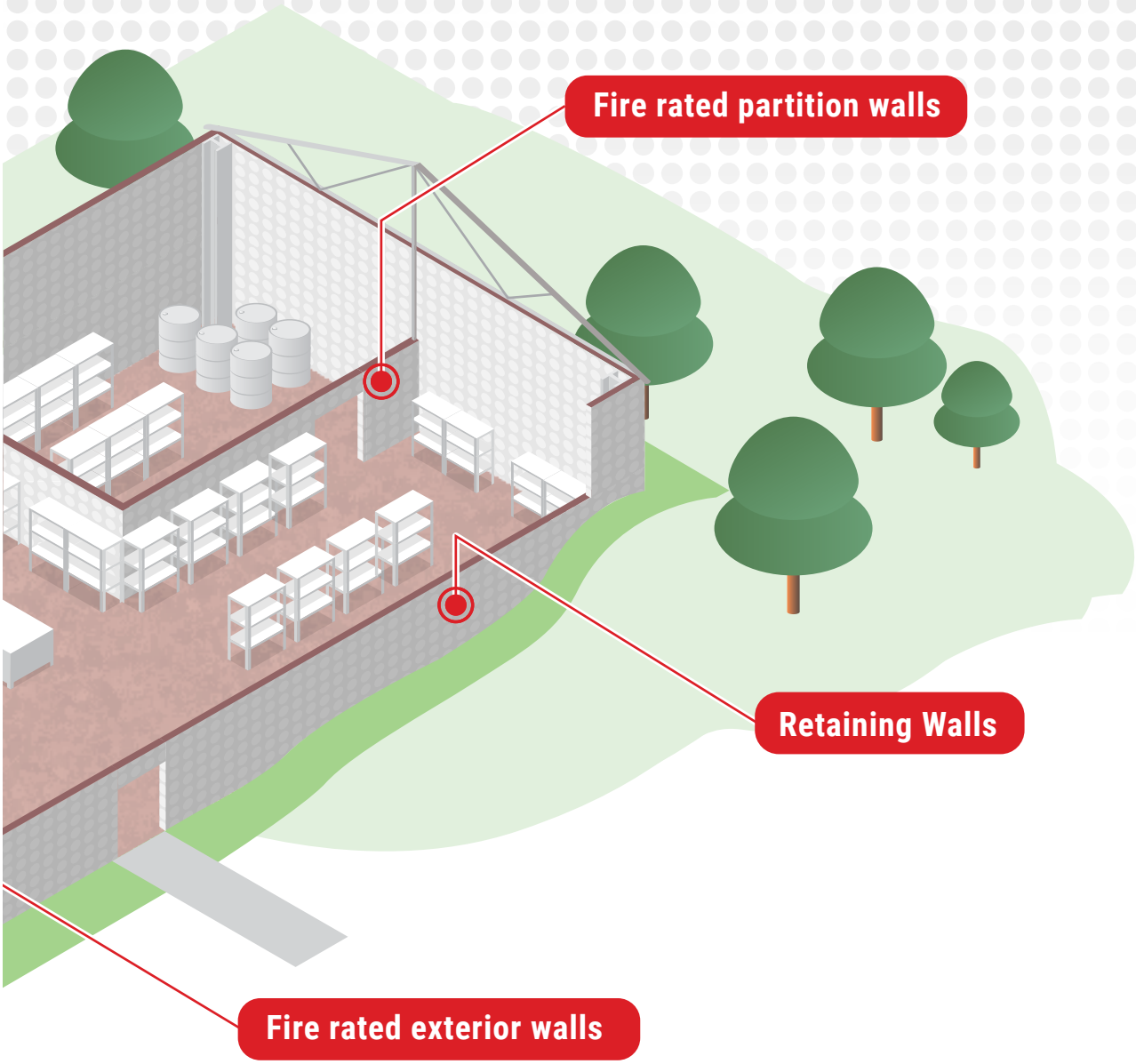
APPLICATIONS




Fire rated partition walls
Retaining Walls
Fire rated exterior walls

DINCEL
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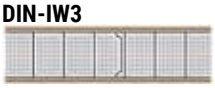
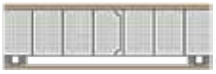
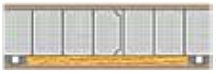
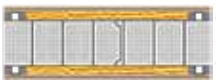
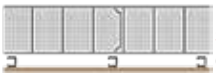
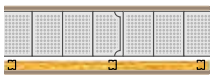
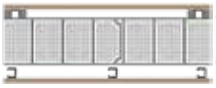
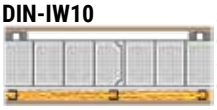
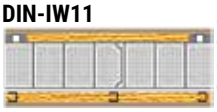
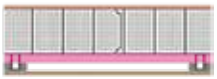
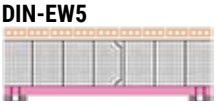
INTERNAL APPLICATIONS

NCC CLASS 10 - GARAGE, CARPORT & FIRE SHELTER

System		Dincel Profile	Min. Plasterboard Thickness	Total Wall Width	System Performance: Rw (Rw+Ctr)	System Performance: Maximum FRL achievable
DIN-IW1 	SIDE 1 Left bare SIDE 2 Left bare	110 155 200 275	N/A N/A N/A N/A	110 155 200 275	48 (43) 51 (45) 53 (48) 53 (48)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW2 	SIDE 1 Plasterboard SIDE 2 Left bare	110 155 200 275	10 13 10 10	120 168 210 285	45 (41) 50 (45) 51 (46) 51 (46)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW3 	SIDE 1 Plasterboard SIDE 2 Plasterboard	110 155 200 275	10 13 10 10	130 181 220 295	45 (41) 50 (45) 51 (46) 51 (46)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW4 	SIDE 1 Plasterboard SIDE 2 28mm furring channels (600 c/c, 30mm cavity), plasterboard	110 155 200 275	13 10 10 10	166 205 250 325	45 (42) 48 (43) 53 (46) 53 (46)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW5 	SIDE 1 Plasterboard SIDE 2 28mm furring channels (600 c/c, 30mm cavity), 25mm glasswool (HD), plasterboard	110 155 200 275	10 10 10 10	160 205 250 325	53 (46) 55 (48) 57 (50) 57 (50)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW6 	SIDE 1 28mm furring channels (600 c/c, 45mm cavity), 25mm glasswool (HD), plasterboard SIDE 2 28mm furring channels (600 c/c, 45mm cavity), 25mm glasswool (HD), plasterboard	110 155 200 275	16 13 13 13	232 271 316 391	63 (50) 60 (52) 63 (54) 63 (54)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW7 	SIDE 1 Left bare SIDE 2 51mm steel studs (600 c/c, 71mm cavity), plasterboard	110 155 200 275	10 10 10 10	191 236 281 356	51 (43) 54 (45) 57 (47) 57 (47)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW8 	SIDE 1 Plasterboard SIDE 2 51mm steel studs (600 c/c, 71mm cavity), 50mm glasswool (LD), plasterboard	110 155 200 275	13 13 10 10	207 252 291 366	57 (50) 63 (51) 61 (53) 61 (53)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW9 	SIDE 1 28mm furring channel (600 c/c, 30mm cavity), plasterboard SIDE 2 51mm steel studs (600 c/c, 71mm cavity), plasterboard	110 155 200 275	10 10 10 10	231 276 321 396	47 (41) 51 (43) 55 (46) 55 (46)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW10 	SIDE 1 28mm furring channel (600 c/c, 30mm cavity), plasterboard SIDE 2 51mm steel studs (600 c/c, 71mm cavity), 50mm glasswool (LD), plasterboard	110 155 200 275	13 13 13 13	237 282 327 402	57 (50) 63 (51) 61 (53) 61 (53)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW11 	SIDE 1 28mm furring channel (600 c/c, 30mm cavity), 25mm glasswool (HD), plasterboard SIDE 2 51mm steel studs (600 c/c, 71mm cavity), 50mm glasswool (LD), plasterboard	110 155 200 275	HD13 HD13 HD13 HD13	237 282 327 402	62 (50) 67 (52) 68 (53) 68 (53)	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]

EXTERNAL APPLICATIONS

NCC CLASS 10 - GARAGE, CARPORT & FIRE SHELTER

System		Dincel Profile	Total Wall Width	System Performance Maximum FRL achievable
DIN-EW1 	SIDE 1 Left bare SIDE 2 Left bare	110 155 200 275	110 155 200 275	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-EW2 	SIDE 1 Choice of finish: paint, render or cladding SIDE 2 Left bare	110 155 200 275	110 155 200 275	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-IW3 	SIDE 1 Left bare SIDE 2 50mm+ cavity, secondary wall for habitable room (either 110 Dincel, lightweight partition, masonry or dry wall)	110 155 200 275	283 328 373 448	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-EW4 	SIDE 1 Choice of finish: paint, render or cladding SIDE 2 40mm insulation board, 28mm furring channel on clips, 13mm plasterboard	110 155 200 275	191 236 281 356	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-EW5 	SIDE 1 110mm brick veneer w/20mm cavity SIDE 2 40mm insulation board, 28mm furring channel on clips, 13mm plasterboard	110 155 200 275	321 366 411 486	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]
DIN-EW6 	SIDE 1 Insulated panel system on top hats SIDE 2 28mm furring channels on clips, 13mm plasterboard	110 155 200 275	268 313 358 433	90/90/90[1] 180/180/180[1] 240/240/240[1] 240/240/240[1]

The 'NCC/Other requirements' information provided above is for guidance purposes only please check with your consultants for specific requirements for your project. The above requirements are based upon the NCC deemed-to-satisfy provisions (Specification C1.1 and F5.0 - F5.5)
The above performance is based on the following product densities:

- *10mm thick plasterboard - 650 kg/m³ bulk density*
- *13mm thick plasterboard - 623 kg/m³ bulk density*
- *HD13mm thick plasterboard (HD = High Density, typically fire rated plasterboard) - 808 kg/m³ bulk density*
- *16mm thick plasterboard - 766 kg/m³ bulk density*
- *25mm thick glasswool insulation (HD) - 24 kg/m³ bulk density*
- *50mm thick glasswool insulation (LD) - 11 kg/m³ bulk density*
- *Concrete within Dincel formwork - 2350 kg/m³ bulk density*

[1] Dependant on design and wall loading. 'Structural Adequacy' component of FRL must be calculated and provided by the project's structural engineer, in accordance to AS3600, Eurocode or other relevant concrete design codes.

DINCEL
STRUCTURAL WALLING

COMPLIANCE & CERTIFICATIONS

Dincel is a CodeMark certified product. Its performance has been tested and assessed by NATA registered laboratories and engineering field experts such as Warringtonfire, CSIRO, Omnii Consulting Fire Engineers, Day Design Consulting Acoustical Engineers, The University of NSW (UNSW), The University of Technology Sydney (UTS) and CETEC.

The following documentation is available from our website **www.dincel.com.au/resources/compliance** or alternatively by contacting us via email at **enquiry@dincel.com.au** or calling **1300 DINCEL.**

Fire Performance

Dincel permanent formwork has been tested and assessed to meet the NCC bushfire regulations for BAL FZ areas in accordance with AS 3959.

It has also been tested to meet other fire regulations by NATA registered laboratories, including AS 5637.1 and ISO 9705 Full Room Test for internal walls and found to be Deemed to Satisfy to NCC 2019 requirements (Group 1, SMOGRA 14).

For external façade walls, Dincel has also been tested to AS 5113/BS 8414 and found to be compliant with the NCC requirements as a Performance Solution.

Several tests to AS 1530.4 have been carried out on the Dincel Structural Walling system, including joint tests with other wall types (plasterboard, aerated autoclaved concrete panels and bricks), as well as penetrations tests (including cable trays, water and electrical services), and in terms of Fire Resistance Levels, when tested to AS 1530.4, the Dincel system can achieve an FRL between 90/90/90 and 240/240/240.

Structural Performance

The design, use and install of Dincel structural walls in accordance with Dincel's design and construction manuals has been assessed as being compliant with AS 3600.

Dincel Structural Walling was put through an extensive testing and assessment regime to determine the adequacy of the system in seismic regions.

The series of tests and accompanying analysis, have confirmed the suitability of the Dincel system to resist large lateral forces and resulting displacement caused by major ground motions measuring up to 9.0 on the Richter scale. Hence the Dincel system offers a safe, practical and reliable seismic resistant solution based on its performance under the most hostile loading environments.

Waterproofing Performance

The Dincel system has been tested and certified by CSIRO as meeting waterproofing requirements without the need for waterproofing membranes and other wall junctions in accordance with the following test methods:

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

Acoustic Performance

The Dincel system has been full system tested by CSIRO at their acoustic testing facility. Acoustic assessments have also been carried out by an external Acoustical Engineering Consultancy firm.

Environment & Sustainability

Dincel PVC is BEP (Best Environmental Practices) certified. Our polymer PVC uses stabilisers that are free from heavy metals and plasticisers.

Our permanent formwork system has been tested for volatile organic compound (VOC) emissions and found to be a low emission product with results below detectable thresholds/limits.

DINCEL PROJECT

G&L Woon
Brush Creek Road,
Yarramalong Valley

DINCEL
STRUCTURAL WALLING

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