



# DINCEL STRUCTURAL WALLING

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WALL COMPARISONS

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## WALL COMPARISONS

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- [\(Download\) CONCRETE WALLS WITH PERMANENT FORMWORK HAVING FIBRE-CEMENT SHEETS \(OR SIMILAR\) ON BOTH FACES](#)
- [\(Download\) AUTOCLAVED AERATED CONCRETE – AAC-WALLS](#)
- [\(Download\) DINCEL'S ALTERNATIVE TO TILT-UP AND PRECAST FACTORY/WAREHOUSE WALLS](#)

## WHY IS DINCEL-WALL SUPERIOR TO OTHERS?

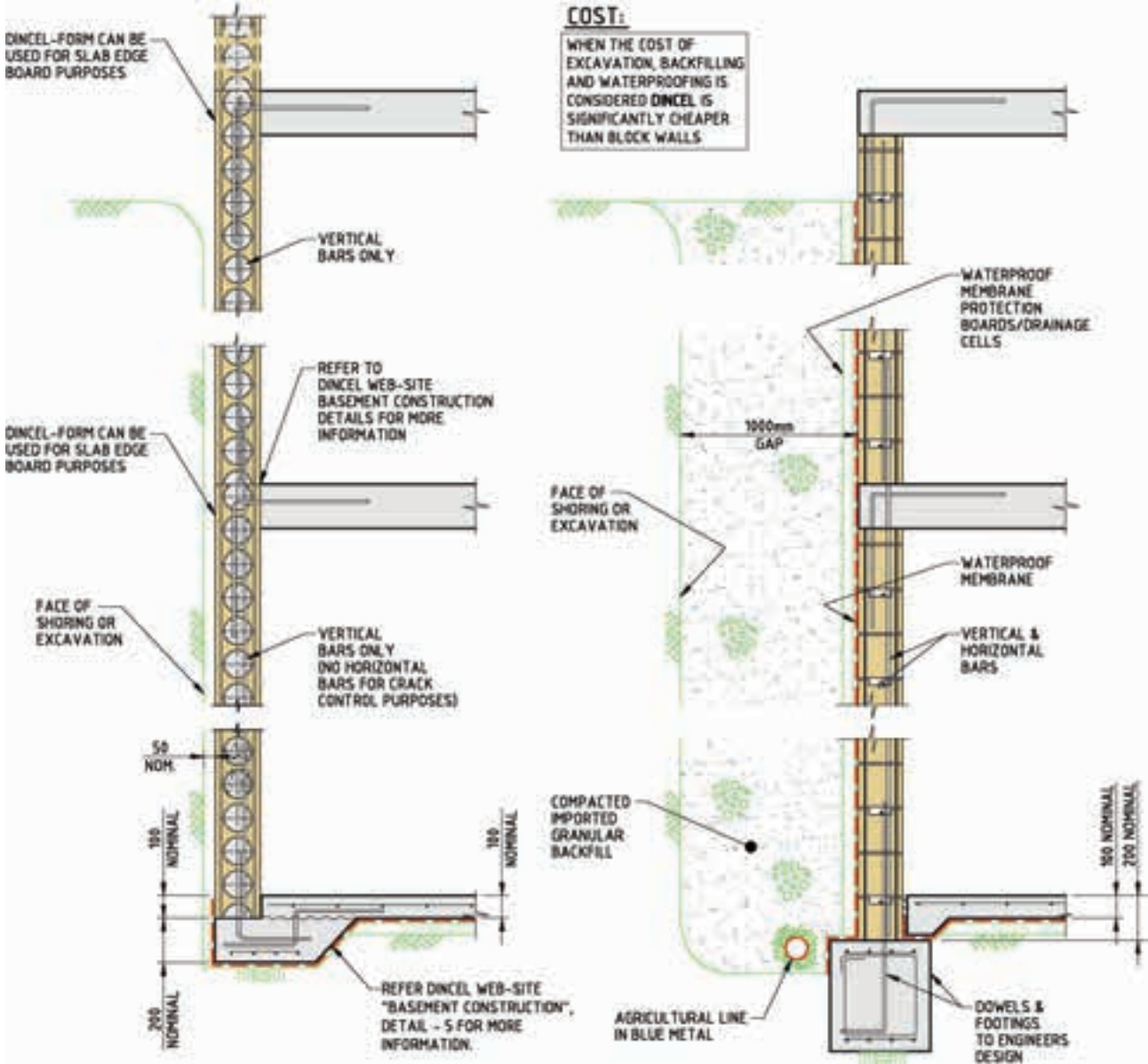
- Waterproof.
- It does not rely on applied membrane systems for waterproofing and durability.
- Damp proof and rot proof.
- Resistance to salts, acids and chemicals.
- Minimum 100 years + life.
- No thermal bridging.
- Vapour barriers on both faces.
- No cavities for bacterial growth.
- Termite proof.
- Lower volatile organic compounds (VOC) below the detection level.
- Solution to sick building syndrome.
- Non-brittle, no cracks, no joints, and eliminates the need for conventional footings.
- Ductile/resilient/impact absorber.
- Reduces steel reinforcement use.
- Reduces cement quantity.
- Increases concrete flowability with less water use and no chemical additives.
- No honeycombing, air pockets and concrete segregation.
- Allow the use of lightweight and porous concrete without compromising durability requirements.
- Significantly faster, non-skilled labour use.
- Lighter, man handleable and no craneage.
- Solution to access problems.
- Eliminates the need for scaffolding.
- Flexible for making curved walls.
- Improves work place safety.
- Lower embodied energy use.
- Easy and practical for recycling.

# BASEMENT WALLS

## DINCEL VS MASONRY BLOCK WALLS

DINCEL WALL

BLOCK WALL



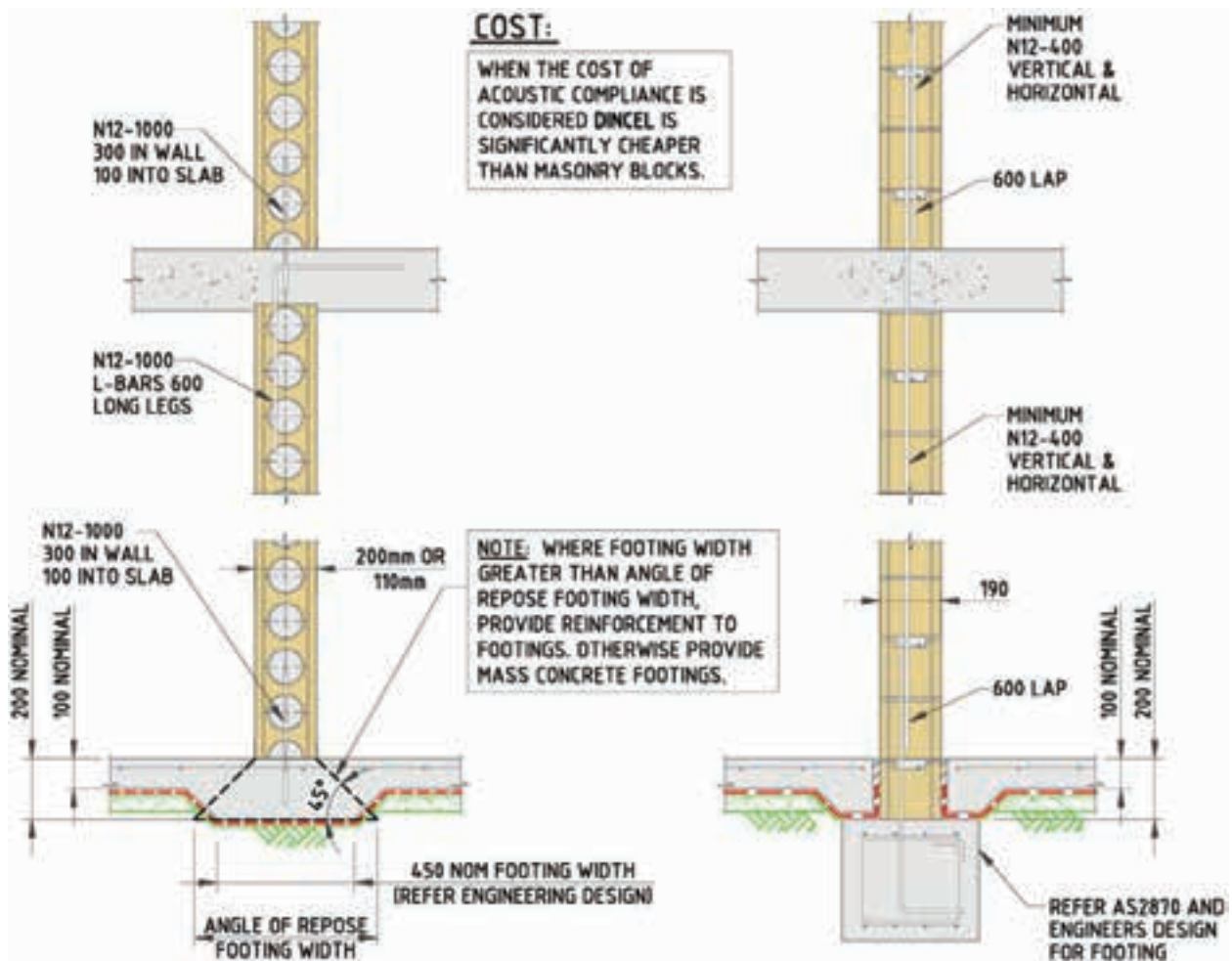
	<b>DINCEL WALL</b>	<b>BLOCK WALL</b>
<b>Thickness</b>	200mm	190mm, 290mm
<b>Strength</b>	DinCEL can be engineered to be much stronger than even a 300mm thick block wall.	The strength of block walls is limited to shell capacity which is conventionally 15 Mpa.
<b>Steel R/F</b>	Horizontal Bars for crack control – NIL REQUIRED.  Vertical Bars – DinCEL require less wall bars in comparison to 190mm block wall.	Horizontal Bars – REQUIRED.  Vertical Bars – 190mm block wall requires more bars in comparison to DinCEL.
<b>Concrete</b>	20 Mpa, 20mm aggregate (increase in concrete strength not required because of DURABILITY reasons).	Minimum 25 Mpa.
<b>Concrete Pump Cost</b>	DinCEL-Wall can be poured up to a height of 6m in the same day.	Block walls will be required to be poured over 2 days for walls exceeding 3m in height.
<b>Joints</b>	NOT REQUIRED (only at major building separations)	Maximum 8m centres. Leakage at joints is unavoidable without proper waterproofing detailing.
<b>Concrete Segregation</b>	NIL due to presence of web holes.	Careful attention required.
<b>Formwork Uplifting</b>	NIL due to impervious polymer and web holes.	NIL in blockwork.
<b>Speed of installation</b>	DinCEL at least 10 times faster	Block walls at least 10 times slower than DinCEL
<b>Scaffolding Requirements</b>	NIL	<ul style="list-style-type: none"> <li>• Requires at each 1.8m height intervals</li> <li>• Loading of scaffolding with construction materials is a workplace safety hazard</li> </ul>
<b>Bracing</b>	NIL in association with conventional floor formworking	Required for walls higher than 2.8m height
<b>Waste</b>	NIL	Minimum 5%
<b>Waterproofing</b>	NOT REQUIRED (refer Waterproof Walls in DinCEL's website).	REQUIRED.
<b>Aggregate Lines</b>	NOT REQUIRED.	REQUIRED.
<b>Over Excavation</b>	NOT REQUIRED.	REQUIRED – this is a safety concern by the authorities. It is a cost and access concern to the builder.
<b>Footings</b>	NOT REQUIRED (for soil reactivity reasons).	REQUIRED.
<b>Footings Detailed Excavation</b>	NOT REQUIRED.	REQUIRED – footing trench cost and cleaning after wet weather is a concern.
<b>Finishes</b>	Ready finish, no painting required.	Many building authorities now require walls to be painted off-white, reflective colour.

## PARTY / DIVISION WALLS

### DINCEL VS MASONRY BLOCK WALLS

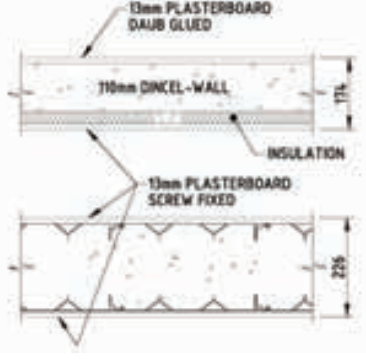
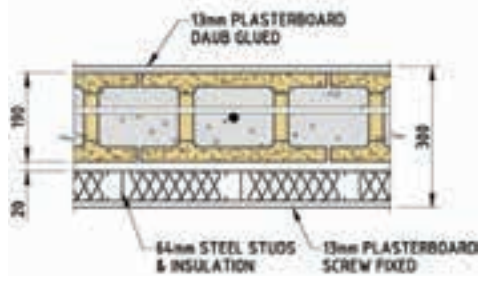
DINCEL WALL

BLOCK WALL



	DINCEL WALL	BLOCK WALL
<b>Thickness</b>	200mm or 110mm	190mm
<b>Steel R/F</b>	NIL vertical or horizontal bars	Minimum N12.400 both vertical and horizontal (refer design engineer)
<b>Concrete</b>	20 Mpa	25 Mpa
<b>Concrete Pump Cost</b>	Dincel-Wall can be poured up to a height of 6m in the same day.	Block walls will be required to be poured over 2 days for walls exceeding 3m in height.
<b>Honeycombing problem</b>	NIL (Impervious polymer surface, unlike block walls, plywood or fibre cement sheets eliminates friction between forms and concrete).	Minimum 190mm wall thickness adopted for this problem by many engineers. It is a common problem that 140mm block walls end up with significant size pockets in concrete filling because of the porosity of the block wall surface and the presence of both horizontal and vertical bars which do not leave much space for concrete flow. The resulting voids in the concrete will create structural, fire and acoustic compliance problems.

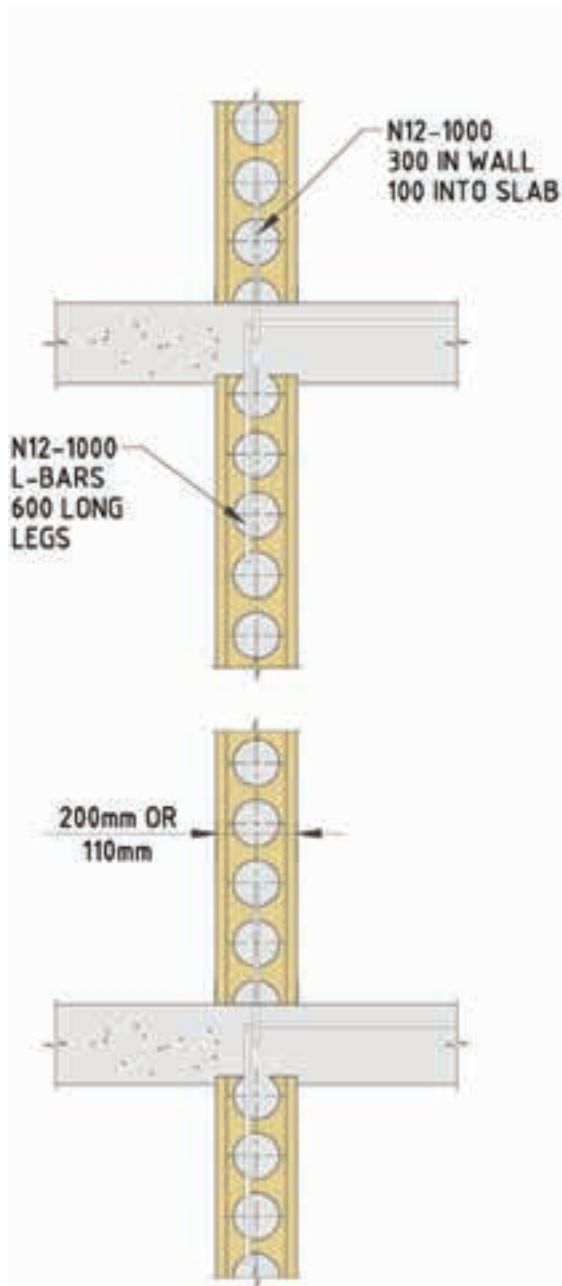


	DINCEL WALL	BLOCK WALL
<b>Concrete Segregation</b>	NIL due to presence of web holes.	Careful attention required.
<b>Formwork Uplifting</b>	NIL due to impervious polymer and web holes.	NIL in blockwork.
<b>Handling</b>	Lightweight, 3m length 12 kg, no craneage.	Craneage required for block packs.
<b>Speed of installation</b>	Dintel at least 10 times faster	Block walls at least 10 times slower than Dintel
<b>Scaffolding Requirements</b>	NIL	<ul style="list-style-type: none"> <li>• Requires at each 1.8m height intervals</li> <li>• Loading of scaffolding with construction materials is a workplace safety hazard</li> </ul>
<b>Bracing</b>	NIL in association with conventional floor formworking	Required for walls higher than 2.8m height
<b>Waste</b>	NIL	Minimum 5%
<b>Structural Advantage / Disadvantage</b>	<ul style="list-style-type: none"> <li>• 200mm can be utilised as deep beams to eliminate transfer floors.</li> <li>• Eliminates the need for conventional footings for soil reactivity purposes.</li> <li>• No limitation to concrete strength for increased load carrying capacity.</li> <li>• No visible wall cracking.</li> </ul>	<ul style="list-style-type: none"> <li>• NIL use as deep beam action.</li> <li>• Conventional footings required to be placed in accordance with AS2870.</li> <li>• The strength of block walls normally limited to 15 Mpa block shell capacity.</li> <li>• Subject to wall cracking for shrinkage, temperature, building movements including settlements.</li> <li>• Honeycombing problem leading to structural problems if 140mm blocks are used.</li> </ul>
<b>Joints</b>	NOT REQUIRED (only at major building joints)	Expansion joints at maximum 8m centres. Joints MUST be treated for fire and acoustic provisions.
<b>Fire Rating</b>	200mm – 4 Hours 110mm – 1.5 Hours	4 Hours for 190 block wall
<b>Acoustic</b>	Complies with deemed to satisfy Airborne Sound acoustic condition of Building Code of Australia. Refer Dintel for Impact Sound provisions.  	Plain, rendered or plasterboard finish directly on both sides of the 190mm block wall does not comply with Building Code of Australia. However, the following detail is developed and accepted by Australian Acoustic engineers as compliance for BCA  
<b>Space Gain</b>	200mm and 110mm Dintel party wall saves 74mm and 126mm respectively against block party wall.	126mm lost space against Dintel party wall.

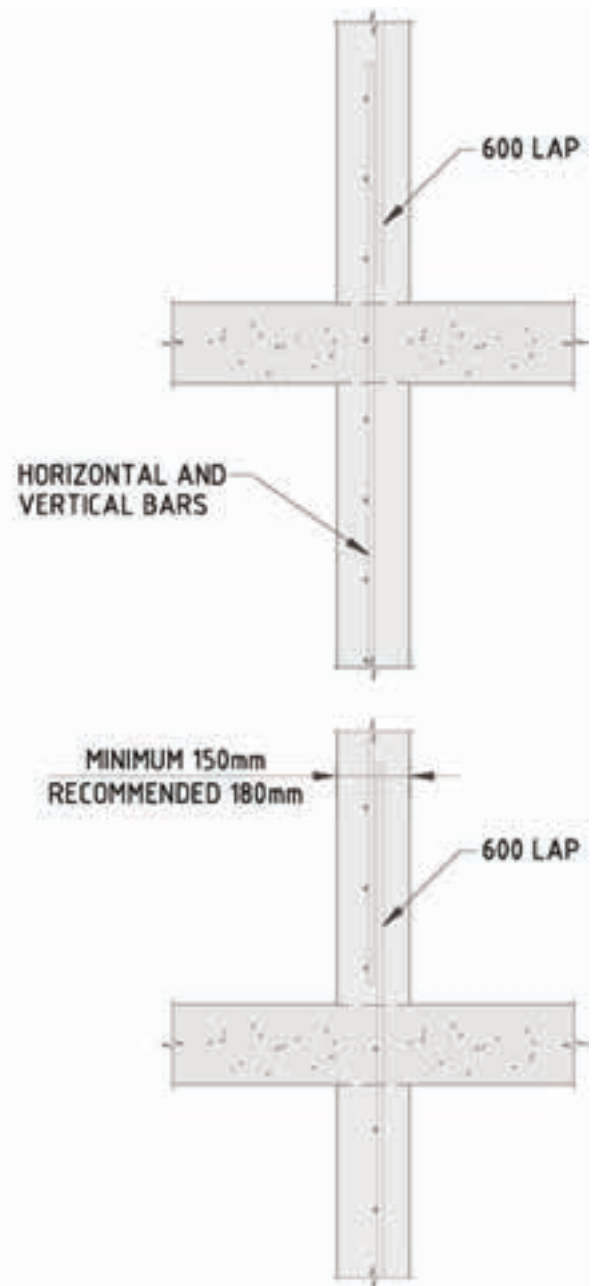
## PARTY / DIVISION WALLS

### DINCEL VS IN-SITU REINFORCED CONCRETE WALLS

DINCEL WALL

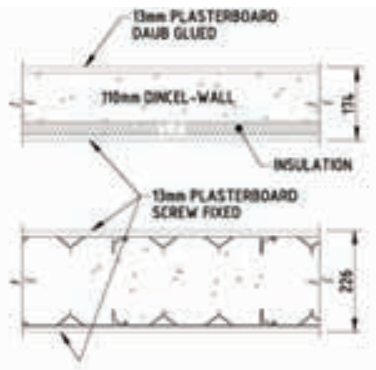
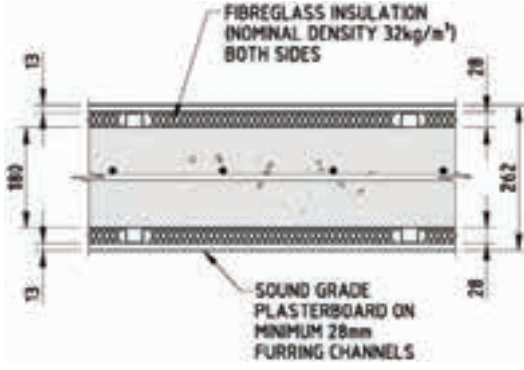


IN-SITU REINFORCED CONCRETE WALL



	DINCEL WALL	IN-SITU REINFORCED CONCRETE WALL
<b>Thickness</b>	200mm or 110mm	Minimum 150mm – for acoustic reasons. 180mm is recommended.
<b>Steel R/F</b>	Horizontal Bars for crack control – NIL REQUIRED Vertical Bars under compression loading – NIL REQUIRED	Minimum N12.400 both directions required depending on the wall's thickness. Reinforcement at each face of the wall is required if wall is thicker than 200mm.
<b>Concrete</b>	20 Mpa	Up to 40 Mpa depending on exposure conditions (refer design engineer).
<b>Mix</b>	Ordinary concrete (20mm aggregate)	Ordinary concrete (20mm aggregate).
<b>Honeycombing problem</b>	NIL (Impervious polymer surface, unlike block walls, plywood or fibre cement sheets eliminates friction between forms and concrete).	Plywood formwork should be oiled to reduce the friction between concrete and plywood. Generous space required for steel and concrete confinement. Vibration of concrete is an important factor.
<b>Concrete Segregation</b>	NIL due to presence of web holes.	Careful attention is required. The common practice is not to exceed 2m for maximum free fall of concrete mix.
<b>Formwork Uplifting</b>	NIL due to impervious polymer and web holes.	A well known significant problem which affects the wall's finishing quality. The forms must be secured to prevent movement during concrete pour.
<b>Handling</b>	Lightweight, 3m length 13 kg, no craneage, no storage.	Re-usable formwork requires storage, significant material handling, heavy lifting and craneage is required. A major disadvantage against Dincel.
<b>Speed of installation</b>	Dincel is at least 10 times faster when considering handling – installation – concreting/reinforcing – stripping of conventional formwork and re-storing.	
<b>Scaffolding Requirements</b>	NIL	Requires at each 1.8m height intervals
<b>Bracing</b>	NIL in association with conventional floor formworking	Significant bracing REQUIRED.
<b>Waste</b>	NIL	Minimum 5%
<b>Joints</b>	NOT REQUIRED (only at major building joints)	Joints at maximum 8m centres required for crack control. Joints must be treated for fire and acoustic purposes.
<b>Structural Advantage / Disadvantage</b>	200mm can be utilised as deep beams to eliminate the transfer floors.	Approximate jointing at 8m centres essential for crack control. A non-monolithical wall cannot be used as a deep beam (refer design engineers).
<b>Fire Rating</b>	200mm – 4 Hours 110mm – 1.5 Hours	4 Hours for walls thicker than 170mm.



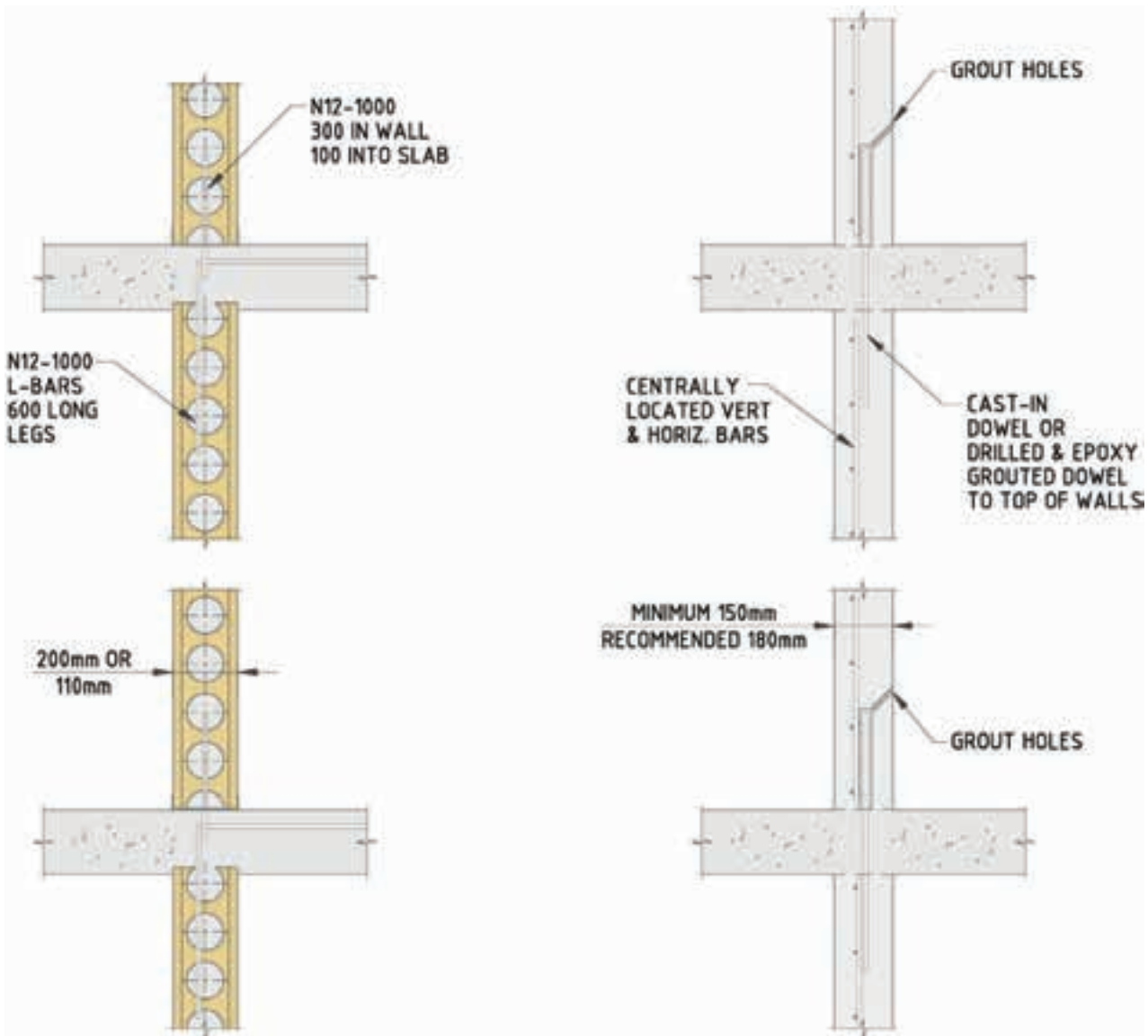
	DINCEL WALL	IN-SITU REINFORCED CONCRETE WALL
Acoustic	Complies with deemed to satisfy Airborne Sound acoustic condition of Building Code of Australia. (Refer Dintel for impact sound provisions).	<p>The Building Code of Australia (BCA) Airborne Sound provisions (an additional 64mm stud wall with 20mm gap is required for impact sound provisions) requires the following:</p> <ul style="list-style-type: none"> <li>• Wall must be monolithic (i.e. no joints).</li> <li>• Concrete walls require joints for crack control purposes at maximum 8m centres. The joints must be treated for acoustic and fire purposes.</li> <li>• A 150mm thick monolithic plain concrete wall has <math>R_w + C_{tr} = 47\text{dB} &lt; 50\text{dB}</math> sound rating which is accepted by the BCA to comply with the deemed to satisfy condition. The plain concrete wall with direct paint, render and plasterboards with screed glue (no daub glue) is also accepted to comply with the BCA provided that the 150mm wall thickness does not incorporate service conduits or wall chasings.</li> <li>• A 150mm thick wall (<math>R_w + C_{tr} = 47 \text{ dB}</math>) with 28mm furring channels and plasterboard finishes on both faces DOES NOT COMPLY as shown in the BCA.</li> <li>• A 180mm thick plain concrete wall has <math>R_w (57) + C_{tr} (-6) = 51 \text{ dB}</math>. The addition of plasterboard finishes significantly changes the acoustic behaviour of a plain concrete wall. However, the following detail is acceptable by many acoustic engineers if the wall has plasterboard finishes and services.</li> </ul>
		
Space Gain	200mm and 110mm Dintel party wall saves 36mm and 88mm respectively against in-situ reinforced concrete walls.	
Cost	Dintel is at least 30% cheaper.	

## PARTY / DIVISION WALLS

### DINCEL VS PRECAST CONCRETE WALLS

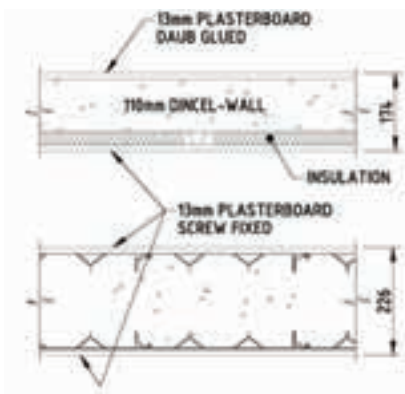
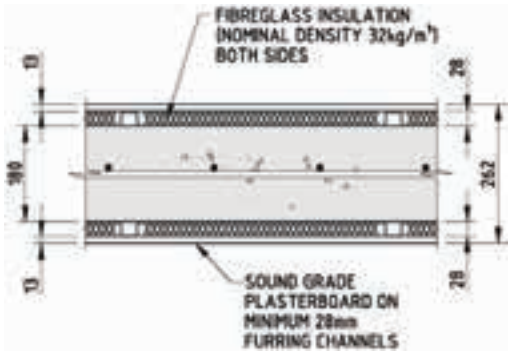
DINCEL WALL

PRECAST CONCRETE WALL



Readers are recommended to obtain copy of CBD-93 Pre-cast Concrete Walls: Problems With Conventional Design which is available at the Canadian Building Digest – <http://www.nrc-cnrc.gc.ca/eng/ibp/irc/cbd/building-digest-93.html>

	DINCEL WALL	PRECAST CONCRETE WALL
<b>Thickness</b>	200mm or 110mm	Minimum 150mm – for acoustic reasons. 180mm is recommended.
<b>Joints</b>	NIL REQUIRED	Required for cramage and handling. Joints must be treated for fire and acoustic purposes.
<b>Steel R/F</b>	Horizontal Bars for crack control – NIL REQUIRED Vertical Bars under compression loading – NIL REQUIRED	Minimum N12.400 both directions required depending on the wall's thickness. Reinforcement at each face of the wall is required if wall is thicker than 200mm.
<b>Concrete</b>	20 Mpa	Up to 40 Mpa depending on exposure conditions (refer design engineer).
<b>Handling</b>	Lightweight, 3m length 13kg, no cramage, no site access issues.	More than one crane may be required depending on the size, shape and access issues of construction site.
<b>Skilled Labour</b>	Except one Supervisor, NIL REQUIRED.	SPECIALIST TEAM REQUIRED.
<b>Workmanship Fault</b>	NIL. If any, it can easily be rectified.	Very hard to fix a problem after installation.
<b>Bracing</b>	NIL in association with conventional floor formworking.	Significant bracing REQUIRED.
<b>Speed of installation</b>	DinCEL is faster when considering access, cramage, bracing and installation issues associated with precast walls.	
<b>Structural Advantage / Disadvantage</b>	<ul style="list-style-type: none"> <li>• 200mm can be utilised as deep beams to eliminate transfer slabs.</li> <li>• Conventional footings not required for soil reactivity purposes.</li> </ul>	<ul style="list-style-type: none"> <li>• Joints cause major load transfers, waterproofing in façade/basement walls, require fire/acoustic treatment in party walls.</li> <li>• Conventional footings required as the walls are not monolithic because of the required joints.</li> </ul>
<b>Facade Wall Use</b>	DinCEL is a waterproof product and provides an effective solution for condensation problems.	Precast walls are known for rain, vapour penetration and condensation problems.

	DINCEL WALL	PRECAST WALL
Acoustic	<p>Complies with deemed to satisfy Airborne Sound acoustic condition of Building Code of Australia. (Refer Dincel for impact sound provisions).</p> 	<p>The Building Code of Australia (BCA) Airborne Sound provisions (an additional 64mm stud wall with 20mm gap is required for impact sound provisions) requires the following:</p> <ul style="list-style-type: none"> <li>• Wall must be monolithic (i.e. no joints).</li> <li>• Precast walls require joints for crange and handling purposes. The joints must be treated for acoustic and fire purposes.</li> <li>• A 150mm thick monolithic plain concrete wall has <math>R_w + C_{tr} = 47\text{dB} &lt; 50\text{dB}</math> sound rating which is accepted by the BCA to comply with the deemed to satisfy condition. The plain concrete wall with direct paint, render and plasterboards with screed glue (no daub glue) is also accepted to comply with the BCA provided that the 150mm wall thickness does not incorporate service conduits or wall chasings.</li> <li>• A 150mm thick plain concrete wall (<math>R_w + C_{tr} = 47 \text{ dB}</math>) with 28mm furring channels and plasterboard finishes on both faces DOES NOT COMPLY as shown in the BCA.</li> <li>• A 180mm thick plain concrete wall has <math>R_w (57) + C_{tr} (-6) = 51 \text{ dB}</math>. The addition of plasterboard finishes significantly changes the acoustic behaviour of a plain concrete wall. However, the following detail is acceptable by many acoustic engineers if the wall has plasterboard finishes and services.</li> </ul> 
Cost	<p>Cranage, safety, specialist skilled installers, availability, and blocking major traffic for installation are extra cost items. These factors increase the cost of precast walls significantly over Dincel-Walls.</p>	

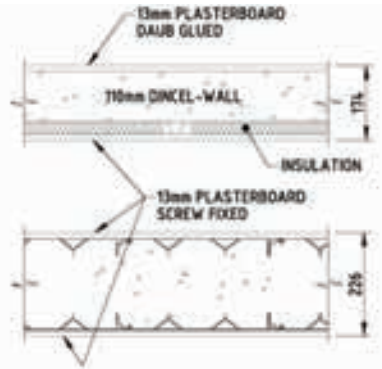
## PARTY / DIVISION WALLS

### DINCEL VS MASONRY BRICK WALLS

The use of brick walls may not be possible because of the revised Australian Earthquake Engineering Standard AS1170.4 – 2007 depending on the building's founding soil, height and plan layout.

The reader is recommended to read [\(Download\) - Earthquake Hazard Risk Prevention for Developers and Building Professionals](#).

Therefore, the following brick wall comparison for earthquake reasons may not be necessary.

	DINCEL WALL	MASONRY BRICK WALL
<b>Suitability</b>	Can be used in all conditions including earthquake.	Not suitable for sub-basement or in contact with ground water conditions and limited use when subject to earthquake conditions.
<b>Footings</b>	NOT REQUIRED (for soil reactivity reasons).	REQUIRED.
<b>Footings Detailed Excavation</b>	NOT REQUIRED.	REQUIRED – footing trench cost and cleaning after wet weather is a concern.
<b>Time required for installation of 3m high wall</b>	Installed at the rate of 20m <sup>2</sup> /man/hour.	600 bricks/two man team/8hours = 24m <sup>2</sup> /man/8hours = 3.0m <sup>2</sup> /man/hour
<b>Scaffolding requirements</b>	NOT REQUIRED.	REQUIRED for walls higher than 1.8m in height intervals.
<b>Bracing</b>	NIL in association with conventional formwork.	REQUIRED for walls higher than 1.8m in height in the absence of cross walls.
<b>Waste</b>	NIL	Between 5% to 8%
<b>Handling</b>	Lightweight, 3m length 13kg, no craneage.	Craneage for brick packs.
<b>Cleaning</b>	NIL	Wastage and mortar cleaning on walls and slabs.
<b>Joints</b>	NOT REQUIRED (only at major building joints).	Joints required at 6m to 8m centres. Joints must be treated for fire and acoustic purposes for dividing walls separating sole occupancies.
<b>Fire Rating</b>	200mm – 4 Hours 110mm – 1.5 Hours	230mm thick solid wall or 2 x 110mm cavity brick wall achieves 4 hours fire rating.
<b>Acoustic</b>	Complies with deemed to satisfy Airborne Sound acoustic condition of Building Code of Australia. Refer Dintel for Impact Sound provisions. 	<b>OPTION 1</b> Brick party wall rendered on both sides, internal brick partition walls. Refer <a href="#">(Download) - Costing Analysis</a> . Dintel is 43% cost effective. <b>OPTION 2</b> Party Wall: Plasterboard + Brick Wall + 64mm insulated steel stud + plasterboards. More space and dearer than Dintel's solution including floor slabs.

	DINCEL WALL	MASONRY BRICK WALL
<b>Structural Advantage / Disadvantage</b>	<ul style="list-style-type: none"> <li>• 200mm can be utilised as deep beams to eliminate transfer floors.</li> <li>• Eliminates the need for conventional footings for soil reactivity purposes.</li> <li>• No limitation to concrete strength for increased load carrying capacity.</li> <li>• No visible wall cracking.</li> </ul>	<ul style="list-style-type: none"> <li>• Nil use as deep beam action.</li> <li>• Conventional footings required to be placed in accordance with AS2870. As a result, significant additional footing costs.</li> <li>• Brittle nature and as a result floors are required to be designed with stringent deflection criterias, i.e. extra concrete and steel in floor slabs.</li> <li>• Easy to crack, requires crack control maintenance.</li> <li>• Strength dependent on the rather weak mortar bed.</li> <li>• Very difficult to use in reactive soil and mine subsidence areas.</li> <li>• Difficult and costly requirements when subjected to earthquake requirements.</li> </ul>
<b>Costs</b>	<p>The direct cost comparison of Dincel –V– Brick Walls at the party walls (i.e. walls between sole occupancy units).</p> <ul style="list-style-type: none"> <li>• Time of installation associated with bricks. Significantly more number of labour is required with brick walls.</li> <li>• The coordination between the brick trade and concreting trade for floor slabs results with substantial loss of time.</li> <li>• Wastage and cleaning associated with brick walls cost significantly extra.</li> <li>• The brick walls, even with joints often display cracks between joints. The cracks often cause substantial maintenance costs.</li> <li>• The acoustic treatment of party walls causes significant extra costs.</li> <li>• The detailing for earthquake provisions makes the use of brick walls expensive.</li> <li>• Dincel is waterproof, brick walls are porous and not waterproof. As a result, brick walls require additional cavity walls, flashings, damp courses.</li> <li>• Dincel is significantly cheaper if compared with cavity or 230mm solid brick wall.</li> </ul>	