INSTALLATION

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*The information contained in this document is intended for suitably qualified and experienced architects, engineers and other building professionals. It 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 and shall be treated as general guidance. Building professionals are required to assess construction site conditions and provide project specific 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.

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F.1. ORDERING

F.1.1. DETERMINING WHAT TO ORDER

- Obtain the latest copy of the architectural and structural drawings. Make sure that drawings clearly identify which walls are specified as Dincel and the wall thicknesses are detailed.
- Upload plans to Dincel website. Our estimating team will make contact with you to discuss further.
- Dincel estimating team will send the components list and quote for your approval. Panel heights and other information may need to be confirmed during this process.

SCAN HERE

F.1.2. WAYS TO ORDER

To order with Dincel, simply use any of the below methods:

- **Call -** Call us on *1300 DINCEL* and get in touch with our Customer Service team who can guide you through the process.
- **Order Form -** Customer fills out an order form which includes details such as profile type, height and any associated accessories. Order forms can be downloaded from: *https://www.dincel.com.au/products.* The order form is then sent to *order@dincel.com.au.*

SCAN HERE

- **Dincel Shop -** Our Dincel online shop makes it easier than ever to place an order. Simply register for an account on our website, and once this is approved by our team you can browse our online catalogue and purchase at a time that suits you. The Dincel shop can be accessed at: *https://shop.dincel.com.au/*

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F.2. TRANSPORT

F.2.1. TRANSPORT OPTIONS

- **Option 1: Delivery** – Delivery organised through Dincel directly to your site.
- **Option 2: Pickup** – Customer organises their own delivery. In such cases, please refer to our Transport Guidance Document. Dincel holding yards are located at:
  - NSW – Erskine Park
  - Victoria – Dandenong South
  - Queensland – Yatala

  Please note – orders must be placed prior to pick up.

F.2.2. TIMEFRAMES

Stock Orders – Generally ready within two business days after payment has been received and cleared.

Custom Orders – Generally ready within 7-14 working days after payment has been received and cleared.

SCAN HERE

F3. UNLOADING & STORAGE

F.3.1. UNLOADING

All Dincel delivery trucks are equipped with a 'hiab' type crane to unload the Dincel product onto the site. From here, the panels can either be carried to their required position by hand, forklift, or the use of a mobile/tower crane.

F.3.2. LIFTING ON SITE

Suitable wide and flat lifting slings (not chains or round ropes) should be used to lift Dincel packs if cranes are used for unloading. These slings should be attached to a lifting/spreader bar where possible and not a 'choker' arrangement in order to prevent panel webs being bent and consequently damaged.

INCORRECT LIFTING *(No lifting/spreader bar used)*

CORRECT LIFTING DEVICE

The crane operator shall ensure that the packs are softly placed on the site's storage area without dropping the packs from a height.

F3.3. STORAGE

When daily temperatures are constantly over 30°C, the product should be kept under cover ensuring that air-flow is not restricted.

The product is delivered to site in packs with timber crates around them. Do not stack more than two packs on top of each other. The packs are required to be stored by the customer/installer on a clean flat area with timber sleepers placed at 1000mm maximum centres. The product will have a tendency to deform if they are stored with uneven or inappropriate support. The stored product may collect dust over a period of time in a construction site's condition. Refer to Section F.14 if cleaning of the snap-joints is required.

F.4. TOOLS

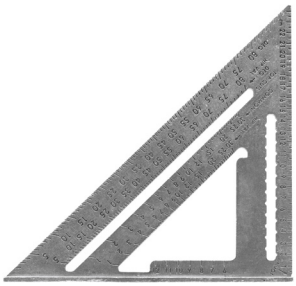
The tools normally associated with formworking and concreting trades can be used to construct Dincel walls. As a general guide, hand and power tools may include but are not limited to the following (products and/or brands shown below are indicative only):

GENERAL CONSTRUCTION

Chalk Line
For marking out wall footprint and any cuts to panels

Marking Pencil/Pen
For marking onto Dincel panels and slab as required

Tape Measure
For taking measurements as required



Squares
For ensuring wall corners and cuts are square

Spirit Level
Checking plumbness of panels

Laser Level
Checking vertical and horizontal panel alignment

Hammer
For general nailing purposes

Tin Snips
For general cutting purposes

Knips
For tying and fixing of steel reinforcement

CUTTING DINCEL PANELS

Angle Grinder
For making small cuts and adjustments to panels

Circular Saw
For cutting entire lengths of panels, or cutting the top of multiple panels

Reciprocating Saw
For cutting through entire cross section of Dincel panels or removing webbing if required

FIXING DINCEL PANELS

Actuated Charge Gun
For fixing angles and Guide to concrete slab

Cordless Drill
For use with the Hole Saw to form additional holes within Dincel profiles and accessories

Hole Saw
For creating T-Junctions or additional openings within Dincel panels

Cordless Impact Driver
For fixing screws to the Dincel profiles and accessories

Cordless Rotary Hammer
For placement of plug type anchors into slab for bracing purposes

Cordless Impact Wrench
For placement of screw type concrete anchors into slab for bracing purposes

CONCRETING

Wheelbarrow, Shovel & Trowel
For handling any concrete spills and finishing top/openings of Dincel walls

Vibrator
Required where SCC is not used. Refer to Section F.12.4 for specific details

Concrete Hose + Pump
For placement of concrete into Dincel walls (2.5inch max). Refer to Section F.12.3 for specific details

CLEANING

Garden Hose
For washing off uncured concrete slurry from walls

Pressure Washer
For cleaning hardened/cured concrete slurry, dust and other reminants from walls

Cleaning Spray and Cloth
To scrub off any remaining markings (for bare Dincel finishes)

F.5. SAFETY

F.5.1. PERSONAL PROTECTIVE EQUIPMENT (PPE)

The installer must adhere to all safety procedures/requirements which would normally be required with formwork and concreting trades. The Personal Protective Equipment (PPE) required will vary depending on the site conditions and it is important that before any work is carried out the risks and hazards are firstly assessed.

Where a Dincel panel is required to be cut on site, Personal Protective Equipment (PPE) such as a dust-proof respirator, safety gloves, hearing protection and protective eyewear must be worn. Always ensure that when cutting, the work area is appropriately ventilated. When concreting, a hard hat and steel cap boots and safety gloves should be worn.

F.5.2. ACCESS

Access to the walls on-site must always be provided in a safe manner and is the responsibility of the installer and builder. It is essential that all scaffolding, EWPs, platforms and edge protection provided comply with the relevant Safe Work practices, laws, standards, regulations and specific site requirements.

F.5.3. SWMS/ITP

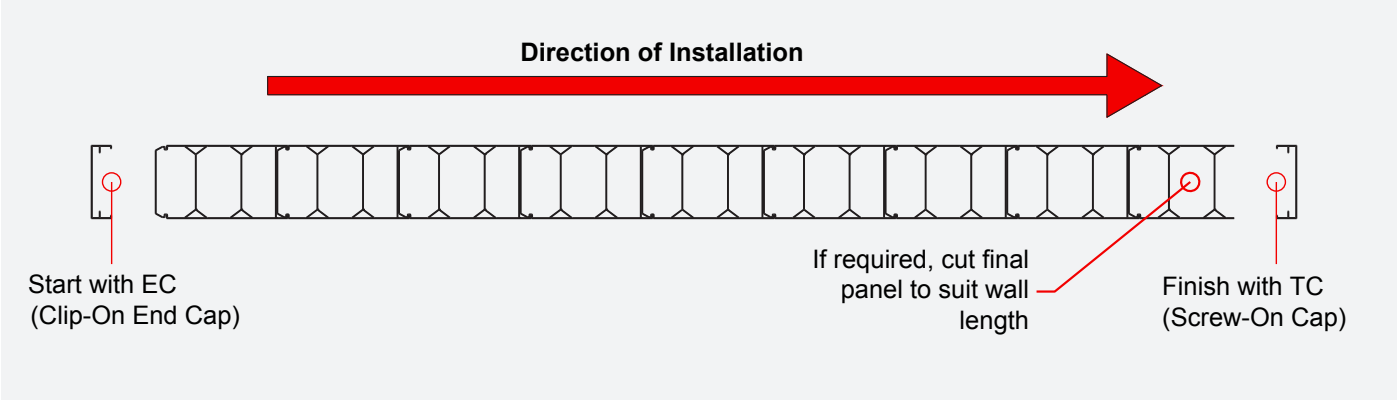
Prior to any installation, a Safe Work Method Statement (SWMS) and Inspection & Test Plan (ITP) should be developed by the builder and/or installer and adhered to at all times. The SWMS at a minimum should take into account safety considerations such as PPE required, safe access and safe lifting procedures.

F.6. PRE-PLANNING

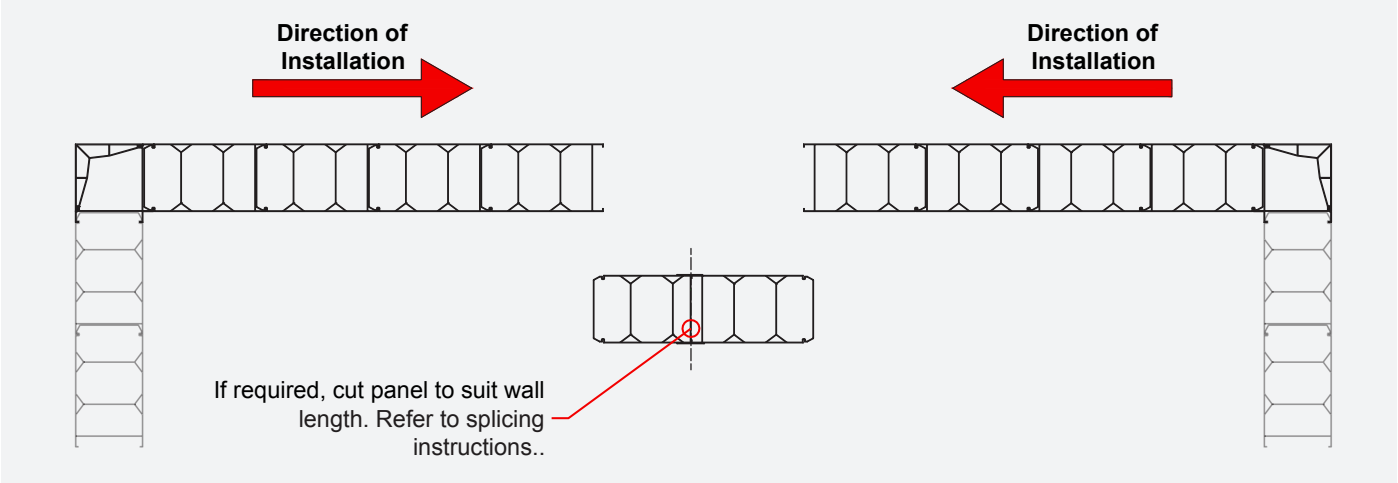
F.6.1 STARTING POINTS

Plan out the most suitable starting point for panel installation.

Option 1 – Use this option when constructing a straight wall



Option 2 – Use this option when constructing along a perimeter such as a basement or tank

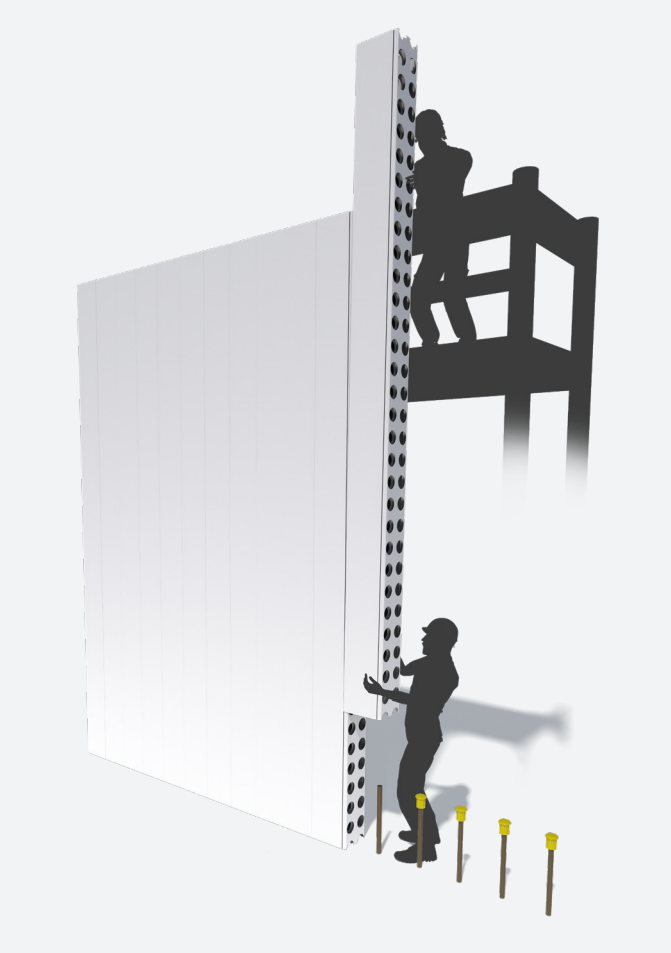


Dincel polymer profiles may be subjected to temperature elongation depending on the length, height and daily temperature. Installers should allow a nominal 10mm of movement for every 15m of wall length for each 10°c temperature variation above 20°c.

On top of temperature movement, installers should allow a construction tolerance of 1mm to each main profile.

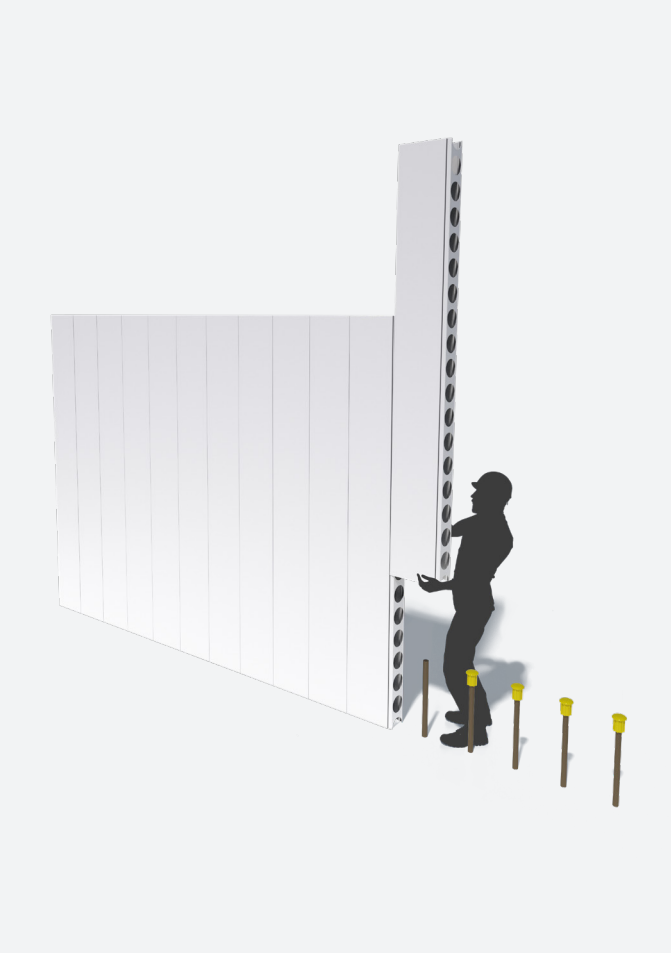
F.6.2 INSTALLATION METHODS

Select the most suitable installation method depending on the site conditions:



Top Down

'Top Down' installation is where panels are clicked into place from the formwork deck above and slid down into position.



Bottom Up

"Bottom Up' installation is where panels are clicked into place from the existing floor slab or ground level work area. This installation method is typically carried out when there is no formwork deck above.

F.6.3. WATERPROOFING

For any wall that is required to be waterproof (e.g. basement walls or tank walls), the method of waterproofing should be planned before installation. Waterproofing detailing should be designed by the project consultants or a qualified waterproofing contractor.

Although the Dincel wall itself is deemed waterproof by CSIRO, it is important to adequately waterproof all wall junctions and any Dincel walling connections that do not utilise the 'snap-lock' joint (such as where panels are cut and joined together).

A - Wall to slab junction at base

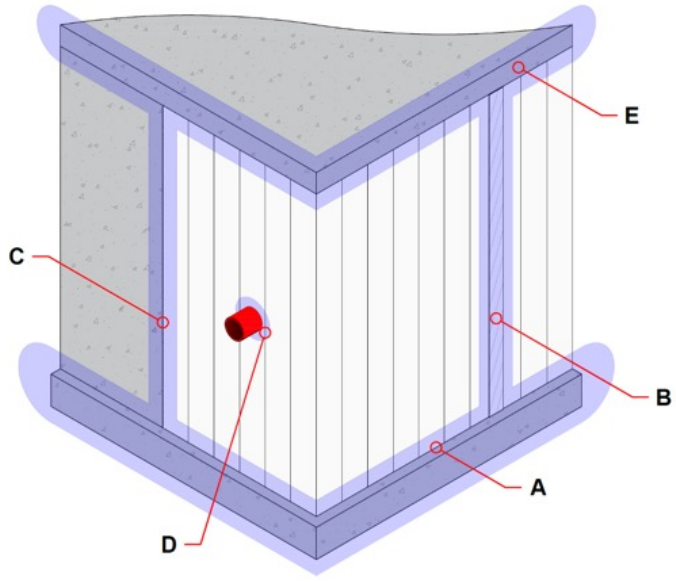
B - Any panel/accessory joints that do not utilise the 'snap-lock' connection (such as where a panel is cut and a P-WS accessory is used). Please refer to Section B.1.1. Option 2.

C - Junctions with other walling types

D - Any wall opening or penetration

E - Junctions with concrete slab above wall.
Note: an exposed slab edge is not recommended, please refer to Section B.3 for detailing.

AREAS HIGHLIGHTED MUST BE ADDITIONALLY WATERPROOFED



When waterproofing the above locations, best results will be achieved when the waterproofing is applied to the positive (exterior/wet) face. This way, water is prevented from entering into the system in the first instance.

One of the most important aspects in achieving a waterproof wall is compacted concrete. Large air voids within the wall will result in leakages. The installer must ensure that there are no air voids within the wall in order to ensure sufficient protection from water. Self-Compacting Concrete (SCC) should be used where waterproofing is critical in order to ensure no air voids.

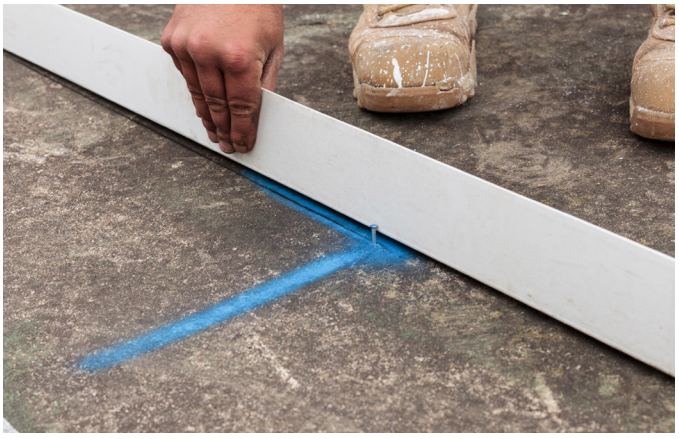
For basements that are located under water table levels or for habitable basements spaces it is recommended to follow the warranted waterproof detailing in the Construction Manual Waterproof Addendum.

F.7. TYPICAL INSTALLATION PROCESS

F.7.1. WALL TRACK

1: Clean substrate ready for set out.

2: Use chalk line to mark out wall base location in accordance with the consultant drawings. Work off gridlines or surveyor marks for accurate placement.



3: Place D-ANG50 PVC Angle along the chalk line mark. Place angles on one side only for conventional concrete or on both sides for self-compacting concrete.

For basement waterproofing, a different detail may have been used by the designer (such as installing along a hob edge or cast in PVC waterstop). Consult with the designer and follow the necessary detail.

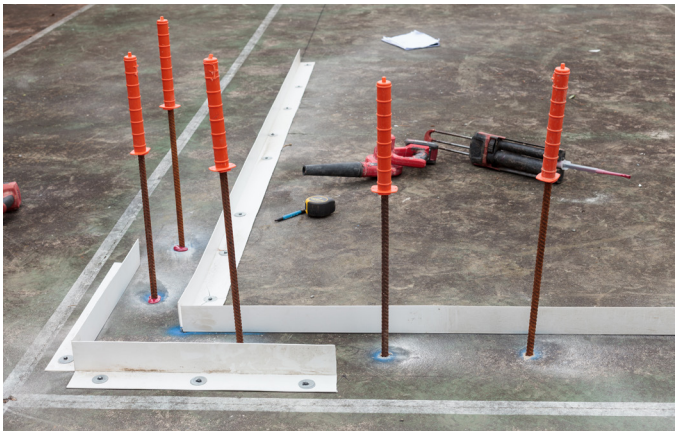
4: Place angles on at least one face of the corner, where:

- On one face the angle is continuous, or
- On the other face the angle extends 600mm each way

5: Fix angles to concrete slab through any of the following methods:

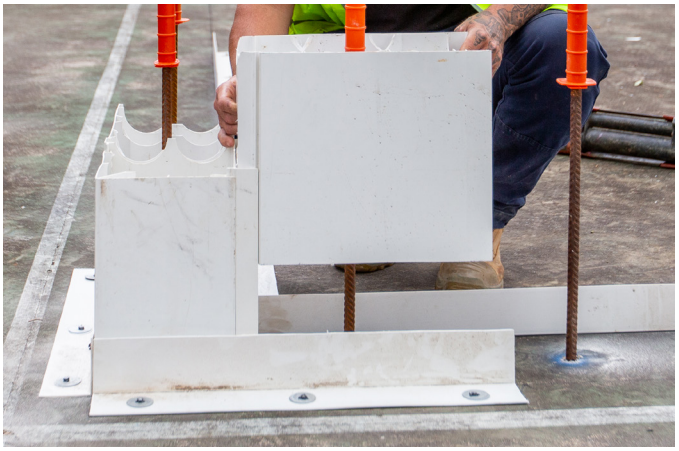
- Concrete nails w/actuator charge gun
- Plug and screw
- Drill and bolt

F.7.2. STARTER BARS



IF starter bars are cast in:
Check they are placed at the correct locations nominated on the engineer's drawings

IF starter bars are post-fixed:
Install starters bars by drill & epoxy at the locations and specifications nominated on the engineer's drawings.



TIP:
A template (sample 300mm tall panel) can be used to assist with starter bar placement.

F.7.3. WALL ASSEMBLY

6: Check quantity of panels before use and distribute evenly to required work zones, including reinforcement and bracing. Remove timber framing from packs.

7: If any dirt/dust has accumulated within panel joints, spray joints with detergent (Windex or similar) to work as a lubricant.

For waterproof walls:
Waterproofing contractor to apply any additional waterproofing (e.g. membrane, hydrophilic material or injection tubes) as detailed within the project design drawings.

Where applicable, start the wall installation with a corner profile (P-5).

10: Screw fix bottom of panels into angle, ensuring that the corner assembly is square.

8: Install 1 to 2 main profiles (P-1) on both sides of the corner.

- Click the profiles above the starter bars then slide down

11: Plumb assembled corner through the use of diagonal braces.

9: Ensure panel end with a 'half' web hole(s) are always positioned towards the bottom for web hole alignment.

12: Place corner horizontal reinforcement into wall:

Where hook bars are specified:

- Place hook bars into the corner from both sides, creating an eyelet for vertical reinforcement bar to be placed inside.
- Hook bar must consist of a return leg no less than 175mm to ensure the bar is seated onto the webbing and not turn.

Where u-bars are specified (200/275 Dincel):
Slide P5 corner cover up to insert u-bar (where this is not possible, remove webbing between the two circles to allow for insertion through the main profile by pre-feeding bars).

13: Continue to install Dincel main profiles (P-1) whilst also inserting the steel reinforcement as required. Ensure that horizontal web holes line up at all times.

Where vertical 200P-VRC/D-VRC accessories are used:
Use the exact concrete cover nominated on the engineers drawing. Bars can be held into place by fixing to the reo-spacer with tie-wire. Place a minimum of three reo-spacers onto vertical bars (at bottom, middle & top providing at least 50mm clearance from starter bars)

- 200P-VRC: Place vertical reinforcement first
- D-VRC: Place horizontal reinforcement first

If there is no horizontal steel required, tie D-VRC clips on alternate sides to ensure concrete cover on both faces.

Where vertical reo-spacer accessories are not used:
Ensure that vertical bars are adequately secured into position. Bar chairs can be used for some applications.

14: If wall is continuing vertically at a later stage or tying to slab, vertical bars should protrude from top of wall (as nominated on engineer's drawings). Tie off vertical bars to a horizontal lace bar or support timber.

15: Ensure that horizontal bars are provided with the correct lap, as specified on engineer's drawings. Bar ends should be marked on the slab or wall. This mark can be used as a reference point for the next horizontal bar to appropriately lap with.

16: Fix horizontal waler into wall by screwing into every panel joint. Place screws in joint location as shown in Section F.11.3.

17: Fix diagonal braces to walers. Plumb the wall by adjusting the turnbuckle on the brace (if applicable). See section F.11 for further details on bracing. Spacing and type of braces as determined by engineer.

18: If the Dincel panel modules do not align with the required wall length then cut the Dincel panel to suit. As the snap lock joint is removed during the cutting process additional screwing is required (refer to Section F.8.1 for instructions).

19: Provide additional bracing to wall ends and corners as required. Refer to Section F.11.5 and F.11.6 for guidance.

F.7.4. WINDOW & DOOR OPENINGS

1: For any openings such as windows or doors, cut the surrounding panels to suit the required opening dimensions.

2: Assemble cut panels into place. Ensure that horizontal web holes line up.

3: Ensure that sill, head and jamb details are formed with any rebates or falls as required on the consultant drawings.

Note: Steel fire rated doors can also be cast into the wall. When cast in, place sealant on flanges of door jamb and fix to Dincel profiles using external grade self-tapping button head screws at 150mm centres.

Optional:
For very short headers, panels may be orientated horizontally. For this option, use a P-WS to join to adjacent panels and screw at min 150mm centres.

4: Prepare capping and bracing for opening as specified in Section F.11.4.

5: When concreting, temporarily remove capping and bracing to sill to allow for concrete hose and insertion of vibrator (for conventional concrete mixes). Port holes can also be created if suitable. Once compacted concrete has reached sill level, reinstate bracing & capping to opening.

F.7.5. CURVED WALLS

1: Remove notches from the base angle to allow the angle to follow the required curvature. Fix curved base angle to slab.

For 200 & 275 Dincel:
2A: Install the P4 and P1 panels along angle (as specified on the components list) to achieve the desired curvature.

For 110 & 155 Dincel:
2B: Cut a slit on one face of panels as required. Then, bend profiles to required curvature and stitch back together using screws at 150mm centres.

F.8. WALL SPLICING

F.8.1. VERTICAL WALL SPLICE

If the wall length does not match up with the Dincel panel modular sizes, a panel can be cut to achieve the exact dimension required. As the snap-lock joint is removed during the cutting process it is required to affix the panel to the rest of the wall through screws:

F.8.1.1. OPTION 1 – USE OF P-WS

A - Cut Dincel panel to suit required width.

B - No requirement to cut adjacent Dincel panel in most cases.

C - P-WS (Wall Splicer) accessory.

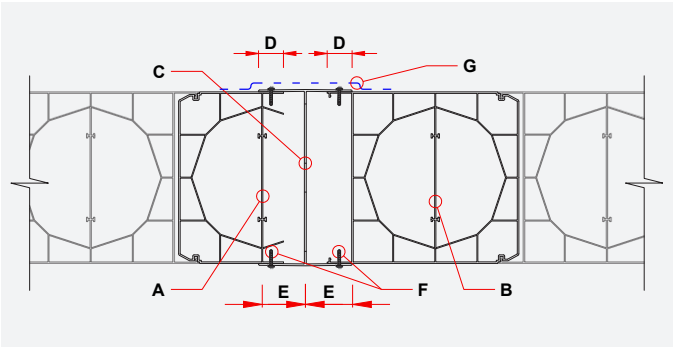
D - Min 40mm overlap between flange of P-WS and adjacent Dincel panels. Apply MS polymer sealant to areas where P-WS makes contact with panels.

E - Max 90mm between web of P-WS and closest web of adjacent Dincel panel, otherwise add additional bracing to prevent bulging.

F - Screws provided at max:
- 150mm centres for bottom 1/3 of wall
- 300mm centres for top 2/3 of wall

For an external or exposed wall, galvanised or stainless steel screws must be used to prevent corrosion.

G - For subterranean, submersed or tank walls, provide min 300mm wide membrane over cut joint on the positive (exposed to water) face. Membrane to be compatible with PVC as a substrate. Where there is no access to apply the membrane, the 2xP1 panels and P-WS can be preconstructed and slid down into place in one piece with the membrane already applied.



F.8.1.2. OPTION 2 – SLIDE TECHNIQUE

A - Cut Dincel panel to suit required width.

B - Remove barbs from panel 'B' to allow for panel to slide into panel 'A'.

C - Remove/cut off barbs from panel to allow cut/spliced panel to be inserted and fixed into place.

D - Min. 40mm overlap between adjacent Dincel panel flanges. Apply MS polymer sealant in between flanges to make a seal between adjacent Dincel panels.

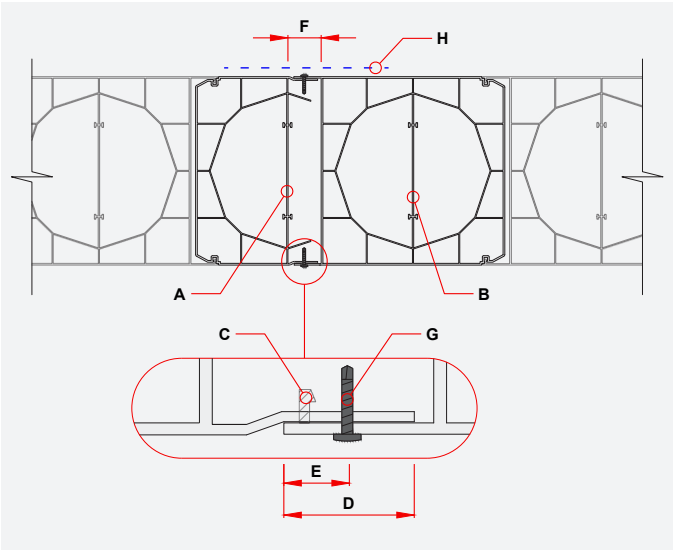
E - Min 15mm between screw fixing and lapped end.

F - Max 90mm between webbing of panels, otherwise add additional bracing to prevent bulging.

G - Screws provided at max:
- 150mm centres for bottom 1/3 of wall
- 300mm centres for top 2/3 of wall

For an external or exposed wall, galvanised or stainless steel screws must be used to prevent corrosion.

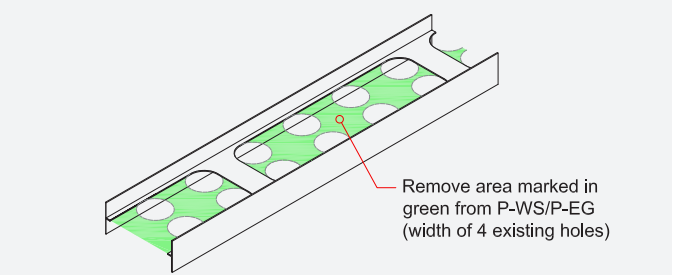
H - For subterranean, submersed or tank walls, provide min 300mm wide membrane over cut joint on the positive (exposed to water) face. Membrane to be compatible with PVC as a substrate. Where there is no access to apply the membrane, the 2xP1 panels can be preconstructed and slid down into place in one piece with the membrane already applied.



F.8.2. HORIZONTAL WALL SPLICE

F.8.2.1. OPTION 1 – USE OF P-WS

A - Join Dincel profiles together using P-WS accessory. Where P-WS is used, modify as per below in order to allow for cast-in vertical bars to pass through and provide a greater concrete-to-concrete interface. Similarly, use P-EG where there is a suspended slab.



B - Screws to be placed at each panel joint as shown (refer to F.11.3 for screw placement guidance).

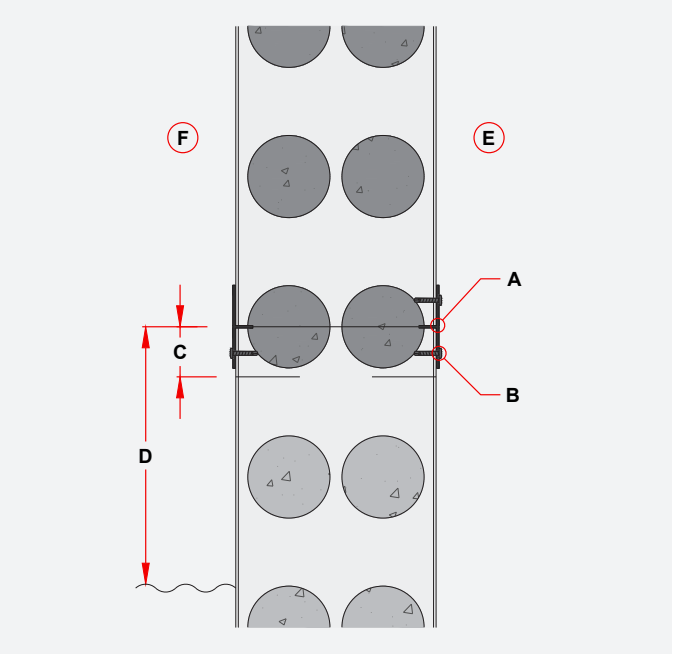
C - Concrete pour break as per consultant drawings or otherwise 50mm below horizontal wall joint (if applicable).

D - Horizontal splice must be minimum 500mm above water table location or permanent water immersion. Otherwise, a membrane must be applied to the positive face to protect the horizontal joint.

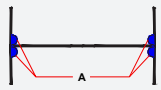
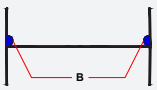
E - Accessible face.

F - Inaccessible face (after placement of profile over the splice joint). Screw for P-WS can be reversed if required..

Note: This detail is only suitable for above ground walls (non-submerged) and subject to Design Engineer approval.



Treatment to P-WS for Horizontal Wall Splices:

Below Ground (but at least 500mm above permanent water table)	**Above Ground** (General Application)	**Above Ground** (Critical aesthetics)
		
A – Provide MS polymer sealant to all 4 flanges	B – Provide MS polymer sealant to top flanges	C – After concrete has set, use angle grinder or multi-tool to remove flanges from P-WS D – Provide MS polymer sealant to remaining joint in wall

F.8.2.2. OPTION 2 – CONVENTIONAL FORMWORK

A - Provide min 300mm x 20mm plywood to both sides of wall.

B - Screws to be placed through the plywood and Dincel panels at minimum each panel joint (refer to F.11.3 for screw placement guidance).

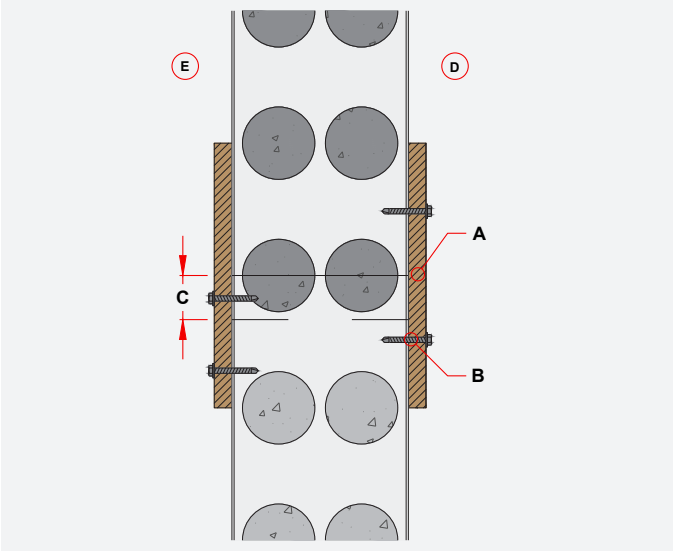
C - Concrete pour break as per consultant drawings or otherwise 50mm below horizontal wall joint (if applicable).

D - Accessible face.

E - Inaccessible face (after placement of profile over the splice joint). Screws to plywood can be reversed if required.

Note: Once plywood formwork is removed, provide horizontal joint with sealant if required for aesthetic or waterproofing purposes.

Note: This detail is only suitable for above ground walls (non-submerged). Otherwise, provide a suitable waterproofing membrane over the horizontal joint.



F.8.2.3. OPTION 3 – 'SAW-TOOTH' SPLICE

A - Install panels in a staggered formation to establish a 'saw tooth' profile.

B - Every second panel to extend up by min 750mm.

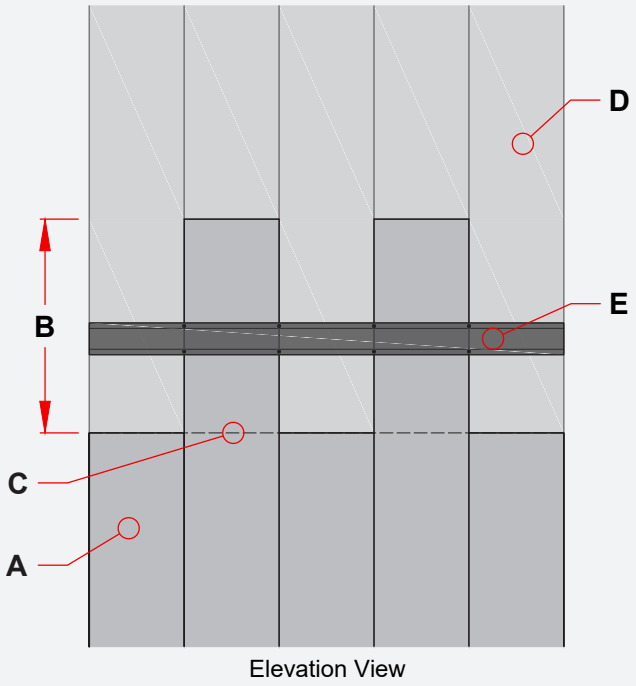
C - Concrete pour break location (if applicable).

D - Panels above to be installed at a later stage (after concrete in panels below has adequately cured). Ensure that horizontal web holes line up between all profiles.

E - For taller walls provide additional bracing at splice location, such as top hat with screws at every panel joint.

Note: Provide horizontal joints with sealant if required for aesthetic or waterproofing purposes.

Note: This detail is only suitable for above ground walls (non-submerged).

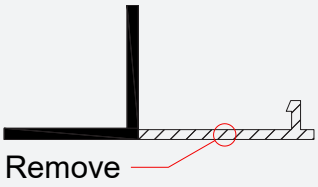


Elevation View

F.8.3.CONNECTION OF DIFFERENT PROFILES

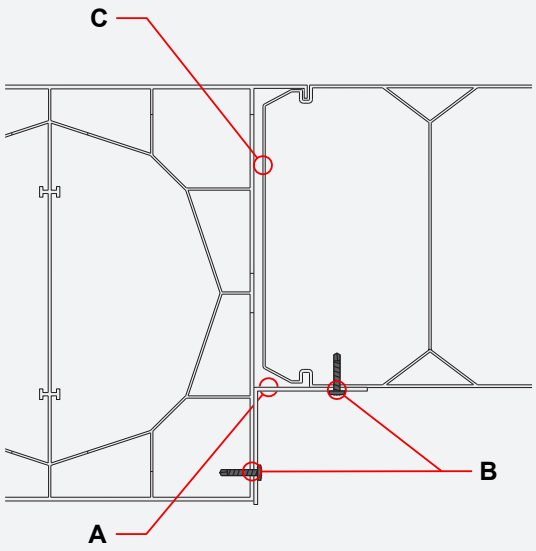
F.8.3.1. STRAIGHT WALLS

A - Provide temporary angle D-ANG50 between profiles on one side to block-out gap.
Note: a larger angle or plywood formwork will be required when connecting Dincel 275 to Dincel 110 or 155.
Remove protruding leg of panel if required:



B - Screw temporary angle at max:
- 150mm centres for bottom 1/3 of wall.
- 300mm centres for top 2/3 of wall.

C - Horizontal steel reinforcement can be fed through on one side if required. Place concrete hose on either side of junction to ensure adequate flow of concrete between the panels.

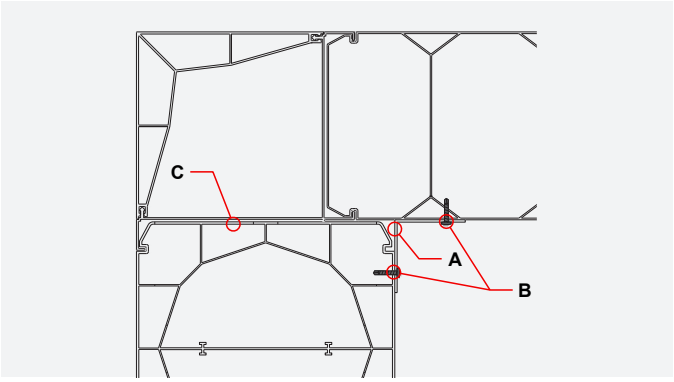


F.8.3.2. CORNERS

A - Provide temporary angle D-ANG50 at corner junction of profiles.

B - Screw temporary angle at max:
- 150mm centres for bottom 1/3 of wall.
- 300mm centres for top 2/3 of wall.

C - Horizontal steel reinforcement can be fed through one side if required. Place concrete hose on either side of junction to ensure adequate flow of concrete between the panels.



F.8.3.3. CORNER SPLICING

A - Un-cut Dincel profile.

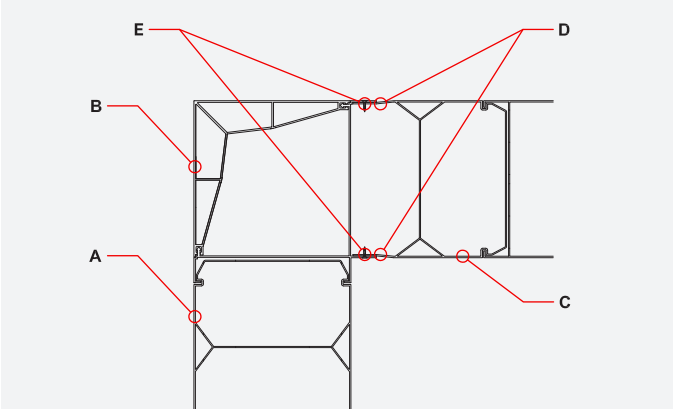
B - Dincel corner profile.

C - Cut Dincel panel to suit required width.

D - Remove barbs from corner B to allow profile D to slide under. Min. 40mm overlap between panels. Apply white MS polymer sealant to areas where panels make contact with each other.

E - Screws provided at max:
- 150mm centres for bottom 1/3 of wall.
- 300mm centres for top 2/3 of wall.

For an external or exposed wall, galvanised or stainless steel screws must be used to prevent corrosion.



F.8.4. SPLICING OFF-CUTS

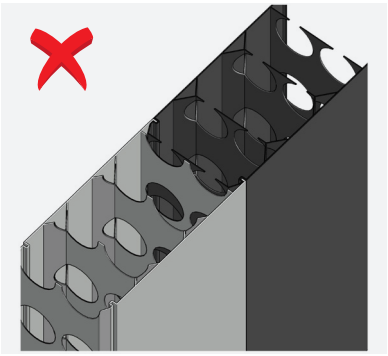
It should be noted that stacking/splicing off-cuts on top of each other to create the height of the wall should be avoided where possible. Stacking of off-cuts is not recommended due to the following:

- Can leads to decreased aesthetics.
- Not suitable for applications where the wall is required to be waterproof, as the protective PVC skin is compromised at the cut locations (unless suitably waterproofed with a membrane or similar).
- Provides less formwork stability and may require additional support/bracing.
- May lead to mis-aligned web holes - refer to Section F.8.5 for further details.

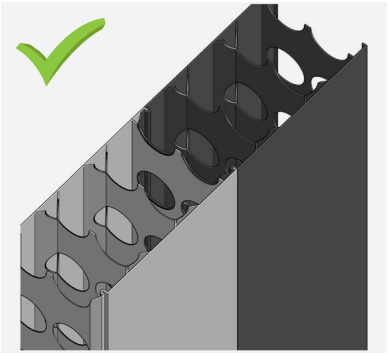
Instead, it is recommended to use full-height panels where possible. In some scenarios, it may not be possible to use a panel for the entire height of the wall (such as for corners/ accessories for tall walls). In these instances, it is critical the above points are adequately addressed at the splice location.

F.8.5. ALIGNMENT OF WEB-HOLES

Web holes within panels must be aligned at all times. Failure to do so will result in decreased concrete flow and the potential for inadequate concrete compaction (air-voids). The half web hole should always be orientated towards the ground and matching with the adjacent panels. Special attention must be provided where panels have been spliced horizontally and not cut at a 'half web-hole' location.



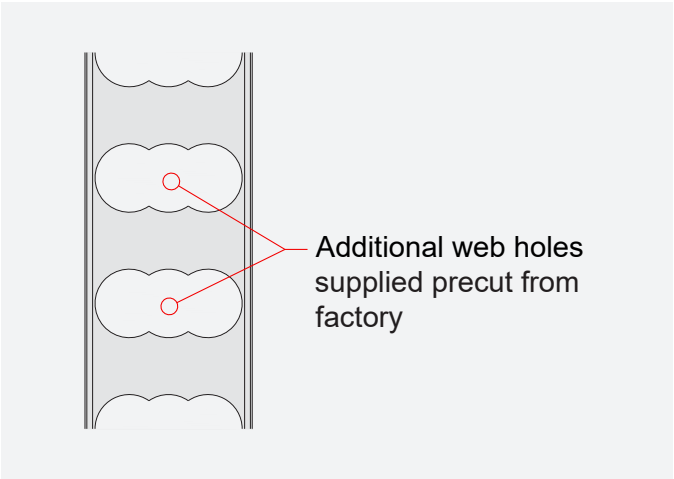
Incorrect – web holes do not align



Correct – web holes align

F.9. INSERTING TIES OR U-BARS

P-1C MAIN PROFILES (AVAILABLE FOR DINCEL 200P-1C AND 275P-1C):



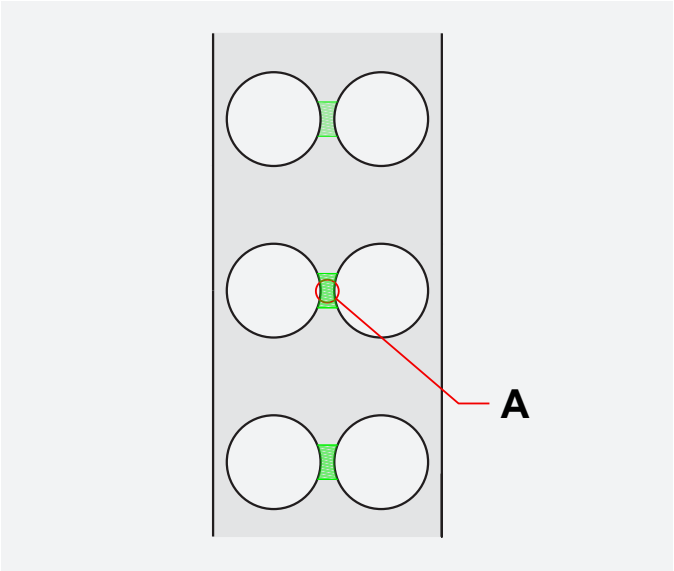
Note: Order 200P-1C or 275P-1C when ties or U-Bars are required.
The P1C main profile panels are pre-cut in the factory to include an additional central web hole which elimantes cutting on site. The additional hole allows for easy insertion of horizontal closed ties and U-Bars for difficult access areas. Otherwise, the below detail can be used if the custom panels were not ordered.

WHERE P-1C NOT ORDERED:

Inserting Closed Ties

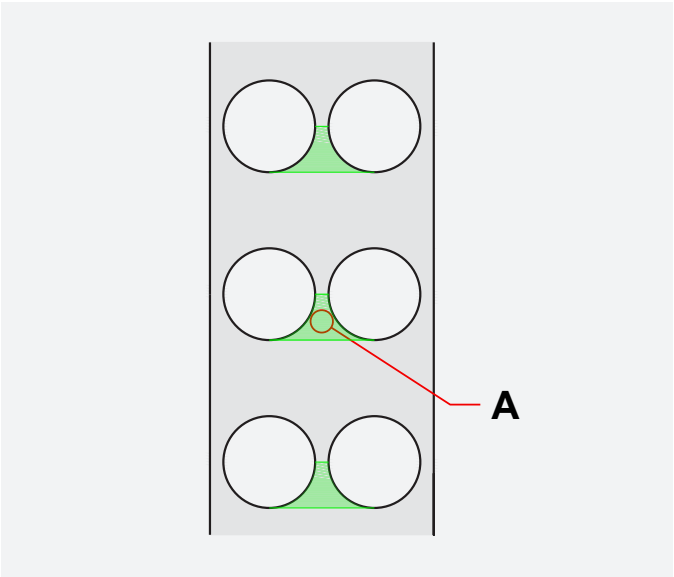
A - Remove the portion of webbing shown in green as required. An angle grinder or reciprocating saw can be used to remove the webbing.

- For U-bars: Only the first web of the profile requires to be cut where the reinforcement is inserted.
- For Closed-Ties: All webs within the profile must be cut where the reinforcement is inserted.



Inserting U-Bars

Note: Care should be taken to ensure that remaining webbing is not damaged or cracked during process. Cracked or damaged webs will lead to bulging following concrete pour.



F.10. CONNECTION TO SLAB OR LANDING

It is important that the structural engineering drawings are followed for all connection details to slabs or stair landings, including reinforcement arrangements, spacings, and any necessary waterproofing details. The details below have been provided as a generic installation guideline for preparing the Dincel panels to receive connection reinforcement specified by the engineer (such as 'L' bars).

F.10.1. PANELS SPANNING ABOVE SLAB

A - Holes removed from face of Dincel panels by using a hole saw. Typically, 100ø or as specified by engineer.

B - If larger opening is required, additional core holes can be taken adjacent (and above or below) to the first hole.

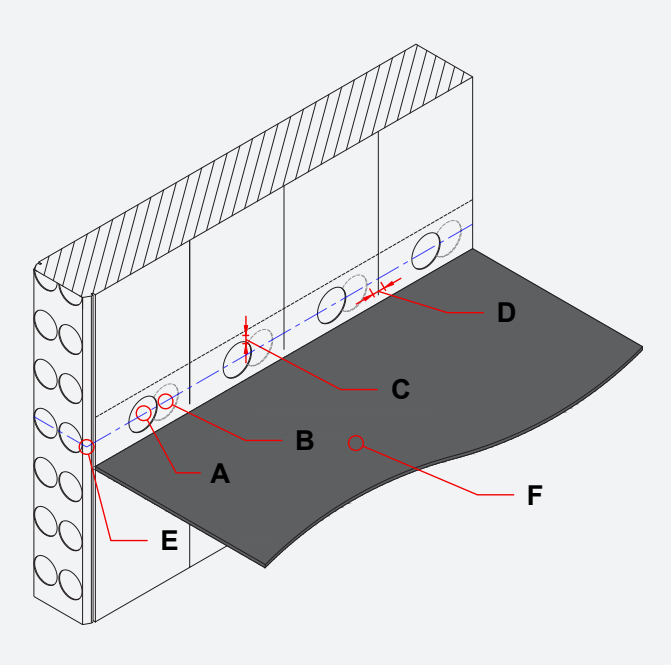
C - 25mm min clearance between top of cored holes and SSL.

D - 50mm min clearance between cored hole and panel joint.

E - Where possible, line up core hole locations with panel web holes. Otherwise, provide bracing to opposite face to prevent bulging if webbing has been removed.

F - Formwork Deck.

Note: Once holes have been prepared, insert steel reinforcement as specified by engineer.



F.10.2. PANELS TERMINATING AT SLAB

A - Remove inner skin from panels and parts of webbing using an angle grinder, reciprocating saw, or similar.

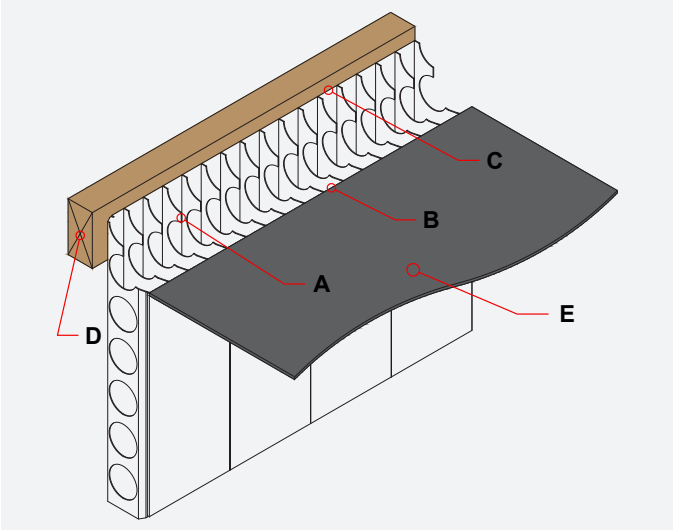
B - Bottom of cut to line up with slab soffit, or as otherwise nominated on engineer's drawings.

C - Top of cut to line up with slab SSL, or as otherwise nominated on engineer's drawings.

D - For slab thicknesses of 200mm or greater, provide support timber prevent bulging. Timber to extend 50mm above Dincel panels and adequately braced.

E - Formwork Deck.

Note: Once Dincel panels have been prepared, insert steel reinforcement as specified by engineer.



F.11. BRACING

It is a safety requirement that any bracing is suitably designed and certified by the project's structural or temporary works engineer in order to provide lateral stability to the wall during installation. This will need to take into account site specific factors such as wind loading, brace capacities, brace spacing, brace fixings, wall height and the loading applied from the concrete pour.

F.11.1. DIAGONAL BRACES

Diagonal bracing is required if the Dincel panels are freestanding and there is no formwork deck to secure the top of the wall onto. If there is a formwork deck above, refer to the next Section.

A - Continuous horizontal waler, constructed from steel (top hat) or timber.

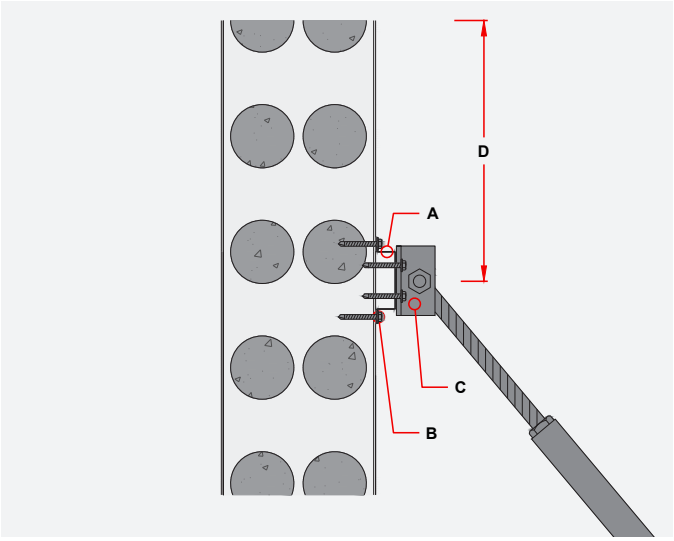
B - Min 2 x 12g hex head screws at each panel joint location (refer to F.11.3 for placement guidance). Screws to be removed after concrete pour, and holes remaining provided with sealant if required.

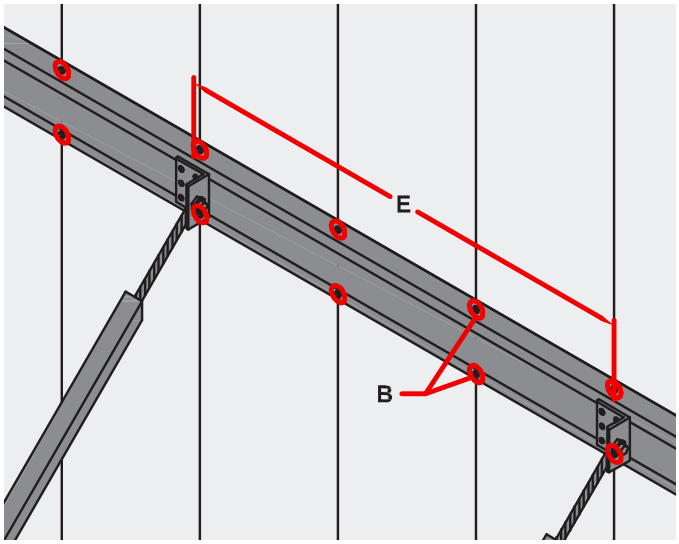
C - Adjustable 'Push-Pull' Prop/Brace.

D - Position waler at 500mm from top of wall, or as otherwise specified by engineer. Where the wall is taller than 4m, a secondary waler with braces should be provided at the wall's mid-height.

E - Spacing between braces as specified by engineer. See below for minimum requirements.

NOTE: The following is provided for illustration and guidance purposes only. Bracing of formwork must be designed by the engineer to suit site conditions. Any wind loading and/or backfill loading has not been considered.





DINCEL PROFILES	WALL HEIGHT	HORIZONTAL SPACING OF WALERS	SPACING BETWEEN BRACES
110, 155, 200	Up to 4.0m	1 row	Maximum 1.66m (every 5-6 panels)
	Above 4.0m, and up to 5.5m	2 rows	Maximum 1.33m (every 4-5 panels)
275	Up to 4.5m	1 row	Maximum 1.38m (every 5-6 panels)
	Above 4.5m, and up to 6.5m	2 rows	Maximum 1.1m (every 4-5 panels)

F.11.2. SECURING TO FORMWORK DECK

Where the Dincel wall height is under 3.6m, panels can be secured to the formwork deck rather than using diagonal bracing. This restraint technique will ensure faster installation and easier access for trades on the level below.

A - Dincel profile, filled with concrete on completion of bracing. Panels must be under 3.6m tall, otherwise supplement with conventional bracing and walers.

B - Formwork decking system, suitably propped and braced as required.

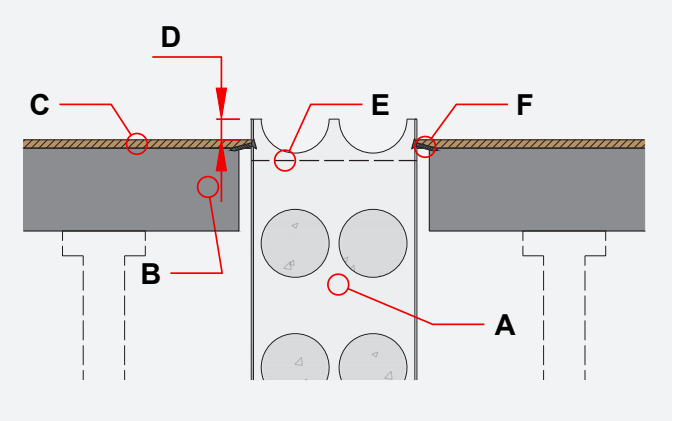
C - Plywood deck surface (min 20mm thick). Plywood to be installed snug surrounding Dincel wall.

D - 25mm lip to enable suitable edge for screw fixings. Lip also prevents deck water run-off & debris entering Dincel panels before pour.

E - Typical pour break location.

F - Screw fixings into plywood deck on one side of wall profile (typically minimum 50mm chipboard screws or minimum 50mm timber hex head screws). Screws should be placed at every panel joint location (refer to F.11.3 for screw placement guidance).

NOTE: The following is provided for illustration and guidance purposes only. Bracing of formwork must be designed by the engineer to suit site conditions.

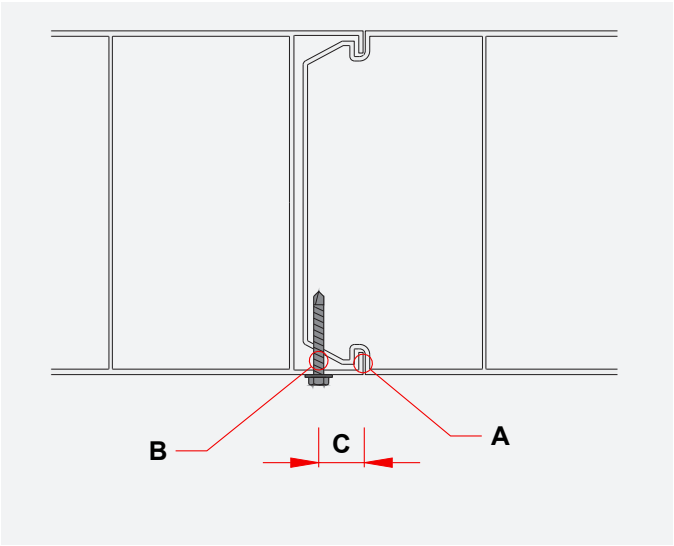


F.11.3. SCREW PLACEMENT

A - Vertical panel joint (simplified illustration without 'barbs' shown).

B - Screw fixings into plywood deck on one side of wall profile (typically minimum 50mm chipboard screws or minimum 50mm timber hex head screws). Screws should be placed at every panel joint location.

C - Screw located 20mm from panel vertical joint in order to provide maximum fixing capacity.



F.11.4. BRACING OF OPENINGS

The below detail is intended for where Self-Compacting Concrete (SCC) is used. If conventional concrete + vibration is selected, the formwork bracing must be installed so that the sill is accessible for pouring/vibration and a pour break occurs at the sill level.

A - Dincel Wall. Profiles are to be cut in order to suit the required opening size.

B - Shutters to cast shape of opening.
For flat openings: use P-TC accessory screwed to profiles at max 150mm centres. If required, these can be removed after concrete set.
For profiled shape openings (i.e. for some windows or doors), either:
• Cast-in metal frame and provide screws at 150mm centres.
• Use combination of plywood and timber formwork to form rebate as required. Fix assembly to Dincel panels at max 150mm centres.

C - Continuous timber bracing to opening sides/jambs. Timber width must closely match wall thickness (by at least 75%).

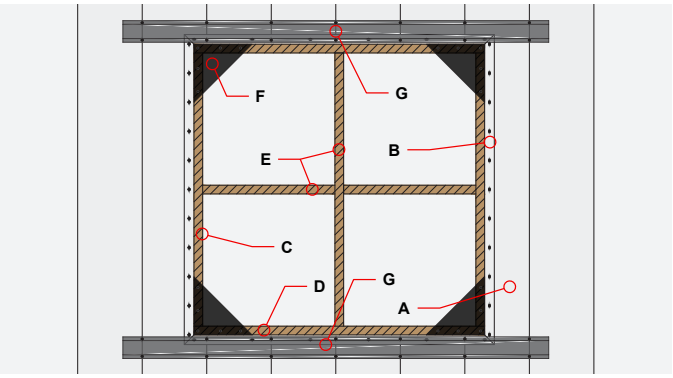
D - Continuous timber bracing to opening header and bottom/sill. Timber width must closely match wall thickness (by at least 75%).

E - Intermediary supports required where timber formwork frame is used. Supports positioned to ensure external timber does not span more than 750mm at any given location.

F - Plywood gussets to maintain squareness of formwork frame.

G - Temporary horizontal waler provided directly above and below opening on both sides of the wall in order to maintain alignment. Waler to be constructed from steel (top hat) or timber and may be required to be braced with push-pull props for larger spans.

Note: Once Dincel panels have been prepared, insert steel reinforcement as specified by engineer.



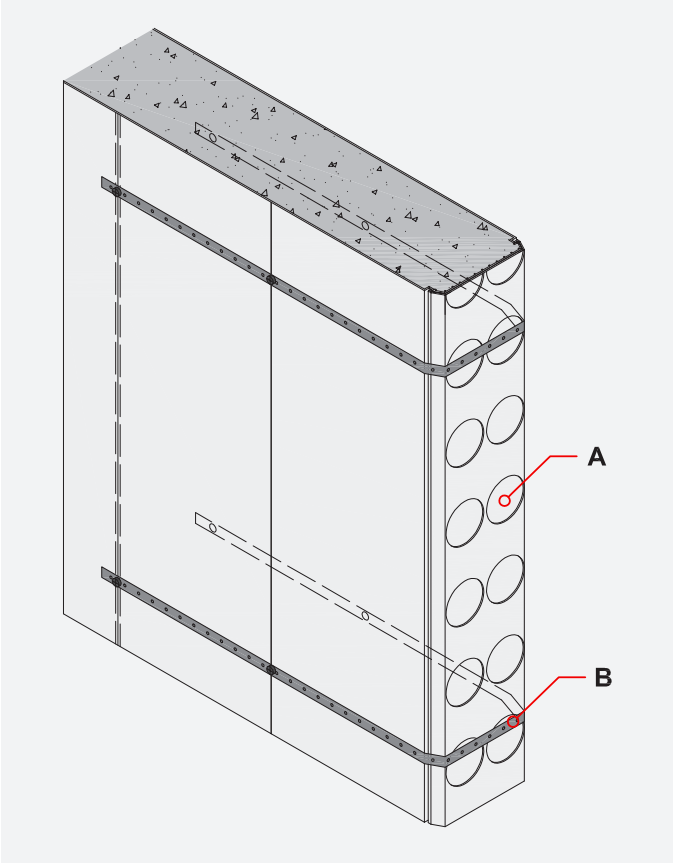
F.11.5. WALL ENDS

F.11.5.1. Non-Critical Aesthetics

WALL HEIGHT	SUGGESTED WALL END BRACING
Up to 3.0m	Use of Stop End accessory. Perforated straps are not required for 155 Dincel. If tolerances do not allow for minimal deflection, use straps for 200 Dincel.
3.0m to 3.6m	Use of Stop End accessory and perforated metal straps @ max 750mm centres for bottom 1/3rd of wall (minimum).
Above 3.6m	Must increase bracing to suit or provide separate pours/lifts.

A - Dincel Stop End Accessory, slid down into slot of main profile.
Note: for 110 and 275 Dincel, a Stop End accessory is not available. Instead, cut a 155-Stop End (155P-SE) to size and slide down panel. For 275 Dincel, use 'critical aesthetics' detail or alternatively, use minimum 3mm thick metal "C" channels.

B - Wrap reusable perforated metal straps around wall end, if required. Straps are to be min 1800mm long and screwed back to first and second panel joints, and positioned at max 300mm from the top and bottom of the wall. Refer to Section F.11.3 for exact screw location.



F.11.5.2. Where Aesthetics Critical

WALL HEIGHT	SUGGESTED WALL END BRACING
Up to 3.0m	Use of Screw-On Cap Accessory screwed @ max 200mm centres, supported by full width timber as shown. Perforated metal straps @ max 750mm centres
3.0m to 3.6m	Use of Screw-On Cap Accessory screwed @ max 150mm centres, supported by full width timber as shown. Perforated metal straps @ max 500mm centres
Above 3.6m	Provide separate pours/lifts, or Increase bracing and supports to suit

A - Dincel Stop End Accessory, slid down into slot of main profile.

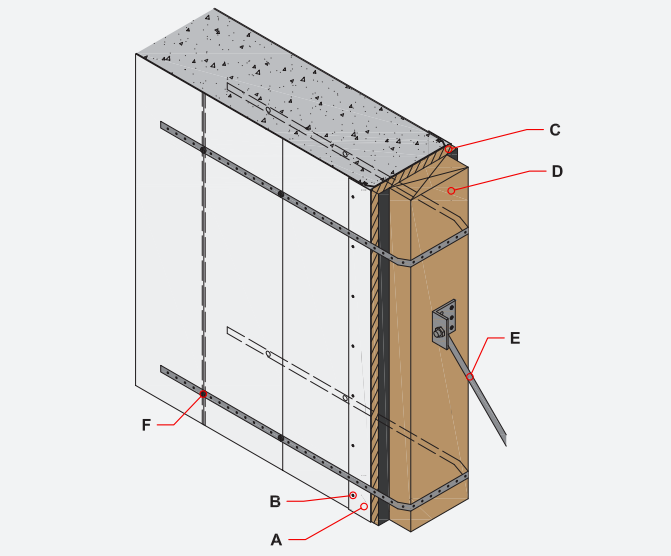
B - Connect Screw-On Cap to main profile by screwing at the required centres.

C - For Dincel 275: Min 20mm x 275mm plywood, provided along full height of wall end.

D - Min 75 x 200mm timber support bearer, provided along full height of wall end. Width of timber support bearer can be reduced to suit for Dincel 110 & 155 Dincel.

E - Push-pull prop screwed to support timber, as specified by engineer. Multiple braces along height of wall are likely required at wall end.

F - Wrap reusable perforated metal straps around wall end, if required. Straps are to be min 1600mm long and screwed back to first and second panel joints, and positioned at max 300mm from the top and bottom of the wall. Refer to Section F.11.3 for exact screw location.

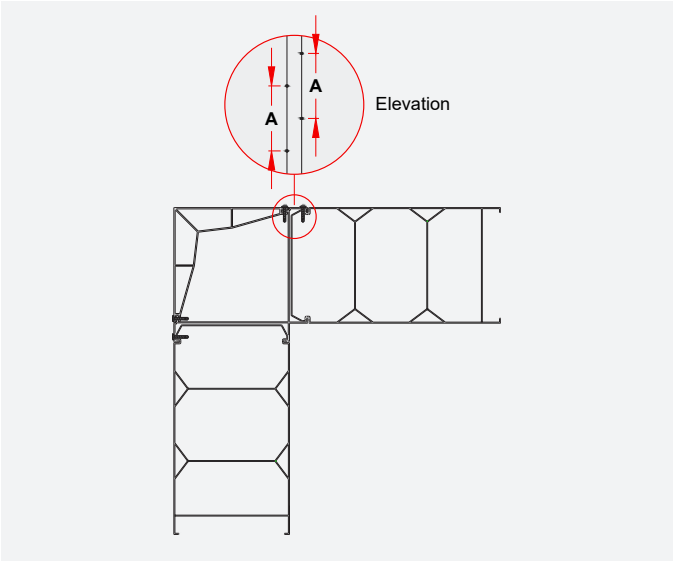


F.11.6. CORNERS

F.11.6.1. Non-Critical Aesthetics

A - Provide screws @ max 300mm centres to joint locations for bottom 1/3rd of corner (minimum). For P5 corners, screws are to be provided to both joints in an alternating arrangement (see figure below).

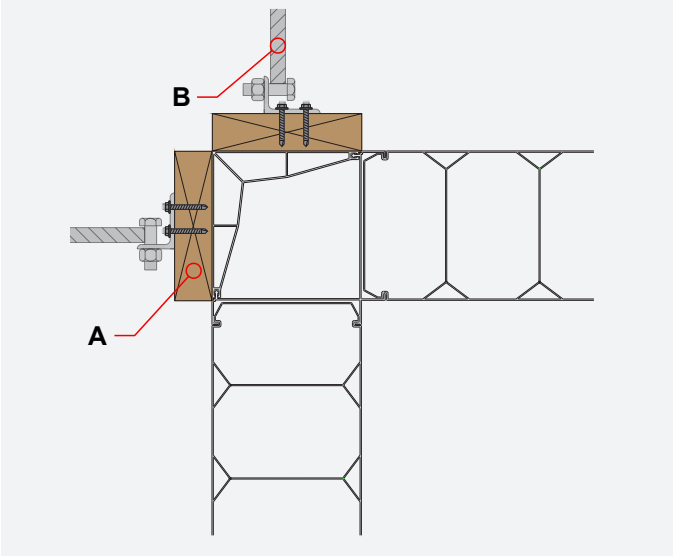
Note: The use of screws to the external face is not suitable for submerged basement walls unless additional waterproofing is provided. Refer to below detail instead.



F.11.6.2. Where Aesthetics Critical

A - Timber support bearer provided along full height and width of corner.

B - Push-pull prop or similar screwed to support timber. Provide min 2 braces (at top and bottom) of timber. For basement or in-ground walls, timber packers can be used between the excavation face and timber supports.



F.11.7. T-JUNCTIONS

F.11.7.1. Option 1

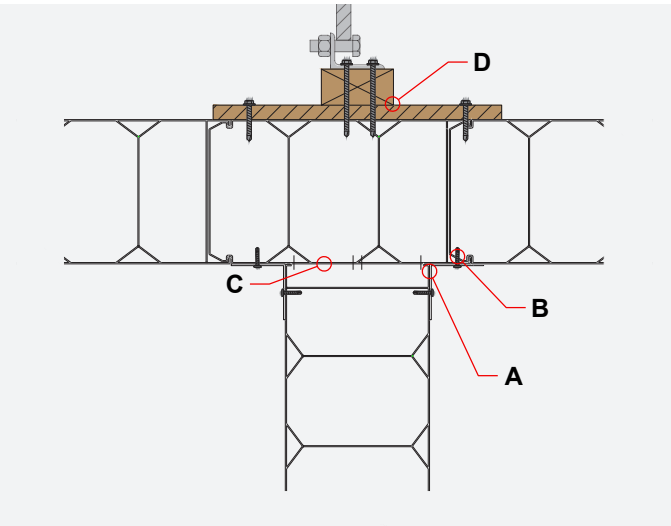
A - Provide temporary angles D-ANG50 to either side of the wall.

B - Screw temporary angles at max:
- 150mm centres for bottom 1/3 of wall
- 300mm centres for top 2/3 of wall

C - If required by engineer, use hole-saw to provide cores at 150mm centres and at diameter to match the main profiles. A Guide accessory can be used as a template for marking hole locations.

D - Provide full width plywood and timber prop to prevent bulging on the opposite face. Alternatively, pour each part of the T-Junction at different times.

Note: Only provide screws to external plywood/timber for interior T-Junctions. For basement walls, no screws are to be used on this face.



F.11.7.2. Option 2

A - Provide temporary angles D-ANG50 to either side of the wall.

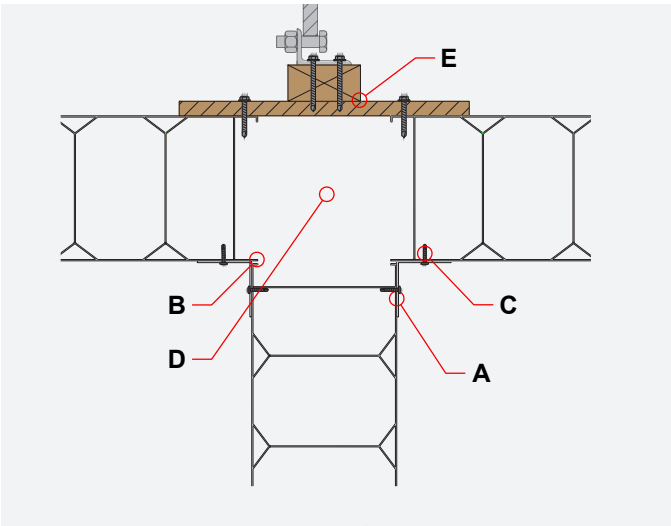
B - Orientate rear of panels (side with barbs) towards T-Junction.

C - Screw temporary angles at max:
- 150mm centres for bottom 1/3 of wall
- 300mm centres for top 2/3 of wall.

D - No Dincel panels or accessories required within T-Junction.

E - Provide full width plywood and vertical timber, suitably propped, to the opposite face. Plywood to be adequately screw fixed to the Dincel panels.

Note: If detail used for wall which requires to be waterproof, exposed concrete surface and angles must be adequately waterproofed with membrane extending min 200mm onto the Dincel panels on either side.



F.11.8 T-JUCTIONS USING 200/275P-TJ

F.11.8.1 T-Junction using P-TJ with same size profile for connecting wall

A - Dincel panels of the same profile dimension i.e. 200P or 275P

B - T-Junction accessory where external wall is the same size as connecting perpendicular wall

C - Where aesthetic finishes are required, provide full width plywood and vertical timber, suitably propped, to the opposite face. Plywood to be adequately screw fixed to the Dincel panels.

Note: If detail used for wall which requires to be waterproof, exposed concrete surfaces and screw holes must be adequately waterproofed with membrane extending min 200mm onto the Dincel panels on either side.

F.11.8.2 T-Junction using P-TJ where connecting wall is a different size

A - Dincel panel of the same profile dimension i.e. 275P-1

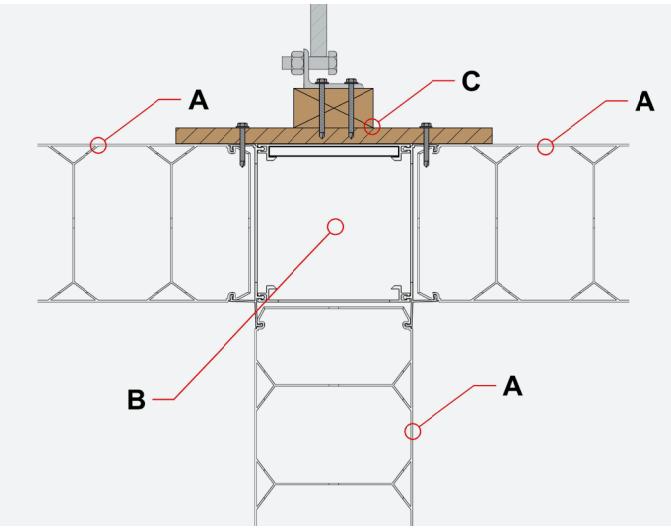
B - Internal connecting wall of smaller size than the external wall i.e. 200P-1

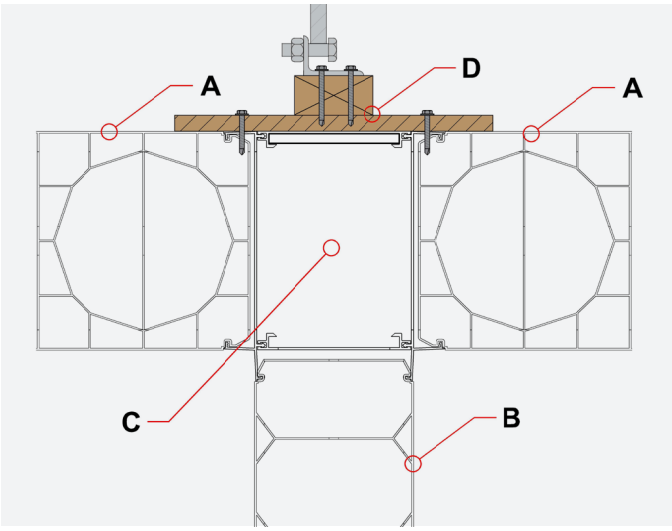
C - T-Junction accessory with alternate sides for connecting wall

D - Where aesthetic finishes are required, provide full width plywood and vertical timber, suitably propped, to the opposite face. Plywood to be adequately screw fixed to the Dincel panels.

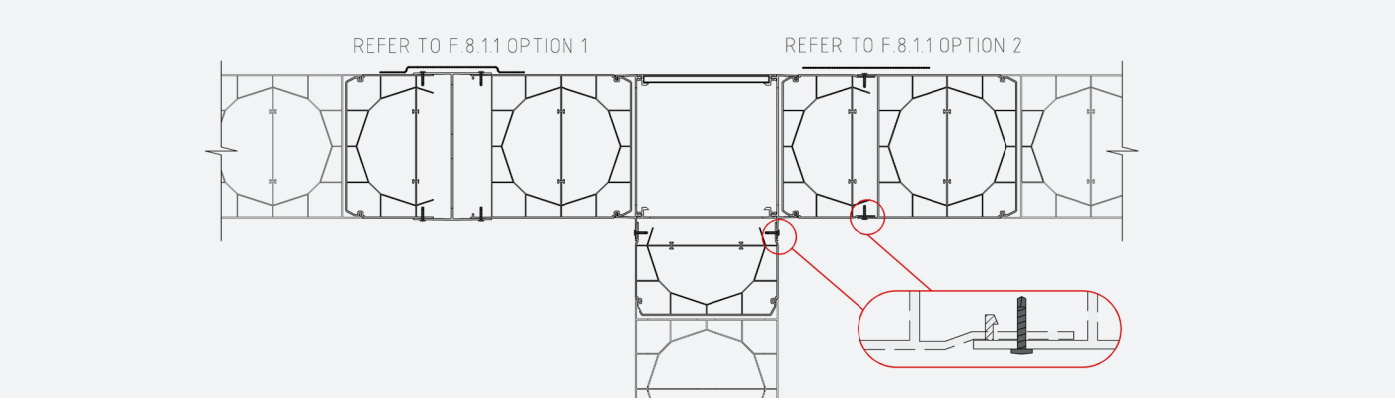
Note: If detail used for wall which requires to be waterproof, exposed concrete surfaces and screw holes must be adequately waterproofed with membrane extending min 200mm onto the Dincel panels on either side.

Note: Please request this configuration when ordering with the Dincel Customer Service team.





F.11.8.3. T-Junction Splicing



F.12. CONCRETING

F.12.1. CONCRETE ORDERING

Ensure that the concrete mix is ordered in accordance with the specification provided by the consulting design engineer. Recommendations by Dincel for concrete mix design can be found in section B.20. In order to ensure adequate concrete compaction within the formwork, the mix should be either of the following:

	SELF-COMPACTING CONCRETE	HIGH SLUMP CONVENTIONAL CONCRETE
CONCRETE STRENGTH	As required by project's engineers	As required by project's engineers
AGGREGATE SIZE	Maximum 10mm	Maximum 10mm
CONCRETE SLUMP/ SPREAD	Nominal 680mm spread	Nominal 220mm (Min. 180mm at the point of truck discharge)
SLUMP/SPREAD TOLERANCE	± 50mm	± 40mm
COMPACTION METHOD	No vibration required on single pours. Refer to F12.4.	Vibration required. Refer to F12.4.

The concrete pour should not take place when the ambient daily temperature is over 35°C or under 5°C, or in notable wet weather conditions, unless given specific approval by the project's consulting structural engineer. Consideration should also be given to the distance that the concrete must travel in the pump hose. For example, where concrete requires to be pumped over 15 storeys, the site team should agree on the methodology and suitability of concrete mix with the concrete manufacturer.

F.12.1.1. Net Concrete Quantity (Guidance)

DINCEL PROFILE	PER M2 OF WALL	PER M3 OF CONCRETE
110MM DINCEL	0.105 m^3 of concrete	9.5 m^2 of wall area
155MM DINCEL	0.15 m^3 of concrete	6.7 m^2 of wall area
200MM DINCEL	0.195 m^3 of concrete	5.1 m^2 of wall area
275MM DINCEL	0.27 m^3 of concrete	3.7 m^2 of wall area

Note: The above excludes wastage from concrete pump, hopper & agitator.

Note: Concrete quantity calculations can vary depending on reinforcement to concrete ratio and compaction of concrete.

F.12.2. POUR RATES

The following pour rate tables (SCC and Conventional) should be followed in order to prevent bulging or rippling of the formwork face. This is particularly an important consideration when Dincel is not rendered or cladded for aesthetic purposes.

Pouring conditions also need to be considered as the concrete mix and ambient temperature of the time of pouring may vary from project to project. These variations should be taken into account to determine the minimum pouring wait times. Continuation of concrete pouring should only take place after the concrete has reached initial setting.

Please note, the table is applicable as a general guide for all Dincel profiles. The engineer can consider pouring higher walls/higher concrete lifts when aesthetics is not critical. Please consult Dincel team regarding any project specific pour rate recommendations.

F.12.2.1.Self-Compacting Concrete (SCC 680mm ±50 spread)

Where SCC is used, ensure good attention to detail is placed when bracing and sealing formwork. The pressure exerted by SCC is similar to pouring conventional high slump concrete and performing extensive vibration. Due to this higher concrete pressure, taller walls may result in a “wavy” finish unless multiple concrete lifts are considered.

Please note, vibration is not required to compact concrete when using SCC. However, it is recommended to agitate/shuffle the top 400mm of concrete between layers/concrete lifts. Refer to F.12.4.

VERTICAL POUR RATE TABLE (WHERE AESTHETICS CRITICAL) - SELF-COMPACTING CONCRETE (SCC)								
DINCEL PROFILE	WALL HEIGHT	1ST CONCRETE LIFT (METRES)	WAITING TIME (HOURS)**		2ND CONCRETE LIFT (METRES)	WAITING TIME (HOURS)**		3RD CONCRETE LIFT (METRES)
			MIN.	MAX.		MIN.	MAX.	
155* 200*	UP TO 3.0M	1.8m	1hr	3hr	1.2m	-	-	-
	3.6M	2.0m	1hr	3hr	1.6m	-	-	-
	4.0M	2.0m	1hr	3hr	2.0m	-	-	-
	4.5M	2.0m	1hr	3hr	1.5m	1hr	3hr	1.0m
	5.0M	2.0m	1hr	3hr	2.0m	1hr	3hr	1.0m
	5.5M	2.0m	1hr	3hr	2.0m	1hr	3hr	1.5m
	6.0M AND ABOVE	2.0m	1hr	3hr	2.0m	1hr	3hr	2.0m*
275*	UP TO 3.0M	3.0m	-	-	-	-	-	-
	3.6M	2.0m	1hr	3hr	1.6m	-	-	-
	4.0M	2.5m	1hr	3hr	1.5m	-	-	-
	5.0M	2.5m	1hr	3hr	2.5m	-	-	-
	6.0M AND ABOVE	2.5m	1hr	3hr	2.0m	1hr	3hr	1.5m*

* Please consult Engineer and Dincel Construction team for project specific advice.

** The time between each concrete lift is based upon when the concrete achieves initial set. Consult with the selected concrete manufacturer/supplier for confirmation of initial setting times. The initial setting time for SCC is generally 2-3 hours from time of dispatch. The design engineer needs to account for any possible cold joints that may occur at pour breaks. Particularly if the cold joint is below ground water table position.

Note: Dincel 275 profiles are available in standard lengths of up to 6.525m. For taller walls, longer profiles can be specially ordered or alternatively use multiple profiles spliced together.

Note: For Self-Compacting Concrete (SCC), no vibration is required besides shuffling between layers/concrete lifts. Refer to section F.12.4 of DCM.

F.12.2.2. High Slump Conventional Concrete (Min 180mm Slump at Truck Discharge) with Vibration

Vibration is required when using conventional concrete in Dincel walls. Where horizontal reinforcement exists in the wall design, the horizontal bars must be vibrated to disperse surrounding concrete and to help eliminate any voids.

VERTICAL POUR RATE TABLE (WHERE AESTHETICS CRITICAL) - HIGH SLUMP CONVENTIONAL CONCRETE						
DINCEL PROFILE	WALL HEIGHT	1ST CONCRETE LIFT (METRES)	MIN. WAITING TIME (HOURS)**	2ND CONCRETE LIFT (METRES	MIN. WAITING TIME (HOURS)**	3RD CONCRETE LIFT (METRES)
110*	UP TO 3.0M	3.0m	-	-	-	-
	4.0M	2.5m	1.0hr	1.5m	-	-
155* 200*	UP TO 3.0M	1.8m	1.0hr	1.2m	-	-
	3.6M	2.0m	1.0hr	1.6m	-	-
	4.0M	2.0m	1.0hr	2.0m	-	-
	4.5M	2.0m	1.0hr	1.5m	1.0hr	1.0m
	5.0M	2.0m	1.0hr	2.0m	1.0hr	1.0m
	5.5M	2.0m	1.0hr	2.0m	1.0hr	1.5m
	6.0M AND ABOVE	2.0m	1.0hr	2.0m	1.0hr	2.0m*
275*	UP TO 3.0M	3.0m	-	-	-	-
	3.6M	2.0m	1.0hr	1.6m	-	-
	4.0M	2.5m	1.0hr	1.5m	-	-
	5.0M	2.5m	1.0hr	2.5m	-	-
	6.0M AND ABOVE	2.5m	1.0hr	2.0m	1.0hr	1.5m*

* Please consult Engineer and Dincel Construction team for project specific advice.

** The time between each concrete lift is based upon when the concrete achieves initial set. Consult with the selected concrete manufacturer for confirmation of initial setting times. The design engineer needs to account for any possible cold joints that may occur at pour breaks. Particularly if the cold joint is below ground water table position.

Note: Dincel 275 profiles are available in standard lengths of up to 6.525m. For taller walls, longer profiles can be specially ordered or alternatively use multiple profiles spliced together.

Note: For Conventional concrete pours, vibrating is required. Refer to section 12.4

Note: For Self-Compacting Concrete (SCC), no vibration is required besides shuffling between layers/concrete lifts. Refer to section F.12.4

F.12.2.3. Horizontally Placed Dincel Panels

Where panels have been installed horizontally (such as for factory/warehouse walls or retaining walls) the recommended concrete placement is:

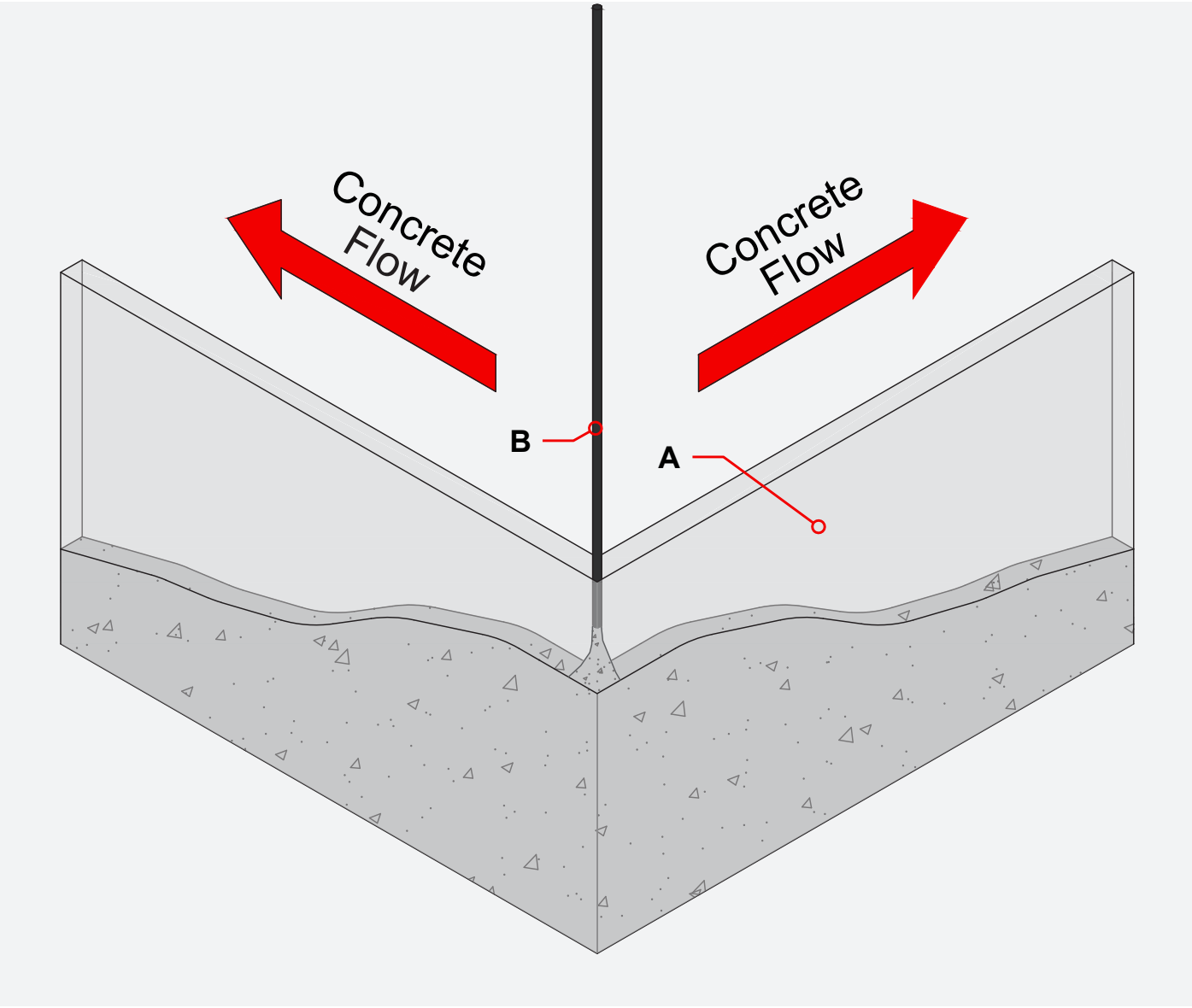
- Dincel 110, 155 & 200: a maximum of 1.0m vertical lifts per hour or until initial concrete set.
- Dincel 275: a maximum of 2.0m vertical lifts per hour or until initial concrete set.

F.12.3. PLACEMENT

It is common for aggregate to segregate when pouring concrete walls due to two main reasons:

1. concrete fall from heights (the below hose positioning options A & B address this issue)
2. build up at the bottom of the concrete hose where the kink created by the hose clamp lies. If dispersed within the wall formwork, this will result in segregated concrete at the base cold joint leading to poor liquid tightness. Due to this event, installers must discharge/dispose this segregated concrete outside of the wall form work (0.1m³) before beginning the placement of concrete.

F.12.3.1. Hose Positioning



A - Dincel Walls (panel joints not shown for clarity).

B - Pour location should always start at corners or braced wall ends where possible. This will ensure that the concrete will flow away from the corner or junction and subsequently divert the pressure from these locations. The pour location may be moved to the centre of the wall once concrete has reached the required lift height at the corner or junction.

F.12.3.2. Option A – Point hose towards webbing

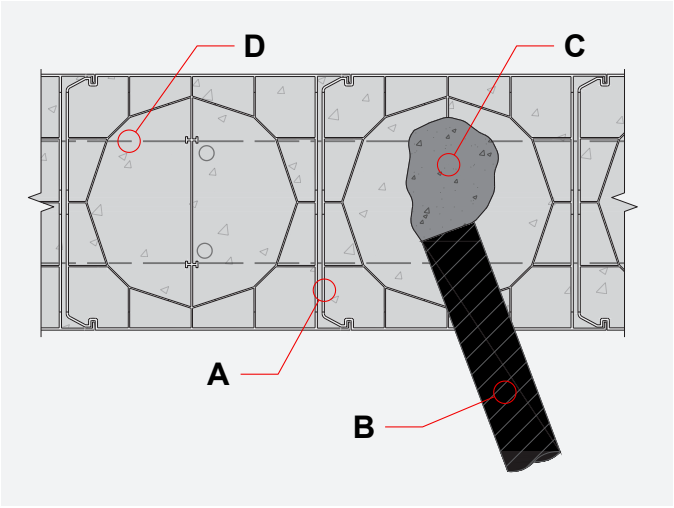
A - Dincel panels.

B - Max 2.5 inch concrete pump hose, lowered into wall. Note: Placement at wall corners or T-Junctions is preferred where possible.

C - Point hose towards Dincel panel webbing to prevent free fall of concrete.

D - Reinforcement as required by engineer.

Note: Option A is suited to walls less than 3.6m in height.



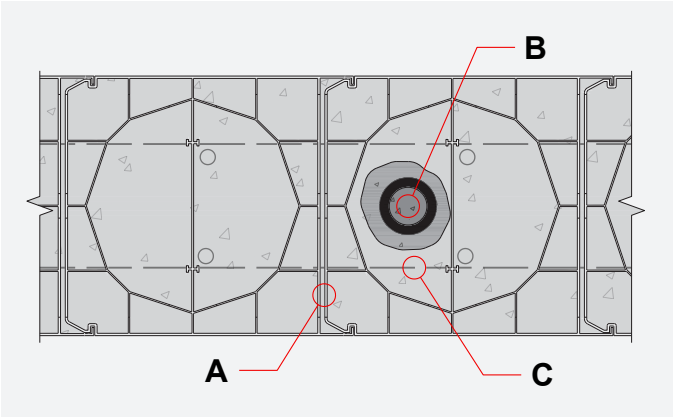
F.12.3.3.Option B – Lower hose or tremie/drop chute into panel

A - Dincel panels.

B - Max 2.5 inch concrete pump hose, lowered into wall. Alternatively, a flexible tremie/drop chute can be used. Note: Placement at wall corners or T-Junctions is preferred where possible.

C - Reinforcement as required by engineer. Hose or chute to be positioned in between reinforcement bars where possible.

Note: Option B is suited to walls greater than 3.6m in height and for Dincel 200 & 275 only. It is an optional approach in order to minimise any chance of segregation.



F.12.4. VIBRATION

F.12.4.1. Requirements

- If conventional concrete is used, vibration must be used.
- If Self-Compacting Concrete (SCC) is used, vibration should not be used. Vibration of SCC to consolidate concrete may lead to segregation. However, it is recommended to use the vibrator to lightly agitate ('shuffle') the top 400mm of concrete between layers/ lifts.

Vibration for conventional concrete is required in order to achieve the following:

- Prevention of air-voids
- Ensure slurry from the concrete mix invades the panel joints in order to create a waterproof seal

F.12.4.2. Specifications

HEAD DIAMETER	TYPE	SHAFT	HOSE LENGTH
25mm	Pocket Vibrator	Flexible	Use of extension hose if required to match wall height.

F.12.4.3. Technique

For guidance on how to vibrate a concrete wall, please refer to the Cement Concrete & Aggregates Australia (CCAA) guide to concrete for housing, Figure 4.3. The CCAA document can be downloaded by scanning the QR Code to the right.

Generally speaking, for each concrete pour/lift, the vibrator should be placed at the bottom of the pour and moved up slowly until it is clear of the concrete. This should be carried out at regular intervals of the wall (i.e. typically at every Dincel panel location). Care should be taken not to over vibrate the concrete in order to prevent segregation of the concrete mix.

As Dincel formwork is a non-porous material, it does not absorb water from the concrete mix during pouring (unlike masonry block walls, fibre cement or plywood forms). This is an automatic measure which will increase flowability of concrete within the formwork.

Care should be taken when using a vibrator as they can damage the webs within Dincel formwork which may cause bulging. The likelihood of damaging webs with a vibrator increases with a large vibrator head size, for this reason vibrators with a head size large than 25mm should not be used. The slim 25mm profile would also ensure that the head can slide past horizontal reinforcement within Dincel formwork. Pay special attention to the sides of all openings, bulkheads and any areas that have a higher than normal concentration of steel.

F.13. PATCHING

In the event that the Dincel polymer surface is damaged, the surface can be patched and repaired. The type of patch will depend on the application:

F.13.1 Patching for aesthetics

For the patching of small holes (such as from screws), a suitable white silicon can simply be applied and made flush with the surface.

For other surface damage:

- The damaged area should be cut and removed from the wall.
- If any concrete repair is required to rectify damaged concrete within the wall, concrete patching can be completed by conventional means.
- The surface is then filled with resin of not less than 2mm in thickness (to match with the adjacent Dincel wall module).
- Sand and level the dried resin surface.
- Apply a colour-matched paint. Note: Dulux produces a 'Dincel White' colour. Before painting, apply a primer base coat designed for PVC substrates.
- Depending on walling application, additional waterproofing treatment may be required over/at the damaged area.

F.13.2. Patching for waterproofing

For any surface which may potentially be exposed to water pressure (i.e. retaining wall, basement wall, or water tank), the surface damage must be repaired through the application of a suitable waterproof membrane over the affected area.

F.14. CLEANING

During concreting, concrete slurry may splatter onto Dincel walls. The removal of hardened concrete slurry could damage the walls' surface which may not be aesthetically pleasing for walls without a paint, render or cladding finish. Therefore, it is always preferable to remove the slurry before it hardens.

F.14.1 Removal of Wet Concrete

- Wash slurry with high-pressure water within 30 minutes of occurring (before the concrete slurry hardens). Care should be taken as to not wet inside the Dincel panels, which would affect the concrete's water-to-cement ratio.

F.14.2. Removal of Hardened Concrete Slurry

- Ensure the concrete slurry is at least two weeks old.
- Apply hydrochloric-acid diluted to 1-in-10 or less onto the concrete slurry with a brush. The soft brushing will allow the concrete slurry to absorb the diluted acid.
- Apply high water pressure to remove the concrete slurry five minutes (or ten minutes maximum) after application of the diluted acid.

F.14.3. General Cleaning

- Any household detergent can be used on the Dincel polymer skin for general cleaning purposes.
- A high-pressure washer is recommended for removing general dirt and dust from the surface

F.15. INSTALLATION CHECKLIST

The installation checklist ensures that most of the critical items regarding installation of a Dincel wall have been carried out by the installer. The checklist can be incorporated into the site Inspection & Test Plan (ITP) in order to capture all site-specific elements and scope of works which may vary from project to project.

To download a copy of the most current Installation Checklist, scan the following QR Code.

NOTES: