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APPENDICES

- TECH-SPECS DATASHEET
- MSDS SAFETY DATA SHEET
- TERMS AND CONDITIONS OF SALE
- PRODUCT CATALOGUE
- PRE-POUR CHECKLIST

Date: August 2019
Version: 2.0

Revisions:
Void rectification process; Tech-specs datasheet; pre-pour checklist; formatting and images

Disclaimer: To be read in conjunction with PERMAFORM INTERNATIONAL P/L TERMS AND CONDITIONS (found in appendices) and 1. Installers' liability. The detailing in this document are to be treated as general guidance and not project specific.
1. INTRODUCTION AND INSTALLERS’ LIABILITY

PERMAFORM is a Polyvinyl Chloride (PVC) permanent formwork wall system for structural elements which is concrete filled.

The installation of PERMAFORM should only be undertaken by persons with building industry knowledge and who have a trade background.

While every effort has been taken to make this guide as comprehensive as possible, it is not feasible to produce a document that pre-empts every detail and circumstance that could arise in the process of installing PERMAFORM. This document is produced solely as a guide. It is the responsibility of the installer to read and understand this manual thoroughly.

To ensure successful installation of PERMAFORM, it is critical that builders and trades people follow the recommended practises within. Installers of PERMAFORM should either be - or be supervised by – those with at least conventional form-working, carpentry or foreman qualifications to adhere to safe construction practices.

These include the requirements of the applicable local authority’s Occupational Health and Safety rules and building codes of practice for form-working and concrete steel placement.

As the manufacturer, PERMAFORM International accepts no liability for any consequences whatsoever that arise as a result of the use of PERMAFORM on any site or in any application. By undertaking to install PERMAFORM, the persons doing so acknowledge they have the skills, knowledge, experience and ability to safely, efficiently and professionally install PERMAFORM; thereby indemnifying PERMAFORM International from any claim that arises from such installation except to make good or replace (at their discretion) any product that has failed as a result of defective materials or manufacture.

1A. BULGING AND BLOW-OUTS

During and after pouring concrete, bulging or ‘blow-outs’ can occur at panel joints if the ribs within the panels have been damaged.

It is the responsibility of the installer to ensure no PERMAFORM ribs or panels are damaged prior to pouring. This manual includes a pre-pour checklist for installers to help mitigate this risk. As the manufacturer, PERMAFORM International accepts no responsibility for installation issues that may occur on the construction site after acceptance of the product. (Refer Terms and Conditions of Sale – in the appendices.)
Installers of PERMAFORM must adhere to all safety standards normally required of formworking and concreting trades.

If the product needs to be cut or drilled on-site, installers must wear appropriate PPE (Personal Protective Equipment) including dust-proof respirators and protective eyewear. Appropriate, safety-tagged cutting tools – drills, grinders with steel blades and circular saws – must be used.

Depending on profile width and length, panels typically weigh between 15kgs and 18kgs per square metre.

Panels up to 20kgs can be safely handled by one person, 20kgs – 40kgs should be handled by two people.

Always follow safe manual handling practices.

PERMAFORM panels do not require any specific PPE. Gloves are not essential, however on sites where mandatory, gloves with rubber fingers and palm infills will reduce the risk of slipping.

PERMAFORM should not be installed in high-wind conditions.

Please refer to PERMAFORM’s MSDS in the appendices.
3A. PACKAGING

PERMAFORM is typically delivered to site in packs – by either a rigid or semi - packaged in timber frames, nailed together and secured by steel strapping.

Depending on profile widths ordered, packs may contain from 12 to 27 panels.

Accessories are packed carefully on an order-by-order basis and will typically arrive with timber spacings to best fit the configuration of the rest of the order.

The number of panels and configuration in each pack – and on each truck - will vary depending on the profile width and length and accompanying accessories.

3B. ACCEPTANCE

Particular care must be taken by the client (or representative) to ensure the unloading and storage of the product on site does not incur damage to the product. Clients are required to sign a Proof of Delivery Docket upon receipt of their order confirming the order has been received in good condition.

Once products are inspected, signed for and accepted on-site – PERMAFORM International is indemnified from any claim that arises. This is particularly important as installing damaged products can lead to blow-outs, bulging and other defects which PERMAFORM cannot accept liability for once acceptance of the product is signed for.

### EXAMPLE: 200MM PROFILE AT 3M LENGTHS:

<table>
<thead>
<tr>
<th>Truck</th>
<th>Packs</th>
<th>Panels (up to)</th>
<th>M$^2$ of product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>8</td>
<td>120 panels</td>
<td>108</td>
</tr>
<tr>
<td>Semi</td>
<td>16</td>
<td>240 panels</td>
<td>216</td>
</tr>
</tbody>
</table>
3C. UNLOADING

Prepare an appropriately sized space onsite for bundles to be unloaded to (refer to dimensions guide below). The space should be a level surface, clear of debris and hazards.

Packs can be unloaded by Hiab, forklift or crane. Lift no more than two bundles at a time. If lifting by Hiab or crane, strap cranage soft slings to the bottom outside faces of timber frames to minimise risk of damaging panels.

Packs should be stacked no greater than two packs high with spacers. Spacers should be at four (4) points for even distribution of dead weight, particularly to prevent distortion in extreme heat.

Packs with stock measuring greater than 5m in length should be lifted one pack at a time.

The licensed forklift driver/crane operator must ensure packs are placed carefully on the ground and not dropped from a height.

3E. IDENTIFYING PACKS

The contents of each pack delivered is clearly labelled on the pack.
Using the pins and markings provided by the surveyor, ensure the walls are clearly and accurately set out. The builder should be responsible for this – and should sign-off on the set out.

It is important to consider the wall layout and to establish the best starting point and sequence in which to proceed with installation of panels, to ensure that the most working space possible is kept clear.

Consideration should also be given to the positioning of braces to provide the best results and also to minimise the restriction of free movement of trades around the site.

If walls are to be filled from a mobile scaffold, run the braces in a logical way that leaves one face of each wall clear.

Refer to the ‘Example panel arrangement’ guides in this chapter to assist in planning your site set-out and forming elements like corners.
155MM EXAMPLE PANEL ARRANGEMENT

AP155
155MM PANEL

PC155
PANEL CONNECTOR

JTM155
JUNCTION TRACK (MALE)

TC155
TOP CAP

CP155
CORNER PANEL
200MM EXAMPLE PANEL ARRANGEMENT
5A. BOTTOM TRACKS AND STARTER BARS

Before beginning the installation of Bottom Tracks, ensure the concrete footing/slab is clear, flat and free of debris.

Using pins/markings provided by the surveyor, ensure that the walls are clearly and accurately set out.

If specified, waterproofing detail must be applied in conjunction with the Bottom Track on all external walls and any portion of the wall that separates or adjoins wet areas.

Place each starter bar as specified by structural engineer’s design. See overleaf for example starter bar positions.

Fix Bottom Track in place using concrete nails. Apply enough nails to ensure the Bottom Track is securely fastened into the slab.

Cut the Bottom Track to accommodate fouling starter bars if required.

Angles or lengths of timber can be used in place of Bottom Tracks to guide the wall panels.
EXAMPLE STARTER BAR PLACEMENT

NOTE: THESE DETAILS ARE SUGGESTIONS ONLY.
STARTER BAR PLACEMENT SHOULD BE SPECIFIED BY THE STRUCTURAL ENGINEER.

110MM WALL
- STARTER BAR
- AP110 - 110MM PANEL
- TCXS110 - TOP CAP OR CORNER STOP
- ITF110 - JUNCTION TRACK FEMALE

200MM WALL
- REINFORCEMENT AT CENTRE
- STARTER BAR
- AP200 - 200MM PANEL
- CP200 - CORNER PANEL

155MM WALL
- STARTER BAR
- AP155 - 155MM PANEL
- CP155 - CORNER PANEL

250MM WALL
- STARTER BAR
- AP250 - 250MM PANEL
- CS250 - CORNER STOP

200MM WALL
- 2 LAYERS OF REINFORCEMENT
- STARTER BAR
- AP200 - 200MM PANEL
- CP200 - CORNER PANEL
5B. FIRST PANEL

It’s recommended to start with a corner panel and plumb this from adjacent faces.

Working in a two-man team, adhering to safe manual handling procedures, lift the panel clear of the starter bars, align with the Bottom Track and lower into position within the track’s upturned edges.

Should any of the starter bars foul on the ribs within the panel, the bars can normally be pushed/pulled clear of the rib and the panel successfully lowered as normal. Occasionally it may be necessary to lift the panel completely clear and bend the starter bar that is fouling to re-align them sufficiently for the panel to be easily lowered into position.

Brace the first panel using one screw per brace. The base of the brace is then fixed to the slab using an anchor style bolt.

The first panel is then plumbed with a spirit level or similar before the brace is fixed.

In some instances, there may be no slab to affix the brace base by bolt. In this case, it is recommended to use a steel peg driven through the brace base plate into the ground.

5C. BRACING AND PROPPING

Adjustable braces are recommended to be able to push/pull the top of the wall into alignment.

In situations where panels higher than 3.3m are being installed, or on sites known to be subject to wild wind conditions, it is the responsibility of the builder and the installers to ensure that the PERMAFORM panels are adequately braced to maintain their integrity until filled with concrete.

Along with the bracing, the top of the panels must also be secured with a timber strong back or steel angle (see diagram). These are to be screwed to the panel. One screw per panel is recommended.

Once the first panel is securely in place and plumbed, screw along the bottom track at 300mm centres. (Do not screw within 10mm of a panel joint).
<table>
<thead>
<tr>
<th>BRACE TYPE</th>
<th>L1/L2 (M)</th>
<th>DESIGN CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINI</td>
<td>4.4 MAX</td>
<td>KN 15</td>
</tr>
<tr>
<td>STANDARD</td>
<td>6.8 MAX</td>
<td>KN 25</td>
</tr>
</tbody>
</table>

- The props with design capacity noted are to comply with Australian standards.
- Dimensions quoted are based on full extension of braces.
- Long braces may require knee bracing - refer to supplier.
SUGGESTED PROPPING FOR LOW WIND / SUBURBAN / SHELTERED AREAS

PLEASE NOTE: DETAILS ARE FOR GUIDANCE PURPOSES ONLY. PROPPING SHOULD BE SPECIFIED BY ENGINEER AND SHOULD BE CALCULATED FOR SPECIFIC SITE CONDITIONS.

SUGGESTED PROPPING FOR OPEN RURAL AREAS AND SUBURBAN EXPOSED AREAS

PLEASE NOTE: DETAILS ARE FOR GUIDANCE PURPOSES ONLY. PROPPING SHOULD BE SPECIFIED BY ENGINEER AND SHOULD BE CALCULATED FOR SPECIFIC SITE CONDITIONS.
5D. PANEL-TO-PANEL

The next panel is now brought alongside the Bottom Track and lifted clear of the starter bars.

Place panels carefully to accommodate starter bars and other detail. Panels clip and slide into place and lock together with ease. Use a rubber mallet or similar for adjustment and persuasion to height and line.

Should any of the starter bars foul on the panels internal ribs, the bar can be adjusted by being pulled or pushed clear of the rib.

Repeat the process

Continue to place panel-to-panel, repeating the process of bracing and propping to ensure plumb – and screwing off at bottom tracks.

Ensure all internal rib holes are aligned with each other to ensure correct placement of horizontal reinforcing bars and free flow of concrete.

6 SETDOWNS AND PLACING HORIZONTAL REINFORCING BARS

All steps in footings and walls must be in suitable increments to align with the rib holes of adjacent panels to ensure correct lapping of reinforcing (as specified by the engineer) and the free flow of concrete.

Horizontal reinforcing is installed as the panels are erected and in strict accordance with the structural engineers’ design.

Typically, 15 panels are erected and braced 6m lengths of reinforcement bars are placed at the centres specified. Another 20 panels are then erected and braced, and another 6m long bars are placed to provide lap as specified by the engineer.

In short run lengths of wall, the reinforcement needs to be cut to the appropriate length and, in the case of a blade wall, placed prior to the end of the wall being capped.
As PERMAFORM panels come in 300mm wide sections, you may need to cut down a section in order to finish within the desired wall dimension. The PERMAFORM panel lock design offers the installer two option of ending a wall – either using an end cap (male or female) or a top cap installed vertically at the end of the wall with screws to its adjoining wall.

All end caps must be braced. Corners should be braced if not locked into an adjacent panel. Not doing so can result in bulging or blow-outs of end caps or unbraced corners.

OPTIONS FOR BRACING/PROPPING ENDS OF WALLS
IRREGULAR CORNERS

FORMING ACUTE ANGLES

- Cut Permaform Wall Panel
- Galvanised Strap Screwed to Wall Panel
- Form ply to be propped as per propping height specifications
- Mitre Bottom Track to Suit Angle

FORMING OBTUSE ANGLES

- Cut Permaform Wall Panel
- Galvanised Strap Screwed to Wall Panel
- Form ply to be propped as per propping height specifications
- Mitre Bottom Track to Suit Angle

Galvanised Strap
@ 400mm C.C.
Screwed to Wall Panel
9
OPENINGS – WINDOWS, DOORS AND PENETRATIONS

OPENINGS IN PERMAFORM WALL

PROVIDE STRAIGHT AND DIAGONAL PROPS AT TOP OF OPENING WHEN NECESSARY

PERMAFORM
TOP CAP OR EDGE FLASHING ALL AROUND WINDOW OPENING

TIMBER VERTICAL PROP @ 900 C.C. MAX
SHOW HATCHED

TIMBER Horizontal BRACING FIXED TO VERTICAL PROPS HATCHED TYP @ 900 C.C. MAX

PERMAFORM
TOP CAP OR EDGE FLASHING ALL AROUND DOOR OPENING

TIMBER HORIZONTAL BRACING FIXED TO VERTICAL PROPS HATCHED TYP @ 900 C.C. MAX

TIMBER VERTICAL PROP @ 900 C.C. MAX SHOW HATCHED

GAP BETWEEN FLOOR SLAB AND TIMBER HORIZONTAL BRACING FOR DRAINAGE
Erect full length PERMAFORM panels sequentially until arriving to the first jamb. You may have to cut into the first jamb panel – this should be done prior to installation.

If a metal door frame is being fitted, the frame is slid into position with the throat of the frame over or into the last panel. The next full-sized panel is then placed in position having been engaged into the throat of the doorframe.

Alternatively, the panels either side of the door frame are fixed into position and plumbed (ensuring the opening between them is accurate). The frame can then be lowered into position, engaging into the panels on both sides and dropping down into the head of the door frame.

Metal door frames require sufficient bracing to prevent distortion during pouring. This can be achieved by timber bracing.

For Fire doors, obtain certificates from the manufacturers for metal frames and doors for the required fire resistance level (FRL).

If metal frames (door, window penetrations) are built within the PERMAFORM panels and are to receive direct contact with wet concrete or moisture conditions, protect appropriately against corrosion (e.g. galvanising).
For windows, install sill panels, screw a top cap into place on the sill and the first jamb.

Install formwork timber framing to the internal measurements of the opening.

Place Top Cap on top of the timber framing for the head panels and the second jamb by screwing into the timber frame.

Install head panels.

Install full length PERMAFORM panel (the second jamb) and engage sill and header panels.

Screw the Top Cap into place by using screws on each face of the PERMAFORM panel at 200mm centres.

The vertical sides of the opening and the window head are capped using Top Caps cut to appropriate lengths and is fitted into the panels using adhesive and screws.

Large span lintels will need temporary propping during and after pour until adequately cured.

Refer to project structural engineer for advic
If a normal formwork deck is being erected, once the deck is in and it is safe to do so, the vertical reinforcing bars are lifted onto the deck. Slide the vertical bars from the top of the PERMAFORM panels at centres prescribed by the structural engineer.

Where the walls continue through to the next floor, the vertical bars are left longer by the amount required to clear the slab and act as the starter bar for the next floor.

Prior to placing each vertical bar, ensure it has a slight curve on the top end. This offset makes it easy when lowering the bar into the wall to guide it either side of the horizontal bars.

On projects where it is necessary to pour walls prior to the deck going in (for example, pre-cast slab systems) place the vertical reinforcement from either a mobile or temporary scaffold.

When the vertical bars are in place, tie the top of each vertical bar to a horizontal length of reinforcement (lacer bar) using normal reinforcement tie wire as specified. This holds the bars in the correct place during the concrete pour.
EXAMPLE OF REINFORCEMENT CONFIGURATION

110MM WALL

155MM WALL

200MM WALL

250MM WALL
11A. PRE-POUR CHECKS

Prior to pouring the PERMAFORM wall, the installer, engineer and builder should perform a check of all walls ensuring they are straight, plumb square and true, and that reinforcing (both horizontal and vertical) has been placed as per the structural drawings and specifications.

Make sure all openings are the correct size. Ensure that all electrical and data conduits are in and according to the plan. Ensure all end caps and corners are correctly braced to prevent any bulging or blow-outs.

Perform the following checks:

- Concrete footing flat and free of debris
- Bottom track installed correctly
- Water proofing/hydrophilic sealant installed correctly
- All walls installed in correct locations as per drawings and survey
- All penetrations locations provided and installed in accordance with site mark-out
- All walls have been installed straight and plumb
- No ribs/diaphragms are damaged, split or cracked
- All wall panels have been clipped in correctly with no visible gaps
- All finish wall heights have been installed as per drawings and specifications
- All corners and stop ends are adequately braced
- All window/door openings have been formed and braced correctly
- All walls checked for areas of minor damage and patched appropriately
- For walls above 4m: midway horizontal strongback to be screwed to panels and propped
- Props installed at a maximum spacing of 1.8m

A complete pre-pour checklist can be found in the appendices.

11B. TEMPORARY PATCHING

When installation of panels is complete, and before the pour, all walls need to be checked for areas of minor damage. They must be temporarily patched to ensure they don’t become weak points and blow-out during the concrete pour.

Complete any patching using appropriate sized pieces of form-ply tek-screwed over the area. After the pour, these patches are simply removed by reversing out the tek-screws.
11C. RECOMMENDED CONCRETE QUANTITY

**Net concrete quantity**
Excluding wastage for pump/hose hopper

Concrete must be placed using a suitable boom pump via a delivery hose.

<table>
<thead>
<tr>
<th></th>
<th>110mm</th>
<th>155mm</th>
<th>200mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per cubic metre of concrete</td>
<td>9.5m2 of wall area</td>
<td>6.67m2 of wall area</td>
<td>5.5m2 of wall area</td>
</tr>
<tr>
<td>Per square metre of wall area</td>
<td>0.105m3 of concrete</td>
<td>0.15m3 of concrete</td>
<td>0.182m3 of concrete</td>
</tr>
</tbody>
</table>

11D. SUGGESTED CONCRETE MIX

The concrete supplier is responsible for providing a mix design that is suitable for filling PERMAFORM.

The mix must be designed with enhanced flow characteristics and should be minimum 150 slump.

The following is a guide only:

<table>
<thead>
<tr>
<th></th>
<th>110mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement type</td>
<td>Type GP in accordance to AS3972. Fly ash in accordance with AS3582.1 may be used as cement replacement.</td>
</tr>
<tr>
<td>Characteristic 28 days compressive strength</td>
<td>20MPa to 60MPa as specified by design engineer</td>
</tr>
<tr>
<td>Concrete pump nozzle size</td>
<td>Internal diameter of 75mm-100mm provided the concrete flow pressure is controlled.</td>
</tr>
</tbody>
</table>
12

POUR SEQUENCE

Below sets out the recommended number of concrete passes required. Higher MPa mixes will gel faster than low strength mix designs. These guidelines will vary according to site conditions, extra passes and extra gelling time may be required in wet or cold weather. In cases of extreme weather, the concrete pour should be postponed.

- Flowing slump concrete: 150mm to 180mm slump.
- Concrete can be mechanically vibrated during placing by using concrete vibrator 20mm to 25mm diameter head to the depth of 500mm within the final layer to assist flow under low pressure.
- After first pour layer, check wall straightness, integrity of ribs. (ribs can be easily damaged from in-situ starter bars)
- Pouring wall same day with the suspended slab: Pour wall concrete first and allow it to set prior to pouring of the slab.

<table>
<thead>
<tr>
<th>Wall Ht (m)</th>
<th>110MM WALL</th>
<th>155MM WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st pour</td>
<td>2nd pour</td>
</tr>
<tr>
<td>2.8</td>
<td>1.2</td>
<td>1.6</td>
</tr>
<tr>
<td>3.0</td>
<td>1.2</td>
<td>1.8</td>
</tr>
<tr>
<td>3.3</td>
<td>1.2</td>
<td>2.1</td>
</tr>
<tr>
<td>3.6</td>
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<td>1.2</td>
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<tr>
<td>4.0</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>5.0</td>
<td></td>
<td></td>
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<tr>
<td>5.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
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<td></td>
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<tr>
<td>6.6</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Wall Ht (m)</th>
<th>200MM WALL</th>
<th>250MM WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st pour</td>
<td>2nd pour</td>
</tr>
<tr>
<td>2.8</td>
<td>1.2</td>
<td>1.6</td>
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</tr>
<tr>
<td>6.6</td>
<td>1.2</td>
<td>1.4</td>
</tr>
</tbody>
</table>

USE FLOWING SLUMP CONCRETE. ALLOW A MINIMUM OF 45 MINUTES BETWEEN POURS. FOR WALLS GREATER THAN 6.6M AND UP TO 8.0M THE FIRST 3 LAYERS FROM THE 6.6M SCHEDULE TO BE ADOPTED.
When pouring, do not aim the pump directly at corners or wall ends. Always point the pump nozzle towards a rib/diaphragm. The pump nozzle should remain at least 500mm away from wall/column ends.

CONCRETE PUMP HOSE LOCATION PLAN
AT END OF WALL / CORNER OF WALL / EDGE OPENING

When moving around the walls filling them, remember that the shorter or thinner a section of wall is, the faster it will fill.

Do not leave finished concrete surface uneven at the top of forms. Following compaction at the top of the walls, screed the concrete to achieve a smooth and even surface.

When slab and walls are poured at the same time, finish the concreting for the walls first. This should provide enough time for wall concrete to settle before the slab concreting takes place over the particular wall.

While pouring, be sure to visually inspect walls regularly to ensure vertical alignment and plumb of the panels is maintained. Stop the pour, or proceed at reduced speed if any areas start to move. Keep props, timbers or plywood readily available to provide temporary bracing if required.
Proper compacting of concrete is essential to prevent voids in the finished walls. Pay particular attention to the sides of all openings, bulkheads and any areas that have a high concentration of steel. Use a 25mm pocket vibrator. Vibrating helps ensure the concrete mix slurry fills all voids, particularly at joints. When vibrating, take care not to damage ribs or the external face of the panels. Place the vibrator in the upper 300mm of the wall panel.

PERMAFORM is made from PVC and is non-porous. This means it does not absorb water like masonry, fibre-cement or plywood. This increases the flowability of concrete and reduces honeycombing.

15A. CLEAN UP
Any household detergent can be used for general cleaning purposes. Any concrete slurry that has spilt onto the PERMAFORM panels can be easily removed if it is washed with high pressure water within 30 minutes before the slurry hardens. If concrete slurry has hardened, removing it may damage the walls’ surface. If this occurs, make sure the slurry is at least two weeks old before attempting to remove it. Apply hydrochloric-acid diluted 1/10 or less onto the slurry with a brush and clean with a soft brush. Apply high water pressure to remove the solution and slurry within 10 minutes.

15B. PATCHING
If surface damage has occurred, it can be patched with a two-part polyester resin (for example Bostik Bog). The damaged part of the surface can be cut and removed. If repairing damaged concrete, complete concrete patching by conventional means. Fill the surface of the patched concrete with resin of not less than 2mm in thickness to match the adjacent panel surface. Sand and level the dried resin surface and apply etching primer to the damaged area only.
15C. REMOVING PROPS AND BRACING

Braces and props should be removed once the slab over is poured or the roof is attached.

If it’s necessary to remove braces earlier, approval must be obtained from the project engineer, especially when the wall is being used as a retaining wall and will be back-filled against.

Removing braces should always be done in accordance with the engineer’s specifications.

15D. CHECK FOR VOIDS

After the PERMAFORM panels have been core filled, they should each be checked by tapping gently with hammer on both sides to check compaction (with caution not to damage the surface). Should a hollow in the wall be identified, the location should be marked. A high strength grout should then be injected into the panel to fill the hollow.

This process should be done in conjunction with specification from the grout supplier and the methodology approved by the project engineer.

15E. VOID RECTIFICATION PROCESS

IDENTIFICATION

Tap panels in a 100mm x 100mm grid with the end of a hammer stick, screwdriver or chisel. If “hollow” or “drummy” noise is heard mark the area. If necessary, confirm by driving a 50mm nail or drilling a 5mm drill bit into the top of the marked panel area (the hole will be removed by a larger hole if a void is present). If nail or drill bit penetrates more than 10mm then a void is present.

RECTIFICATION PROCESS

1. Drill a 40mm hole into the panel at the very top of the void area (if possible the hole should extend just above void). Align and attach a 40mm PVC pipe fitting 450 or 900 to the wall and secure accordingly so as to stay in place through the filling process.

2. Fill void with non-shrinking grout of an equivalent or higher strength material than was used to fill the walls, i.e. if walls have been filled with 32 MPA concrete typically 40 MPA non-shrinking grout is used.

3. Fill the void by pouring in liquid non-shrinking grout mixed to manufacturers specification into attached pipe fitting (this can be done via a funnel or similar), tap void with rubber mallet to aid in movement, continue to fill until the top of pipe fitting is full.

4. Allow non-shrinking grout to harden.

5. Next day the fitting can be removed with a hammer or grinder

CONFIRMATION

Confirmation that the void has been filled is typically done by repeating the tapping process or ground penetrating radar or “x-ray” concrete scanning can be used to ensure no voids are left present in the walls.
## TECH SPECS
### DATASHEET
#### AS AT AUGUST 2019

## PRODUCT SPECIFICATIONS

<table>
<thead>
<tr>
<th>Profiles</th>
<th>110MM, 150MM, 200MM AND 150MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC Thickness</td>
<td>2.6 MM</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>Minimum 50 Years</td>
</tr>
<tr>
<td>Height</td>
<td>All panels can be ordered to custom heights minimum 1.0M – maximum 8.0M. Stock heights: 2.8M, 3M, 3.3M, 3.6M, 3.8M, 4.0M, 4.6M, 5M, 6M.</td>
</tr>
</tbody>
</table>

| Panel Width | 300 MM |
| PVC Density | 1,300 KG/ M³ |
| Finish | Gloss white, water resistant |
| UV Stability | Not affected by exposure to sunlight either in storage or as finished product |
| Specific PPE | None required. Gloves are not essential, but on sites where mandatory, gloves with rubber fingers and palm infill will remove risk of slipping. |

<table>
<thead>
<tr>
<th>Concrete Volume (M³ / M²)</th>
<th>Product Weight (KG/ M²)</th>
<th>Fire Rating (Minutes Minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>110MM Profile</td>
<td>0.101</td>
<td>14.7</td>
</tr>
<tr>
<td>155MM Profile</td>
<td>0.146</td>
<td>15.8</td>
</tr>
<tr>
<td>200MM Profile</td>
<td>0.188</td>
<td>16.8</td>
</tr>
<tr>
<td>250MM Profile</td>
<td>0.2404</td>
<td>17.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MSDS</th>
<th>Readily Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordering Lead Time</td>
<td>Stock heights delivered to major capital cities within seven days from order. Custom height panels within five weeks.</td>
</tr>
<tr>
<td>Shipping and Freight</td>
<td>We offer delivery at cost, or you can arrange your own</td>
</tr>
<tr>
<td>Payment Terms</td>
<td>COD or 30-day account upon application</td>
</tr>
</tbody>
</table>

## CERTIFICATIONS AND COMPLIANCE

<table>
<thead>
<tr>
<th>Code, Specification or Standard</th>
<th>Certified By</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS1530.3 - Ignitability, Flame Propagation, Heat Release and Smoke Release</td>
<td>CSIRO</td>
</tr>
<tr>
<td>BCA Parts A2 &amp; C1 - Heat &amp; Smoke Release Requirements</td>
<td>CSIRO; SGS-CSTC; MURTAGH BOND STRUCTURAL ENGINEERS</td>
</tr>
<tr>
<td>BCA Part F5 – Acoustic Performance, Sound Transmission and Insulation</td>
<td>RUDDS CONSULTING ENGINEERS</td>
</tr>
<tr>
<td>Green Building Council of Australia – Green Star Office Design</td>
<td>CETEC</td>
</tr>
</tbody>
</table>

## ABBREVIATIONS AND ACRONYMS

+ BCA – Building Code of Australia
+ PPE – Personal Protective Equipment
+ MSDS – Material Safety Data Sheet
+ CSIRO – Commonwealth Scientific and Industrial Research Organisation
+ SGS-CSTC - the world’s leading inspection, verification, testing and certification company. [www.sgs.com](http://www.sgs.com)
+ CETEC Pty Ltd - a professional and independent consultancy delivering scientific and technical based solutions.
+ CETEC focuses on providing Environmental, Sustainability and OH&S services and solutions for buildings and the built environment [www.cetec.com.au](http://www.cetec.com.au)
PERMAFORM IS A PERMANENT PVC CONCRETE WALL FORMWORK SYSTEM DESIGNED AND PRODUCED FOR AUSTRALIAN CONDITIONS

PERMAFORM is a permanent PVC wall formwork system for concrete retention which remains in place for the life of the structure, designed and produced for Australian conditions. As such it does not affect the structural integrity of the concrete element.

1- PRODUCT IDENTIFIER AND CHEMICAL IDENTITY

PRODUCT NAME: PERMAFORM

Recommended Use of the Chemical and Restriction on Use: Formwork system - extruded rigid polymer material used for permanent formwork for retaining concrete when pouring and subsequently as permanent wall cladding.

DETAILS OF MANUFACTURER/IMPORTER:

Permaform International Pty Ltd
PO Box 490
Fyshwick ACT 2609

PH: 1800 737 623
Emergency: 0488 040 603

2- HAZARDS IDENTIFICATION

PRECAUTIONARY STATEMENTS

+ P272 Contaminated work clothing should not be allowed out of the workplace.
+ P201 Obtain special instructions before use.
+ P202 Do not handle until all safety precautions have been read and understood.
+ P321 Specific treatment (see on this label).
+ P308+P313 If exposed or concerned: Get medical advice/attention.
+ P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
+ P302+P352 If on skin Wash with plenty of soap and water.
+ P362+P364 Take off contaminated clothing and wash it before reuse.
+ P405 Store locked up.
+ P501 Dispose of contents/container in accordance with local/regional/national regulations.

3- COMPOSITION AND INFORMATION ON INGREDIENTS

CHEMICAL CHARACTERIZATION: MIXTURES

Description: Mixture of substances listed below with nonhazardous additions.

ACCORDING TO SAFE WORK AUSTRALIA

Product Name: PERMAFORM 36.0.9

HAZARDOUS COMPONENTS:

471-34-1 calcium carbonate 4%; 12202-17-4 Lead oxide sulphate; Repr. 1B, H360; STOT RE 2, H373; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Acute Tox. 4, H302; Acute Tox. 4, H332 1% 8013-07-8 Soybean oil, epoxidized Skin Sens. 1, H317 1%
4- FIRST AID MEASURES

**INHALATION:** If inhaled, remove to fresh air. Seek medical attention if breathing problems develop.

**SKIN CONTACT:** In case of skin contact, immediately remove contaminated clothing and wash affected areas with water and soap. Seek medical attention if symptoms occur.

**EYE CONTACT:** In case of eye contact, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical attention.

**INGESTION:** If swallowed, do not induce vomiting. Do not give anything by mouth to an unconscious person. Seek immediate medical attention.

5- FIRE FIGHTING MEASURES

**SUITABLE EXTINGUISHING MEDIA**
Use fire-extinguishing methods suitable to surrounding conditions.

**SPECIFIC HAZARDS ARISING FROM THE CHEMICAL**
No further relevant information available.

**SPECIAL PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIRE FIGHTERS**
Wear Safe Work Australia approved self-contained breathing apparatus and full protective clothing.

6- ACCIDENTAL RELEASE MEASURES

**PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES:** Wear Safe Work Australia full protective clothing. Evacuate all non-essential personnel from affected area. Do not breathe vapours/dusts. Ensure adequate ventilation.

**ENVIRONMENTAL PRECAUTIONS:** In the event of a major spill, prevent spillage from entering drains or watercourses.

**METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP:**
Collect the pieces and place into a suitable container for disposal. Avoid generating dusts. Provide adequate ventilation.
7- HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING: Use of safe work practices are recommended to avoid eye or skin contact and inhalation of dusts. Use only outdoors or in a well-ventilated area.

Food, beverages and tobacco products should not be stored or consumed where this material is in use. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storage or re-use.

CONDITIONS FOR SAFE STORAGE: Store in a cool, dry and well-ventilated area. Avoid accumulation of dust.

8- EXPOSURE CONTROLS AND PERSONAL PROTECTION

EXPOSURE STANDARDS (SAFE WORK AUSTRALIA): 471-34-1 calcium carbonate NES 10 mg/m³

ENGINEERING CONTROLS: Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapour below occupational exposure standards.

PERSONAL PROTECTIVE EQUIPMENT (PPE): Wear Safe Work Australia full protective clothing.

RESPIRATORY PROTECTION: Use dust mask when cutting product. See Australian Standards AS/NZS 1715 and 1716 for more information.

SKIN PROTECTION: Impermeable gloves and protective clothing. See Australian Standards AS/NZS 2161, 2210.1 and 2210.2 for more information.

EYE AND FACE PROTECTION: Safety glasses with top and side shields or goggles. See Australian Standards AS/NZS 1336 and 1337 for more information.

9- PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Form: Solid - hollow-type rib reinforced plastic material comprising of two PVC panel facings adhered onto a concrete block with three internal reinforcing PVC ribs.

Colour: Off white

Odour: None

MELTING POINT/MELTING RANGE: No information available

FLAMMABILITY: Non-flammable

RELATIVE DENSITY AT 20 ºC: 1300 kg/m³
10- STABILITY AND REACTIVITY

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerisation will not occur.

CONDITIONS TO AVOID: No further relevant information available.

CHEMICAL STABILITY: Stable at ambient temperature and under normal conditions of use.

INCOMPATIBLE MATERIALS: No further relevant information available.

HAZARDOUS DECOMPOSITION PRODUCTS: No dangerous decomposition products known.

11- TOXICOLOGICAL INFORMATION

TOXICITY: LD50/LC50 VALUES RELEVANT FOR CLASSIFICATION

471-34-1 calcium carbonate
Oral LD50 6450 mg/kg (rat)
8013-07-8 Soybean oil, epoxidized Oral LD50 0 21000-40000 mg/kg (rat)
Dermal LD50 >2000 mg/kg (rabbit)

ACCORDING TO SAFE WORK AUSTRALIA

Printing date 11.04.2013 Revision: 11.04.2013

ACUTE HEALTH EFFECTS: Skin Corrosion / Irritation: No information available

SERIOUS EYE DAMAGE / IRRITATION: No information available

RESPIRATORY OR SKIN SENSITISATION: Sensitization possible through skin contact.

GERM CELL MUTAGENICITY: No information available

CARCINOGENICITY: Polyvinyl chloride is classified by IARC as a Group 3 - Not classifiable as to its carcinogenicity to humans.

SPECIFIC TARGET ORGAN TOXICITY (STOT) - SINGLE EXPOSURE: No information available

SPECIFIC TARGET ORGAN TOXICITY (STOT) - REPEATED EXPOSURE: No information available

CHRONIC HEALTH EFFECTS: No information available

EXISTING CONDITIONS AGGRAVATED BY EXPOSURE: No information available

12- ECOLOGICAL INFORMATION

ECOTOXICITY AQUATIC TOXICITY

8013-07-8 Soybean oil, epoxidized EC50 / 24 hours > 100 mg/l (daphnia)
Inhalation LC50 900 mg/m³ (flathead minnows)

PERSISTENCE AND DEGRADABILITY

No further relevant information available.

BIOACCUMULATIVE: Potential: No further relevant information available.

MOBILITY IN SOIL: No further relevant information available.
13- DISPOSAL CONSIDERATIONS

**DISPOSAL METHODS AND CONTAINERS:** Dispose according to applicable local and state government regulations.

**SPECIAL PRECAUTIONS FOR LANDFILL OR INCINERATION:** Please consult your state Land Waste Management Authority for more information.

**UN NUMBER:** ADG, IMDG, IATA: Not applicable

**PROPER SHIPPING NAME:** ADG, IMDG, IATA: Not applicable

**DANGEROUS GOODS CLASS:** ADG CLASS: Not applicable

**PACKING GROUP:** ADG, IMDG, IATA Not applicable

14- TRANSPORT INFORMATION

**UN NUMBER:** ADG, IMDG, IATA: Not applicable

**PROPER SHIPPING NAME:** ADG, IMDG, IATA: Not applicable

**DANGEROUS GOODS CLASS:** ADG Class: Not applicable

**PACKING GROUP:** ADG, IMDG, IATA: Not applicable

15- REGULATORY INFORMATION

**AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES:** All ingredients are listed.

16- OTHER INFORMATION

**CREATION DATE:** 11 April 2013

**PREPARED BY:** MSDS.COM.AU Pty Ltd

www.msds.com.au

**DISCLAIMER:** This MSDS is prepared in accord with the Safe Work Australia document “Code of Practice for the Preparation of Safety Data Sheets for Hazardous Chemicals - December 2011”

The information contained in this material safety data sheet is provided in good faith and is believed to be accurate at the date of issuance. Permaform Australia Pty Ltd makes no representation of the accuracy or comprehensiveness of the information and to the full extent allowed by law excludes all liability for any loss or damage related to the supply or use of the information in this material safety data sheet. MSDS.COM.AU Pty Ltd is not in a position to warrant the accuracy of the data herein. The user is cautioned to make their own determinations as to the suitability of the information provided to the particular circumstances in which the product is used.
7. Payment may be made by electronic on-line banking, or by any other method as agreed between the Customer and Permaform.

8. Unless otherwise stated the Price does not include GST. In addition to the Price the Customer must pay to Permaform an amount equal to any GST Permaform must pay for any supply by Permaform under this or any other agreement for the use of the same or similar goods or services by the Customer must pay GST without deduction or set off of any other amounts, at the same time and on the same basis as the Customer pays the Price. In addition the Customer must notify Permaform in writing not less than seven (7) days before the date per which they are expressly included in the Price.

9. The price quoted may be subject to change due to but not limited to changes in the cost of materials and the currency fluctuations of the Australian Dollar. The price charged will be the price by which is quotedє and changes occurring prior to or at the date of collection/delivery. The project under construction may consist of a number of orders. The prices between these orders may vary.

10. Where Permaform has offered credit by way of an account with Permaform then Permaform, at its sole and absolute discretion, may alter any offered Credit Limit and in any amount including zero without notice and will confirm this in writing within five (5) business days of the decision. Furthermore, Permaform is entitled to demand immediate payment in full of all unpaid monies. If any invoice remains unpaid seven (7) days after such demand, then the Customer is in default and Permaform is entitled to commence all legal actions required to recover unpaid amounts.

11. Permaform may extend credit, to approved Customers, on a strict thirty (30) day basis from the end of the month in which the invoice is dated. Statements may be issued on the last day of each month. The customer must pay all amounts on all of the invoices within the payment terms.

12. Should any invoice remain unpaid (in full) not less than seven (7) calendar days after the due date, the Customer must provide in writing to Permaform an explanation of why the delay in payment has occurred. If a final notice remains unpaid (in full) seven (7) days after due date, a charge of 2.5% per month will be calculated on the full value of the invoice to cover the cost of finance incurred by Permaform. If any invoice remains unpaid (in full) more than seven days after due date Permaform may take legal action to recover the amount.

13. Permaform Trade Credit Insurer cancels or reduces the insurance offered to the Customer, then Permaform reserves the right to immediately terminate any Credit Terms and demand immediate payment of any and all accounts (invoices) issued to the Customer.

6. Delivery of Goods

1. Delivery ("Delivery") of the Goods is to be made at the time that: (a) the Customer is notified by Permaform to the Customer; or (b) the Goods are loaded onto the Customer’s premises.

2. Permaform reserves the right to charge the Price if a variation to Permaform’s quotation is requested. Any variation from the plan of scheduled Services or specifications (including, but not limited to, any variation as a result of additional work required due to unforeseen circumstances) as a result of any request to Permaform in the costs of materials and labour will be charged for on the basis of Permaform’s quotation and will be shown as variations on the invoice.

3. Permaform’s sole discretion as to whether fits particular purpose may be issued by Permaform to the Customer on placement of an order. Any applicable payment schedule will be duly noted on the invoice.

4. Permaform’s sole discretion as to whether it is required which, shall be the amount of the invoice if the order proceeds; or

5. becomes non-refundable if the order does not proceed or is cancelled per clause 14.2.

6. If any part of an invoice is not paid then the Customer shall notify Permaform in writing within ten (10) business days once in receipt of the invoice, then the Customer may only withhold payment for that part of the invoice that is in dispute and shall balance the invoice on due.

7. For any materials for which delivery is confirmed, the Price will be payable by the Customer on the date(s) determined by Permaform, which may be

8. available for the whole period as available for collection or delivery ex-warehouse;

9. by way of instalments/progress payments in accordance with agreement; or

10. the date specified on any invoice or other form of being the date for payment;

11. failing any notice to the contrary, the date which is seven (7) business days following the date of any invoice given to the Customer by Permaform.
10. Security and Charge

10.1 In consideration of Permaform agreeing to supply the Goods, the Customer charges all its rights, title and interest (whether joint or several in and/or, really or other assets capable of being charged, owned by the Customer either now or in the future, to such extent as determined by the Customer of its obligations under these terms and conditions (including, but not limited to, the payment of any money).

12. Intellectual Property

12.1 Where Permaform has designed, drawn or developed Goods for the Customer's order or any element of it, in any design and drawings and documents shall remain the property of Permaform.
PERMAFORM INTERNATIONAL
ABN 70 609 958 527
PO BOX 490
FYSHWICK ACT 2609
PH 1800 PERMAFORM
(1800 737 623)
permaform.com.au
info@permaform.com.au
## WALL INSTALLATION
### QUALITY ASSURANCE CHECKLIST

<table>
<thead>
<tr>
<th>REF</th>
<th>DESCRIPTION</th>
<th>APPROVED</th>
<th>COMMENTS/REFERENCE/CONTACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PRELIMINARIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Drawing transmittal date</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>(Confirm all drawing numbers and revisions are correct)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Wall quantities/heights/sizes approved by client</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Material supplied by: (eg installer/builder)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>All reinforcement supplied meets all drawing and specification requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concrete mix designs have been submitted and approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Provide mix code/number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Concrete testing number: Test frequency:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>All concrete supplied meets all drawings and specification requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Concrete supplier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Concrete pump supplied by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>Concrete pump size: Rego:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>PREPOUR CHECKLIST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Wall survey supplied by</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Concrete footing flat and free of debris</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Bottom track installed correctly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Water proofing/hydrophilic sealant installed correctly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>All walls installed in correct locations as per drawings and survey</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All penetrations locations provided and installed in accordance with site mark-out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>All walls have been installed straight and plumb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>No ribs/diaphragms are damaged, split or cracked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>All wall panels have been clipped in correctly with no visible gaps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>All finish wall heights have been installed as per drawings and specifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>All corners and stop ends are adequately braced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>All window/door openings have been formed and braced correctly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>For walls above 4m: midway horizontal strongback to be screwed to panels and propped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>Props installed at a maximum spacing of 1.8m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>POUR CHECKLIST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Max fill height 1500mm adhered to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Concrete leaks are cleaned from walls and door frames</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Door frames remain plumb during pour process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Window sills topped up and steel trowled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>All props secure and fixed and remain in situ in readiness of concrete slab above concrete pour</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PERMAFORM INSTALLER  
*NAME*  
*SIGNATURE*  
*DATE*

### AUTHORISED CLIENT REPRESENTATIVE  
*NAME*  
*SIGNATURE*  
*DATE*