



1. Installation of Residential Panels – Planning and System Parameters

1.1 Health & Safety Act 1992

The principle objectives of the Health & Safety Employment Act 1992 (HSE Act) are to prevent harm to employees at work. To achieve this, the Act imposes duties on employers, employees, principals and others to promote excellent health and safety management by employers. It also provides for the making of regulations and codes of practice. The “Approved Code of Practice for the Safe Handling, Transportation and Erection of Precast Concrete” was developed by construction industry representatives to ensure safe work practices are promoted and become standardised normal work practices in precast factories and on building sites. All Litecrete panels should be installed by persons familiar with precast concrete installation. All of the major craneage companies offer skilled precast concrete riggers as part of their installation service. It is also important that the builder is made familiar with the construction procedures detailed below.

1.2 Handling and Storage

As with regular precast concrete, care must be taken with Litecrete panels to protect edges and corners from damage during shipping, craneage and placement. For construction efficiency precast concrete products are usually installed as soon as they are delivered to site. If for some reason the Litecrete panels are to be stored on site they must be placed vertically on A-frames with a resilient type of dunnage (strips of carpet, etc) placed between the panels to protect the panel face. Do not store the panels horizontally in a stack.

1.3 Delivery

Access to the site. Check that the site has appropriate access for a truck/truck and trailer unit and that the ground has sufficient stability to support the weight.

1.4 Craneage

Cranes are one of the most expensive pieces of equipment used during the installation of Litecrete panels. To minimise this cost it is important to plan ahead for the optimum crane size needed and time the unit is on site.



Considerations:

1. The load. Litecrete will supply weight and load dimensions well in advance of panel manufacture so that planning can start early.
2. Proximity of the crane to the lift load. The capacity of the crane is determined by the distance the load is from the centre of rotation.
3. Obstacles which the crane may incur. Power lines, trees and buildings can all impact on the operation of the crane.
4. Ground conditions. Ensure the ground area is big enough to support the weight of the crane when being positioned and working.
5. Impact of crane on the general public. If the operation results in extra traffic control or requires loads being lifted over roadways or other property then permission from the appropriate authority will be required.

1.5 Lifting

Edge lifting is the predominant method used with Litecrete panels. This ensures the panel is vertical for placement over starter bars or other connections; allows panels to be able to be placed close to adjacent structures and also leaves the face of the panel untouched. Because of flexural stresses induced in edge lifting of the panels the maximum residential panel size, with a standard smooth (F5) finish, is approximately 7-8 metres x 3.8 metres, subject to design parameters such as window/door openings. Because of design constraints there may occasionally be the necessity to use face lifters, however these are used as a last resort and in consultation with the customer.





1.6 Horizontal Weather Joints

When lifting panels or lintels which have a staggered horizontal weather joint, the lifting shackles can cause damage to the joint upstands. To mitigate this problem the usual method used by the precast manufacturer is to cast-in polystyrene block-outs into the upstands, within the area of the lifting eyes, so that the lifting shackle is free to move without breaking out the concrete. Photo at right shows a horizontal weather joint where the polystyrene block-out has been removed from the joint upstand to expose the lifting eye. After panel installation the upstand is remediated to restore the weatherproofing integrity of the joint, by applying a primer such as Cemix *Multibond* to the precast prior to filling the void with a compound such as Holdfast *Powercrete 7-Minute Repair*.



1.7 Propping

Props are used to temporarily support the precast panels until permanent fixing are made. Planning the placement of the props is important as, although they are in place for a relatively short period of time, they take up a significant amount of room and can affect other site works. Typically, external walls are propped from the inside panel face back to the existing floor slab.

However, if the construction design requires the walls to sit on footings with the floor slab being poured between the walls later, then the panels will require propping from the exterior face and attached to "dead men" positioned in the ground outside of the floor area, as shown in the photo at right. It is recommended that M16 threaded propping inserts are cast in to the inside panel face of the panels during manufacture. The craneage company will usually advise us of their requirement for the propping set-out prior to manufacture of the panels. Photo (left) shows a Reid TIM threaded insert used for propping. A reinforcing bar goes through the hole near the base of the insert. The open end of the insert is set about 3mm below the panel surface and can be covered over after use. G-clamp props are also available. These fit over the top of the panels, removing the need for cast-in propping inserts.



NZIA award-winning Ponsonby house. The Litecrete panels were cast on top of plywood rectangles so that the plywood joints would be visible in the surface of the panels.



2.0 Installation Methods

There are three typical methods of installing single-storey and two-storey Litecrete wall panels in conjunction with concrete floor slabs:

Option 1: Panels sit in a rebate in the floor slab and are attached using Drossbach tubes. The wall panels are manufactured with cast-in 40 mm diameter Drossbach tubes, 800-900 mm high, typically at 600 mm (design by structural engineer). These tubes fit over D12 starter bars which have previously been cast-in to a 230 mm wide x 50 mm deep perimeter rebate when the floor slab was poured, prior to the panels arriving on site. See detail *D(3)2 Panel/Floor Slab Connection*. Once the panels are installed and properly aligned the tubes are filled with epoxy grout. The grout holes are plastered over after filling.

Option 2: Panels sit on concrete footings below the floor level, prior to the floor slab being poured. The Litecrete wall panels are manufactured with one or two rows of cast-in Reid brand RB12ti inserts at the bottom of the panel, at centres as designed by the engineer. The panels are positioned on concrete footings, Reid brand RB12 starters are screwed into the inserts and the concrete floor slab is poured. See detail *D(3)3 Panel/Floor Slab Connection*. While single-storey walls are usually trucked standing up, panels over 3 metres high are delivered sitting on their long edge and require pitching to the vertical during the lifting process using rollers attached to the crane boom.

Option 3: Lower cost version of Option 2. Starter bars (typically 900 mm long and at 600 mm centres) are cast-in to the panels during manufacture. They are bent for shipping and straightened out after installation and prior to casting the floor slab.

2.1 Installation using Drossbach Tubes

2.1.1 The floor slab is poured with a 20 mm deep rebate set around the perimeter slightly wider than the specified width of the panel. Starters are cast-in to the perimeter rebate at nominated centres. The base of the rebate must be level to within +/- 5mm in 5m.

2.1.2 Before beginning panel installation, usually well before the delivery truck arrives, mark chalk lines around the perimeter of the floor slab rebate for correct alignment of the panels. Also, mark chalk lines for the internal Litecrete walls, if applicable. Spray chalk lines with clear polyurethane so that they do not scuff or wash off. Perimeter levels should be determined and shims placed prior panel installation. The first panel is usually installed at a corner furthest away from the crane.

2.1.3 Position the panel correctly on the shims, with the inside edge of the panel sitting on the chalk line and the outer panel edge flush with the edge of the foundation. The panels are manufactured with cast-in Drossbach tubes, typically at 600 mm centres, which are usually 3 x the diameter of the starter bars.

2.1.4 Panels are lifted into position, ensuring the starter bars in the slab are guided into the Drossbach tubes in the panel. See detail *D(3)2 Panel/Floor Slab Connection*.



Photo shows the rebate and starter bars protruding from slab

2.1.5 Attach adjustable props to upright panel with a threaded bolt attached to the cast-in inserts on the panel face and to the floor slab using expansion bolts. If the floor slab is to have a polished surface, props should be attached to the external panel face and secured to "dead men" in the ground outside the perimeter of the floor slab. Adjust props until panel is plumb. Epoxy grout is gravity-fed into the tubes through grout holes after the panels are fully aligned.

2.1.6 Apply same procedure to the other external wall panels, working progressively around the foundation perimeter. Ensure that nominal 12 mm vertical gaps are left between each panel. Install lintels, if necessary.

2.1.7 When the timber top plates are in place, weld plates are secured and the panel joints are sealed both sides, the props can be removed. Plaster over grout holes on the internal face of the panels.

2.2 Installation using Reid inserts

2.2.1 Footings are poured to engineer's design to support the Litecrete panels, nominally 400 mm below the floor level.

2.2.2 Levels for the footings should be determined and shims placed in position prior to the panels being installed.

2.2.3 Lift panel and position in place on top of the footings. Align panel and attach adjustable props with a threaded bolt attached to the cast-in inserts on the internal/external panel face and secure to (a) "dead men" in the ground outside the perimeter of the floor slab or (b) prop off other panels already secured.

2.2.4 Adjust props until panel is plumb. Apply same procedure to the other external wall panels, working progressively around the foundation perimeter. See detail *D(3)3 Panel/Floor Slab Connection*. Props should be positioned so as to not obstruct the pouring of the floor slab.

2.2.5 Ensure that nominal 12 mm vertical gaps are left between each panel. Screw RB12 starters into inserts at the bottom of the panels. The panels are now ready for pouring of the floor slab. Photo (above) shows panel with a row of cast-in inserts prior to Reidbars being screwed in and the floor slab being poured.

2.2.6 When the timber top plates are in place and weld plates are secured the props can be removed.



2.2 Installation using starter bars cast-into the panel



The photo at left shows the bent starter bars at the bottom of the Litecrete panels. These are straightened out after the installation is complete and prior to the floor slab being poured.

2.3 Installing Litecrete Panels on top of Retaining Walls

Litecrete panels can be stacked on top of standard precast or masonry retaining walls. A typical connection is shown in detail *D3(4) Panel to Masonry Connection*.

2.4 Installing Suspended First Floor Walls

Some houses are designed with first storey Litecrete walls inset from the vertical line of the ground floor walls. A steel beam is required to support the weight of the Litecrete, as shown in detail *D17 Suspended First Floor Wall Panel Installation*.

2.5 Installing Internal Litecrete Walls (if applicable)

As Litecrete internal wall panels are not required to be insulated, a 150 mm panel thickness is suitable. The panels can be installed using either Drossbach tubes – as for external walls; see detail *D3(7) Typical Internal Wall/Floor Slab Connection*, or sitting on purpose-built footings in the ground prior to the floor slab being poured, see detail *D3(6) Typical Internal Wall/Floor Slab Connection*. In detail *D3(7)* the starter bars may be (a) cast-in to the floor slab when it is poured prior, or (b) installed by drilling into the slab using Chemset adhesive, 24 hours prior to panel arrival.



Stone veneer glue-fixed to Litecrete panels



2.6 Installing Weatherboards

Designer will sometimes specify weatherboards as a feature, maybe on a particular elevation, to be fixed over Litecrete panels. For this application we can cast-in vertical H3 treated timber fillets at 600 mm centres which provide fixing for horizontal battens to which the weatherboards are nailed (see detail *D23 Cast-in Timber Fillet for Weatherboard Attachment*).

2.7 Supplementary External Cladding

Additional exterior cladding systems, such as brick or stone veneer, can be attached to Litecrete exterior wall panels to create feature walls. Such systems must be fit for purpose and must comply with the relevant provisions of the New Zealand Building Code. In all cases the manufacturers' installation, application and maintenance instructions must be followed.

2.8 Litecrete/Weatherboard Transition

Vertical connection showing typical weatherboards butting up to Litecrete. See detail *D10(1) Panel to Weatherboard Connection*.

2.9 Litecrete/Fibre-cement Transition

Vertical connection showing fibre-cement panels butting up to Litecrete. See detail *D10(2) Panel to Fibre-cement Board Connection*.

2.10 External Plant-Ons

There are proprietary products available, which can be attached to the exterior surfaces of Litecrete walls to replicate classic architectural styles with features such as windowsills, quoins, cornices and mouldings. These can be manufactured from lightweight concrete, expanded polystyrene or plaster and attached according to manufacturers' recommendations.

2.11 Timber/Ply Mid-floor Installation

Attach continuous ex 200 x 50 timber joists to wall using Ramset M12 Chemset Anchors at 800 mm centres. See detail *D8 Litecrete Wall/Timber Floor Connection*.

2.12 Insitu Concrete Mid-floor Installation

Attach continuous steel supporting bracket to wall, to engineer's design, using Ramset M16 Chemset Anchors at centres as specified by the engineer. For an example of an insitu concrete system see detail *D8A Litecrete Wall/Insitu Concrete (Metal Tray System) Floor Connection*.

2.13 Wall Panel/Floor/Deck Connection

See detail *D3(5) Typical Wall Panel/Floor/Deck Connection*.



Photo shows concrete beam and timber infill midfloor system prior to the insitu concrete slab being poured. Starter bars are screwed into inserts in the Litecrete panels which locks the panels and slab together.



2.14 Door and Window Openings

Litecrete wall panels will have openings for windows and doors cast-in during manufacture. A weatherstrip is created at the window head and a sloping sill at the bottom (see detail *D5 Litecrete Window Details*). Residential windows are installed as per recommendations of the Window Manufacturers' Association with regard to precast concrete (see detail *D6 Litecrete Window Installation - single glazing* and detail *D6(1) Window Installation - double glazing*).

2.15 Ventilation Grilles

Where a suspended ground floor is designed, say 600 mm above the ground level, the cavity space underneath requires ventilation. Cast-in openings can be provided through the Litecrete panels for the installation of proprietary concrete or metal vermin-proof grilles (see detail *D23 Typical Ventilation Grille Opening*).

2.16 Internal timber-framed walls

Internal timber frame walls adjoining Litecrete exterior or interior wall panels are connected by fixing the vertical end stud against the Litecrete wall panel using chemical anchors (see detail *D9 Litecrete Wall/Timber Frame Connection*).

2.17 Parapet Wall and Flush Fascia Details

See details *D11 Litecrete Parapet Wall* and detail *D12 Litecrete Flush Fascia*

2.18 Wall/Roof (Apron Flashing)

See detail *D13 Litecrete Wall/Roof Junction*.

2.19 Gutter/Wall Junction

See detail *D14 Litecrete Gutter/Wall Junction*.

2.20 Meter Box Installation

See detail *D15 Litecrete Meter box Installation*.

2.21 Attaching Top Plates

Fixings for all structural and non-structural fittings, where applicable, should be embedded in the Litecrete panels during manufacture. Threaded rods for the attachment of a 50 mm thick timber top plate (if required) should extend 75 mm out of the top of the panel (see detail *D4 Litecrete Wall/Roof Connection*).

2.22 Services and Wall Penetrations

In some instances through-services such as plumbing and electrical, are required to penetrate through Litecrete panels. The advantage of precast panels is that openings can be cast in at the time of manufacture. For smaller service holes the Litecrete panels can be easily drilled out on site. Care should be taken when drilling to avoid hitting reinforcing bars. Note that the maximum allowable non-specific dimension of such openings is 400 mm x 400 mm. See detail *D16 Litecrete Pipe Penetrations*.