Panel Installation

The top of all supporting masonry should be finished to give a level, unbroken surface. Panels are lifted into place either on slings or a panel lifter, which can be loaned from LCNZ Ltd. Panels are positioned adjacent to each other with end bearing equidistant on each end. It is important to accurately align the first panel so that the following panels do not need any further adjustment when placed. Panels should be propped at mid-span so that all are at the same level for grouting. D12 reinforcing is then placed in all longitudinal ring anchor grooves and around the exterior perimeter of each floor section. Reinforcing should be supported on chairs so that grout can flow all round the reinforcement to encase it. Formwork for the ring anchor on the exterior walls is usually constructed using 50 mm facing blocks on edge, as permanent formwork. See Details 3 & 4.
All ring anchors and edge bond beams are then filled with 15 Mpa (minimum) grout, after dampening of panels with water to reduce suction. Grooves should be overfilled and then trowelled level after initial shrinkage has taken place.

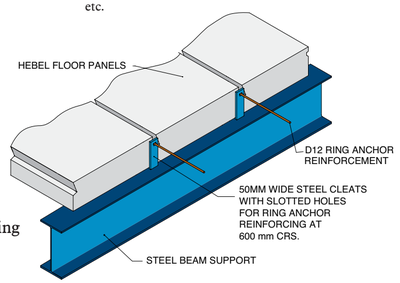
If concentrated loads, such as block pallets, are placed on floor panels during construction, that exceed design loadings, temporary props should be installed to support the panels at these points.

Where it is not possible to install an edge ring anchor (e.g. on the outer edge of cantilevered balcony panels) it is necessary to cut a chase along the edge of panels for the transverse ring anchor and to tie in the longitudinal steel.

Where panels are joined on steel support beams, no transverse reinforcement is required. Longitudinal steel in the ring anchors is fed through slotted holes in cleats on top of the beam as shown in Detail 6.

Only panels identified as cuttable at the time of order should be cut on site. The ends of all reinforcing exposed in site cutting must be coated with an anti-corrosive agent.

Panels used in exterior areas such as patios, decks or balconies must have a waterproof membrane applied insitu as a trafficalde wearing course or before tiling etc.



Detail 6. Cleats for Joining Panels on Steel Beams

TABLE 1		STANDARD FLOOR PANELS											
		RECOMMENDED MAXIMUM CLEAR SPAN (metres)											
Live Load (kPa)		1.0	1.5				2.0				3.0		5.0
Dead Load (kPa)		0.0	0.0	0.5	1.0	1.2	0.0	0.5	1.0	1.2	1.0	1.2	0.0
Span / Deflection		250	250	250	250	600	250	250	250	600	250	250	250
Panel Thickness mm	150	4.30	4.05	3.80	3.55	3.25	3.90	3.65	3.45	3.10	3.25	3.20	3.20
	175	5.00	4.75	4.45	4.20	3.90	4.55	4.30	4.10	3.70	3.85	3.80	3.80
	200	5.55	5.30	4.95	4.70	4.35	5.10	4.80	4.55	4.15	4.35	4.25	4.25
	225	5.80	5.75	5.40	5.10	4.80	5.50	5.20	5.00	4.60	4.75	4.65	4.65
	250	5.80	5.80	5.80	5.50	5.20	5.80	5.60	5.35	4.95	5.10	5.05	5.05

Notes: Refer notes on Table 2

TABLE 2		FIRE RATED FLOOR PANELS											
		RECOMMENDED MAXIMUM CLEAR SPAN (metres)											
Live Load (kPa)		1.0	1.5				2.0				3.0		5.0
Dead Load (kPa)		0.0	0.0	0.5	1.0	1.2	0.0	0.5	1.0	1.2	1.0	1.2	0.0
Span / Deflection		250	250	250	250	600	250	250	250	600	250	250	250
Panel Thickness mm	FRL (MIN)												
	150 / 120	4.15	3.90	3.60	3.40	3.30	3.70	3.45	3.25	3.20	3.10	3.05	3.05
	150 / 180	3.95	3.70	3.40	3.20	3.10	3.55	3.25	3.10	3.00	2.90	2.85	2.80
	150 / 240	3.80	3.60	3.30	3.05	3.00	3.40	3.15	2.95	2.85	2.75	2.70	2.65
	175 / 120	4.80	4.55	4.25	4.00	3.90	4.35	4.10	3.90	3.80	3.65	3.60	3.60
	175 / 180	4.55	4.30	4.00	3.75	3.70	4.10	3.85	3.65	3.60	3.45	3.40	3.40
	175 / 240	4.35	4.15	3.80	3.55	3.50	3.95	3.65	3.45	3.40	3.25	3.20	3.20
	200 / 120	5.30	5.05	4.70	4.45	4.35	4.85	4.55	4.35	4.25	4.10	4.05	4.05
	200 / 180	5.05	4.80	4.45	4.20	4.15	4.60	4.30	4.10	4.00	3.90	3.80	3.80
	200 / 240	4.85	4.60	4.25	4.00	3.95	4.40	4.10	3.90	3.80	3.70	3.65	3.65
	225 / 120	5.70	5.45	5.15	4.85	4.75	5.25	4.95	4.75	4.65	4.50	4.45	4.45
	225 / 180	5.45	5.25	4.90	4.65	4.55	5.05	4.75	4.50	4.45	4.30	4.20	4.20
	225 / 240	5.25	4.95	4.70	4.45	4.35	4.80	4.55	4.30	4.25	4.10	4.00	4.00
	250 / 120	5.80	5.80	5.55	5.25	5.15	5.65	5.35	5.10	5.05	4.90	4.80	4.80
	250 / 180	5.80	5.65	5.35	5.05	4.95	5.45	5.15	4.90	4.85	4.70	4.60	4.60
	250 / 240	5.65	5.45	5.10	4.85	4.75	5.25	4.95	4.70	4.60	4.45	4.40	4.40

Notes
* All Standard Floor Panels have a FRL of 90 minutes
* These tables are for guidance only - span / load combinations should be confirmed by Lightweight Concrete NZ Ltd before finalising designs
* Live and Dead loads are ultimate strength factored design loads
* Spans shown are absolute maximums

TABLE 3	THERMAL RESISTANCE				
Floor Panel thickness (mm)	150	175	200	225	250
Dry State Thermal Resistance - R	1.09	1.27	1.45	1.63	1.81

* Additional thermal properties of floor coverings, ceiling insulation and linings should be calculated by the designer.

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Hebel STRUCTURAL FLOOR PANELS

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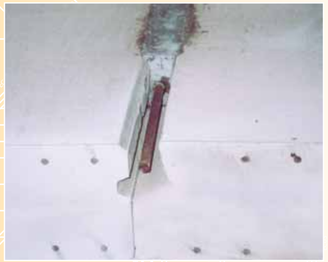


Hebel STRUCTURAL FLOOR PANELS

What are Hebel Structural Floor Panels?

Hebel Structural floor panels are precast reinforced autoclaved aerated concrete (AAC) load bearing components that can span up to 5.85 metres. They are manufactured in various thicknesses for specific load/span configurations, and provide an instant dry concrete floor with excellent thermal and acoustic properties.

Benefits

- Hebel Panels are approximately one quarter of the density of standard reinforced concrete. Therefore bracing demand is substantially reduced, as are the freight costs to site. Reduced crane capacity is also possible, with resultant savings.
- Installation time is very fast. Although dependant on site conditions and panel layout, installation times in excess of 30 m2 per hour can commonly be achieved.
- Hebel Panels require no poured topping once placed and can be used as a working surface immediately.
- Locking of panels into the building structure is quick and simple using the ring anchor system of grouting steel into preformed edge grooves and Hebel facing blocks, to form exterior ring beams.
- Panels form a rigid structural diaphragm for structural bracing when ring anchors are complete.
- Panels can be cut or drilled on site if required to form openings for services, or to fit irregular floor plans.
- Panels form an ideal substrate for tile, carpet or timber flooring without the need for a topping slab.
- Panels provide a simple method for fastening of hangers for suspended ceiling systems if required.
- Panels have all the thermal and acoustic benefits of AAC. When combined with an insulated, suspended ceiling, panels provide an excellent intertenancy floor solution.

- Panels have a minimum fire rating of 90 minutes. This can be increased to a FRL of 240/240/240 minutes for the structural adequacy, integrity and insulation requirements, for all panel thicknesses, by varying reinforcement cover for specific locations.
- Panels are ideally suited as a roof structure with their inherent thermal, acoustic, and fire resistant properties.

Panel Details

All Hebel Structural Floor Panels are manufactured in 600 mm widths. If narrower panels are required for the last panel in a run, these can be factory cut or site cut down to a minimum width of 300 mm. Panels can be manufactured to specified lengths to fit a building exactly, and this is normally the case. However, panels can alternatively be site cut if changes on site require shorter panels, or angled or curved ends are required.

Panels are manufactured with a bevelled chase on one side and a groove on the other. When placed together, a space to fit the reinforcing and grout for the ring anchor is formed, and this acts as a shear key between the panels.

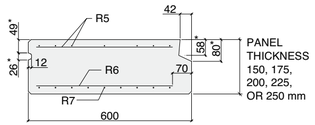
Panels are available in thicknesses of 150, 175, 200, 225 and 250 mm and in any length up to 6.0 metres. However, shipping constraints, at present, can limit panel length to 5.85 metres, with 6.0 metre panels only being available for larger orders.

All Hebel Structural floor Panels are manufactured with top and bottom reinforcing steel. Transverse bars are welded to the longitudinal bars to form a mesh, which is dipped in anti corrosive agent prior to placing in moulds.

Panels are manufactured with an AAC compressive strength of 4.5 Mpa.

Hebel stair treads are available to complement the floor panels. They are 300mm wide x 175mm high in lengths of 1.0 or 1.2 metres.

Typical panel dimensions are shown in Detail 1.



Detail 1. Typical Panel Details

Structural Design

Design Tables

Span tables for Standard floor panels are shown in table 1. Note that these tables are indicative only and confirmation of span/load combinations for a specific panel thickness must be obtained from LCNZ Ltd.

Concentrated Loads

Generally, the effect of concentrated loads such as masonry walls and load bearing timber framed partitions acting in the mid-span of floor panels has not been allowed for in the design tables. Non load bearing partition loads are acceptable providing it can be guaranteed that roof or upper floor loads cannot be transferred down on to the floor panels. It is therefore desirable in Hebel block construction to have all upper level partitions supported from below either by block walls aligned with the upper walls, or for the floor panels to be fully supported by steel or reinforced concrete beams, under the upper walls.

Cantilevered Panels

Floor panels may be cantilevered providing the cantilevered length does not exceed 1/3 of the total panel length or exceed 1200 mm. Cantilevering should not be considered with panel thickness less than 200 mm. or in situations where balcony balustrades etc, put a concentrated load on the end of the panel. The panel connection at the opposite end to the cantilever should also be checked for uplift when the cantilevered section is fully loaded.

Diaphragm Action

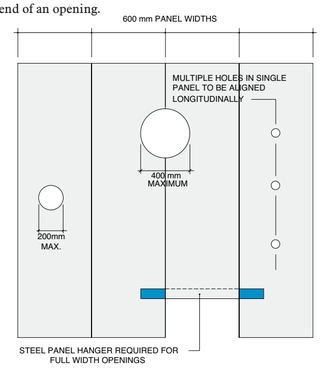
Hebel Structural floor panels can be designed to act as a diaphragm to disperse horizontally applied live loads throughout the structure. The floor panels are considered to act as a diaphragm when locked together with ring anchor reinforcement. Truss analogy is used to design ring anchor reinforcement, and if diagonal compressive forces in the AAC exceed 10 kN, corner chamfering of panels can be used to spread the compression load on the AAC to lower the stress.

Penetrations and Holes in Panels

The location and size of all panel penetrations and notches should be clearly specified when panels are ordered so that sufficient reinforcing can be placed around them. Note that the size of some penetrations or notches may require the thickness of panel to be increased.

The maximum width of any opening or notch should be one third of the panel width, ie. 200 mm maximum. By locating a hole centred on a panel join, a maximum opening width of 400 mm is possible. See Detail 2.

For opening widths wider than 600 mm, these are best done in 600 mm multiples of width with a full width steel frame inserted between the panels to support the panels at either end of an opening.



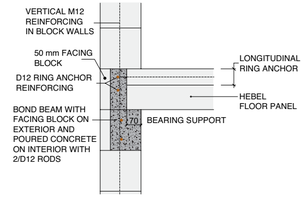
Detail 2. Openings in Panels

End and Side Bearing Support of Panels

The minimum bearing support at the end of panels is 60 mm for panels up to 4.8 metres long, or L/80 for longer panels. Generally, it is advisable to work on a 70 mm bearing distance to allow for any inaccuracies in wall layout and construction. See Detail 3.

The side bearing width along the panel should be a minimum of 50mm. See Detail 4.

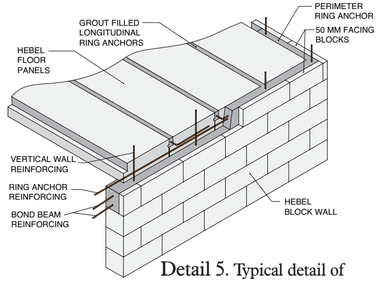
For 250 and 300 mm Hebel end support walls, the bond beam and ring anchor can be combined in the same course as there is sufficient width for the reinforced concrete. The longitudinal exterior ring anchor can also be combined with the bond beam on 200 mm walls if the side support is exactly 50 mm. Note that where the ends of panels are supported on bond beams, the concrete should extend full width under the panel and not be supported on a 50 mm Hebel facing block



Detail 3. End Support of Panels

Optimum Thickness

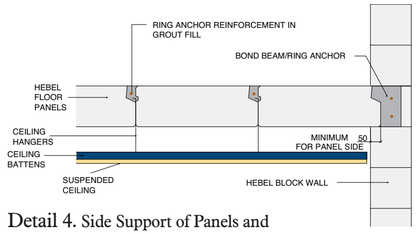
Hebel Structural floor panels are most economic in the 4.5 to 5.0 metre length, in a thickness of 200mm. This also ties in well with the Hebel block course height. Using 150 mm thick panels for decks and balconies and 200 mm panels for interior floors is also a good solution. The use of 225mm and 250 mm thick panels is often desirable to obtain a clear span but consideration of these should be carefully undertaken to ensure that the floor will be economic compared with possible additional support beams for thinner panels. Careful consideration should also be given to whether differing panel thicknesses are combined in one floor area, as the added complications of supports at different levels can outweigh the additional cost of having all floor panels the same thickness.



Detail 5. Typical detail of Floor Panels on Block Walls

Fire Design

All Hebel structural floor panels will achieve a FRL of 90/90/90 minutes, but can be designed to achieve a FRL in excess of 240/240/240 minutes. Span / Load information for fire rated panels is shown in Table 2. Consideration should be given to providing additional reinforcement cover on exposed ends of fire rated panels by gluing Hebel facings on to the ends of panels.



Detail 4. Side Support of Panels and Suspended Ceilings

Ordering of Panels

These panels are designed and manufactured for specific designs and locations. To ensure that this is done to the client's requirements, clients are required to sign off a panel schedule at the time of order. This details panel sizes, thickness, quantity, location, fire rating and loadings etc.

The Effect of Floor Covering Type

Where tiled floors or any similar product is used that is glued to the panel surface, it is recommended that deflection of the panel be limited to 1/600 x span length to provide a stiffer floor. This is because it has been found that over long periods, cyclic deflection of the floors under live load can cause the glue or tile to debond from longitudinal shear. This is no different from any other structural floor material.